

Pseudo-Masha'allah  
*On the Astrolabe*

Part IV: *Practica*  
Critical Edition  
with English Translation``  
by

Ron B. Thomson

Version 1.5

Toronto, 2019

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## TEXT AND TRANSLATION

[ <i>Prologue</i> ]	
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Note: the page numbering (with occasional blank pages) is designed to display the Latin on the left and the corresponding English on the right when printed as a book.

[ De practica  
astrolabii ]

[ On the use of  
the astrolabe ]

The following manuscripts begin with the Prologue, line 1:

Bβ Bγ Bδ Bε Bε<sub>1</sub> Bζ Bη Bθ Bι Bκ Cγ Cδ Cε Cζ Cη Cι Dγ Dδ Dη Eα Eβ Eγ Eδ Eζ Eη Eκ Eμ Eρ Eτ  
Eυ Fα Fβ Fζ Gα Kα Kδ Kε Kθ Lβ Lγ Lδ Lε Lζ Lη Lλ Lκ Lμ Mα Mδ Mη Mι Mλ Mν Mο Mτ Mυ  
Mφ Nα Nγ Oβ Oγ Oζ Oη Oι Oν Oξ Oρ Oσ Oτ Oυ Oχ Pα Pβ Pγ Pδ Pε Pζ Pθ Pι Pμ Pν Pο Pρ Pσ  
Pτ Pυ Pω Qβ Qγ Qδ Qε Qθ Qι Qλ Rα Sα Sβ Sδ Sη Sθ Sι Sκ Sλ Tδ Vα Vβ Vγ Vι Vν Vπ Vρ Vτ Vυ  
Vφ Vψ Wα Wβ Wθ Wι Wλ Wμ Xα Xγ Xδ

NOTE: Any irregular ordering of the capitula of the *Practica* in the various manuscripts is noted in the Introduction, "E. The Manuscripts of each Section".

## 1 INCIPIT PRACTICA ASTROLABII

1 Incipit ... astrolabii] *om.* Ββ Βδ Βε<sub>1</sub> Βζ Βθ Cγ Cε Cη Eα Eγ Eζ Eυ Gα Kε Λβ Λδ Λζ Lκ Mα Mλ Mτ Nα Nγ Oγ Oη Ov Oσ Pβ Pγ Pι Pμ Po Pτ Qε Qθ Qi Sa Sβ Sη Si Sl Vα Vυ Vφ Vτ Wθ Wλ Xγ; *faded* Eδ; Capitulum preambulum in usum astrolabii Βθ; Capitulum primum Vι; De nominibus instrumentorum astrolabii Kθ Oχ Pζ Ra Xα; De nominibus variorum instrumentorum Cδ; De usu astrolabii et primo epilog[*illeg.*] partes Pε; De usu astrolabii et primus de nominibus instrumentorum eius Dγ; De utilitate astrolabii et primo epilogus. Rubrica Qδ; De utilitatibus astrolabii et usu eius Bι; Epylogatio nominum instrumentorum Bγ; Epilogus in usum et operationes astrolabii Wβ; Incipit canones astrolabii Cζ; Incipit epilogus in usum et operationes astrolabii Messehalle Εκ(Mesalle) Eτ Vβ(*add.* et aliorum); Incipit instrumenta et utilitas astrolabii Pω; Incipit lectura astrolabii Sθ; Incipit liber de operatione astrolabii Λλ Vγ(*add.* De nominibus); Incipit opus astrolabii ad inveniendum gradum solis per diem mensis vel diei gradus circa primum huius secunde partis Eσ; Incipit practica astrolabii Mι(*much later hand*) Oσ(*add. in marg. C. 1<sup>m</sup>*) Ov; Incipit practica astrolabii capitulum primum de nominibus instrumentorum astrolabii Fβ(*different hand*); Incipit practica astrolabii sive rememoratio Xδ; Incipit practica astrolabii sive(et primo Bε Wμ) rememoratio partium(instrumentorum Pν) astrolabii Bε Dη Eβ Eη Fα Fζ Lγ Lη Lε Lμ Mδ Mo(*add. different hand* secundum Pthol' al') Mφ Oζ Oi Oξ Oτ Πα Pν Pρ Qγ Qλ Sδ Tδ Wα Wμ; Incipit practica astrolabii sive rememoratio partium astrolabii sive prologus in usum et operationem astrolabii Mυ(*later hand*); Incipit practica astrolabii sive re[memoratio] p[ar]ciu astrolabii Pθ; Incipit practica astrolabii (*add. cum re*) sive reme(*add. memoratio*)moratio par(*add. ne parti*)tium astrolabii(*add. um ipsi astrolabii*) Qβ<sup>1</sup>; Incipit usus astrolabii Vν; Incipit utilitatis astrolabii Mν; Incipiunt canones astrolabii Eμ Kα; Incipiunt canones astrolabii et sunt 36. Et primo de nominibus instrumentorum eius Bη; Incipiunt utilitates tractatus astrolabii messallat Dδ; Pri[mo] pemoracio(!) in usum astrolabii Pν; Prohemium Messehallath in practicam astrolabii feliciter incipit Kδ; Rememoratio partium astrolabii Cι Mη Pδ; Seuitur astrolbium; Bκ Seq[uit]ur de usu astrolabii primo [*illeg.*]gat partes Wι; Sequitur modo tractatus et de utilitatibus astrolabii et de practica eius et primo de nominibus partium ipsius astrolabii Eυ; Sequitur nomina instrumentorum astrolabii cum ipsius usu et practica Pσ; Utilitatis astrolabii Vσ; [*illeg.*] astrolabium componedi primo [*illeg.*] nomina Oβ

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<sup>1</sup> This odd title in ms Qβ stems from the fact that the normal title is repeated but intertwined.

THE USE OF THE ASTROLABE BEGINS

Nomina<sup>2</sup> instrumentorum sunt hec. Primum est armilla suspensoria ad

- 2 Nomina] Bγ Bδ Bε Bε<sub>1</sub> Bη Bθ Bι Cζ Cη Cι Dγ Dδ Eβ Eδ Eη Εκ Εμ Ερ Ετ Fα Gα Kα Lβ Lγ Lε Lζ Lη Lκ Lλ Lμ Mδ Mη Mι Mλ Mν Mο Mυ Mφ Nγ Oβ Oγ Oζ Oη Oι Oρ Oτ Oυ Pα Pβ Pδ Pζ Pμ Po Pρ Pσ Pτ Pυ Pω Qθ Qι Qλ Sα Sι Sκ Sλ Vρ Vφ Vψ Wα Wι Wμ; Comina Fζ; [ ]mina Vτ; [ ]omina Bζ Cδ Cε Dη Eζ Ev Fβ Mα Mτ Oσ Pθ Qβ Rα Sδ Sη Tδ Vα Vβ Vι Vν Vπ Wλ Xα Xγ; [N]omina Bκ Eα Kε Lδ Nα Ov Oξ Pε Pι Pν Qγ Qδ Sβ Sθ Vυ Wβ Wθ Xδ; Oί'a Oχ; Oīā Kθ; [O]mina Eγ; [O]mnia Pγ; Omnia Cγ Oomina Bβ Vγ; Oomina *corr. to* Nomina Qε; *add. in marg.* Incipit practica astrolabii Fβ; *add. igitur* Bι Vρ Nomina ... hec] Instrumentorum astrolabii prima sunt nomina et ideo, ut cognitionem eorum habeamus, singula a parte tractare decrevi. Qua propter, si quis cupit ad perfectam astrologie scientiam devenire, omnia que in hoc parvo libello dixero peroptime perscrutetur. Quoniam scriptum est: non potest quis nisi per magnos labores ad magna premia devenire Kδ; Omnia instrumentorum nomina astrolabii Cγ instrumentorum] hocabulorum(?) Kγ; *corr. from* signorum Rα; *add.* astrolabii Bη Eζ(*interlin.*) Εκ Εμ Lβ(*interlin.*) Lδ Lλ Oγ Oη Oχ Pζ Pι Qι Sα Sβ Vβ Vγ Wω Xγ; *add.* in astrolabio Kγ Ov sunt] *interlin.* Eζ sunt hec] [*illeg.*] astrolabii Eγ hec] *om.* Oσ Vυ; *interlin.* Pτ Primum] De armilla. Primum igitur instrumentum astrolabii Kδ Primum est] *om.* Kα; Primo Kγ Primum ... armilla] *om.* Bβ est] *om.* Cγ Sι armilla] *and elsewhere* armila Cγ suspensoria] suspensoria Cδ Wθ; suspensola Ev; *add. in marg.* id est pars qua suspenditur astrolabium Oι; *add.* per quod tenetur astrolabium Pι ad] *add.* aliquam Bκ Mλ Vν Vτ
- 2-3 ad ... altitudinem] et ex ea altitudo solis capitur Kδ

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<sup>2</sup> While in many cases the opening word is quite clear, either as “Nomina” or “[N]omina” (with a space for a rubricated first letter and the “N” noted in the margin), some scribes seemed to have had problems. The writing of “nomina” is also susceptible to minim corruption. In some instances the initial “N”, written as an enlarged “lower case” character with a rounded top and possibly an added base-line, could have led later readers to interpret it, and copy it, as an “O”.



The names of the “instruments” [i.e., parts of the astrolabe] are these. First is the suspending ring<sup>3</sup> for

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<sup>3</sup> See *Comp.*, Fig. 1; Cap. 2, note 3.

capiendam altitudinem, et dicitur arabice “alhantica.” Secundum est alhabor, id est, ansa que iungitur ei. Postea mater, rotula scilicet, in se continens omnes tabulas cum

3 capiendam] *add.* aliquam Ev altitudinem] *add. interlin.* solis in die et stellarum in nocte Lβ et ... arabice] *om.* Eη Sα; *marg.* Bε dicitur] *om.* Bε; *add.* tunc Bκ arabice] adrabite *corr. in marg. to arabice* Sι alhantica] abuachia Mv; alachacia Bθ Vπ; alachcia Ev; alahahuacea Pγ; alahancia Eα Oη; alahnacia Cζ Ov Po Pτ Vq; alahicacia Sλ; alahuacia Bζ Bη Bι Dγ Eζ Lζ Eμ Eq Gα Oσ Pv Qδ Sθ Vα; alahuatia Bε<sub>1</sub> Bκ Rα Vv Xα; alahucia Mτ Oq; alalontia Sι; alathnacia Cδ; alauacia Ek; albariacha Cγ; alcantica Sκ; alchantica Lκ; alchantita Bδ; alhahuacia Bγ Eτ Mλ Pε Wβ; alhahucia Cη; alhanacia Mo; alhanca Pβ; alhancia Cε Kδ Pδ Pθ; alhancica Kθ Qι; alhannca Fβ; alhantbica Xδ; alhantia Pv; alhantica Bε Cι Dη Eβ Fα Fζ Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mι Mv Mφ Nγ Oγ Oζ Oι Oξ Oτ Ov Pα Pμ Pq Pσ Pω Qβ Qγ Qθ Qλ Sδ Sη Tδ Vι Wα Wλ Wμ Xγ; alhantita Vψ; alhatita Dδ; alhauaga Vv; alhaunca Eη; alhuatia Eδ; alhucia Oβ; allahiraacha Mα; allahirac Wθ; allahiraca Vγ; allahiracca *corr. to allahiracha* Vβ; allahiracta Pζ; allahiraeca Lλ Oχ Qε; allahu[*illeg.*] Sβ; allantacica Nα; alphaitia Vφ; alphancia Kα; arathacia Vτ; alruana Pv; *illeg.* Eγ; in alhanthabuth Bβ alhan~] *add. interlin* in aī alahuacia Vβ *before Secundum*] *add.* De ansa Kδ; *add. in marg.* 2<sup>m</sup> Wα Secundum est] Deinde Cγ Secundum ... alhabor] *om.* Pσ est.] *om.* Bη Oχ Qε Vv Vτ; dicitur Vφ alhabor] *illeg.* Eγ; alaahoraa Wθ; alabor Bζ Bκ Eα Lζ Mλ Qδ Vτ; alahabor Mo; alahoi Bη Eμ; alahor Oη Oq Oσ Vα Vv; alahoy Cζ; alanoy Sι; alantabor Mτ; alathora Cγ; albahor Wλ; alcantabor Nα; alhab<sup>9</sup> Oβ; alhabor Bβ Bθ Cε Cη Cι Dδ Eδ Gα Kγ Kδ Kθ Mη Mv Mv Mφ Ov Pγ Pδ Pε Pθ Pι Po Pv Pτ Sk Vι Vπ Vφ Vψ Wβ Wι Xγ; alhabos Eτ; alhaboz Bγ; alhalka Vv; alhancabor Fβ Qθ; alhantaboe Pα; alhantabor Bδ Bε Dη Eβ Eη Fα Fζ Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mι Nγ Oγ Oζ Oι Oξ Oτ Ov Pβ Pμ Pv Pω Qβ Qγ Qλ Sδ Tδ Xδ; alhantitabor Wμ; alhantobor Qι; alhatabor Pq Sη Wα; alhentabor Kε; allabo Bε; allabor Bι Dγ Ek Eq Rα Xα; *corr. from* allaboriaa Sβ; allabora Vγ; allahaor *corr. to* allahor Sθ; allahor Sλ; allahora Lλ Oχ; allahoraa Mα Pζ Qε Vβ; allator Vq; alphabor Ev; alphontabox Kα; alrahora/anahor Cδ; habor *corr. to* <sup>alla</sup>habor Eζ alhabor, id est] *om.* Sα id est] *om.* Vψ; cum Sλ; et Pγ; videlicet Pι

3-4 id est ansa] *interlin.* Kε

4 que] quem Kδ iungitur] coniungitur Cγ Eγ Oγ; *add.* bii Pv ei] *om.* Kθ Oχ Vv; *add.* Tertium Mv Vι; *add. illeg.* Wλ Postea] Deinde est Kε; Et deinde Kδ; *add. in marg.* 3<sup>m</sup> Wα mater] autem Lλ; in Sθ; materiorla(?) Pι; *add.* que Cγ Eγ Mα Oχ Pζ Qε Wθ; *add.* id est Nγ mater ... scilicet] aca quo(?) Vγ; motreclans Cδ; mat'cula scilicet Kδ rotula scilicet] *om.* Pι; rotoclas Sθ; rotulans aīng Sλ; rotulas Bζ Bη Bι Bκ Cζ Eγ Eμ Lζ Lλ Mα Mλ Oη Ov Oq Oσ Oχ Pζ Qε Qi Sα Sβ Si Vα Vβ Vγ Vv Vτ Vv Wθ; rotulla Dδ; *add.* ōs Qε scilicet] *om.* Gα Kα Kε Lμ Mτ Oβ Pq Pσ Qθ Sβ Vq Wλ Xδ Xγ; que Tδ in se] *om.* Gα Mτ Pι; *interlin.* Pτ; ansa Pβ; en se Wλ; iuste Sη continens] continet Mα Oχ Qε omnes] *om.* Mι Mo Mτ Nγ Oξ Oχ Sλ; *add.* sive Vβ(*add. interlin.* p id est) tabulas] *om.* Bη Bκ Cζ Cδ Eγ Eμ Oη Oχ Pζ Si Sλ Vγ Vτ Oσ Sα Sβ Sθ Vα Vv Wθ

measuring an altitude, and it is called “the halqa”<sup>4</sup> in Arabic. Second is the habs,<sup>5</sup> that is, the ring which is joined to it.<sup>6</sup> Next the mother,<sup>7</sup> that is a small disk, containing in itself all the plates with

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<sup>4</sup> *Comp.*, Fig. 1. For *al-ḥalqa* see *Comp.*, Cap. 2, note 25.

<sup>5</sup> *Comp.*, Fig. 1. For *al-ḥabs* see *Comp.*, Cap. 1, note 14.

<sup>6</sup> *Comp.*, Cap. 2, note 3.

<sup>7</sup> *Comp.*, Cap. 1.

5 aranea cui coniungitur margolabrum<sup>8</sup> scilicet in 360 gradus divisum. Tabule autem ab hac contente signantur tribus circulis quorum minor est circulus Cancrī, et medius

5 aranea] *add. interlin.* id est alagacrabuz(?) Pτ cui] *om.* Bη; *interlin.* Qλ; *add.* aranee Mι Nγ coniungitur] adiungitur Cγ Eγ; iungitur Bκ Cδ Cζ Dη Eμ Kα Mα Mι Mτ Nγ Oη Ov Oχ Sα Sβ Sθ Vα Vν; iungitur *corr. to* coniungitur Mη margolabrum] margo.labrum Mα Qε; margo labrum Bκ Cε Oχ Pε Pζ Sλ Vα Vγ Vν Wθ; margo labri Cγ; a margolade Bδ; margo astrolabii Sι; margo astrolabii vel margolabium Bη Cζ Eμ Oη; margolabium Dγ; magrolabrum Mι; mugrolabrum Nγ; *add.* id est limbus Oι(*interlin.*) Oξ(*marg.*) Oτ(*interlin.*) Qλ(*interlin.*); *add. in marg.* at limbus Ov scilicet] *om.* Bη Bι Cζ Dδ Eμ Kα Kε Pq Mτ Vν; id est Kδ; id est librer qui est Mι Nγ; vel limbus Vτ; *add.* limbus qui adequatur rethi Wλ; *add.* vel labium Sβ; *add. interlin.* limbus Lβ scilicet ... divisum] divisum in 360 Sι in] *om.* Bκ Oβ 360] ccclx Oχ Pζ; 365 *corr. to* 360 Pω; 16 Tδ gradus] *om.* Bε Qθ; *interlin.* Kθ; divisiones Bθ Eν Vπ; gradibus Qδ Tδ; partes Bη Cζ Oη; *om.* Nα divisum] de istis Mι Nγ; divisio Qδ Tabule] Que sunt Bζ; Rotulle Cγ autem] *om.* Bε<sub>1</sub> Vα ab] *om.* Cζ Oη; in Fα Mι Nγ

6-7 ab hac] *om.* Sα

6 hac] *om.* Oq; *add.* mater Dη Mι Nγ; *add.* scilicet mater Lδ Oγ contente] *om.* Bη signantur] fignarantur Vφ; fignicatur Dγ; figurantur Bβ Bθ Bι Cδ Cη Eγ Kθ Lζ Lλ Mα Mλ Nα Oχ Pζ Qε Qθ Sη Vβ Vγ Vν Vπ Vν Wθ Wι Pε; signatur Kα Lκ Mη Pδ Qι; sig<sup>a</sup> Mν; *illeg.* Lμ Oβ; significatur Dδ; significantur Eδ Mτ Oη Po Qδ Xα; signurentur Pγ tribus] 3 *some*; tres Oη circulis] *add.* ex Sβ quorum] quibus Mα Oχ; quolarum Bδ; *add.* ciculorum Dδ quorum ... circulus<sub>2</sub>] *om.* Eτ Pγ minor] *illeg.* Eγ; maior Vν; primus et minimus Bη Cζ Eμ; primus [*illeg.*] Vτ minor ... medius] b<sup>or</sup> est Sη est.] *om.* Kε Pq Qβ; dicitur Dδ circulus.] capitis(?) Eγ; motus capitis Lλ Mα Oχ Pζ Vγ Qε Sβ Wθ; m' id est motus capitis Cγ; tropicus Mτ Cancrī] *interlin.* Vτ et] id est Qι medius] *add.* est Bγ Bθ Bι Bκ Cη Dδ Eκ Mλ Mν Nγ Ov Oq Pq Vν Vπ; *add. illeg.* Cι; *add.* veo Cγ

6-7 quorum ... Capricorni] quibus mime Sλ

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<sup>8</sup> Most mss write this as one word, although it does not seem to be recorded as such in any dictionary. Since *margo* and *labrum* are almost synonymous, CJMD suggests that these should be treated as two words, with *labrum* as a gloss on *margo*.

the rete to which is joined a marginal lip thus divided into 360 degrees.<sup>9</sup> The plates moreover contained by this are inscribed with three circles of which the smaller is the circle of Cancer, and the middle one the

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<sup>9</sup> *Comp.*, Cap. 1.

circulus equinoctialis, et maximus circulus Capricorni. Postea almucantharat,<sup>10</sup> qui sunt circuli in medietate superiori descripti quorum quidam sunt integri, quidam apparent

- 7 circulus,] *om.* Bκ Eκ Λζ Μλ Μτ Να Ον Ρτ Vτ; vero Arietis et Libre id est Cγ; *add.* eorum Bη; *add.* est Sθ; *add.* est circulus Oη; *add. in marg.* id est circulus Arietis et Libre desc'bit equinoctial~ Ov circulus equinoctialis] vero Arietis et Libre Λλ Μα Oχ(*om.* vero) Pζ Qε Sβ Vγ Wθ et] id est Qι maximus] maior Λλ {Μα} Oχ Pζ Qε Sβ Vγ Vv; maiorem Cγ; *add.* eorum est Bη Bθ Bκ Cζ Eκ Eμ Eν Λζ Μλ Sθ Vα Vπ Vτ Vυ; *add.* est Dδ Mι Pδ Vv; *add.* motuum capitis circuli Eγ; *add.* motum vel circuli continet Cγ; *add.* eorum Oβ Oι Oσ; *add.* eorum est Oη circulus<sup>2</sup>] *om.* Eκ Να; articulus Pγ; motum continet Λλ Μα Oχ Pζ Qε Sβ Vγ; vero tropicus Μτ Capricorni] *add.* DE ALMUCANTARACH Kδ; *add.* per extremitatem tabularum Sι; *add. in marg.* In alio libro: quibus minor est motus capitis Cancri, medius vero Arietis et Libre, et maior motum continet Capricorni Vβ Postea] *interlin.* Qι; Deinde Μτ; Post sunt Eα; *add.* circuli Bγ; *add.* circulus Cη Eτ Pγ Wβ; *add.* sequitor Kδ almucantharat] *illeg* Xγ; alhuuatr *corr.* to alhuutantrat Lβ; almucantaraz Oσ; almicantarath Bκ Cδ Eγ; almicantarath *corr.* to almicantharath Eδ; almicantarath Lδ; almicantaraz Oη; almicanterat Ov; almicantharat Pσ; almicantharath Po; almicanthrat Wλ; almicantrat Kα; almicantrath Kε Μτ; almicantratus Oβ; almicatharath Kθ; alminchant<sup>f</sup> Lκ; almu<sup>-ath</sup> Pι; almuancarath Wθ; almuancarath Bθ Fβ; almuancarath Dγ Pα Pθ; almuancarath[*illeg.*] Eκ; almuancarath Eν Sη Sι Vq Vτ; almuancarath Cζ Λλ Lμ Oχ Pζ Qε Qθ Vα; almuancarath Bι Cε Eα Eη Gα Να Oγ Oq Pδ Pω Qι Sβ Vβ Vγ; almuancarath Λζ Sλ; almuancarath<sup>a</sup>z Sθ; almuancarath<sup>a</sup>th Bβ; almuancarath Vπ; almuancarath Bε; almuancarath Bζ Lε Μα Oι Pτ Pγ Qβ Sκ; almuancarath Bγ Cη Eβ Eq Eτ Fα Fζ Lγ Lη Mo Mv Mφ Oζ Oξ Oτ Pμ Pν Pq Qβ Qδ Qλ Rα Sδ Tδ Vι Vv Wα Wβ Wι Wμ Xα; almuancarath Dη; almuancarath Eζ; almuancarath Kδ; almuancarath Sα; almuancarath Bδ; almuancarath Pυ Vψ; almuancarath Eμ; almuancarath Ov Pε Xδ; almuancarath Bε; almuancarath Pβ; almuancarath<sup>f</sup> Dδ; almuancarath Mv; almuancarath Μλ Vυ; almuancarath Mι Nγ; almuancarath Mη; almuancarath Cγ; almuancarath Vφ
- 8 circuli] *om.* Kα Μλ descripti] *om.* Mv Mφ Oχ Vι Wα Wθ; scripti Qι quidam,] *add.* autem Bζ quidam ... integri] *om.* Bδ Fζ sunt] *om.* Bη Cγ Cδ Cζ Eγ Eκ Eμ Λζ Μα Μλ Oβ Oη Oq Oχ Pζ Qε Sα Sθ Sι Sλ Vα Vγ Vv Wθ; *twice* Eβ; *interlin.* Vβ integri] perfecte/perfecti Dδ; *add.* apparent Vv quidam,] *marg.* Eζ; *rep.* Vψ; quedam Bδ; qui Lκ; *add.* autem Bζ Eδ Oχ; *add.* ut Vγ; *add.* vero Qε Pζ Wθ apparent] *om.* Dδ Lμ Vv

<sup>10</sup> My choice of a Latin spelling is somewhat arbitrary – witness the large number of variants. I have used the form established in the *Compositio*. See *Comp.*, Cap. 13.

equatorial circle [i.e., the celestial equator], and the greatest the circle of Capricorn.<sup>11</sup> Next the almucantars, which are circles drawn in the upper middle of which some are complete, others appear

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<sup>11</sup> *Comp.*, Cap. 7.

imperfecti quibus prior est orizon, et dividit duo emisperia. Centrum autem inferioris

- 9 imperfecti] imfecti Nα; perfecti VQ; *add.* de Vγ; *add.* ex Mι Nγ Sβ quibus] quilibet St; quorum Mτ; *add.* circulis Dδ quibus ... emisperia] *om.* Pι prior] primus Mλ est] *om.* Bη Bκ Cγ Cδ Cζ Eμ Lζ Lλ Mα Mλ Mυ Mφ Oη Oρ Oχ Pζ Qε Sα Sβ Sθ Sλ Vα Vι Vν Vρ Vτ Wθ; scilicet Vγ; *add.* in Lμ et ... emisperia] *om.* Wλ et] *om.* Vι Wθ; *interlin.* Lβ; qui Eζ(*margin.*) Eυ Gα Vπ Vφ dividit] *illeg.* Xγ; dividerit Mη; dividens Oγ; dividit/s? Oβ {Rα} Xα; dividu VQ; *add.* enim Bδ Bε Cε Dδ Dη Eβ Eη Fα Fβ Fζ(?) Kα Kδ Lγ Lε Lη Lκ Lμ Mδ Mo Mτ Mφ Oζ Oξ Oυ Pα Pβ Pδ Pμ Pν Pρ Pσ Pω Qβ Qγ Qθ Qλ Sδ Tδ Vι Vψ Wα Wμ Xδ duo] ii/2 *some*; 20 Qθ; enim Qδ; *add.* enim Mι Nγ; *add.* *interlin.* id est nocte et die Kε emisperii] *add.* A Dγ; *add.* in *margin./interlin.* id est tantum cclorum in duo cingena Kθ autem] *rep.* Cγ inferioris] inferior Mτ; in superiori Oυ; interioris Bβ Bγ Bε Cη Eτ Kθ Pγ Pε Wβ Wυ; *add.* *interlin.* interioris Lβ Ov; *add.* partis Mι Nγ



incomplete;<sup>12</sup> the first of them is the horizon,<sup>13</sup> and it divides the two hemispheres.<sup>14</sup> The centre, moreover, of the lowest

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<sup>12</sup> *Comp.*, Cap. 13.

<sup>13</sup> *Comp.*, Cap. 13.

<sup>14</sup> I.e., above the horizon and below the horizon.

## 10 almucanthat cenith capitum nominatur. Deinde sunt azimuth, qui sunt partes

- 10 almucanthat] *om.* Oχ; abnitarath/abnutarath Vταlmi<sup>ath</sup> Kε; almicantarath Bκ Cδ; almicantarath Lδ; almicantaraz Oη; almicanterath Ov; almicanthat Eδ Pσ; almicanthatrath Pο; almicanthatrath Wλ; almicanthatrath Kα; almichant' Lκ; almichanthatrath Kθ; almu<sup>ath</sup> Pι; almuancanthatrath Gα; almuancanthatrath Qθ; almuancanthatrath Bη; almuancanthatrath Pα Pθ; almuancanthatrath Sα; almuancanthatrath Sθ; almuancanthatrath Cζ Eγ Eκ Λλ Λμ Oρ Oσ Pζ Qε Vα; almuancanthatrath Nα Sη Sι Vο; almuancanthatrath Bθ Bι Eα Eη Eυ Kδ Mδ Oγ Qγ Qι Sβ Vβ Vγ Wι; almuancanthatrath Mλ Lζ Oσ Sλ; almuancanthatrath Cε Pγ Pω; almuancanthatrath<sup>h</sup> Xα; almuancanthatrath Bε; almuancanthatrath Bζ Eβ Lγ Lη Mα Oι Sκ Xδ; almuancanthatrath Cη Cι Dγ Eζ Eρ Eτ Fβ Lβ Lε Mο Mυ Mφ Oζ Oξ Oτ Pδ Pμ Pν Pρ Pτ Pυ Qβ Qδ Qλ Rα Sδ Tδ Vι Vν Vπ Wβ Wμ Xγ; almuancanthatrath Dη; almuancanthatrath Bβ Bγ; almuancanthatrath Oβ; almuancanthatrath Bδ; almuancanthatrath Wθ; almuancanthatrath Eμ; almuancanthatrath Vψ; almuancanthatrath Oυ Pε; almuancanthatrath Bε; almuancanthatrath Mτ; almuancanthatrath Pβ; almuancanthatrath Dδ; almuancanthatrath Mν; almuancanthatrath Vυ; almuancanthatrath Mι Nγ; almuancanthatrath Cγ; almuancanthatrath Mη; almuancanthatrath Vφ; *add.* dicitur esse Cδ; *add.* est Sι; *add.* est zenith regionis et Bε; *add.* in marg. almuancanthatrath arabice dicitur. Latine autem progressionis solis in hore Kε cenith] cenith Bη Cη Dγ Eγ Eρ Fα Kκ Kα Nγ Pβ Pζ Pθ Pμ Pυ Qι Sι Qε Sβ Vυ Wι; cenith<sup>c</sup> Fζ; cenith Lγ Mα; cenith Kε; cenith Xγ; cenith Bδ; zenith Dδ Pρ Pσ Sα Vφ; zenith Lκ; zenith Cγ Wθ cenith capitum] *twice* Tδ capitum] capitis Mτ; captio Mη; *add.* sive Sι nominatur] *om.* Cδ; *rep.* Bζ; dicitur Eκ Sλ Deinde] Postea Mτ sunt] *illeg.* Eγ; *om.* C Cδ Eκ Mν Oχ Pε Pτ Qε Sι Sλ Wλ; est Bα Bε<sub>1</sub> Bξ Bι Cη Dγ Eδ Eζ Eμ Eρ Eτ Gα Nα Oν Oσ Pγ Pο Pυ Qδ Rα Sβ Sη Sθ Vγ Vρ Vτ Wι Xα; etiam Bη Bθ Bκ Cζ Lζ Λλ Oη Mα Mλ Oβ Pζ Sα Vα Vβ Vν Vπ Vυ Wθ; super Mδ azimuth] alsumuth *and add.* *interlin.* vel azimuth Sβ; alzemut Cγ; asimut Qε; asimuth Oρ Vτ; assumucht Mι Nγ; assumut Oχ Wθ; atimuth Vυ; atzemutz Pβ; azim' Oν; azimuch Bβ Bδ Cε; azimud Eκ; azimut Bζ Bκ Cδ Kα Lβ Lε Lζ Lκ Lμ Oη Oσ Pω Qι Sλ Vα; azinn<sup>t</sup> Oξ Pζ; azmut Mτ; *add.* vero he'mns(?) Cγ qui] que Oη qui sunt] *om.* Eκ Mι Nγ; *add.* etiam Wθ sunt] *om.* Bζ Pι; sibi Dγ Qδ

- 10-11 cenith ... almucanthatrath] *om.* Eυ nominatur ... intersecantes] *marg.* Nγ qui sunt partes circularum] circuli Kε; circuli partes Bδ Bε Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mτ Mυ Mφ Oγ Oζ Oξ Oτ Oυ Pα Pβ Pδ Pθ Pμ Pν Pρ Pσ Pω Qβ Qγ Qθ Qι Qλ Sδ Sκ Tδ Vι Xδ Vψ Wα Wμ partes circularum] per Cζ Oη

almucantar is called the overhead zenith.<sup>15</sup> Next are the azimuths which are parts

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<sup>15</sup> *Comp.*, Cap. 13.

circulorum almucanthatat intersecantes. Post quas sunt hore, in medietate inferiori descripte. Inter horas vero due sunt crepusculorum linee. Postea linea medii celi que est

- 11      circulorum] *del.* Εμ; circulos Βη      almucanthatat] almi<sup>ath</sup> Κε; almicangtarach Κθ;  
 almicantarath Βκ Cδ; almicantarath Lδ; almicantaraz Οη; almicanterath Ου; almicanthatat  
 Εδ Ρσ; almicanthatath Ρο; almicanthatat Wλ; almicanthatat Κα; almicantrech Οβ; almicanthat'  
 Lκ; almicancarath Γα; almicancharath Πα; almicantarach Βδ Ση Σι Vο Vτ; almicantarath  
 Cζ Εκ Λλ Οχ Ρζ Qε Wθ; almicantarath Βζ Βι Εα Εη Κδ Λμ Μδ Να Ογ Ρδ Ρω Qδ Qi Sβ Tδ  
 Vα Vβ Wα ; almicantaraz Lζ Μλ Οσ Σλ; almicant<sup>az</sup> Sθ; almicanterath Εα; almicanthatat  
 Οζ Ργ; almicanthatat~ Βη; almicanthatat Ρτ; almicanthatat Βε; almicanthatat Fβ Lβ  
 Lγ Lη Μα Οι Οτ Ου Ρυ Χδ; almicanthatat Ββ Βγ Cη Dγ Εβ Εζ Εο Fζ Lε Μο Μυ Μφ Οξ  
 Ρμ Ρν Ρο Qβ Qγ Qλ Ρα Sδ Vγ Vi Vπ Wβ Wi Wμ Χα Χγ; almicanthatat Dη; almicanthat<sup>ut</sup>  
 Qθ; almicanthatat Ρε Vψ; almicantaraz Εμ; almicanthatat Ρθ; almicanthat<sup>th</sup> Βε;  
 almi~Μτ; almi<sup>rat</sup> Εγ Vν; almicantarath Ρβ; almi<sup>ut</sup>Dδ; almicantarach Μν; almicantarath  
 Οο; almicantaraz Vυ; almicanterach Mi Nγ; almicanthatat Cγ; almicanthat<sup>a</sup> Σα; almicanthatat'  
 Μη; almicanthatat Vφ; almicanthatat *corr. to [illeg.]* canthatat Ρι      Post quas] Deinde  
 Μτ; Postea Ρι Wλ; Primum quod Εα      quas] hoc Βε Dδ; quos *many*      sunt hore]  
 super hec Cγ      hore] qdic Οβ; *add. inequales 12 plarum (?)* Να; *add. interlin.* id est  
 linee horaire Κε      in] *om* Βζ      medietate] medi.... Vψ; mediate Βδ Μο Ρδ; *add.*  
 plarum Ση; mediate *corr. to* medietate Ου; *add. interlin.* id est in nocte Κε      inferiori]  
*om.* Ββ Κδ; in superiori Ευ Ργ Vπ; *add. interiori* Χδ; *add. parte* Cζ Ρι; *add. parte tabule* Σι
- 12      descripte] *om.* Vφ; *add.* Inter has sunt due linee que ostendunt ortum aurore in matutino  
 et occasum luminis in nocte. Sed iste due linee in quibusdam astrolabii ponuntur inferiori  
 quadam parte in quibusdam in superiori. Mo      Inter] In Κα; *add.* has Mo      Inter ...  
 linee] *om.* Κδ Wβ      horas vero] quas Οβ; quas vero Βδ; horas 15 Lε; quas horas vero  
 Μη      horas vero due] vero ~~duas~~ horas Ρα      vero] *om.* Ββ Βδ Βε<sub>1</sub> Βκ Cη Dη Ετ Κθ  
 Lζ Μη Μλ Μο Να Οβ Ον Πα Ργ Ρε Qθ Qi Sβ Ση Vν Wι; *illeg.* Tδ; *interlin.* Βγ; autem Εκ;  
 15 Ρβ      vero due] et Μτ      due] 2 *many*; *om.* Βζ Εο Γα Wθ Χα; *interlin.* Vφ; duas  
 Ρυ; duo Mi; side Κα      sunt] *om.* Cε Μη Ρτ      Postea] Deinde Μτ      linea] *om.*  
 Οβ; alinea Να; est linea Εκ; medii Σα      celi] *marg.* Οζ      que est] *om.* Εκ
- 12-13      est linea] *om.* Βδ

of the circles intersecting the almucantars.<sup>16</sup> After these are the hours, marked in the lower middle area.<sup>17</sup> Within the hours are indeed the two twilight lines.<sup>18</sup> Afterwards the line of the middle of the sky<sup>19</sup> which is

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<sup>16</sup> *Comp.*, Cap. 15.

<sup>17</sup> *Comp.*, Cap. 16.

<sup>18</sup> *Comp.*, Cap. 21.

<sup>19</sup> *Comp.*, Cap. 12.

linea descendens ab armilla per centrum in oppositam partem astrolabii, cuius medietas a centro in armillam dicitur “linea meridiei”; et alia dicitur “angulus terre” et “medie

- 13      linea] *interlin.* Lβ; *om.* Bε Cε Dδ Dη Eβ Eκ Fα Fβ Fζ Kα Lγ Lδ Lη Mτ Mυ Mφ Oζ Oξ Oτ  
 Oυ Pα Pβ Pμ Pν Pρ Pω Qβ Qι Sδ Tδ Vι Wα Wμ Xδ; L.M.A.A. Vψ      descendens]  
 ascendens Bδ      ab] *om.* Oξ; de Kα      armilla] armilla Sη      per centrum] *twice*  
 Mν; *om.* Qβ; per medium centri Eδ      in] ad Sκ(*interlin.*)      oppositam] positam Vψ  
 partem astrolabii] *om.* Pω      astrolabii] *om.* Bη Bκ Cγ Cδ Cζ Eγ Eμ Lζ Lλ Mα Mι  
 Oη Oν Oρ Oχ Pζ Qε Sα Sβ Sθ Sι Sλ Vα Vν Vτ Vυ Wθ      astrolabii cuius] *om.* Nγ  
 medietas] *add.* est Sι
- 14      a] ad Vτ; in Pρ      centro] polo Oγ; *add.* scilicet Vγ      in] *om.* Pρ; versus Wλ  
 dicitur.] *twice* Eν; *om.* Cε; *add.* medii celi Pι      linea] medii celi hoc est Qθ; *add.*  
 medii celi id est Lμ; *add.* sunt Pι      linea meridiei] medii celi linea sive meridiei Qβ  
 meridiei] meridionalis Oγ; medii celi Cζ Eγ Eμ Mτ; medii celi hoc est in meridiei  
 Kε Po(*om.* in); medii diei Bη Bκ Cγ Cδ Eκ Lλ Mα Mι Oρ Nγ Oσ Oχ Pζ Qε Sι Sλ Vβ(*add.*  
*interlin.* a] meridiei) Vγ Vν Vυ Wθ; *add.* in marg. vel medii celi Oι      alia] aliud Eα;  
 aliter autem Kε; *add.* medietas Dδ Sα Sλ; *add.* medietas vero Mτ; *add.* *interlin.* modiens Cδ;  
*add.* *interlin.* scilicet medietas Vβ      alia dicitur] almuri Oρ      dicitur.] *om.* Cγ Eκ  
 Kε; *add.* linea Eγ; *add.* *interlin.* linea scilicet Vβ      angulus] anguli Sλ Vβ Wθ      et.]  
 sive Vγ; vel Mτ Pι; *add.* linea Cζ Eμ Vτ

the line descending from the ring through the centre to the opposite part of the astrolabe, of which the half from the centre to the ring is called the “midday line” and the other is called “the angle of the earth”<sup>20</sup> and “midnight

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<sup>20</sup> In the sphere, the angle (along the mid-day colure through the poles) between the plane of the horizon (through the centre of the earth) and the opposite (the south) pole is equivalent to the latitude (“angle of the earth”) of the observer, that is, the latitude of the astrolabe plate.

15 noctis." Post hec et sequitur alhantabuz, id est aranea, in qua sunt signa cum zodiaco constituta, stelle quoque fixe, in quo via dicitur esse solis. Et quicquid fuerit infra

- 15 Post hic] Postea Bθ Cγ Eζ Lζ Mτ Oη Vv Vπ Vτ Post ... sequitur] Deinde est Mτ  
 et] *om.* Bζ Bθ Bι Bκ Cγ Lζ Pζ Vv Vq Vτ Vφ; est Wλ; etiam Bβ Lλ Mα Mo Oβ Oq Pδ  
 Rα Vα Vβ Vv Wθ; vero Bη Cζ Eμ Oη et sequitur] *om.* Bε Bη Dη Eβ Eη Fα Fβ Kε Kδ  
 Lβ Lγ Lε Lη Lκ Lμ Mα Mo Mv Mφ Oγ Oζ Oξ Oτ Ou Pα Pβ Pδ Pθ Pμ Pν Pq Pσ Pω Qβ  
 Qγ Qθ Qi Sδ Sk Tδ Vi Vπ Wα Wμ Xδ; *interlin.* Lβ Oi; etiam Ci Pτ Qδ Vψ Xγ et ...  
 est] *om.* Bδ Dδ alhantabuz] Bε Cε Eβ Eη Fα Lγ Lδ Lη Lμ Mδ Mη Oγ Oζ Oτ Pθ Pμ  
 Pω Qβ Qi Wμ; *illeg.* Xγ; abhantabuz Mv; alabanthabuth Vπ; alacabut Cδ; alacaburz Sλ;  
 alagagabuch Dγ Qδ; alagagaburth Bε; alagagbuch Pτ; alahantabuth Bθ; alancabut Mα Oχ  
 Vv Wθ; alancabuth Vβ; alanchabuz Oσ; alangabut Oq; alanganbut Vα; alanhabuz Cγ;  
 alankabuz Vv; alantabach Nα; alantabuch Bζ Vτ; alantabunt Mi Nγ; alantabuth Cζ Oη Pv  
 Si; alantanith Mτ; alanthabuth Eμ; alatabus Kε; alaucabud Eκ; albantabuch Mv;  
 alcantabuth Eα; alcauabuz Sθ; alhancabuch Gα Oβ; alhancabut Eγ; alhancabuz Qθ;  
 alhanchaboth Kθ; alhanchabuth Ou; alhantabor Lκ; alhantabuch Kδ Pε; alhantabum Pq  
 Vψ; alhantabur Pv; alhantaburz Ou; alhantabus Pσ; alhantabut Wα Po Sη; alhantabuth Dη  
 Eδ Eζ Eτ Lβ Oi Pi Rα Vφ Wβ Xα; alhantabutz Fβ Fζ Lε Mφ Oξ Pα Pβ Qγ Qλ Tδ Vi;  
 alhantarbuch Ev; alhantbuz Sk; alhantabuth Bβ Bγ Cη Eq Mo Wi Pγ; alhantabuz Ci Xδ;  
 alhantibus Wλ; alhathabuz Pδ; alhuscabuch *and add. interlin.* alagagabuth Sβ;  
 allanancabuz Pζ; allancabut Lγ Qε; allancibut Vγ; allantabuz Bi Vq; almutantabuz Bκ Lζ  
 Mλ; alphantaboc Kα alhantabuz ... est] *om.* Sa id est] *om.* Pγ; dicitur Pσ; et Vq;  
 mediu Pε(*and del.*); sive Mτ id est aranea] *om.* Eγ Lλ Mα Mi Nγ Oχ Vγ Qε Wθ;  
*interlin.* Sβ; *marg. later hand* Pζ aranea] recte scilicet Cγ qua] quibus Gα; quo  
 some signa] *om.* Lκ cum] *om.* Bθ Pμ; in Bβ Cγ Eγ zodiaco] zodiatho Cγ;  
 zodyac Bβ Fβ
- 16 stelle quoque fixe] *om.* Cγ Dη Vγ; cum stellis fixis Eκ; stelle [*illeg.*] Oβ; et stella fixe Sλ  
 quoque] a Kα fixe] *marg.* Sk; *add.* zodiaci Cδ quo] qua Kε Mτ Nα Vv;  
 quibus Vφ; *add. interlin.* zodiaco Lβ in quo] in qua esse Bε in quo ... fuerit] ei  
 quoque sint Bδ via] *om.* Qi Wλ; viam Cζ; etiam Oη; *add.* etiam Eμ dicitur esse]  
 est Vτ esse] *om.* Cγ Eγ Oβ Si Vγ Vv; via Cζ Oη solis] *add.* et stelle fixe Dγ; *add.*  
 stelle quoque fixe Cγ Vγ Et] Etiam Mτ; Item Pi; *add.* infra Nα quicquid]  
 quidquot Bβ fuerit] sit Dη fuerit infra] *illeg.* Wλ infra] in Xα; intra Cτγ;  
 inter Oη Si; in term Vπ; *add. interlin.* id est in [*illeg.*] Kθ
- 16-17 Et ... septentrionale] *marg.* Ov



[line].” After this there also follows the hantabuz,<sup>21</sup> that is the spider [i.e., the rete] in which the signs are set in order with the zodiac, likewise the fixed stars, in which the path of the sun is said to be.<sup>22</sup> And whatever

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<sup>21</sup> For *alhanthabuth* (or *alhanthabuth*), العنكبوت (al-<sup>c</sup>ankabūt) – spider-web, i.e., rete – see *Comp.*, Cap. 11, line 14 and note, and Kunitzsch, *Glossar*, no. 1, pp. 515-517.

<sup>22</sup> *Comp.*, Cap. 10 and 11.

motum capitis Arietis et Libre, ex hoc zodiaco, dicitur esse septentrionale; quod autem extra meridianum dicitur. Sequitur almuri, quod “ostensor” dicitur latine, denticulus

- 17 motum] *corr. to* locum Lβ; medius Mτ; *add. interlin.* id est circulum Oτ motum capitis] circulum Dη Arietis] *om.* Vι et] in Bβ Libre] *add.* usque ad finem Virginis et dicitur signa septentrionalia. Meridionalia vero a principio Libre usque ad finem Piscium Mo ex hoc] ex horrum Vψ; in Mτ; in hoc Pι ex hoc zodiaco] *om.* Pσ; secundum meridionem infra sub dictum Kα ex ... esse] dicitur [*illeg.*] zodiaco Wλ hoc] *om.* Oη zodiaco] zodiatho Cγ; zodyaco Lκ dicitur esse] *om.* Cη Ek Et Ev Pγ Pv; *add. interlin.* Bγ; *add.* sol Pβ esse] *om.* Bζ Bη Bι Cγ Cζ Dγ Eα Eγ Eδ Eζ Eμ Eρ Gα Kε Kθ Lλ Lζ Mα Mι Mλ Mν Mτ Nγ Oβ Oη Ov Oρ Oσ Oχ Pε Pζ Pι Po Pω Pτ Qε Rα Sα Sθ Sλ Vα Vν Vβ Vγ Vπ Vρ Vυ Vφ Xα Xδ Xγ Wθ Wι; *add. interlin.* Sβ septentrionale] *add.* eam Ev septentrionale ... autem] *om.* Mι Nγ quod] ex Ov quod autem] et quidquid Ek; qui autem est Nα autem] *om.* Bι Vρ Vτ; *add.* est Mυ Mφ; *add.* ex alia parte Oβ; *add.* fuerit motum Dδ
- 18 extra] *add.* dicitur Bε Eγ; *add.* circulum Capricorni Vι; *add.* dicitur esse Dη meridianum] *add.* applicatur Cδ; *add.* appuarsi(?) Oσ dicitur] *marg. later hand* Pζ; *om.* Bβ Bγ Bζ Bε<sub>1</sub> Bη Bι Cγ Cζ Cη Dγ Eδ Eζ Ek Eρ Et Eμ Ev Gα Kθ Lζ Lλ Mα Mι Mλ Mν Mo Nγ Oη Ov Oρ Oσ Oχ Pγ Pε Po Pτ Pv Qε Rα Sβ Sθ Sι Sλ Vα Vβ Vγ Vν Vπ Vρ Vτ Wθ Wι Xα Xγ Xδ; appellatur Cδ Vυ; fuerit dicitur Oβ; *add. in marg.* id est a capite Libre in finem Piscum dicitur meridiana pars Kε Sequitur] *om.* Eρ; Deinde Mo; Deinde est Mτ Vι; Postea Oξ; Postea est Bδ Bε Bη Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mν Mφ Oγ Oζ Oι Oτ Ov Pα Pβ Pδ Pθ Pν Pρ Pσ Pω Qβ Qγ Qθ Qi Qλ Sδ Sι Sk Tδ Vι Wα Wμ Xδ Sequitur ... dicitur] *om.* Pμ almuri] abmiuri / abmuiri Sι; azimuth Pρ quod] id est Ek; qui Bθ Cγ Mι Wθ; vel Mτ; *add.* est Eα Xα ostensor] *add.* gradus Sλ dicitur] *om.* Ek; *add.* est Cδ; *add.* et Mτ latine] *om.* Eγ; *twice* Xδ; *add.* sive Dη Kθ; *add.* vel Pζ; *add.* vel meridor Vτ; *add.* videlicet Pι denticulus] centiculus Mι Nγ; deciculus Pβ
- 18-19 sequitur ... relictus] *om.* Vψ denticulus ... est] Deinde Sα

from the zodiac would be within [the circle] of the beginning of Aries and of Libra is said to be to the north; what, however, [would be] outside is called southern. There follows the *muri*,<sup>23</sup> which is called “the indicator” in Latin,

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<sup>23</sup> *Comp.* Cap. 1 and 11. For *almuri* see note to *Comp.*, Cap. 1, line 5. *Almuri* / *muri* has a slightly different meaning elsewhere in the *Practica*; see below Cap. 3, line 12 and note.

scilicet, extra circulum Capricorni. In alhantabuz relictus deinde almehaur, id est,

- 19 scilicet] *om.* Bδ Κε Μτ Ρι Ρο; *superscr.* Cδ; graduum Nα; id est Bζ Οη Ρβ Vα  
 circulum] tiens(?) a capite Eδ Capricorni] *add.* extra Xδ In] *om.* Eδ Οβ Ρο  
 Wβ In alhantabuz] *om.* Ρο alhantabuz] *illeg.* Εκ Mα Μη; agen alengabuth/ageu  
 aleugabuth Bε; ahangabuth Pτ; alaacabut Qε; alahantabuth Bθ Vπ; alaiancia Sθ;  
 alancabuch Nα; alancabut Wθ; alancabuth Μτ Vβ; alancabuz Pζ Vν; alanchabuc Bη;  
 alanchabuz Oσ; alangabat Oο; alanganbut Vα; alaniabuz Bδ; alantabut Vυ; alantabuth Cζ  
 Ευ Οη Σι; alantabuz Bκ Cδ Lζ Mλ; alanthabuth Eμ; alanthabuz Cγ; alantibut Sλ; alcanbut  
 Eγ; alchanthabuth Pγ; alegabuth Gα; alengabuth Eο Qδ Rα Xα; alentabuch Vτ;  
 aleu| gabuch Dγ; aleugabut Bζ; alhancabuc Sβ; alhanfabuch Sη; alhantabor Tδ; alhantabur  
 Pν; alhantabus Wλ; alhantabut Pσ; alhantabuth Bβ Dη Eα Eδ Eζ Eτ Kδ Lβ Mν Ον Ρι Ρο  
 Qλ Vφ; alhantabutz Qι; alhantabuv Lδ; alhantabuz Bε Eβ Fα Fβ Fζ Lγ Lε Lη Lμ Mδ Oγ  
 Oζ Oι Oξ Oτ Ου Ρβ Ρμ Ρω Qβ Qγ Qθ Sδ Sκ Wμ Xδ; alhant[?]buz Cε; alhanthab Lκ;  
 alhanthabuth Bγ Cη Mo Wι Pε; alhanthabutz Pα; alhanthabuz Cι Pδ; alhantibz Dδ;  
 alhantibz *corr. to* alhantibiz Kε; alhatabuz Pθ; allancaburh Vο; allancabut Lλ Oχ Vγ;  
 allancabuzh Bι; alliancabuth Oβ; alphantaboc Kα; altabubuth Mυ Mφ Vι; altabuth Wα;  
 almthaur Vψ; almuthabuth Wβ; anantabut Mι Nγ; hathantibuz Eη; *add. interlin.* id est  
 aranea Oι; *add. interlin.* id est in rethe Kθ; *add. interlin.* id est rethe Wβ relictus] de  
 relictus *or* derelictus Mτ; lictus Oν; *add.* que Vτ deinde] postea Εκ; *add.* est Dη  
 almehaur] *illeg.* Mα Sη; abmehaur Ρο; abnehaur Eζ; ahmehaur Pτ; ahnehair Lμ;  
 albutair Σι; almahahun Qδ; almahau' Oβ; almahir Ρο; almanuch Ευ; almathaur Sθ;  
 almauach Vτ; almcaur Bη; almchaur Mη; almeahir Xδ; almear Mτ; almeaur Eα Εκ;  
 almeauth Vα; almebaur Bδ; almebuara Wθ; almechuar Nγ; almedir Oγ; almehae Bζ;  
 almehahur Kδ; almehair Bε Eη Fα Lβ Lγ Lδ Lε Lη Lκ Mδ Oζ Oι Oξ Oτ Ου Ρα Ρβ Ρμ Ρν  
 Ρσ Ρω Qβ Qγ Qλ Sδ Tδ Xγ; almeham Cε Dγ Dδ Dη; almehant Mν; almehar Fβ Vο;  
 almehatur Gα; almehaur Cδ Eδ Eο Mι Mo Oσ Pδ Pθ Ρι Ρυ Qθ Rα Sκ Vυ Vφ Vψ Wα Xα;  
 almehaut Bε; almehayr Mυ Mφ Vι; almehuar Bι Pζ Qε Sβ Vβ(*add. interlin.* ał almehaur);  
 almehuhar Lλ Vγ; almehur Eβ; almena<sup>bu</sup>th Bγ; almenar Oν; almenat Cζ; almenath Bθ Cη  
 Eτ Vπ Wι; almenhar Eγ; almeriar Bβ; almeris Nα; almethan Kα; almethaur Qι;  
 almeuach/almenach Pγ Wβ; almeuair *or* almenair Oχ; almeuar Kθ; almeuath Pε; almeur  
 Sλ; almhair Cι; almicur Eμ; almihair Wμ; almohayr Kε; almthaur Oο Wλ; almmumchache  
 Bκ; almmumehaur Lζ Mλ; almmumehaura Vν; alnehair Fζ; alnithnar Cγ; alnitur Oη; *add. in*  
*marg.* almenath Lβ id est] *om.* Vν Wθ; quod est Ρο; scilicet id est Σι

that is a small tooth, outside the circle of Capricorn. Then in the hantabuz<sup>24</sup> there remains the mehour,<sup>25</sup> that is,

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<sup>24</sup> The rete (see above, note to line 15). See *Comp.*, Cap. 11.

<sup>25</sup> The centre of the rete and plates: *al-miḥwar* / المحور. See Kunitzsch, *Glossar*, no. 28 (pp. 533-534/79-80).

20 foramen quod est in medio rethis, in quo est axis retinens tabulas climatatum, in quam intrat alferaz, id est, “equus” restringens araneam cum rotulis, quasi cuneus. Et in alia parte matris sunt duo circuli equationis solis quorum unus continet numerum dierum

- 20 foramen] *add.* in medio rethe et climatatum Sk quod est] *om.* Bε<sub>1</sub> Kε Lμ Qθ est]  
*om.* Vα in<sub>1</sub>] *om.* Ev Oχ rethis] *twice* Lμ; arietis Wθ; rectic Cγ; rectis Mα VQ; rete  
Pζ; retis Cδ Ek Eq Lζ LA MA Nα Nγ Oq Si Sk SA Vγ Vv Vτ Vψ; rrethis Kα; *add.* relictus  
Kε Qθ axis] assis Mι Nγ; axila Oξ; clausus Vγ; pars Mλ; *add.* id est alihitop Dη; *add.*  
*interlin.* id est clausus Oτ retinens] continens Bβ tabulas] tabellas Bε<sub>1</sub> Eμ Eq LA  
Mo Oη Oq Pζ Pv Sβ Vβ Vq Vφ; rolulas Cγ climatatum] circuli maluhi Bβ in  
quam] *om.* Wθ; quod Sα; *corr.* to quot Lβ quam] qua Kα Vv; quod Bβ; quo Bθ Cγ Dη  
Kε Mδ; quem Bη Bι Ci Oη Pγ Pζ Po Qβ Qδ Si Vβ
- 21 intrat] ingrat Mτ; intret Cδ; net-ia est Vv alferaz] alfarast Gα; alfarat Cγ Eγ Mα;  
alfarum Pγ; alfat Oβ; albebach Eδ; alferac Po; alferae Eζ; alferam Bη Ev Vq Wθ; alferas  
Bε<sub>1</sub> Oη Rα Xα; alferase Eq Vφ; alferatz Vv; alferaz Bθ Bι Bκ Cδ Cζ Eμ Et Lζ LA Mι MA Nγ  
Oι(*add. interlin.*) Ov Os Pζ Qε Sθ SA Vα Vγ Vπ Vv; alferax Vτ; alfezar Oq; alforas Ea;  
alforase Pι; alforath Dη Nα; alphaeraz Cη; *corr.* to alphasaras Bζ; alpharath Mv; alphasarich Kθ;  
alphasaras Sβ; alphasarath Dγ Sη; alphasarath Bβ; alphasaraz Bγ Oχ Pε Pv Vβ Wβ Wι; alphasaras Si;  
*corr.* to alphasara Lβ alferaz id est] *om.* Bε Dδ Ek Kε Sα; unus Bδ Cε Ci Eβ Eη Fa Fβ Fζ  
Kα Kδ Lγ Lδ Le Lη Lκ Lμ Mδ Mη Mo Mτ Mv Mφ Oγ Oζ Oξ Oτ Ov Pa Pβ Pδ Pθ Pμ Pv  
Pq Pσ Pτ Pω Qβ Qγ Qδ Qθ Qi Qλ Sδ Sk Tδ Vi Vψ Wα Wλ Wμ Xγ; *add in marg.* alfaram  
Xδ; *add. interlin.* id est alphasaras arabice Kε id est ... restringens] *obliterated by repair*  
Pε equus] *om.* Ek; equus many; *add.* T uneq Ev; *add.* id est caballus Kα; *add.* retinens et  
Qθ; *add.* vel cuneus Bθ Vπ Vτ restringens] *marg.* Mτ; destrringens Mι Nγ; retrringens  
Oη araneam] *add.* restringens Kε Lμ Pσ cum] *om.* Kα rotulis] *om.* Dδ;  
totulis Vv quasi] *om.* Nα; id est Sη Vv; *add.* tenens Qδ quasi cuneus] *om.* MA  
Vτ; .q. Si cuneus] *om.* Xδ; omeus Bζ; tunes Pε; tuneus Vφ Et] *add. in marg.* DE  
DORSO ASTROLABII Fβ; *add. interlin.* ex Sk alia] altera many ille Cη Pε
- 22 parte] *om.* Pγ; *add.* walzathore id est Dη matris] *add.* in dorso Mτ; *add.* scilicet in  
dorso Vτ duo] *om.* SA; 2 many; 360 Kα equationis] equatoris Wθ solis]  
*om.* Lκ; ◉ Vι; *add.* exterius Bβ Bγ Cη Ea Ed Eζ Et Kθ Lβ(*interlin.*) Mv Oβ Pγ Wι  
quorum] *om.* Ek; maior Mτ unus] *add. interlin.* circulus Oτ
- 22-23 numerum ... circulus] *om.* Wλ

a hole which is in the middle of the rete, in which is the axis [i.e., pin] holding the plates of the climates [i.e., the various latitudes], into which the faraz,<sup>26</sup> that is, the "horse," like a wedge, enters fastening the rete with the plates.<sup>27</sup> And on the other side of the mother [i.e., the back of the astrolabe] are two circles of the equation of the sun, one of which contains the number

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<sup>26</sup> *al-faras* [the wedge]: see *Comp.*, Cap. 6, line 1 and note.

<sup>27</sup> See *Comp.*, Cap. 6.

anni 365, et scribentur sub eo nomina mensium. Et alius circulus gradus signorum et infra eum scribuntur nomina signorum. Postea quarta capiende altitudinis. Postea

- 23 anni] *add.* scilicet Cζ Dη Eκ Eμ Kθ Lζ Mτ Oη Oσ Sλ Vα Vν Vυ; *add.* scilicet inferior Cγ Eγ; *add.* solaris Cδ 365] *om.* Pι; CCCLXV Lκ Oχ Qε Sβ; 36 et dies Bβ; 305 Oβ; *add.* dies Bη Cζ Eμ Kθ Oη scribuntur] inscribuntur Eγ; scribuntur Bη Bθ Cι Dδ Fα Mδ Qδ; scribuntur Mo sub eo] *om.* Bδ Cζ Wθ; *add.* latinorum Eγ eo] *om.* Cε; hoc Dη Mτ nomina] *add.* latinorum Lλ Mι Pζ Nγ Wθ mensium] *om.* Sλ; signorum Eα Eδ Mν Oβ alius circulus gradus signorum] *om.* Bη Cδ Cζ Eα Eμ Lζ Mλ Nγ Oη Oρ Oσ Sα Sθ Sι Vα Vν Vρ Vυ; alius circulus enim graduum signorum Pρ; alius circulus] *add.* etiam Lδ; *add.* est Oγ) continens gradus signorum Dη Lδ Oγ; alius circulus continet gradus signorum Lβ; alius continet signorum gradus Kθ Pι; alius continet numerum graduum signorum 360 Cγ Eγ; alius signorum gradus Bβ Bγ Bε<sub>1</sub> Bθ Bι Cη Dγ Eδ Eζ Eκ Eτ Eυ Gα Mν Pγ Pε Po Pτ Pυ Vβ Vπ Vτ Wι Xα Xγ; alius signorum gradus 360] Lλ Mα Mι Nα Oχ(ccclx) Pζ Qε(ccclx) Sβ(ccclx) Sη Vγ Wθ; alius signorum graduum] Eρ Mo Vψ; aliorum signorum gradus] Bζ Rα; alius signorum super/supra Ov; circulus graduum signorum Kε et] *om.* many<sup>28</sup>; *add.* etiam Lλ
- 23-24 nomina ... eum] *om.* Mτ Et<sub>2</sub> ... signorum] *om.* Bκ Sλ alius ... nomina] *om.* Oβ
- 24 infra eum] *om.* Vτ; in quo Kε Pσ Qβ; in quem Qθ; inferior eum Xα eum] *om.* Cγ; quem Bε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kα Kδ Lβ Lγ Lδ Lε Lη Lκ Mδ Mν Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pδ Pθ Pι Pμ Pν Pρ Pω Qγ Qι Qλ Sκ Tδ Vι Vψ Wα Wμ; eorum Mν Po; etiam Oχ; A quod Xδ; quod Cε; *add.* etiam Mα Mι Nγ Pζ Qε scribuntur] signantur Kα; conscribuntur Cγ; scribantur Bθ nomina] etiam Wθ Postea<sub>1</sub>] Deinde Lζ Mτ Oχ; seu quadratum id est Kδ; *add.* cum Fζ; *add.* sequitur Lβ; *add.* est Bβ Bγ Bδ Bε Cγ Cε Cι Dη Eβ Eγ Eη Fα Fβ Kδ Kε Lδ Lε Lη Lκ Lμ Mδ Mη Mτ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pδ Pθ Pι Pμ Pν Pρ Pω Qγ Qδ Qθ Qλ Sη Tδ Vι Wμ Xδ; *add.* qui Vτ; *add.* scribuntur sub eo Eα Postea<sub>1</sub> ... altitudinis] *om.* Nα Pτ Vψ quarta] 4<sup>a</sup> some; iii<sup>a</sup> Qε; carta Sα; quadra Bθ Vτ; *add.* id est 4 Lκ; *add.* in marg. id est ad capiendum altitudinem solis t stellarum Lβ capiende] accipienda Cγ Mι Nγ; accipiende Cδ Eγ Lλ Mα Pζ Qε Sβ Sκ Sγ; accipiente Wθ; capienda Bβ Oβ; *add.* interlin. accipiende Vβ altitudinis] altitudines Cζ Postea<sub>2</sub>] Deinde Bη Bκ Cγ Cδ Cζ Eγ Lλ Mα Mι Mλ Mτ Nγ Oη Oν Oσ Pζ Qε Sα Sβ Sθ Sι Sλ Vα Vβ Vγ Vν Vτ Vυ Wθ; *add.* est Vψ

<sup>28</sup> Generally “et” is missing when “quem” is substituted for “eum” in line 24; “and within it are written...” becomes “within which are written...”.



of the 365 days of the year, and the names of the months will be written below it.<sup>29</sup> The other circle [contains] the degrees of the signs, and within it are written the names of the signs.<sup>30</sup> Then [there is] a quarter for measuring an altitude.<sup>31</sup> Then a square, whose

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<sup>29</sup> *Comp.*, Cap. 2.

<sup>30</sup> *Comp.*, Cap. 2.

<sup>31</sup> *Comp.*, Cap. 2.

25 quadrans, cuius latera in 12 puncta divisa sunt. Sequitur regula, que circumvoluitur in dorso astrolabii, in qua sunt tabule perforate, ad capiendum altitudinem solis in die,

25 quadrans] cadrans Pτ; quadrans Vψ; quadrantis Cγ; *add.* scilicet Vπ cuius] cuiuslibet Pε; cum Gα; scilicet cui Bβ Bθ latera] alt<sup>o</sup>a Eδ; *add.* cuius Lκ in] *om.* Bθ 12] xii / duodecim *some*; ii Oq; tix Kα; av Sθ; 20 Bζ; *add. in marg.* partes dividi punc. quodli et latus parte et boca partes illius divisiones puncto vel digiti umbre recte vel umbre verse Lβ puncta] *om.* Cδ Cζ Lζ Mι Mλ Nγ Oη Oq Pσ Sλ Vν; partes Mτ Pι Si(*marg.*) divisa sunt] *illeg.* Eκ; dividi possunt Bζ Bη Bθ Bi Bκ Cζ Dγ Eδ Eζ Eμ Eρ Ev Gα Lζ Mλ Mν Mo Oβ Oη Ov Oq Oσ Pι Po Pσ Pτ Pv Qδ Rα Sη Sθ Si Sλ Vα Vν Vπ Vq Vτ Vφ Xα; dividi possunt postremo Cδ; dividitur Cγ; dividuntur Eγ Lλ Mα Mι Nγ Oχ Pζ Qε Sβ Vγ Wθ; *add.* cuncta Mι Nγ; *add.* quodlibet latus per se et vora partes illud divisionem partam vel diniti umbra recta vel versa Pι sunt] *om.* Pγ *before* Sequitur] *add.* Postea Bε Sequitur] Similiter Si; *add.* tunc allidada id est Dη Sequitur regula] Similiter tabulla Mτ regula] *add. in marg.* aī alidada Ov Po(allidada) que] *om.* Oq circumvoluitur] circumrolunter volunter Pθ; voluitur Cδ Sλ; voluntur Mτ in] a Mα

25-26 puncta ... astrolabii] *om.* Sα

25-27 Sequitur ... nocte] *om.* Kδ

26 astrolabii] *add.* scilicet dicitur alidada Oγ qua] quo Bδ sunt] *add. interlin.* alhidada Lβ; *add.* alhidada id est due Pι tabula] regula Mδ; tabele Sβ; tabelle Bε<sub>1</sub> Eρ Oβ Oq Oχ Pζ Pv Qε Rα Sα Sη Sθ Vα Vβ Vφ Xα; tabulle Cγ; *add.* ad capiendum Oγ; *add.* septentrional' que autem Mι Nγ; *add. in marg.* aī pinule Ov perforate] *om.* Eγ Sλ; *marg.* Vφ; *inserted after "solis"* Eα; per foraminem Cγ capiendum] accapiendam Vγ; capiendam Lλ; sumendam Bη Cζ Oη altitudinem] latitudinem Wθ; *add.* perforate scilicet Sλ; *add.* scilicet Cδ solis] *om.* Mν Mφ Nα Vι in die] *om.* Kθ die] *add.* et Bβ Bδ Cδ Dγ Mδ Mη; *add.* etin Pγ; *add.* u<sup>c</sup>tīō(?) et altitudinem Cζ

26-27 tabule ... nocte] *om.* Pω

sides are divided into 12 points.<sup>32</sup> The rule is next, which rotates on the back of the astrolabe on which are perforated vanes for taking the altitude of the sun in daytime and of the

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<sup>32</sup> *Comp.*, Cap. 3.

27 stellarum in nocte.

27 stellarum] *add.* fixarum Bε nocte] *add.* et hoc per foramina Eκ; *add.* Explicit Bζ<sup>33</sup> Gα; *add. in marg.* Verte tria folia et habebis residium videlicet “Cum vis scire gradum solis” Lκ[*text skips from fol. 133<sup>r</sup> to fol. 136<sup>r</sup>*]; *add.* huc usque diximus de compositione astrolabii modo de eius utilitatibus est dicendum Vα; *add.* eum/cum dicendum Vα; *add.* Nota que pars astrolabii que est versus recte horatur facies rpms/[*illeg.*] astrolabii alia partis opposita parti superscriptem vocata [*illeg.*] sive dorsum Cγ mss Bε<sub>1</sub> ends; mss OQ Pω Sα discontinued<sup>34</sup>

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<sup>33</sup> In ms Bζ the Prologue is found at the end of the other material, hence the “Explicit” at this point.

<sup>34</sup> These mss, from this point on, show extensive variation or revision. They might be later classified as a entirely different text. I will return to these mss when I have finished editing all the capitula.

stars at night.<sup>35</sup>

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<sup>35</sup> *Comp.*, Cap. 5.

## [CAPITULUM 1]. DE GRADU SOLIS INVENIENDO CAPITULUM

1 *mss* Cα Eλ Eο Mγ Mπ Oφ Pξ Pφ Qζ Qη Vξ Zα *begin*

*om.* Bδ Bζ Bκ Cα Cγ Cδ Cε Cη Dδ Eα Eγ Eκ Eλ Eρ Eυ Kε Lζ Lκ Mα Nα Oβ Oσ Oχ Pγ Pι Pμ Pσ Qε Qη Qι Sβ Sθ Sι Sλ Vα Vν Vτ Vυ Wθ Wλ Xγ; *faded* Eδ; Accepte gradu solis inveniendū per diē suū et econverso Cζ; Ad inveniendū gradū solis Lμ Qε; Ad inveniendū gradū solis in dorso astrolabii Bι(*add. in marg. 1<sup>m</sup> c*); Ad inveniendū gradū solis per diē mensis Pτ; Canones astrolabii Pξ; Capitulum ad inveniendū gradū solis per diē mensis vel diē per gradū Vξ; Capitulum primum. De inveniendū loco solis Mλ; De divisione gradus per diē et econverso Sδ(*add. C. 2*); De gradu solis inveniendū per diē mensis (suū Bη Eμ) et econverso Bη Eμ(*marg. and add. 1<sup>us</sup>*) Qδ; De gradu solis inveniendū per regulam super diē mensis et econverso Mδ; De gradu solis per diē mensis et econverso inveniendū Vφ(*add. in marg. 1<sup>m</sup>*); De inventionē gradus solis Dγ Mι Nγ; De inventionē gradus solis et diē mensis Pο; De inventionē gradus solis in diē et stellarum in nocte Lγ; De inventionē gradus solis per diē Dη; De inventionē gradus solis per(et Eζ) diē mensis Eζ Lε Tδ; De(Sequitur de Vψ) inventionē gradus(*interlin. Mη*) solis per diē mensis et econverso Bε Bθ Cι Eβ Eη Fα Fζ Kδ Lβ Lδ Lη Mη Mφ Oγ Oζ Oι Oξ Oτ Pα Pδ Pθ Pυ Pυ Qγ Qλ Sκ Vβ Vπ Vψ Wα Wμ Xδ; De inventionē vero motus solis similiter et diē mensis Zα; Hic secuntur canones ad operandū cum astrolabio; capitulum primum de gradu solis inveniendū per suū et econverso Oη; In quo gradu cuiuslibet et signi sit sol Fβ(*different hand*); Incipit liber de operatione astrolabii et primo ad [*cut off*] gradū sol[is] Pζ; Incipit opus astrolabii ad inveniendū gradū solis per diē mensis et per gradū Mγ; Incipit opus astrolabii ad inveniendū gradū solis per diē mensis vel diē per(*interlin.*) gradū Eο; Incipit practica astrolabii Mτ; Incipit practica astrolabii et primo ad inveniendū gradū solis per diē mensis vel diē per gradū Bγ(*later hand*); Incipit practica astrolabii per lineam superscriptam Qζ; Incipit secunda pars de modo operandi per astrol'. Capitulum primum, De gradu solis habendo per diē et diē mensis econverso per dorsum Oφ; Incipiunt operationes astrolabii Gα; Inventio gradus solis Lλ(*add. 2.*) Oν Vγ; Inventio gradus solis in dorso astrolabii per diē mensis Mν Mν(*add. et econverso*) Vι(*add. et econverso*) Wβ; Invenio gradus solis per diē mensis datam(*om. Pβ Qβ Rα Xα*) et econverso Oυ(*add. sic habetur*) Pβ Pε Qβ Rα Sη Wι Xα; Inveniendū gradus solis per diē mensis datum et econverso Bβ Kθ; Modus inventionis gradus solis in dorso astrolabii Vρ; Prima practica. De inventionē gradus solis per diē mensis et econverso Kα; Primum capitulum. Inventio gradus solis mensis astrolabii Eτ; Qualiter inveniuntur gradus solis per diē mensis et econverso Pρ; Sequitur usus astrolabii utilis valde Pφ

1-19 De ... ostendet] *om.* Sα

[CHAPTER 1]. CHAPTER ON FINDING THE DEGREE OF THE SUN

Cum volueris scire gradum solis, pone regulam super diem mensis presentis, et gradus a summitate eius tactus erit gradus solis – qui cuius signi sit videbis – et eum

- 2 Cum] Cumque Vι; Et cum Pφ Sι; Quando Lμ; Quia Bδ; Si Cα; *add.* igitur Bκ Kδ  
 volueris] vis *some* scire] *om.* Eβ; *interlin.* Oγ gradum] gradus Kδ;  
 graduum Sκ solis] *interlin.* Wβ; *add.* ignotum Vν; *add.* in zodiaco Xα regulam]  
*add.* scilicet(*om.* Lβ Pι Pρ) in dorso astrolabii Lβ(*marg.*) Oι (*interlin.*) Pι Pρ super] sub  
 Vτ; *corr.* to supra Dδ diem] *add.* presentem Lβ(*interlin.*) Sβ mensis] *interlin.* Bι;  
*om.* Cα Dγ Gα Pυ presentis] *om.* Eo Mo; *repeat* Cα; de quo queris Dη; *add.* x-line gloss  
 Oη
- 3 gradus,] signus Vτ a] in Cα Dη Mτ; super Oγ eius] *om.* Cα Ov; cuius Mν;  
 eiusdem Pι; vel Mι Nα tactus] *om.* Cζ; *illeg.* Bη; *interlin.* Mτ; contactus Cα Nκ Pι Qζ;  
 regule Sι; tantus Vτ; *corr.* from tactrar Kε; *add.* et equale Vπ; *add.* in circulo signorum Pι;  
*add.* regule Bθ Bκ Ov; *add.* *interlin.* id est gradus signorum Lβ gradus<sub>2</sub>] *om.* Cε Vτ;  
 tactus Xδ gradus solis] *om.* Bδ; *add.* *interlin.* gradus Mτ solis] *om.* Pγ qui]  
*om.* Vτ; id est gradus Oη; quem Lλ Mα Oχ Pζ Wθ; quere Mι Nγ; quod Sλ; *add.* gradus Dδ  
 qui ... sit] in eius signo sicut Cγ sit] *om.* Eτ Pτ Sκ Xγ Xδ; fuerit Bε Oφ; *add.*  
 statim Dη videbis] videbitur Bβ; *add.* per lineam subscriptam Dη et eum] *om.*  
 Xδ; aliquam Mφ; cumque Mν; etiam eum Mγ Vν eum] *om.* Dη Fζ; *twice* Zα; alium  
 Pτ Xγ; enim Mλ Qζ; gradus Pι; tunc Qη; *corr.* to gradus Lβ; *add.* gradum Cα Vφ; *add.*  
*interlin.* scilicet gradum Vβ



When you wish to know the degree of the sun [along the ecliptic], set the rule [or alidade] on the day of the current month, and the degree touched by its tip will be the degree of the sun – you will see which sign this is – and

ex alia parte nota in zodiaco in rethi. Notabis etiam nadir eius, quod est similis gradus

4 ex alia parte nota] a parte nota aliqua(alia SΛ; autem Vα) Pφ Sι SΛ Vα; a parte(*add. interlin.* ex alia Eμ) nota aliqua(*add. parte* Bκ) notabis Bη Bκ Eμ Vυ; a parte(*add. interlin* vel ex altera quia in matre) nota ~~aliquam~~ Oφ; a parte nota quam altera parte notabis Lζ; ex alia nota a<sup>ca</sup> notabis Sβ; ex alia nota notabis Mη; ex alia parte a parte nota alia notabis Dγ; ex alia parte aliqua nota alia(*add. interlin. [illeg.]* Bι) notabis Bι Qε Sθ Vρ Wθ; ex(*om.* Eλ; a Cδ Oη; in Mι Nγ) alia parte(*om.* Eκ; parte Oη) nota(notam Vτ; *erasure and add. interlin.* astrolabii Lβ; *add. erasure* Eζ) Bβ Bγ Bθ Cδ Cη Eζ Eη Eκ Eλ Eτ Eυ Kθ Lγ Lμ Mι Mπ Nα Nγ Oγ Oζ Oη Oν Pγ Sη Vπ Vτ Wβ Wι; ex alia parte nota alia(a<sup>a</sup> Vξ) Eδ Mν Po Vξ; ex alia parte nota(notam Qδ) alia(a<sup>a</sup> Wθ; a<sup>ca</sup> Sβ) notabis Pτ Qδ Sβ Xγ; ex alia parte(*add.* in rethis eum Eρ) nota aliqua(*del.* Eο) Eα Eγ Eο Eρ Mα Vφ Wθ Xα; ex(a Cζ Oσ; *add. aliqua* Pθ) alia parte(*add. interlin.* scilicet in rethi Vβ) nota(notam Lε) aliqua(a<sup>a</sup> Wθ) notabis(*add. in zodiaco in rethis* Eα) Cζ Cι Eα Kδ Lε Lγ Lλ Mo Oσ Oχ Pδ Pζ Pθ Rα Sκ Vβ Vψ Wθ; ex alia parte nota altera Bζ; ex alia(aliqua Cε) parte(*om.* Cε) nota(notam Fζ Pμ Qβ Sδ Tδ Xδ; *corr. from nomina* Lκ; *add. et* Pμ) notabis Bδ Cε Dη Fζ Lκ Oι Oξ Pμ Pξ Qβ Sδ Tδ Xδ; ex alia parte notabis Wλ Zα; ex alia parte notam aliam notabis Qδ; ex alia parte notam nota Qη; ex alia parte [*erasure*] notabis Pυ; ex altera parte Pι; ex altera parte nota(nota ~~nota~~ Oυ; *add. in marg.* alia Wα; *add. and del.* notabis Wα) Bε Dδ Eβ Fα Kα Lδ Lη Mδ Oβ Oξ Oτ Pρ Pσ Qγ Qθ Wα Wμ; ex altera parte(*twice* Mτ) notabis(noctis? Qι); Cα Mτ Qζ Qι Vι; ex altera parte notam(nota nota Mυ; nota Cγ Mφ) aliqua Cγ Gα Mυ Mφ; ex altera parte notam(*interlin.* Kε) notabis Fβ Kε Pα Pβ Pν Qλ; ex illa parte nota Pε; ex illa parte nota aliqua notabis Vγ; nota aliqua Mγ Mλ; notabis nota aliqua Vν in<sub>1</sub>] *om.* Sβ in zodiaco] *om.* Pι Sη Wλ; eum in zodiaco Qζ; in zodiacho Mτ; *add. interlin* in rethi Bι Oφ; *add. interlin.* et rethis Kε; *add. interlin.* scilicet in rethi Vβ; *add. interlin.* scilicet retis Sβ in<sub>2</sub>] *om.* Gα Lκ Oβ Qη Vφ; scilicet Bζ Eο(*add. interlin.* in) Rα Sβ Xα in rethi] *om.* Bη Bθ Bκ Cα Cγ Cδ Cε Cζ Dγ Eα Eγ Eδ Eζ Eκ Eλ Eμ Eν Lζ Lλ Mα Mγ Mη Mι Mλ Mν Mo Nγ Oη Oσ Oχ Pζ Po Pτ Pυ Pφ Qδ Qε Sδ Sι Sθ Sλ Tδ Vα Vβ Vγ Vν Vξ Vπ Vρ Vτ Vυ Wθ Xγ rethi] rechi Wα; rete Vψ; rethis Bζ Oβ Qζ Qη Xα; reti Kδ Oι; retis Rα Vφ; rthethi Kα Notabis] *om.* Bκ Lζ; Nota Eκ; Notaberis Bβ; super Dη; *corr. to* No<sup>u2</sup> Lβ etiam] *om.* Bκ Dη Lγ; *erased* Lβ; et Lζ Mυ Vι Vτ; et forabis Oν; *add. in* Nγ nadir] *illeg.* Xγ; gaudair Sκ; gnadair Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Cε Dδ; nadair Dη Eβ Eδ Eμ Eν Eζ Eτ Fα Fβ Lβ Lγ Lη Mν Mφ Oζ Oι Oν Oξ Oτ Oυ Pα Pμ Oν Pξ Po Pσ Pυ Qβ Qγ Qi Ql Sδ Sη Tδ Vβ Vi Vν Vπ Vρ Vυ ; nadair Oν; nadare Mυ; nadayr Bγ Bκ Fζ Lε Lζ Pε Oσ Pγ Pτ Qδ Qη Wι; nadayz Cη; nadhir Cδ; nadir Bε Cζ Eα Eγ Eη Eλ Eο Eρ Gα Kδ Kε Kθ Lκ Lλ Lμ Mα Mγ Mλ Mo Nα Oβ Oη Oφ Oχ Pβ Pζ Pρ Pφ Qε Qζ Qθ Rα Sβ Sθ Sι Sλ Vγ Vτ Vφ Wβ Wμ Xα Zα; nadyr Cα Lδ Mδ Pι Vξ Wλ; nadyrth Xδ; nardir Bδ Dγ; nadire Vα; nardix Mι Nγ; natair Bθ; navcidit Bβ; vadair *corr. to* nadair Wα(*add. in marg.* gnadair); *add. solis* Kα Wθ; *add. in marg.* id est opositio Sι eius] cuius Vα; *om.* Cε Pυ; *add. etiam* Xα; *add. id est oppositum* eius Cγ; *add. in oppositum* est Eγ quod] qui Bζ Cγ Dδ Lζ Lκ Mγ Mι Nα Nγ Vν Vπ Xα Xγ est] erit Cγ Eγ Mι Nγ Oχ Pζ Vγ est similis] *om.* Wα similis] *om.* Cζ Mλ Mφ Oη Pφ Vι; *illeg.* Eη; *interlin* Oφ; simul Cη Kα; solis Dη gradus] *om.* Cγ; gradu Oβ; gradui Mγ Pδ Pυ Qδ Vγ Vξ; *add. eius* Oγ; *add. and del.* medii celi Vγ

[ continued opposite ]

note it on the zodiac on the rete on the other side [of the astrolabe]. And you will note its nadir, which is a similar degree of the 7<sup>th</sup> sign.<sup>1</sup>

4-5 Notabis ... signi] *om.* Μτ

4-6 eius ... ostendet] *illeg.* Εη

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<sup>1</sup> The nadir will be the same degree but in the opposite sign. Beginning with the sign in which the sun was found and counting around the zodiac, the opposite sign will be the seventh sign.

5 septimi signi. Diem quoque mensis per gradum solis invenies; posita enim regula super gradum solis diem quesitum ostendet.

5 septimi] 7/ 7<sup>i</sup> / 7<sup>mi</sup>/vii *many*; à Bβ; alii Fβ; alius opposita Lκ; alterius Qη; oppositi Pζ; *add.* notabis diem Cγ signi] opponitur/oppositur signus alii Gα; *add.* abeo Dη; *add.* computando illud signum in quo est Cα; *add.* id est signi oppositi Mφ Vι; *add.* in signi oppositi Mν; *add.* notabis Eγ; *add. interlin.* oppositi Oφ; *add. in marg.* id est signi oppositi Wα; *add. illeg.* Zα Diem] Dicit Vυ quoque] *corr. from* quousque Sκ et Pι; quam Kα; quo Mι Nγ; *add.* gradus Wθ; *add.* solis Mν mensis] *om.* Oγ; *rep.* Cα; *add. interlin.* econverso Wβ per] *marg.* Kδ gradum] gradus Oφ Pθ Rα solis] *interlin.* Eμ; *om.* Pγ invenies] *om.* Cα Wα; *add.* econversion Pι posita] *nondo* (= *nondum?*) Lκ; positum Xα posita enim] *corr. to* econverso u3 ponitur Lβ enim] *illeg.* Eγ; *om.* Cδ Oφ Pφ Sι Xα; *es corr. in marg. to* enim Sκ; igitur Cγ; in Oχ regula] *om.* Xα; 12(*deleted*) Pβ

5-6 enim ... ostendet] *om.* Oη

6 super] supra Dδ Pφ Vν gradum] gradus Bζ Eo Kδ solis] *om.* Dη diem] *rep.* Qλ; dies Eμ Eo Mγ Mλ Oφ Pφ Vν; *add.* tibi Cγ Eγ Lλ Mα Mι Oχ Sβ Vγ diem ... ostendet] *om.* Cδ quesitum] *marg.* Qζ quesitum ostendet] ostendit Mτ; que sit Kα Wμ; que sit quod notus erit Vτ; que sint ostendet Pμ; quesitus erit Cζ Eμ Pφ Sι; quesitus notus erit Bζ Mγ Mλ Oφ(*notus interlin.*); quesitus noctis erit Eo; quis sit ostendet Dη; *add. 2.5 line gloss* Cζ ostendet] ostendit Vα; noctis o[ste]n[de]t Eo; notus erit Vν; *add.* De gradu solis Qη; *add.* econverso Kδ

And you also find the day of the month from the degree of the sun, for the rule, when placed against the degree of the sun, will show the day you have sought.

[ Comment:

The calendar and zodiac circles around the rim on the back of the astrolabe enable the true motion of the sun along the ecliptic to be linked to the day of the year, and vice versa. This can then be used to set the rete on the front. ]

## CAPITULUM 2]. DE ALTITUDINE SOLIS ET STELLARUM INVENIENDA

Cum vis altitudinem solis scire, suspende astrolabium de manu tua dextra per

- 1 De ... invenienda] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Lζ Lκ Mα Mπ Mτ Nα Oβ Oσ Oυ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qi Sβ Si Sλ Vα Vν Vτ Vυ Wθ Wλ Xα Xγ; *marg.* Eμ; *faded* Eδ; *illeg.* Vϱ; Ad inveniendum altitudinem solis Eϱ Mλ Vξ(*add.* in gradibus); Ad inveniendum altitudinem solis in qualibet Eo Mγ Pτ(*add.* hora); Ad inveniendum altitudinem solis et stellarum Lμ Oφ Qθ; Capitulum 2<sup>m</sup>. De altitudinis solis vel alterius rei habenda in dorso per regulam Qδ; Capitulum secundum de altitudine solis et stellarum accipienda Oη; De(Sequitur de Sη) acceptione altitudinis solis et cuiuslibet alterius per astrolabium Bβ Kθ Pε Sη Wι; De altitudine solis Lλ(*add.* 3.) Mι Nγ Pζ; De altitudine solis accipienda Bθ Cι Kδ Mη(*accipiendi*) Pδ Pθ Pυ Sθ(*marg.*; *add.* et stellarum) Sκ Vβ Vπ(*add.* Rubrica) Vψ; De altitudine solis vel stelle accipienda per astrolabium Mν Mυ Vι; De altitudine solis vel stelle per astrolabium Eτ Wβ; De invenienda altitudine solis per astrolabium Rα Xα; De inventione altitudinis solis Dγ Eζ; De inventione hore et ascendentis Kα; Doctrina de modo accipiendi altitudinem solis vel alterius rei Bι(*add.* in *marg.* 2<sup>m</sup> c<sup>m</sup>); Inventio altitudinis solis et stellarum Lδ Oγ Oτ; Invenio altitudinis solis et stellarum per astrolabio Qβ; Inventio altitudinis solis in qualibet hora Bγ(*later hand*); *add.* C. 3 Sδ; *add.* in *marg.* 2<sup>m</sup>/2<sup>us</sup> Eβ Qζ Vφ De] *om.* Wα et stellarum] *om.* Vγ et ... invenienda] *illeg.* Vφ stellarum] *add.* fixarum Pβ invenienda] *om.* Oυ Zα; accipienda Bη Eμ; hunda Dη; venienda Oυ; *add.* Capitulum Cη Mo
- 1-6 De ... fixas] *illeg.* Eη
- 2 Cum] Sum Oυ vis] volueris *many*; *interlin/marg.* Wα; *add.* inventionem Mτ vis scire] quesieris Bη Bκ Cα Cγ Cδ Cζ Eγ Eκ Eμ Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Oν Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sλ Vα Vβ Vγ Vν Vξ Vτ Vυ Wθ scire] *interlin.* Bγ; *om.* Eδ Eζ Eτ Kθ Mν Pγ Po Vϱ; habere Bθ Nα Pτ Pυ Qδ Sη Vπ Wι Xγ; hore Wλ; invenire Bδ Bε Cδ Dδ Eβ Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mυ Mφ Oγ Oζ Oi Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pϱ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Tδ Vι Wα Wμ Xδ Zα solis] *add.* et stellarum Bδ Bε Bη Cζ Ci Dη Eβ Eμ Fα Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Mδ Mη Mπ Mτ Mυ Mφ Oγ Oζ Oη Oi Oξ Oτ Oυ Oφ(*interlin.*) Pα Pβ Pδ Pθ Pμ Pν Pξ Pϱ Pσ Qβ Qγ Qζ Qη Qθ Qi Qλ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; *add.* et stellarum fixarum Dδ; *add.* id est per gradus elevatur centrum solis ab horizonte tuo Eυ; *add.* vel stellarum Wβ astrolabium] strolabium Pβ; *corr. from.* astrolabium Sκ de] in Cα Kε Mτ Oγ Pγ Sκ; *add.* de Nα manu] *add.* *interlin.* id est per manum Eδ tua] *om.* Bε Dη Fα Fζ Lγ Lδ Lε Lη Lκ Mδ Mπ Mυ Mφ Oξ Oτ Oυ Pα Pβ Pι Pμ Pν Pξ Pϱ Pσ Qβ Qη Qi Qλ Sδ Tδ Vι Wα Wμ Xδ Zα; *interlin.* Eo dextra] *om.* Nα Xγ; *add.* in sinistram Kα
- 2-3 per ... armillam] *interlin.* Pτ

[CHAPTER 2]. ON FINDING THE ELEVATION OF THE SUN AND THE STARS.

When you wish to know the elevation of the sun, suspend the astrolabe from your right hand using

eius armillam, et sinistro tuo latere soli opposito, subleva vel depone regulam, donec radius solis per utriusque tabule foramen transeat; quo facto, vide quot gradus a linea

- 3 eius] *om.* Εκ armillam] armilam Cγ et] *add.* in Bδ Bε Bθ Dδ Dη Eβ Fα Fβ Fζ Kα Lγ Lδ Lε Lη Mδ Mπ Mτ Oζ Oι Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Qβ Qζ Qη Qθ Qι Σκ Tδ Vυ Xδ Zα tuo] *om.* Bη Pι; ductus Kα soli] *om.* Kδ; *twice* Xα; eius Bκ; sibi Vτ; sole Vξ opposito] apposito Cα subleva] snaileva/suaileva(?) Sθ vel] et Wμ depone] deprime Mτ Pγ Pε Qζ Wβ Bβ Bγ Bε Bι Cη Dδ Dη Eλ Eτ Fα Kα Kε Kθ; pone *corr.* to depone Oι; *add.* depone Fα; *add.* vel deprime Cζ Oη; *add. interlin.* at deprime Oφ regulam] *add. interlin.* scilicet in dorso astrolabii Oι
- 4 solis] *om.* Bδ Pξ; solie Vτ per] *om.* Vτ utriusque tabule foramen] ambo foramina tabule Bδ Bε(tabularum) Dδ Dη Eβ Fα Fβ Fζ Kε Lγ Lδ Lε Lη Lμ Mδ Mπ Mτ(*om.* tabule) Mυ Mφ Oγ Oζ Oι Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vι Vυ Wα Wμ Xδ(*tabule corr.* to *tabelle*) Zα tabule] *om.* Dγ Pε Pυ Qδ; *interlin.* Bι; *tabelle* Bη Cγ Eγ Eκ Eμ Oη Qε Sβ Sθ Vα Vβ Vγ Wθ; *add.* vel *tabelle* Mι foramen] foramina Cα Rα Vρ Vυ Xα Xγ; foraminem Eυ transeat] *om.* Dγ Qδ; *transierat* Kα; *intra* Mι Nγ; *intrans* Bη; *intret* Bζ Bθ Bι Bκ Cα Cγ Cδ Cζ Eα Eδ Eζ Eλ Eκ Eμ Eο Eρ Eυ Gα Lζ Lκ Lλ Mα Mγ Mλ Mν Oη Oν Oσ Oφ Oχ Pζ Pι Pο Pτ Pφ Qε Qη Rα(*interlin.*) Sβ Sθ Sι Vα Vγ Vν Vξ Vπ Vρ Vτ Vυ Vφ Wθ Wλ Xα Xγ; *add.* vel [*illeg.*] Zα; *add. interlin.* *intret* Lβ; *add. inerlin.* at *intret* Vβ quo] hoc Kε quo facto] tunc Vγ quo ... vide] et per Qη quo ... quot] Et tunc per quod Lκ vide] *fide* Mν; *vede* Mπ; *videas* Qι Vπ; *add.* per Dη Zα quot] *om.* Gα; *quod* Mν Mπ Σκ Wλ gradus] gradibus Bζ Bη Bκ Cα Cγ Eγ Eλ Eμ Eο Eυ Lζ Lλ Mγ Mι Mλ Mο Nγ Oν Oσ Pζ Pτ Pφ Sβ Sθ Sλ Vα Vν Vξ Vπ Vρ Vυ Wλ; *corr.* to gradibus Lβ; *add. interlin.* at gradibus Vβ a] *om.* Bδ a linea] *alenina* Mπ; *alia* Bβ Mν
- 4-5 a ... orientali] *om.* Mν



its ring, and with your left side away from<sup>1</sup> the sun, raise or lower the rule [alidade] until a ray of the sun passes through the pin-holes of both the vanes; having done this, see how many degrees

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<sup>1</sup> For "*oppositus*" Gunther writes "towards the sun." However, it makes no difference if the observer's left or right side is toward the sun or away from the sun. One angles the alidade so that the sun's rays pass through both pin holes, and one can then read the altitude of the sun along the edge, whether the alidade is angled from the upper left to the lower right (the observer's left side toward the sun), or from the upper right to the lower left (the observer's right side toward the sun).

5 orientali elevatur regula, et illa est solis altitudo. Similiter facies in nocte, per stellas fixas.

- 5 orientali] occidentali Kθ; orgencali Mπ; *add.* id est a linea illa qua transit a puncio Arietis per centram astrolabii cuspido Ev elevatur] allevatur Bβ et] quia Dη illa] *om.* Bδ Bε Cη Cι Dδ Eβ Eτ Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lε Lη Lμ Mδ Mτ Mυ Mφ Oζ Oι Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Sκ Tδ Vι Vψ Wα Wβ Wμ Xδ Zα; *illeg.* Eη Oξ Vτ; hoc Dη; idem numerus Lδ; ille numerus Oγ; ista Mπ Nα; *add.* [*illeg.*] Lδ illa est] *om.* Pγ illa ... altitudo] illi ostenderit altitudinem solis Pδ et est] *repeat* Bδ est] erit Cγ Kθ Lκ Lλ Mα Oχ Qε Vγ similiter] *om.* Lκ; solis Xα facies] *fac many; om.* Pσ Qθ; *interlin.* Qζ; facias Bη Kδ; *add. illeg.* Zα in] de Kδ Mo Vτ; *om.* Cα Eκ Rα Xα per] sic de Lκ
- 5-6 similiter ... fixas] *om.* Ov per ... fixas] de stellis fixis Dη Qη; per stellam id est fixam Cζ; per stellam fixam Mλ Oφ(*add. interlin.* vel stellas fixas) Sι Vν
- 6 fixas] *om.* Eδ Mo Mτ Pξ Sθ; *add. illeg.* Bκ; *add.* cum oportunum fuerit Kδ; *add.* et cetera Pι; *add.* et per planetas si possu<sup>3</sup> sed non tabulum quia locus ipsarum variatur Bζ; *add.* facies per stellas fixas Mπ; *add.* Nota quod hoc facilius(melius Oγ) fiat. Si retro tendantur candele ut melius videantur tabulo Lδ Oγ; *add.* per spiendo foramina et cetera Oβ; *add.* quacumque Oη; *add.* visas per foramina<sup>2</sup> Zα; *add. 3-line gloss* Cζ

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<sup>2</sup> These words were added by Gunther to his Latin text, based on the version published as an addendum to Georg Reisch, *Margarita Philosophica Nova*, printed by Johann Grüniger (Strasburg, 1515). See John Ferguson, "The *Margarita Philosophica* of Gregorius Reisch. A Bibliography," *The Library. Transactions of the Bibliographical Society*, ser. 4, 10 (1929) 194-216.

the rule is raised above the eastern line, and that is the altitude of the sun. You will do the same thing at night using the fixed stars.

[ Comment:

Suspend the astrolabe from its ring so that it is vertical, then adjust the rule with its sighting vanes toward the sun or star so that the sun's rays pass through the two (smaller) holes in the vanes or so that the star can be seen when looking through the two (larger) holes in the vanes. The degree of elevation can then be noted, as the point at which the rule intersects with the graduated rim of the astrolabe. ]

## [CAPITULUM 3.] DE INVENTIONE HORE INEQUALIS ET SIGNI ASCIDENTIS.

- 1 De ... ascendentis] *ms* Qα *begin; om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Cζ Cη Dδ Eα Eγ Eκ Ev Gα Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qα Qε Qζ Qη Qi Sβ Si VαVv Vτ Vv Wθ Xγ; *faded* Eδ; *illeg.* Eη Kα Kε; Ad habendam altitudinem solis et ascensionem Mγ; Ad havendum certitudinem hore et ascendentis Vξ; Ad habendum horam et ascendens Pτ; Ad inveniendum altitudinem solis et ascendentis Eo Eφ; Ad inveniendum horam diei et noctis et ascendentis Qθ; Ad inveniendam horarum diei vel nocte vel ascendentis Lμ; Ad sciendum certitudinem hore et ascendentis Dγ; Ad sciendum hore et ascendentis per gradum solis Bθ Cι(gradus) Eβ; De certitudine horarum Mπ; De certitudine hore et ascendentis invenienda(*om.* Oφ) Lδ Oγ Oτ Oφ; De habenda hora et ascent~ Mλ; De hora diei et gradu ascendentis per astrolabii Eτ; De hora diei et noctis et gradu ascendentis inveniundo per astrolabium Ov; De horis diei et noctis capiendum. Cap. 3<sup>m</sup> Oη; De hora diei vel noctis cum gradu ascendentis Mv; De hora diei vel noctis et gradu ascendentis eius Mv; De hora diei vel noctis et gradu ascendentis inveniundo Vι Wβ; De horis assōitur(?) in die Mι Nγ; De horis diei et noctis accipiendis Eμ(*marg.; add. in marg. 3<sup>us</sup>*) Sθ(*marg.*); De horis diei et noctis accipiundo et gradu ascendentis Bη; De(4. De Lλ) horis et ascendente in diei Lλ Pζ Vγ; De invenienda certitudinem hore et ascendentis Bι(*add. in marg. 3 c<sup>m</sup>*); De inventione ascendentis per gradum solis Sκ; De inventione certe hore et ascendentis Eζ Pο; De inventione certe hore et gradus ascendentis Rα; De inventione horarum et ascendentis Tδ; De inventione hore et ascendentis Dη; De inventione(*add. solis Pv*) hore(horarum Lε) et ascendentis per gradum solis Eβ Fα Kδ Lβ Lγ Lε Lη Mδ Mη Mo Mφ Oζ Oi Oξ Ov Pα Pβ Pδ Pθ(*add. Rubrica et cetera*) Pμ Pv Pv Qγ Vβ Vπ(*add. Rubrica*) Vψ Wα(*om. De*) Wμ Qλ Sδ(*add. C. 4*) Vφ(*marg.*) Xδ; De inventione hore inequalis et signi ascendentis Zα; De inventione hore naturalis et gradus ascendentis per altitudinem solis et stelle Sη; De inventione hore vel et gradu ascendentis per altitudinem solis vel stelle Bβ Wι; De invencionem hore inequalis et gradu ascendentis per altitudinem solis vel stelle Pε; De inventionem stelle fixe hore et gradus ascendentis Xα; Inveniencio certitudinis hore et ascendentis Fζ Qβ(*add. Capitulum*); Inventio certa horae et ascendentis de die vel de nocte Bγ(*later hand*); Qualiter inveniatur hora et ascendens per gradum solis Pq; *add. in marg. 3 Qζ* inequalis ... ascendentis] *illeg.* Cη

[CHAPTER 3.] ON FINDING AN UNEQUAL HOUR AND AN ASCENDING SIGN

Si autem vis scire certitudinem hore et ascendentis, pone gradum solis super

- 2 Si autem] Cum Bζ Eλ autem] *om.* Εκ Οφ Ρι Ρξ Ρφ Qα Sι Vγ Vν Vτ Vψ vis] volueris *many* scire] *om.* Βη Cγ Eγ Eμ Mι Nγ Oχ Qε; *add. and del.* altitudinem Sη certitudinem] *om.* Ρι; altitudinem Eν(*add. interlin. inequalis*) Ργ; certitudinaliter Lκ; per altitudinem Qη hore] horam diei Ρι; per horam altitudinem Lκ; *add.* descendentis Sβ; *add. inequalis* Kδ Nα; *add. per astrolabium* Vι; *add. scilicet equalis* Cζ Oη Sη; et] signi Bβ Zα; vel equalis Pθ; *add. etiam* Cη Cι Mν; *add. gradus illeg.* Sι; *add. and del.* facies Sθ hore et ascendentis] horas transactas de die Qη ascendentis] ascendens Lκ; ascendentes Cζ; assendentis Mι N; asuncio Pε; *add. hore* Βη; *add. interlin.* altitudinis Lβ pone] ponere Mλ gradum] gradus Mτ solis] *add. id est* pone gradum signi in quo gradus est sol Cα; *add. illius diei* Eν; *add. illeg.* Zα super] id est per gradum solis computa numerum Ρτ Xγ; in Ρι

However, if you wish to ascertain with certain knowledge the hour and the ascendent [sign], set the degree of the sun [i.e., its position along the ecliptic on the rete]

## almucanthatrat altitudinis ex parte orientis, si fuerit ante medium diem, aut ex parte

- 3 almucanthatrat] albimutantarach(?) Sι; almacantra Lκ; alm<sup>at</sup> Kε; almiacatharath Eζ;  
 almicantarach Oβ; almicantarath Pσ; almicantaraz Cδ Oη; almicanthatrat Oι; almicanthatrat  
 Qζ; almicanthatrat Kα; almicatharath Pο; almichancarach Mγ; almirarat Vτ; almi<sup>th</sup> Qη;  
 almkatarach Sη; almuc[illeg.] Gα; almucacharath Pα; almucancharat Wλ; almucanharatz  
 Dη; almucant' Fα Lμ Qθ; almucantar' Oσ; almucantarach Bδ VQ; almucantarath Eγ Eκ Lλ  
 Oχ Pζ Qα Qε Vγ Wθ; almucantarath Bη Eα Eη Eλ Fβ Kδ Lδ Mπ Oγ Pξ PQ Pυ Pφ Qγ Rα  
 Sβ Tδ Vα Vβ Vπ; almucantaraz Cζ Lζ Sλ; almucant<sup>ar</sup>z Sθ; almucantera' Cα;  
 almucanteraht Oν; almucanteraht Mι; almucanteraht Nα Oφ Qι; almucanthat' Pγ Pθ;  
 almucanthatrach Cι Kθ Pτ Wβ; almucanthatrat Eδ Fζ Mα Oτ Oυ Sκ Zα; almucanthatrach Bβ  
 Bγ Bζ Bθ Bι Cη Dγ Eβ Eο EQ Eτ Eυ Lγ Lη Mη Mλ Mο Mυ Mφ Oζ Oξ Pδ Pν Qβ Qδ Qλ Sδ  
 Vι Vν Wμ Wι Xα Xγ; almucanthatrach Mτ; almucatarath Mδ; almucatharath Pμ Wα;  
 almuchanchath Cε; almuchantarach Vξ; almuchantarath Vψ Xδ; almuchanthatrach Lε Pε;  
 almu<sup>rath</sup> Pι; almuschantarach Pβ; almutant Dδ; almutantarach Mν; almutantaraz Vυ;  
 almutanterat Nγ; almutanthatrat Cγ; almutarat Lβ; almu<sup>th</sup> Bε; almuthantaraz Eμ;  
 almuthanthatrat Vφ; *add.* h Sη; *add.* sue Cα altitudinis] *om.* Vγ; altitudinem Mγ;  
 super similem altitudinem similiter sol fuerit levatus in illa hora Pι; *add.* lune(!) Qβ; *add.*  
 solis Eκ; *add.* sue Bδ Bε Dδ Dη Eη Eλ Fα Fβ Kδ Kε Lδ Oβ Oγ Oζ Oξ Oυ(*marg.*) Pα Pβ Pξ  
 PQ Pσ Pι Vα Wα Qζ Qθ Tδ Zα; *corr. to (later hand)* scilicet ante meridiem accepisti solis  
 altitudinem Lβ ex parte] *marg.* Lκ orientis] horientis Mι Nγ; oriente Tδ; *add.*  
*illeg.* Lμ; *add.* 2.5-line gloss Cα fuerit] *om.* Cα Oσ Pι; altitudo sit Bβ Bγ Cη Eτ Kθ Pε  
 Pγ Wα Wι; *add.* altitudo accepta Bι(*interlin.*) VQ ante] an VQ; *ms* Pε ends  
 medium diem] meridiem Bβ Bγ Bε Bθ Bκ Cη Dη Eτ Eυ Gα Kθ Lβ Lζ Lκ Mπ Mτ Oβ  
 Oν Pγ Qη Vα Vπ Vτ Wι Wλ Zα; *add.* accepisti altitudinem solis(*om.* Oσ Pι Vυ) Cα(*add.*  
 solis) Oσ Pι Vυ; *add.* et cetera Pτ Xγ aut] *add.* super almucanthatrat sue altitud[inis]  
 Cα; *add.* super almucantar' altitudinis Oσ; *add.* super almu<sup>rath</sup> Pι; *add.* super almutantaraz  
 altitudinis Vυ ex parte] *om.* Qα
- 3-4 medium ... post] *om.* Bδ Mν Nα ante ... post] *om.* Mγ ante ... diem] in die ante  
 meridiem Vγ aut ... diem] *om.* Bδ; *marg.* Qι aut ... altitudinem] *om.* Mυ Mφ  
 Vι



on the almucantar of the altitude on the side of the east, if the altitude be before noon,  
or on

occidentis, si post medium diem accepisti altitudinem; et super quam horam ceciderit

- 4 occidentis] occidente Tδ; *om.* Gα; *corr. from orientis* Qε si] *interlin.* Qα; *add.* altitudo sit accepta Bβ Bγ Cη Eτ Kθ Pγ Wβ Wι; *add.* etiam Vγ; *add.* fuerit Bκ Gα Lζ Mλ Mπ Mτ Oη Oν Oφ Pφ Qα Qη Vν Vξ Vτ Vφ Xα Xδ Zα; *add. and del. fuerit* Cδ Kε Wθ medium diem] meridiem Bβ Bε Eα Eγ Eλ Lβ Lκ Mτ Oβ Oφ Pι Qη Vγ(*add. illeg.*) Vτ Wλ Zα(*add. celi*) diem] *om.* Mλ; *marg.* Sι; *add.* quod Oη; *add.* ubi Qη accepisti altitudinem] *om.* Bβ Bγ Cη Eτ Mπ Oφ Pγ Pφ Qα Wβ; altitudo accepta Bε Bζ Eο Lζ Mγ Mλ Vν Vτ; *add.* solis Cα Kδ(*marg.*); *add. interlin. va...cat* Sι et super] *rep.* Qδ super] supra Bβ quam] *marg.* Kδ; *add.* partem ex parte Lκ horam] *illeg.* Wθ; gradu Bζ; horarum Bγ Bδ Bε Bθ Bκ Cα Cγ Cδ Cι Eγ Eδ Eη Ek Eρ Kα Kδ Lγ Lε Lζ Lλ Mα Mδ Mη Mι Mλ Mν Mo Mπ Mυ Mφ Nγ Oβ Oζ Oι Oν Oξ Oσ Oτ Oυ Pα Pβ Pδ Pτ Pζ Pθ Pι Pμ Pν Pξ Po Pρ Pσ Qα Qβ Qγ Qδ Qε Qθ Qλ Rα Sβ Sδ Sθ Sι Sλ Tδ Vα Vγ Vι Vπ Vυ Vψ Wα Wβ Wι Wλ Wμ Xα Xγ Xδ; horarum *corr. from* horam Eτ; horum Pυ; *add. interlin. inaequalem* Eυ; *add. interlin. vel horarum* Eμ ceciderit] *om.* Qλ; *marg.* Qι

the side of the west, if you have taken the altitude after mid-day; and upon whichever hour

## 5 nadir gradus solis illa est hora presens; et signum quod fuerit ex parte orientis

- 5 nadir] Bβ Bε Bκ Cγ Cζ Dγ Eα Eγ Eη Eκ Eλ Eρ Gα Kα Kδ Kε Kθ Lβ Lδ Lκ Lλ Lμ Mα Mλ Mo Mτ Nα Oβ Oη Ov Oφ Oχ Pβ Pζ Pρ Pφ Qα Qε Qζ Qi Rα Sβ Sθ Si Sλ Vγ Vτ Vυ Vφ Wβ Wθ Wμ Xα Zα; nadar Oγ; gnadair Cε Ci Mη Pδ Pθ; gnadayr Vψ; gnadir Dδ; gnadir *corr. to nadir* Mπ; guadair Sκ; nadair Bι Dη Eβ Eδ Eζ Eμ Eτ Eυ Fα Fβ Lγ Lε Lζ Lη Mφ Oζ Oi Oξ Ot Ov Pα Pμ Pν Pξ Po Pσ Pυ Qγ Qδ Qλ Sδ Sη Tδ Vβ Vi Vv Vπ Vρ Wα; nadar Xγ; nadayr Bγ Fζ Mγ Oσ Pγ Pτ Qβ Wι; nadayz Cη; nadire Vα; nadyr Cα Cδ Pi Qη Qθ Vξ Xδ; nardir Bδ Mι Nγ; nadire Mυ; vadair Mν; *add. a punctus oppositus* Bκ; *add. id est oppositum* Cγ Fβ Pα(*interlin.*) Sβ Vβ(*interlin.*); *add. interlin. id est in quartus oppositus* Lζ gradus] *om. Lκ Oγ Pφ; corr. in marg. to id est opositum gradum* Si solis] *add. i<sup>a</sup> Cα Ci; add. and del. et signum* Qε; *add. interlin. illa* Bγ; *add. vel regula ponitur directe super signum solis* Oγ illa] *om. Bβ Bε Eτ Kθ Lβ Mπ Pδ Wι; suprascr. Bγ; illeg. Eη; ipsa* Qα; *ista* Kε Mτ Qζ; *talis* Lκ illa ... presens] *marg. Pζ; om. Eδ Eζ Mν est] illeg. Eη Eλ; erit* Bβ Bγ Cγ Eγ Eτ Kθ Lβ Lδ Lλ Mι Nγ Pγ Sβ Wι hora] *om. Bβ; add. illa* Lκ; *add. inequalis* Cα(*add. 19 lines concerning planets*) praesens] *large erasure follows* Pυ; *add. horas(hora* Eυ) noctis indicabit gradus Eκ *add. Horas(Hora* Eυ Qα) vero(*om. Eκ; autem* Nα Sβ Sη) noctis indicabit tibi(*om. Eκ Oβ*) gradus solis Bη Bθ Bι(solis *interlin.*) Bκ Cγ(*add. 2.5-line gloss*) Cδ Cζ Dγ Eκ Eλ Eμ Eο Eρ Eυ Gα Lζ Lλ Mα Mγ Mι Mλ Mo Nα Nγ Oβ(*add. 5-line gloss*) Oη Oi(*marg.*) Oσ Oχ Pζ(*marg.*) Pi Qα Qδ Qε Qη Rα Sη Sθ Si(*add. va...cat*) Vα Vβ Vγ Vv Vξ Vπ Vρ Vυ Vφ Wθ Xα signum] *add. sive gradus signi* Lδ Oγ; *add. per illud(istud* Cζ) quod dicit hic scies certitudinem ascendentis Cζ Oη fuerit] *om. Wβ; erit* Eκ; *est* Lκ ex] *in* Cγ Eγ Lλ Wθ ex parte] *om. Pφ; marg. Si; in* Bζ Mγ Mλ Oφ(*interlin.*) orientis] *om. Cγ Cδ Eγ Sλ Wλ; orizontis* Bβ Dδ Eκ
- 5-6 est ... orientali] estia Kα orizontis orientali] *illeg. Eτ; orizonte orientali* Eο Mγ Mλ Oφ Vν; orizonte orientali Eδ; ~~orizontis~~ orientali Pτ; orizontis in linea orientali Mo; orientali in linea orizontis Wμ; orientali linea orizontis Oi; orientalis orientis Kδ Sη; orientalis orizonte Tδ; oriente orientali Bζ Wτ; orientis ~~linea orizontis~~ Lβ; orientis orientali Vυ Wθ; orientis orientalis *corr. to orizontis orientalis* Lζ

the nadir of the degree of the sun falls that is the present hour; and the sign which would be on the east side of the horizon [i.e., toward the eastern horizon]

orientali est oriens, id est, ascendens; quod vero in occidentali occidens. Quod vero

- 6 orientali] *illeg.* Nα; *om.* Qδ; orientalis Bβ Bθ Bι Cδ Eζ Ek El Eq Lγ Lκ Lμ Mτ Ov Ou Pα Pθ Qβ Qζ St Vι Vξ Vπ Wβ; orient Oβ; *add.* accipi[*illeg.*] almucant' ex parti orientali Qα est] erit Cγ Eγ Mι Nγ Oφ Oχ Pζ Qε Vζ Zα; *add.* signum Pι oriens] orientis Lλ id est] *interlin.* Cγ; et Bκ Pι; vel Lκ id ... ascendens] et precedens Pγ quod<sub>1</sub> ... occidens] *om.* Cγ Pξ vero<sub>1</sub>] *add.* ceciderit Vξ; *add.* ex parte Lβ; *add.* and delete fuerit Cδ in] ex in Pγ occidentali] *rep.* Cα; *add.* linea Dδ Eη Fα Fβ Fζ Kε Lδ Le Lη Lμ Mδ Oγ Oι Oξ Oτ Ov Pα Pβ Pμ Pν Pρ Qβ Qγ Qζ Qι Sδ St(*marg.*) Tδ Wμ; *add.* erit Dη El Mι Nγ Qε; *add.* linea est Kα Mτ Qθ Vξ; *add.* fuerit St; *add.* locum Bε; *add.* occidentis Pφ; *add.* *interlin.* scilicet linea Oφ; *add.* *interlin.* scilicet orizontis Oι occidens] *om.* Vτ; accidentis est occidens Oφ; *add.* est Bβ Bι Bκ Ek Eo Gα Kε Lβ Lζ Mγ Mλ Mν Mφ Oβ Ov Pφ Qζ Sθ Vβ Vι Vν Vξ Vτ Wα Xα Zα; *add.* est sive cadens Bθ Ev Vπ Zα; *add.* sive cadens El occidens ... vero<sub>2</sub>] *illeg.* Nα vero<sub>2</sub>] *om.* Mν Wθ; autem Cγ Eγ Ek Mι Nγ Pζ Qε; non Pγ; *add.* in occidentali Xα; *add.* *interlin.* autem Vβ
- 6-7 Quod<sub>2</sub> ... celi<sub>1</sub>] *om.* Vρ

is rising, that is, ascending; moreover, that one toward the west is setting. And what indeed

ceciderit in linea medii celi est in medio celi, et eius nadir angulus terre.

- 7 ceciderit] *om.* Vψ; acciderit Kθ; erit Εκ; est Pι ceciderit ... celi] in medio(medii Eγ) celi linea erit in medie celi Cγ Eγ medii celi] *twice* Eα; medii Εκ; medii circuli Lκ; medii diei Lλ Mι Nγ Pζ Qε Vβ(*corr. to* celi) Sβ(*add. interlin.* scilicet celi) Wθ; medio celi Cγ; meridiei celi Wλ; meridionali Dη; meridionalis id est in medio celi Mτ Pσ Qζ Qθ; meridionalis id est(cum Mυ; *add.* in Lμ) medii celi Bδ Bε Cε Cι Dδ Eβ Eη Fα Fβ Fζ Kα Kδ Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mπ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Oχ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Qβ Qγ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα Wμ Xδ; meridionali illud Zα; *add.* id est in linea meridiei Ca est] *om.* Fζ Qι Vι Zα; erit Cγ Dη Lλ Mα Mι Nγ Qε Sθ(*add.* u) Vγ est ... celi] *om.* Eδ Eζ Mν Mo Po Pυ Qδ Ra Vτ Xα in] *om.* Lμ Ov Pγ Xδ medio celi] *illeg.* Mα; gradus medii celi Ov; medii celi Xδ; medio Oβ; medio celo Bβ Bδ Bη Bθ Bι Cε Cη Dγ Eλ Eμ Ev Kθ Mδ Mγ(cello) Mλ Oσ Oφ Pγ Pτ Pφ Qα Sη Vβ Sβ Si Sλ Vα Vν Vξ Vπ Vρ Vυ Vφ Wι Wλ Xγ; medium celi Kδ(*marg.*) Kε Mτ Qζ Qθ Zα; *add.* est Lβ Lδ Lε Mη et ... terre] *marg.* Vυ nadir Bβ Bε Bκ Cγ Cζ Eα Eγ Eη Εκ Eλ Eρ Gα Kα Kδ Kε Kθ Lβ Lκ Lγ Lμ Mλ Mτ Nα Oβ Oη Ov Pβ Pζ Pρ Pφ Qα Qε Qζ Qθ Qι Qλ Ra Sβ Sη Sθ Si Sλ Vγ Vξ Vτ Vυ Wβ Wθ Wμ Xα Zα; *illeg.* Mα; nadir *corr. to* nadair Eo; guadair Sκ; gnadair Cε Cι Mη Pδ Pθ; gn[a]dayr Vψ; gnadir Dδ Mπ; nadair Bι Dη Eβ Eδ Eζ Eμ Eτ Ev Fα Fβ Lγ Lε Lζ Lη Oζ Oι Oξ Oτ Oυ Oχ Pμ Pν Pξ Po Pσ Pυ Qβ Qγ Sδ Vβ Vι Vν Vπ Vρ; nadair Oγ Xγ; nadair Bγ Cδ Dγ Fζ Oσ Pγ Pτ Qδ Tδ Wι; nadays Cη; nadire Vα; nadyr Cα Mδ Qη Vφ Xδ; nardir Bδ Mι Nγ; nazare Mυ; vadir Mγ Mν; vadir *corr. in marg.* to gnadair Wα; *add.* est Dγ Bζ Bθ Cγ Cε Dδ Eβ Eη Εκ Ev Lμ Mη Mλ Mo Mπ Mτ Mυ Oβ Oζ Ov Oφ Pα Pβ Pδ Pθ Pι Pμ Pν Pξ Pρ Pσ Pτ Pφ Qα Qβ Qγ Qζ Qη Qθ Qι Qλ Sδ Si Sκ Tδ Vι Vν Vξ Vπ Vψ Wα Wβ Wμ Xγ Xδ Zα; *add.* est in Bγ(*interlin.*) Eλ Vτ; *add.* erit Dη Lλ; *add.* id est oppositum est Fβ; *add. interlin.* id est opposito Pα terre] *add.* altera est supple altitudo solis sive gradus Fβ; *add.* suple(supple Mπ Qβ; suppe Xδ) altitudo solis sive gradus Fζ Lβ Lγ Lε(*and del.*) Mπ Oι Oξ Ov Pβ Pμ Pν Pσ Qβ Sδ Xδ; *add. illeg.* Mα; *add. Cap. 21 and 22* Lκ



falls on the line of the middle of the sky is in the middle of the sky and its nadir, the  
“angle of the earth.”<sup>1</sup>

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<sup>1</sup> See Prologue, line 14, and note.

## Et si ceciderit inter duo almucanthat, vide differentiam numeri inter

- 8 *before Et] add. AD CORRIGENDUM GRADUS ALMICHANCARACH(ALMU<sup>RATH</sup> VΞ) IMPERFECTI MΥ VΞ; add. AD CORRIGENDUM GRADUS [illeg.] EΘ; add. DE INVENIENDA HORA VEL ASCENDENTE CUM GRADUS SOLIS CAD<sup>T</sup> INTER 2 MΛ; add. in marg. DE PROPORZIONE ALTITUDINIS DΥ Et si] interlin. BΥ; Si vero Vυ; add. altitudo CΥ EΥ Lδ LΛ Mι NΥ OΥ Oι(interlin.) OΧ Pζ Qε Sβ Sθ Vβ VΥ Wθ; add. altitudo solis Oβ Pα(interlin.); add. gradus solis Gα Vφ Wλ; add. vero altitudo solis sive gradus Sη; add. interlin. scilicet gradus solis Pθ Zα; add. marg. scilicet altitudino solis Oυ; add. marg. altitudo sive gradus solis Sι Et ... inter] marg. Sκ*
- Et ... duo] Suppleo Kα ceciderit] *add. gradus solis Eκ Eλ Kδ inter] super Pφ Vφ inter duo] rep. Pθ inter<sub>1</sub> ... inter<sub>2</sub>] super Dδ duo] 2 / 2° some; ii Oβ; om. Nα; duas Cζ DΥ Eο(interlin.) Lλ MΥ Oη Oσ Oφ Oχ Pφ Qα Qι Sβ Sθ Sι Vβ VΥ Vν Vρ Vτ Wθ Xγ; duos Mο Pζ Qε; tres corr. in marg. to 2 Pο; 3 et PΥ Vα almucanthat] abumitarach Sι; almicanct<sup>am</sup> Qζ; almicanct' Oβ; almicanthat Pσ; almicanthat Bκ Cδ Oη; almicanth Cε; almicanthat Pο; almicanthrat Wλ; almicathrath Eζ; almichancharach MΥ; almichanthat Lκ; almikauthrat Qη; alm<sup>trat</sup> Kε; almuc' Mπ; almucancharach Sη; almucancharath Vρ; almucancharath Pα; almucanthat Vτ; almucant' Λμ Qα Qθ; almucant<sup>ar3</sup> Sθ; almucanthat Bδ; almucanthat Qι; almucanthat Bη Eκ Lλ Oχ Pζ Qε VΥ Wθ Zα; almucanthat Bι Eα Eη Eλ Fβ Kδ Lδ Mδ OΥ Pρ Pφ Sβ Tδ Vβ; almucanthatorum Vα; almucanthat Cζ Eμ Lζ Oσ Sλ; almucanthat~ Cα; almucanthat Oν; almucanthat' Eβ PΥ Pδ; almucanthatrac QΥ; almucanthatrach Bθ Cι Kθ Pτ Wβ; almucanthatrat Eδ Fα Mα Oζ Oι Oτ Oυ Pθ Sκ; almucanthatrach Bβ BΥ Bζ Cη DΥ Eο Eρ Eτ Fζ Lβ LΥ Lε Lη Mη Mλ Mο Mυ Mφ Oξ Pμ Pν Pσ Qβ Qδ Qλ Rα Sδ Vι Vν Vξ Vπ Wι Wμ Xα Xγ; almucanthatrath Oφ; almucantorath Pξ; almucanthatrath Gα Mτ; almucanthatrath Vφ Xδ; almucanthatratz Dη; almucanthatrat Wα; almu<sup>rath</sup> Pι; almuscan<sup>arat</sup> EΥ; almuscanthatrach Pβ; almutanthatrach Mν; almutanthatrach Vυ; almutanthatrach Mι NΥ; almutanthatrach CΥ; almuthanthatrach Vφ; almu<sup>th</sup> Bε; al'tarat Kα vide] *add. quid Qη differentiam] illeg. Nα; add. utriusque Mτ Qζ differentiam ... inter.] quid denominatur per unius Qη numeri] marg. Mτ Sβ; interlin. Kε; om Bδ(lacuna) Bη Bι DΥ Eδ Eλ Eτ Mλ OΥ Vν inter<sub>2</sub>] om. Eο Oι; in Cι**
- 8-9 vide ... almucanthatrach] *om. Bζ Dε Oχ PΥ Vτ*
- 8-16 Et ... superius] *rewritten in 68 lines Cα (ff. 50<sup>v</sup>-51)*

And if it has fallen between two almucantars, observe the difference of the number between

almucanthurath precedentem et altitudinem solis, et denomina ipsam differentiam de

- 9 almucanthurath] abumitantarach Si; almi~ Oβ; almicact<sup>am</sup> Qζ; almicantarath Pσ;  
 almicantaraz Bκ Cδ Eμ Oη; almicanthurath Eζ; almicanthurat Wλ; almicantrat Kδ;  
 almicatharat Pο; almichancarach Mγ; almichanth Lκ; almihanth Bε; almikrouth~ Qη;  
 almnc<sup>raz</sup> Lζ; alm<sup>trat</sup> Kε; almuc' Mπ; almucan Pφ; almucancarach Sη; almucancarath Pα Vq;  
 almucan<sup>rath</sup> Eτ; almucant' Eβ Lη Lμ Qα Qθ; almucantar' Oσ; almucantarach Bδ;  
 almucantaraz Qι; almucantarath Bη Eκ Λλ Pζ Qε Vγ Wθ Zα; almucantarath Bι Eα Eλ Eη  
 Fβ Fζ Kδ Lδ Mδ Oγ Pξ Pq Pσ Pυ Qγ Sβ Sλ Vα Vβ Vψ; almucantaraz Cζ; almucant<sup>z</sup> Sθ;  
 almucanterahz Oν; almucanterath Nα Oφ; almucanth Kθ Lβ; almucanth' Cι Fα Oζ Pδ;  
 almucanthurach Bθ Pτ Vξ Wβ; almucanthurath Eδ Mα Oι Oτ Pθ Sκ; almucanthurath Bβ Bγ  
 Cη Dγ Eο Eq Ev Lγ Lε Mη Mλ Mο Mυ Mφ Oξ Pμ Pν Qβ Qδ Qλ Rα Sδ Tδ Vι Vπ Wι Wμ  
 Xα Xγ; almucantrath Gα Mτ; almuchantar' Dη; almuchantarath Xδ; almuchanthorath Wα;  
 almuchatarath Oυ; almu<sup>rath</sup> Pι Vν; almuscantarach Pβ; almut Dδ Eγ; almutantarach Mν;  
 almutantaraz Vυ; almutantrat Cγ; almutantherach Mι Nγ; almuthanthurath Vφ  
 precedentem] *om.* Gα; presentem Oγ et<sub>1</sub> ... solis] *om.* Mν Vν; in sequentem Qη  
 altitudinem] eo altitudinem Rα; *add.* gradus Eκ; altitudinem solis] almicantrat  
 sequentem Kα solis] *om.* Bζ Bη Bθ Bι Bκ Cγ Cδ Cζ Dγ Eγ Eδ Eζ Eμ Eο Eq Ev Lζ Λλ  
 Mα Mγ Mι Mλ Oβ Oη Oν Oσ Oφ Oχ Pζ Pμ Qα Qε Rα Sβ Sθ Sλ Vα Vβ Vγ Vξ Vq Vυ Wθ  
 Xα; *interlin.* Si; *add. one-line gloss* Cζ denomina] denominabis Eο Mλ Vτ; nomina Pυ;  
 nota Mι Nγ ipsam] *om.* Bβ Cη Pγ; *interlin.* Wι; illam Bγ(*interlin.*); *add. and del.* illam  
 Eζ differentiam] *om.* Eζ Mδ Mν; *add. inter* Bε Eη Xγ; *add. interlin.* graduum Wι  
 de] *om.* Wθ; et Cγ Pν
- 9-10 altitudinem ... longitudinem] *om.* Mπ de ... longitudinis] *om.* Dδ; graduum Cζ;  
 ipsum Dδ; vel usque numerum(?) Differentiam de numero altitudinis Qη

the preceding almucantar and the altitude of the sun, and compare this difference with

## 10 numero longitudinis almucanthat, quod est 6 si almucanthat continet 6

- 10 numero] *add.* graduum Bη longitudinis] *illeg.* Λμ Μα Να; altitudinis Cι ΜΛ Μτ Qβ Vξ Sδ Vτ; altitudinis *corr. in marg. to* longitudinis Vυ; graduum Εμ Οη; illius Εγ; magnitudinis Χγ; unius Cγ Λλ Μι Νγ Οχ Ρζ Qε Sβ(*add. in marg. longitudinis*) Sθ Vγ Wθ; *add. ab* Pο; *add. et* Sκ almucanthat<sub>1</sub>] alimutantarach Sι; almicant<sup>am</sup> Qζ; almicant~ Oβ; almicantarath Eζ; almicantaraz Cδ Oη; almicanthat Pο; almicanthat Wλ; almicanthat Kα; almichancarach Mγ; almichanth Λκ; almi<sup>rath</sup> Pσ; almi<sup>raz</sup> Bκ; almi<sup>th</sup> Qη; alm<sup>trat</sup> Kε; almu Pφ; almu<sup>ant</sup> Eγ; almu<sup>c</sup> Mπ; almucancarach Sη Vο; almucanthat Pα; almucanthat Vτ; almu<sup>cant</sup> Eκ(*cut off*); almu<sup>cant</sup> Eβ Λη Λμ Οζ Qα Qθ; almucantarach Bδ Bθ; almucantarach Qι; almucantarath Bη Λλ Οχ Ρζ Σλ Vγ Qε; almucantarath Bι Eα Eλ Fβ Kδ Λδ Mδ Oγ Qγ Qδ Sβ Vα Vβ Vν; almucantaraz Cζ Eμ Oσ; almu<sup>cant</sup><sup>a</sup>z Sθ; almu<sup>cant</sup>erath Nα Oν Oφ; almu<sup>cant</sup>h' Cι Fα Λβ Μλ Pγ Pδ; almu<sup>cant</sup>har' Dη; almu<sup>cant</sup>harach Pτ Wβ; almu<sup>cant</sup>harath Eδ Fζ Mα Sκ; almu<sup>cant</sup>harath Bβ Bγ Bζ Cη Dγ Eο Λγ Λε Mο Mυ Mφ Oι Oξ Oτ Pμ Pν Pο Pυ Qβ Qλ Rα Sδ Tδ Vξ Vπ Wι Wμ Xα Xγ; almu<sup>cant</sup>harath Gα Mτ Pξ; almu<sup>cant</sup>h Eη; almu<sup>cant</sup>h Kθ; almu<sup>cant</sup>h' Pθ; almu<sup>cant</sup>h'a~ Eο; almu<sup>cant</sup>harath Oυ Vψ; almu<sup>cant</sup>h Cε; almu<sup>cant</sup>harath Xδ; almu<sup>cant</sup>harath Vι Wα; almu<sup>cant</sup><sup>raz</sup> Kζ; almu<sup>rath</sup> Eτ Pι; almu<sup>cant</sup>harach Pβ; almu<sup>cant</sup> Dδ; almu<sup>cant</sup>antarach Mν; almu<sup>cant</sup>antaraz Vυ; almu<sup>cant</sup>harach Mι Νγ; almu<sup>cant</sup>harath Cγ; almu<sup>th</sup> Bε; almu<sup>cant</sup>harath' Mη; almu<sup>cant</sup>harath Vφ; almu<sup>cant</sup>harath Eο quod] qui Bη Cγ Eμ Mι Νγ Oη Ρζ Vπ quod ... almucanthat<sub>2</sub>] *marg.* Pο quod ... continet] *om.* Xα 6<sub>1</sub>] *sex / vi some; sextum* Wβ; *illeg.* Vψ; 16 Wθ; 60 Eυ; idem Sλ; *add.* gradus Bγ(*interlin.*) Bη Bθ Eλ Eυ Kα Λζ Oν Qδ Sη Vο Vπ; *add. and del.* gradus Pι; *add.* quod Sη; *add.* scilicet Cδ Cζ Bη Bθ Bκ Eμ Eυ Nα Oη Oι(*interlin.*) Oν Oσ Pζ(*marg.*) Vυ 6<sub>1</sub> ... continet] *om.* Mο Pυ si] *om.* Bδ Wβ; id est si Eυ almucanthat<sub>2</sub>] alimutantarach Sι; almicant<sup>am</sup> Qζ; almicantarath Pο(*marg.*) Pσ; almicantaraz Cδ Oη; almicanthat Wλ: almicanthat Kα; almichancarach Mγ; almichanth Λκ; almi<sup>raz</sup> Bκ; almi<sup>th</sup> Qη; alm<sup>trat</sup> Kε; almu Pφ Xδ; almu<sup>cant</sup>harath Eζ; almu<sup>cant</sup>h' Fα Mπ; almu<sup>cant</sup>h' Sη; almucancarach Vο; almucanthat Pα; almucanthat Vτ; almu<sup>cant</sup>h' Eβ Λη Λμ Οζ Qα Qθ; almucantarach Bδ Bθ; almucantarach Qι; almucantarath Bη Eκ Pζ Zα; almucantarath Bι Bζ Eα Eλ Fβ Kδ Λδ Mδ Oγ Oι Pξ Qδ Sβ Vα Vβ Vν; almucantaraz Cζ Eμ Oσ; almu<sup>cant</sup>erath Oν Oφ; almu<sup>cant</sup>h Eη Λβ; almu<sup>cant</sup>h' Cι Μλ Pγ Pδ Pθ; almu<sup>cant</sup>har' Dη; almu<sup>cant</sup>harach Wβ; almu<sup>cant</sup>harath Eδ Fζ Sκ; almu<sup>cant</sup>harath Bβ Bγ Cη Eο Λγ Λε Mυ Mφ Oξ Oτ Pν Pο Qβ Qλ Rα Sδ Tδ Vι Vξ Vπ Wι Wμ; almu<sup>cant</sup>harath Gα Mτ; almu<sup>cant</sup>h Kθ; almu<sup>cant</sup>h'a~ Eο; almu<sup>cant</sup>harath Oυ Vψ; almu<sup>cant</sup>h Cε; almu<sup>cant</sup>harath Wα; almu<sup>cant</sup><sup>raz</sup> Lζ; almu<sup>rath</sup> Eτ Pι Qγ; almu<sup>cant</sup>harach Pβ; almu<sup>cant</sup> Dδ; almu<sup>cant</sup>antarach Mν; almu<sup>cant</sup>antaraz Vυ; almu<sup>th</sup> Bε Dγ; almu<sup>cant</sup>harath Vφ; almu<sup>cant</sup>harath' Mη; *add.* quod est sex Pγ continet] *om.* Eδ Eζ Gα Mν Pζ Pο Rα Sβ; contineant Oη Sι Vα Vυ; contineat Oφ; sit Qη 6<sub>2</sub>] *sex some; unum* Vτ
- 10-11 quod ... gradus<sub>2</sub>] *illeg.* Oβ si ... 6] *om.* Xγ si ... 3<sub>1</sub>] *om.* Pτ si ... gradus<sub>2</sub>] *om.* Nα 6<sub>2</sub> ... continet] *marg.* Pι
- 10-12 si ... 3] *marg.* Sβ si ... aliis] *om.* Cγ Eγ Λλ Μα Μι Μγ Νγ Οχ Qε Σλ Vγ Wθ; *marg.* Pζ

the longitudinal number<sup>2</sup> of the almucantar, which is six if the almucantar comprises 6

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<sup>2</sup> I.e., the number of longitudinal degrees between each pair of almucantars.

## gradus et 6 gradus; quod si almucantarath contineat 3 gradus et 3, denomina partem

- 11 gradus<sub>1</sub>] *om.* Mv Mφ Qα Vι Wα; graduum Gα; signa Fζ Qι et 6 gradus] *om.* Bβ Bε Bζ Bη Bθ Bι Cζ Dγ Dη Eη Eλ Eμ Eο Eρ Ev Kα Kδ Kε Kθ Lδ Lμ Mγ Mλ Mτ Nα Oγ Oζ Oη Oφ Pζ Pμ Pρ Pφ Qγ Qζ Qη Qθ Sη Si Vβ Vν Vξ Vπ Vρ Vτ Wβ Wλ Xδ Zα; *del.* Sk Vφ gradus<sub>2</sub>] *om.* Bγ Cη Eτ Pγ Pi Wi quod] et Dγ; ne Vρ; vel 3 Qη quod si] *om.* Lε Mπ Tδ; *add. in marg.* “Quod si almucantarath” usque ad litteram exclusuram “Postea scito motum almuri” est addita tamen utilis et bona Vβ quod ... 3<sub>1</sub>] *marg.* Eζ(*later hand*) quod ... 3<sub>2</sub>] *om.* Qζ Vξ; 3 gradus Kα; et 3 Mv; et si contineat 3 Mλ; et si 3 gradus Bδ Bε(*add. et cetera*) Cε Ci Eα Eβ Eδ(*om. si*) Eη Fα Fζ Kδ Kε Lβ Lδ Lε Lη Lκ Lμ Mδ Mη Mo Mv Nφ Oγ Oζ Oi Oξ Ot Ov Pα(*add. interlin. almucancharat contineat*) Pβ Pδ Pθ Pv Pρ Qγ Qδ Qθ Qi Qλ Sη Sk(*add. in marg. continet*) Vι Vφ Vψ Wα Wμ Xδ Zα; et si 3/tres Mτ Pξ; et 3 gradus Eζ Eλ Po Pv Rα Sβ Xα Xγ; si vero 3' gradus Eρ; vel 3 gradus Vτ si] *om.* Oβ almucantarath] *illeg.* Nα; abimutantarach Si; almichancarach Mγ; almicantarath Cδ; almicantaraz Oη; almi<sup>th</sup> Qη; almi<sup>raz</sup> Bκ; alm<sup>raz</sup> Lζ; almu<sup>atath</sup> Eτ; almuc<sup>p</sup> Eζ(*later hand*); almucan Pφ; almucancarath Vρ; almucant' Qα; almucantarath Bη Ek Pζ; almucantarath Bζ Bθ Bi Fβ Vα Vβ; almucantaraz Cζ Oσ; almucanterath Oφ; almucanteraz Ov; almucanth' Pγ; almucanthar' Dη; almucantharach Wβ; almucantharath Bγ Cη Ev Lγ Qβ Tδ Vπ Wi; almucantharaz Eμ; almuch Kθ; almucha<sup>r</sup> Eο; almu<sup>rath</sup> Lε Pi Sδ Vν; almut Dδ; almutantaraz Vν; almu<sup>th</sup> Bβ Bε Dγ almucantarath ... 3<sub>1</sub>] *om.* Kα contineat] contineant Cζ Pζ Pi Va; continet Vν; sit Qη; *add. et si* Tδ 3<sub>1</sub>] *interlin.* Bγ; sex Va et 3<sub>2</sub>] *om.* Bη Bi Bκ Dη Fβ Kα Kθ Lγ Lδ Mπ Oβ Pζ Pi Qβ Qη Sδ Va Vρ; et si 3 Nα; *add. gradus* Cδ Cζ Dγ Bζ Bθ Eζ Ek Eμ Eο Ev Lζ Mγ Mλ Nα Oη Ov Oσ Oφ Pτ Pφ Vβ Vν Vπ Vν; *add. numerus quibus possunt almicantaraz cressere* Oη 3<sub>2</sub>] tres *some* denomina] denominabit Eο Mλ Oφ Pφ Vν; denominabut Dγ; nomina Kα; *add. half-line gloss* Cζ



degrees and 6 degrees; but if the almucantars comprise 3 degrees and 3, compare the part

illorum de 3; et sic de aliis. Postea scito motum almuri ab initio primi almucantharat

- 12 illorum] illam Eα; illarum Cδ; ipsorum Bθ Kε Qζ Vπ; istorum Vξ de 3] *om.* Eλ  
 3] tribus/3<sup>bus</sup> *some*; *add.* gradibus Dη Kε et ... aliis] *om.* Sβ sic de aliis] *illeg.*  
 Bη Lμ Vφ; aliis Vι; *marg.* [cut off] de aliis Mτ; cetera Bε Kα Zα; de aliis Eν Pι; et tribus Bβ;  
*add.* numerus quibus possunt almicantaraz crescere Cζ; *add.* half-line gloss Cζ Postea]  
 Deinde Ek scito] cito EQ; scias Qη; *add.* introytum id est Cγ; *add.* in t<sup>a</sup>uiia Eγ  
 scito ... almucantharath] *om.* Kα motum] *om.* Kδ; gradum Kε Lμ Mτ Qζ; *add.*  
 quod in limbo describit movendo ipsum gradum solis ab initio precedentis  
 almucantharat ad eius finem et Bζ almuri] *om.* (i.e., lacuna) Bδ; albimuri Sι; almmuri  
 Oβ; almurei Mν; almury Lδ; *add.* interlin. id est denticuli Oι initio] fine Dγ Mλ Vτ;  
*add.* id est que est tota in denominacione illorum graduum quos pertransunt almuri in  
 motu suo ab initio Oη primi] *om.* Eλ Nα; 1<sup>i</sup> Lμ; precedentis Dγ Mλ Vτ  
 almucantharat] alm<sup>at</sup> Bη Kε; almicanct<sup>am</sup> Qζ; almicantarath Pσ; almicantaraz Cδ Oη;  
 almicantharath Eζ Pο; almicanthrat Wλ; almichancarach Mγ; almichanth Lκ; almi<sup>raz</sup> Bκ;  
 almit~ Oβ; almitantarach Sι; almi<sup>th</sup> Qη; almuc' Mπ Oζ; almucancarach Sη; almucancarath  
 Vρ; almucancharath Pα; almucanrath Vτ; almucan<sup>raz</sup> Oν; almucant' Fα Lη Lμ Qα Qθ;  
 almucantar~ Sβ; almucantarach Bδ Bθ Pτ; almucantarach Qι; almucantaras Nα;  
 almucantarath Lλ Oχ Pζ Qε Sλ Vγ Wθ; almucantarath Bζ Bι Eα Eλ Fβ Gα Kδ Lδ Mδ Oγ  
 Oυ Pξ Pφ Qγ Vα Vβ; almucantaraz Cζ Eμ Lζ Oσ Sθ; almucanth' Cι Dγ Eβ Eη Lβ Mλ Pγ;  
 almucanthar' Dη; almucantharach Wβ; almucantharat Eδ Fζ Mα Oτ Pυ Sκ Zα;  
 almucantharath Bβ Bγ Cη Eρ Eν Lγ Lε Mο Mυ Mφ Oι Oξ Pδ Pμ Pν Pρ Qβ Qδ Qλ Rα Sδ  
 Tδ Vι Vν Vξ Vπ Wι Wμ Xγ; almucantrath Mτ; almuc'a<sup>th</sup> Xα; almuch Kθ; almuchan Xδ;  
 almuchantarath Vψ Wα; almuchanth Cε; almuchantharat Pθ; almucha<sup>r</sup> Eο; almu<sup>rat</sup>(?) Eγ;  
 almu<sup>rat</sup> Eτ Pι; almuscantarach Pβ; almut Dδ; almu<sup>ta</sup> Oφ; almutantarach Mν; almutantaraz  
 Vυ; almutanterach Mι; almutantherach Nγ; almutantrat Cγ; almu<sup>th</sup> Bε; almuthanth' Mη;  
 almuthantharat Vφ; *illeg.* Eκ; *add.* In quo est altitudo Oβ Pμ; *add.* interlin. in quo est  
 altitudo [*illeg.*] Pα

of them with three, and so for the others. Then observe the movement of the muralidade<sup>3</sup> from the beginning of the first almucantar

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<sup>3</sup> In these chapters the term *almuri* (*muri*) meaning “pointer”, “indicator”, “hand” has been transferred to the alidade or rule. The complete term is *al-murī al-<sup>c</sup>iḏāda* ( المرعي العضاذة ). See Kunitzsch, *Glossar*, no. 32b, p. 539.

usque ad initium secundi de gradibus marginis; et pone super illorum partem  
denominatam ab eis, secundum proportionem differentie dicte, ex 6 vel de 3

- 13 ad] *om.* Eζ; *add.* finem eius inter gradus marginis et pone almuri super partem illorum et cetera usque ad Pμ initium] numerum Cγ et ... partem] et super rem illorum pone *illeg.* Eη secundi] 2<sup>1</sup> Lμ; *illeg.* Nα; id est secundus Bι(*interlin.*); sequenti Eλ Vτ; *add.* almucanthat Zα; *add.* almuri his(?) contrat Kα; *add.* gradus Qη; *add.* quota sint ipsa differentia numeri primi almicantaraz usque ad initium secundi Oη de] *om.* Eα Mν Po; in *corr. to* de Eζ gradibus] gradus Mν Oφ; gradus *corr. in marg.* Mτ; gradus altitudinis Eα; *add.* in Mι marginis] magnis Pφ Vι; marginibus Wβ; *add.* id est limbi Kθ Lδ Oγ; *add. one-line gloss* Cζ pone] *twice* Qυ; *add.* almuri Cζ Eμ(*interlin.*) Eλ Kδ Oβ Oη Pθ Vτ; *add.* id est almuri Qζ; *add.* scilicet almuri Bθ Eυ Vπ; *add.* notam Bδ Bε Dη Eβ Fα Fζ Kα Kε Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mo Mπ Mτ Mυ Mφ Nα Oγ Oζ Oi Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Sη Si(*marg.*) Tδ Vι Wα Wμ Xδ Zα super] si per Bδ; *add.* eos Dγ Mλ Oφ(*interlin.*) illorum] *illeg.* Nα; eorum Eυ; illam Mδ; ipsorum Mτ; istorum Qζ Vξ; *add.* graduum Lδ Oγ partem] notam Dδ; *add.* illorum Eρ; *add.* pone numerum Fβ; *add. interlin.* id est almuri Kε; *add. interlin.* notam Qη; *add. two-line gloss* Cζ
- 14 ab eis] et aleis Vτ eis] eius Pγ; *add.* gradibus Mυ Vι secundum] *add.* differentiam Xα proportionem] *add.* diem Oβ differentie] *rep.* Eλ dicte] *om.* Mα Pι; denotate Qα; predicte Cγ Lγ Mι Nγ Oχ Pζ Qε Sβ Sθ Vα Wθ ex] de Bζ Bη Cζ Ek Eλ Eμ Eo Kε Mγ Pφ Qζ Qη Vν Vξ Vτ; in Oχ; *corr. to* de Wι 6] sex / vi *some* vel] idem Oφ Pφ Si de] *om.* Bι Cι Kδ Oβ Oγ Pθ Qα Qη Vα Vυ Xδ; ex Bθ Dδ Pι Vπ Vρ 3] tribus / 3<sup>bus</sup> *some*
- 14-15 vel ... gradibus] *om.* Cγ Eγ Lλ Mα Mι Nγ Oχ Pζ Qε Sθ Sλ Vγ Wθ; *interlin.* Sβ

as far as the beginning of the second [mark] along the degrees on the margin, and place on the part of them compared with them,<sup>4</sup> according to the proportion of the said difference, from 6 or from 3

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<sup>4</sup> That is, the proportion (between two almucantars) of the position of the muri-alidade which has been observed should then be applied to the degrees along the rim.

## 15 gradibus; et tunc habebis certum gradum inter duo almucantharat; et tunc considera

15 gradibus] *om.* Bδ Bε Bη Bκ Cδ Dδ Dη Eβ Eη Eκ Eμ Fα Fβ Fζ Kα Kε Lβ Lγ Lδ Lε Lζ Lη Lκ Mδ Mπ Oγ Oη Oι Oν Oξ Oσ Oτ Oυ Oφ Pα Pβ Pμ Pν Pξ Pσ Pφ Qβ Qζ Qθ Qι Qλ Sδ Sι Tδ Vα Vξ Vυ Wμ Xδ; *marg.* Wα; g<sup>a</sup> Pτ; gra Pι; tolle Dγ Mγ Vτ Vυ; vel duobus Zα; *add.* tolle Bζ Eλ; *add. in marg.* “vel de tribus gradibus” est littera addita Vβ gradibus ... duo] *om.* Pρ et<sub>1</sub>] ex Dη et<sub>1</sub> ... almucantharat] *om.* Qη tunc<sub>1</sub>] secundum hoc Qβ habebis] habebitis Cζ; *add.* locum Oχ certum] *illeg.* Oχ; 3/trium Pτ Pυ Xγ; certitudinem Mλ; *add.* diem Vτ; *add.* locum Bγ(*interlin.*) Bζ Bη Bθ Bκ Cγ Cδ Cζ Dδ Dγ Eγ Eκ Eλ Eμ Eο Eυ Lζ Lλ Mα Mγ Mι Oβ Oη Oν Oφ Oχ Pζ Pφ Qα Qε Sβ Sθ Sι Vα Vβ Vυ Vπ Vυ Wθ; *add.* numerum Wβ; *add. and del.* partem Qδ; *add. in marg.* scilicet locum Oι gradum] *om.* Pσ; *interlin.* Qθ; gradus Bζ Bκ Cγ Cδ Cζ Eκ Eλ Eο Lζ Oν Pζ Vπ; *add.* dictum Mπ; *add.* solis Eμ(*interlin.*) Eλ inter] *om.* Eο; intra Mι Nγ inter duo] *illeg.* Nα duo] *om.* Cε Mτ Pσ Qζ; 2 some; duas Bζ Cζ Dγ Eο Lζ Mα Mγ Mλ Oη Oν Qι Vγ Vυ Vτ; duos Cδ Mο Mυ Mφ Oσ Oυ(*add. interlin.* vel duas vel duo) Oχ Pβ Pζ Pφ Qα Qε Sβ Sθ Sι Sλ Vα Vβ Vι Vυ Wα Wθ; 3 Xα almucantharat] al Xδ; alimutantarach Sι; alm<sup>at</sup> Kε; almicanct<sup>am</sup> Qζ; almicantharat Cδ; almicantharath Pσ; almicantharaz Bκ Oη; almicantharaz Oν; almicantharath Eζ Pο; almicanthrat Kα; almichancarach Mγ; almichanth Lκ; almit~ Oβ; almu<sup>at</sup> Bη; almuc’ Fα; almucan’ Mπ; almucancarach Sη; almucancarath Vρ; almucanrath Vτ; almucant’Lη Lμ Oζ Qα Qθ; almucantar~ Sβ; almucantarach Bδ Bθ; almucantarath Eκ Oχ Pζ Qε Sλ Vγ Wθ Zα; almucantarath Bι Eα Eη Eλ Fβ Kδ Lδ Lλ Mδ Oγ Oυ Pα Pξ Pφ Vα Vβ Wμ; almucantaraz Cζ Eμ Sθ; almucantherath Nα; almucan<sup>th</sup> Oφ; almucanth’ Cι Eβ Lβ Mλ Pγ Pδ Pθ; almucantha’ Xα; almucanthar’ Dη; almucantharach Wβ; almucantharat Eδ Lγ Mα Oτ Sκ; almucantharath Bβ Bγ Bζ Cη Fζ Lε Mο Mυ Mφ Oι Oξ Pμ Pν Pρ Pυ Qβ Qδ Qι Qλ Rα Sδ Tδ Vι Vπ Wι Xγ; almucanthrat Wλ; almucantrath Cγ; almucantrath Gα Mτ; almucatharach Pτ; almuchantarath Vψ; almuchanth Cε; almuchantharath Wα; almucharat Eο; almuch<sup>rath</sup> Vξ; almuc<sup>raz</sup> Lζ; almulch Kθ; almu<sup>rat</sup> Eγ Vν; almu<sup>rath</sup> Eτ Pι Qγ; almuscantarach Pβ; almut Dδ; almutantarath Mν; almutantaraz Vυ; almutanterach Mι Nγ; almu<sup>th</sup> Bε Dγ; almuthanth’ Mη; almuthantharat Vφ; *add.* et tunc numerum exentem inter duo almucantharath subtrahe a gradibus almuri in limbo descriptis Bζ; *add. illeg.* Zα tunc<sub>2</sub>] *om.* Vξ; tunch Pβ considera] *om.* Pξ

degrees; and then you will have the exact degree between the two almucantars; and then consider

eas horas et cetera, sicut dictum est superius.

Si<sup>5</sup> illud idem in nocte scire desideras, accipe altitudinem alicuius stelle in

- 16 eas] *om.* Cγ Dγ Eγ Eλ Kα Kθ Lλ Mα Mγ Mι Mλ Nγ Oν Oχ Pζ Pι Qε Sβ Sθ Vγ Vν Vυ Wθ; has Mτ; illas Cε eas horas] eam horam Cζ Eμ Oη; *add.* supra quam cecederit gradus solis vel nadir gradus solis et illa est presens hora diei vel noctis Oη et cetera] *om.* Bβ Bη Dγ Dη Kδ Mυ Oβ Pι Qη Vν Vξ Vυ Vψ Xγ; astedece (?) Eλ; et est Eα cetera] *om.* Gα Mγ Mλ Oξ Qθ; alius Vτ; *add.* 32 line gloss Cζ sicut] *illeg.* Bη; ut Ek est] *om.* Vq; *add.* tibi Dγ Mγ Mλ Vν superius] *om.* Bκ Gα Mι Nγ Vγ; prius Eq Oσ Qα Vυ Zα; prius superius Vπ Vτ
- 17 before Si] *add.* AD HABENDUM HORAM ET ASCENSIONEM SIVE ASCENDENTEM PER STELLAS IN NOCTE Vξ; *add.* AD HABENDUM HORAM VEL ASC[END]ENS IN NOCTE PER STELLAS Mλ; *add.* AD HABENDUM HORAS ET ASCENDENS IN NOCTE PER STELLAS Eq; *add.* AD INVENIENDUM HORAS ET ASCENDENS IN NOCTE PER STELLAS Eo Gα; *add.* AD INVENIENDUM HORAS ET ASCENSIONES IN NOCTE PER STELLAM Mγ; *add.* DE EODEM IN NOCTE Mι Nγ Pζ Vβ; *add.* DE PREDICTIS IN NOCTE Vγ; *add.* 5. DE PREDICTIS INVENTIONE Lλ; *add.* DE SCIENDE PROPORZIONE IN ALTITUDINIS IN NOCTE Dγ; *add.* ITEM DE EODEM IN NOCTE Oχ; *add.* ITEM DE INVENTIONE ASCENDENTIS PER STELLAS FIXAS IN RETHI POSITAS DE NOCTE CERTITUDINALITER. Oφ Si] *om.* Cγ Oχ; Et Oβ; Sed Oη Xα; Sed si Oσ; *add.* etiam Eλ; *add.* vero Cδ illud] *om.* Oν Pι; istud Cα Vυ illud idem] i<sup>d</sup> Wλ idem] *om.* Gα Lδ Oγ; *interlin.* Sβ; *add.* etiam Bζ Bη Bκ Cζ Eμ Eo Lζ Lλ Mα Mγ Oη St Vα Vυ; *add.* facies Cγ in<sub>1</sub>] *om.* Wι; de Dδ Ek in nocte] *marg.* Qθ; *add.* etiam Wθ; *add.* si Cγ scire] videre Wθ scire desideras] consideras Pτ; queras Ek desideras] consideras Kα Mo; volueris Cδ Lβ Pβ accipe] tunc Pι; *add.* id(?) Bε alicuius] *om.* Sλ; ~~ipsius~~ Pν; *add.* gradus Vτ stelle] *marg.* Sκ; *add.* fixe Bζ Bη Bθ Bι Bκ Cα Cγ Cδ Cζ Dγ Eγ Ek Eλ Eμ Eo Eq Et Eu Gα Lβ(*marg.*) Lζ Lλ Mα Mγ Mι Mλ Mo Nα Nγ Oβ Oη Oι(*marg.*) Oν Oσ Oφ Oχ Pγ Pζ Pι Pτ Pυ Pφ Qα Qδ Qε Qη Rα Sβ Sη Sθ Si Sλ Vα Vβ Vγ Vν Vπ Vq Vτ Vυ Vφ Wθ Wλ Xα Xγ in<sub>2</sub>] *om.* Cε

<sup>5</sup> A minority of mss treat this as the beginning of a new chapter; hence the added titles in some.



these hours, etc., as was said above.

If you were to wish to know the same thing at night, take the altitude of any star marked on

## alhanabuz descripte, que transit ex parte orientis vel occidentis, et pone cacumen

- 18 alhanabuz] *illeg.* Xγ; abmimatantarach(?) Sι; ailancabut/allancabut Vγ; alaantibuz Pζ;  
alacantabuz Sλ; alahantabuth Oβ; alancabud Eκ; alancabut Eγ Mα Mγ Mλ Qα;  
alancabuth Oη Vβ; alancabuut Wθ; alanca•cabut Sη; alanchabuch Dγ; alanchabuth Eμ;  
alanctabuz Cδ; alangabut / alanganbut Vα; alantabur Bκ Cα; alantabut Bζ Eο Mι Nγ Vν  
Vυ; alantabuth Bθ Cζ Eα Vπ; alantabuz Bδ Dδ Lζ Lη Oι; alanthabut Bη; alanthabuth Qη;  
alanthabuz Cγ Oσ; alcantabuth Qδ; alcatabuth Bι; alcuthabuth *corr. in marg. to*  
alahancabut Vφ; alencabuth Mo Pτ Pυ Rα Vρ Xα; alentabuch Eρ; aletabuch Vτ; alhanbuth  
Pγ; alhancabuch Ov; alhancabutz Qi; alhancabuz Cε; alhanhabuch Kθ; alhanhabuth Mτ  
Pi; alhanab<sup>t</sup> Fα; alhanabm Pρ Vψ; alhanabur Pν; alhanabus Wλ; alhanabut Oχ;  
alhanabuch Wβ; alhanabuth Bγ Dη Eδ Eζ Eλ Eυ Kδ Kε Lβ Mν Po Qζ Vξ Wi Zα;  
alhanabut/z Pα; alhanabuz Bε Eβ Eη Fβ Fζ Lγ Lδ Lε Lμ Mδ Mυ Mφ Oγ Oζ Oξ Oτ Oυ  
Pβ Pθ Pμ Pξ Pσ Qβ Qγ Qθ Qλ Tδ Vi Wα Wμ; alhanabuz Mπ; alhanhabuth Bβ Cη Eτ;  
alhanhabuz Ci Mη Pδ Sκ; allaancabut Qε; allancabunt Sθ; allancabut Lλ Sβ; allancabuz  
Sδ; almicabuth Gα; alphantabuz Kα; halantabut Oφ; halhantabut Xδ; almichanth Lκ;  
almucantarath Pφ; aranea Nα; *add. interlin. illeg.* Sη; *add. et rethi* Oβ; *add. id est aranea* Oι;  
*add. id est rethi* Bβ Bη(*interlin.*) Fβ(*interlin.*) Kθ(*interlin.*) Mπ(*interlin.*; rete) Qi Vβ(*interlin.*)  
descripte] *om.* Cζ Eμ Oη; describe Mυ Mφ Vi; *add. ex(in Dη)* parte illa Bδ Dζ Dη Eβ  
Eη Fα Fβ Fζ Kα Kε Lβ(*and del.*) Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mυ Mφ Oγ Oι Oξ Oτ Oυ  
Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qη Qθ Qi Qλ Sδ Tδ Vi Wα Wμ Xα que] qua *some*;  
quo *some*; qui Sκ que transit] *om.* Dγ Eλ Mλ Vν Vτ; *add. interlin. scilicet* Oι ex]  
in Pρ orientis] *add. si est ante medium noctem* Kα vel] et Cγ Eδ; *add. ex parte*  
Bδ Bε Bζ Dδ Dη Eβ Eη Eμ Fα Fβ Fζ Kα Kε Lγ Lδ Lε Lη Lκ Lμ Mπ Mτ Mυ Mφ Oγ Oζ Oη  
Oι Oξ Oτ Oυ Pα Pβ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Tδ Vi Wα Wμ Xδ Zα  
occidentis] *add. si post* Kα cacumen] accumen Nα Vτ; acumen Cδ Dγ Mλ Wα;  
alumen Eλ; cacum Eο(*and add. in marg. ał cacumen*)

the hantabuz [i.e., rete] which crosses from the east or the west, and place the cacumen [i.e., tip of the star-pointer]

ipsius stelle in almucanthatrat sue altitudinis, et gradus solis indicabit tibi horas noctis,

19 ipsius] *illeg.* Mγ; *om.* Cγ Dη Eγ; illius Bβ Bγ Bθ Cα Cδ Cη Dδ Eτ Eυ Kε Kθ Lδ Mι Mπ Mτ Oγ Oν Oφ Pγ Pμ Pφ Qδ Rα Sη Sλ Vξ Vπ Wβ; istius Oβ; ius [= illius or ipsius] Vι ipsius stelle] *om.* Bη Cζ Eμ Oη stelle] *om.* Kα; *marg.* Mτ; *add.* in altitudinem Kθ almucanthatrat] *illeg.* Nα; alm<sup>at</sup> Kε; almicant' Oβ; almicantarath Pσ; almicantaraz Bκ Cδ Oη; almicanterth Oν; almicanthatrat Pο; almicanthrat Wλ; almicanthatrat Kα; almicanthatrat Mτ; almicanthatrat Eζ; almichancarach Mγ; almichanth Lκ; almi<sup>ctam</sup> Qζ; almitantarach Sι; almi<sup>th</sup> Qη; almu Bη; almuc' Mπ Pθ Sκ; almucancarach Sη; almucancarath Vο; almucanthatrat Vτ; almicant' Eβ Fα Lβ Lη Lμ Qα; almucantar~ Sβ; almucantarach Bθ; almucantarath Eκ Lλ Oχ Pζ Qε Qθ Sλ Vα Vγ Wθ; almucantarath Bδ Bζ Bι Eα Eη Eλ Eρ Eυ Fβ Fζ Kδ Lγ Lδ Mδ Oγ Oι Oυ Pξ Pφ Vβ Vπ; almucantaraz Oσ Sθ; almucanteras Cα; almucanth' Cι Dγ Mλ Oζ Pγ Pδ Vι; almucanthatrach Pτ Wβ; almucanthatralz Dη; almucanthatrat Mα Pυ Zα; almucanthatrach Cη Mο Mυ Mφ Oξ Oτ Pα Pμ Pν Pρ Qβ Qδ Qι Qλ Tδ Vν Vξ Wι Wμ Xα Xγ; almucanthatrit Eδ; almucanthatrat Gα; almuchantarath Vψ Xδ; almuchantaraz Eμ; almuchant'at Lε; almuchanth Kθ; almuchanthatrach Wα; almuchara<sup>t</sup> Eο; almuc<sup>rath</sup> Pι; almuc<sup>t</sup> Cε; almu<sup>rat</sup> Eγ; almu<sup>rath</sup> Eτ Qγ Rα Sδ; almu<sup>raz</sup> Lζ; almuscantarach Pβ; almut Dδ; almutantarach Mν; almutantaraz Vυ; almutanterach Mι Nγ; almu<sup>th</sup> Bε Oφ; almuthantarath Bβ Bγ; almuthanth' Mη; almuthanthatrat Vφ; almutrantar Cγ; *add.* ca't Lμ sue] illius Mπ; *illeg.* Zα sue altitudinis] *add.* accepte Mο; *add.* accepte per regulam in dorso matris Bδ Bε Dδ Dη(*om.* matris) Eβ Eη Fα Fβ Kα Kε Lβ Lγ Lδ Lε Lη Lμ Mδ Mπ Mφ Oγ Oζ Oι Oτ Oυ Pα Pβ Pμ Pρ Pσ Qβ Qγ Qδ Qζ Qθ Qλ Sκ(*marg.*) Wα Wμ Xδ; *add.* accipe in dorso matris Mτ; *add.* accipe per regulam in dorso matris Mυ Pν; *add.* in *marg.* si vero fuerit in medio celi stella illa dimittes eam Oσ gradus] gradibus Oχ solis] *om.* Eρ Oυ Pι Vφ; *add.* et ipse Mτ indicabit] ostendit Pι tibi] *om.* Eκ Vν Vρ; *add.* gradus solis Cα horas] hora seu horas Kα; *add.* inequales Cα

19-20 noctis ... horas] *om.* Wθ

of this star on the almucantar of its altitude, and the degree of the sun will indicate to you the hours [or hour] of the night,

20 sicut nadir eius horas diei; de aliis fac omnibus, ut dictum est superius.

20 sicut] *om.* Pγ; *twice* Sκ nadir] gaudair Sκ; gnadair Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Dδ Mπ; nadair Bι Dη Eα Eβ Eδ Eμ Eτ Eν Fα Fβ Lβ Lγ Lε Lζ Lη Mν Mφ Oζ Oι Ov Oξ Pα Pμ Pν Pξ Po Pσ Pυ Qα Qγ Qλ Sδ Sη Vβ Vι Vν Vπ Vρ Xγ; nadayr Bγ Cδ Fζ Oσ Pγ Pτ Qβ Qδ Tδ Wι Xδ; nadayz Cη; nadire Vα; nardir Bδ Mι Nγ; nadyr Cα Mδ Oφ Pι Qη Qθ Vξ Vφ Wλ; nazare Mυ; vadair Mγ; vadir *corr. in marg. to* gnadair Wα; *add. in marg.* id est oppositum Ov eius] *om.* Ov Wλ; *interlin.* Cδ; eiusdem Dη horas] hora Vρ; *interlin.* Bγ Oι Wβ; *om.* Bβ Bδ Bε Cι Cε Cη Dδ Eα Eβ Eδ Eζ Eη Eτ Fα Fβ Fζ Kα Lβ Lγ Lδ Lε Lη Lμ Mδ Mη Mλ Mν Mo Mπ Mυ Mφ Nα Oγ Oζ Oξ Oτ Ov Pα Pβ Pγ Pδ Pθ Pμ Pν Pξ Po Pρ Pσ Pτ Pυ Qβ Qγ Qδ Qθ Qι Qλ Sδ Sη Sκ Tδ Vι Vψ Wα Wι Wμ Xγ Xδ Zα; *add. inequales* Cα horas diei] *illeg.* Kθ diei] *om.* Bβ Eκ Eο; dies Eμ; *add.* id est si ceciderit cacumen stelle inter duos(duas Oη) almucantaraz(almicantaraz Oη) equabis sicut prius Cζ Eμ(*interlin.*) Oη; *add.* et non tuum indicabit tibi gradus solis horas inequales noctis sed etiam equales Cα aliis] illis Wθ; *add.* autem Cα; *add.* etiam Bη Bθ Bκ Cζ Eμ Eτ Eν Lγ Mα Mγ Mι Oχ Pζ Qα Qε Sβ Sλ Vα Vβ Vγ Vν VπVυ Wθ; *add.* etiam diebus Eγ; *add.* etiam horis Dγ Mλ aliis ... omnibus] de partibus horarum fac Pι fac] *om.* Bε Eη Eκ Eρ Vι; *illeg.* Sι; facies Bκ; sit Bι fac ... superius] *om.* Vρ omnibus] *om.* Dγ Eκ Fβ Gα Mλ; etiam diebus Cγ; etiam horis Oφ Pφ Vτ; horis Mγ Sι Vν; otum(?) Bδ ut] *om.* Mπ ut ... superius] *illeg.* Vι; isto modo Bκ; sicut de in superius est Bθ Kθ; sicut dictum est Mι Nγ Wβ; sicut dictum est superius Bζ Bι Cα Cδ Cε Cι Eλ Eο Eρ Lλ Mα Mγ Mη Mλ Mo Oσ Oφ Oχ Pδ Pθ Pι Pτ Pυ Pφ Qα Qδ Qε Sβ Sθ Sκ Vα Vβ Vγ Vν Vπ Vτ Vυ Vφ; sicut dictum est in superioribus Bβ Bγ Cη Dγ Ov Pγ Wι; sicut dictum est prius Wθ; sicut dictum superius Bι Kδ Pζ; sicut distinctum est superius Mν Po; sicut supradictum est Lζ; sicut supra dictum est Vψ; ut dictum est Eκ Mτ(*add. sq.*) Xα; ut dictum est prius Bη Cζ Eμ Oη Qη; ut dictum superius Xδ; ut predictum est superius Lδ; ut supradictum est Cγ Eγ Oγ; *add.* x a Po; *ms* Qα ends<sup>6</sup>

<sup>6</sup> Ms Qα jumps to Cap. 37.

just as its nadir [showed] the hours [or hour] of the day; for all others do as was said above.

[ Comment:

Having observed the altitude of the sun (Cap. 2) move that day's position of the sun (along the ecliptic on the rete) (Cap. 1) to the almucantar for that altitude, on the east if in the morning and on the west if in the afternoon. Lay the ruler on this point and examine the point on the ecliptic opposite to it, that is, the nadir of the sun. The time will be where the nadir lies between the unequal hour lines in the bottom segment of the astrolabe.

If the altitude lies between two almucantars, work proportionately.

The same can be done at night using the altitude of a star (if it is engraved on the rete). In this case, the position of the sun along the ecliptic (and not its nadir) will indicate the unequal hour of the night.

Note: obviously, if the sun's altitude is measured in the morning, the sign of the sun will be rising or ascending; and if measured in the afternoon, the sign will be setting. ]

## [CAPITULUM 4.] DE CREPUSCULO VESPERTINO ET MATUTINO

Cum volueris scire finem crepusculi vespertini et initium matutini, vide cum

- 1 De ... matutino] Bθ Bι Cη Eβ Fα Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Mδ Mo Oζ Pα Pμ Qγ Qλ Tδ Vπ Vψ Xδ; *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Ev Eu Kε Lζ Lκ Mα Mτ Nα Oβ Oσ Ov Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qi Sβ Sθ Si Sl Vα Vv Vτ Vυ Wθ Wλ Xγ; *faded* Eδ; Ad habendum finem et initium crepusculi Mλ; Ad inveniendum crepusculum Dη; Ad inveniendum crepusculum vespertini et initium(*om.* Vξ) matutini Lμ Qθ Vξ; Ad inveniendum horam crepusculi Eo Eρ Gα Mγ; Ad inveniendum horam crepusculi matutini et vespertini Bγ [*Later hand*]; De crepusculis Mι; De crepusculo Nγ; De crepusculo in altitudine et vespertino Cι; De crepusculo vespertino et matiotu(!) matutino Wα; De crepusculo vespertino et matutino (*or* matutino et vespertino) Mη Mφ Oξ Pβ Pδ Pθ Pv Pρ Pv Sδ Sη Sκ Vψ Wμ; De fine crepusculi et cetera Mπ; De fine crepusculi sequitur Qη(*l ter hand*); Capitulum 4<sup>m</sup>. De fine crepusculi vespertini et finis Qδ; De fine crepusculi vespertini et initio matutini(*ma* Wι) Bη(*add. in marg.* Canon 4<sup>us</sup>) Bι(*add. in marg.* 4<sup>m</sup> c) Cζ Eη Eμ(*add. in marg.* 4<sup>us</sup>) Kθ Lδ Oγ Oη Oτ Pζ(*marg.*)Vβ Wι; De fine crepusculi vespertini et matutini et initio Lλ; De fine et initio crepusculi vespertini et matutini Vγ; Invenio cepusculi finis matutini et initium matutini Pο; Inventio finis crepusculi et initium matutini Mυ(*later hand*) Qβ; Inventio finis crepusculi matutini initii vespertini Dγ; Inventio finis crepusculi vespertini cum mat~ Wβ; Inventio finis crepusculi vespertini et initium matutini Eζ Eτ Ov Oφ(*add. in marg.* De finem crepusculi vespertini sciendo) Rα Vι; Inventio finis crepusculi vespertini et initium matutini per lineam crepusculi per 18 almutanter Mv; Inventio finis per lineam crepusculi vespertini et matutini initii Xα; Inventio finis vespertini crepusculi et initium maturini Pτ; Modus accipiendi finem crepusculi vespertini et initium matutini Vρ; Si volueris scire finem crepusculi et matutini Bβ; *add. in marg.* 4 Qζ; *add. in marg.* 4<sup>m</sup> Vψ matutino] meridiano Kα; *add.* Rubrica Vπ
- 2 Cum] Dum Bδ; Si Pι; *add.* autem Bκ volueris] *add.* etiam Ev Vπ finem] *om.* Vτ; *add.* gressi Eα vespertini] *om.* Dγ Pξ; *interlin.* Bε; vertini Nγ et] vel Pι Vτ initium] *om.* Lη; *marg.* Pι; *add.* crepusculi Zα; *add.* vespertini Eδ matutini] *add.* aurore Eλ; *add.* et aurore Vτ



[CHAPTER 4.] ON THE EVENING AND MORNING TWILIGHT

When you wish to know the end of evening twilight and the beginning of early morning [twilight], observe when

venerit gradus solis ad lineam crepusculi occidentalis; tunc est finis eius; et cum ad orientalem, est initium crepusculi.

- 3 venerit] eveneris Kδ; fuerit Oγ Xδ; pervenerit Cα Oσ Vυ; *add. and del. dies Gα solis] om. Cι Mη Mλ Wθ ad<sub>1</sub>] et Eο Pρ; add. horam Bζ lineam] finem Eγ; horam Mγ; add. horam Eο crepusculi] add. circuli Eκ; add. vespertini sive Eλ; add. vespertini vel Vτ occidentalis] occidentalem Bβ; vespertini Pι; *corr. from occidentalem Bγ; add. quam Bη Cζ Eμ; add. quare Vπ; add. quare esse Vτ; add. quia Bθ Eλ; add. quoniam Oη occidentalis tunc] om. Cα tunc] illeg. Xγ; om. Bι Bκ Cα Cγ Eδ Eο Eρ Lζ Mγ Mι Mλ Mν Mο Pγ Pζ Pο Pτ Pυ Pφ Rα Sβ Si Vα Vβ Vρ Vι Vν Vξ Vυ Wθ Wλ Xα; interlin. Bγ Vψ; ibi Cδ Sλ; quam tunc Cζ; quare tunc Eυ; qui tunc Wι(marg.) tunc est] om. Bζ Eζ Gα; illeg. Pι; erit Lλ Mα Nγ Oχ Pξ Qε Sθ Vγ; et Dγ; et erit Eγ; interem Eκ; tunc erit Oφ(add. in marg.) est] om. Pδ cum] om. Kα; o Pτ; venerit Pξ; add. venerit Bζ Cγ Dγ Eγ Eλ Eο Mγ Mλ Pδ Vξ Vτ cum ad] tunc Wλ ad<sub>2</sub>] om. Fζ Xδ; add. lineam Eμ(interlin) Oη**
- 4 orientalem] horizontalem Mι; lineam orientalem crepusculi Cζ; orientalis Oη ; *add. tunc Cε Dη Eβ Eη Fα Fβ Fζ Kδ Kε Lβ Lγ Lδ Lκ Lμ Mδ Mη Mτ Mυ Mφ Oγ Oζ Oξ Oτ Pα Pδ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qi Qλ Sδ Sκ Tδ Vi Vψ Wα Wμ Xδ Zα; add. interlin. crepusculi Eμ est] om. Oβ; erit Cγ Lλ Mα Mι Nγ Oχ Qε Sθ Vγ; add. interlin. erit Vβ; add. in marg. ał erit Oφ est ... crepusculi] linea est initium Kα initium] om. Ea crepusculi] marg. Oι; interlin. Kε; illeg. Pξ om. Bδ Bε Cε Cι Eβ Eζ Eη Fα Fβ Fζ Kδ Lγ Lδ Lη Lε Lμ Mδ Mη Mν Mο Mφ Mπ Mτ Oγ Oζ Oξ Oτ Pα Pδ Pθ Pμ Pο Pσ Pυ Qβ Qγ Qδ Qθ Qλ Sδ Sκ Tδ Vi Vτ Vψ Wα Wμ Xδ Zα; et c. Eδ; add. matutini Bβ Dη Eτ Kθ Lκ Pι Wβ Pγ; add. matutine sive orientalis Sλ; add. occidentalis Bη; add. orientalis Bζ Bθ Bι Bκ Cα Cγ Cζ Dγ Eγ Eκ Eλ Eμ Eο Eρ Eυ Gα Kε Lζ Lλ Mα Mι Mλ Mγ Nγ Oβ Oη Oι(marg.) Oν Oσ Oφ Oχ Pζ Pτ Qε Qη Pφ Rα Sβ Sθ Si Vα Vβ Vγ Vξ Vπ Vρ Vν Vυ Vψ Wθ Wλ Xα; add. orientalis id est aurore Vτ; add. orientalis sive aurore Eλ; add. orientalis sive matutini Cδ; add. illeg. Xγ*

the degree of the sun comes to the line of the western twilight; then this is its end; and when [it comes] to [the line] of the eastern [twilight], it is the beginning of [morning] twilight.

5 Vel<sup>1</sup> sic; vide quam nadir solis venerit ad 18 gradum almucantharat in oriente,

- 5 *before Vel] add. ALITER IDEM Cη; add. ALIUS MODUS Bβ; add. DE EODEM Sη Wι; add. DE EODEM ALITER ATQUE MELIUS Mλ; add. DE EODEM ALITER ET MELIUS. CAPITULUM Wβ; add. DE EODEM ET MELIUS ET CETERA Kθ; DE EODEM SCILICET MELIUS Pυ; add. DE EODEM SED MELIUS Bθ Pδ Vπ(add. RUBRICA); add. ITEM DE EODEM ALIO MODO ET MELIUS Vβ; add. ITEM DE EODEM ALITER Eτ; add. in marg. quod idem modus est melior Lδ Vel sic] Aliter de eodem Ov; add. in marg. Istud capitulum “Vel sic” et cetera est additum Vβ sic] om. Bζ Kα Mη; add. de eodem melius Wι; add. et melius Eλ Vξ Vτ vide quam] *illeg.* Xγ; cum Bδ Bε Cι Dδ Eβ Eη Fβ Fζ Kα Kδ Lε Lκ Lμ Mδ Mη Mπ Mτ Mφ Nγ Oγ Oζ Oι Oξ Oφ Oτ Pα Pβ Pθ Pι Pμ Pν Pξ Pρ Pσ Qβ Qγ(*interlin.*) Qζ Qθ Qι Qλ Sδ Sδ Tδ Vφ Vψ Wα Wμ Xδ Zα; vide cum Bζ quam] *interlin.* Pο; quando Ov Pυ Vβ nadir] gaudayr Sκ; gnadair Cε Cι Mη Pδ Pθ; gnadayr Vψ; gnadir Dδ; nadair Bδ Bθ Dη Eβ Eδ Eζ Ev Fa Fβ Lβ Lγ Lε Lη Mυ Mφ Oζ Oι Oξ Oτ Pα Pμ Pξ Pν Pο Pρ Pσ Pυ Qβ Qγ Sδ Sη Vβ Vι Vπ Xγ; nadar Eτ Oγ; nadayr Bγ Eα Fζ Mλ Pγ Pτ Qδ Tδ Wι Xδ; nadayz Cη; nadir *corr. to* nadair Wα; nadyr Mδ Pι Vξ Vφ; naidar Bδ; narctir Nγ; nardir Mι; gradus Mν; *add.* gradus Eλ solis] *om.* Cε ad] *om.* Qι 18] 18<sup>m</sup> *some*; decimoctam Kθ; 8 Pμ gradum] *om.* Kε Oγ; gradus Kδ Lμ almucantharat] almicanrath Mτ; almicanrath Vτ; almicantharath Bζ; almicantharath Kδ Lδ Pξ Pσ; almicantharaz Ov; almich Kθ; almichantharatz Dη; almichanth Lκ; almi<sup>tra</sup> Kε; almuc’ Mπ; almucan<sup>at</sup> Vφ; almucan<sup>rac</sup> Qγ; almucan<sup>rath</sup> Mλ; almucant’ Eβ Fa Lη Lμ Qθ; almucantharath Bδ Bθ; almucantharat Zα; almucantharath Eα Eλ Ev Fβ Mδ Oγ Pφ Qi Vβ; almucant<sup>at</sup> Qζ; almucantherath Nα; almucanth Eη; almucanth’ Lβ Oζ Pγ Pδ Pθ; almucanth’th Vι; almucan<sup>th</sup> Oφ Tδ; almucanthar’ Cι; almucantharath Wβ; almucantharat Fζ Oτ Sκ; almucantharath Bγ Cη Eτ Lε Mυ Mφ Oι Oξ Ov Pα Pμ Pρ Pτ Pυ Qβ Qδ Qλ Sδ Vξ Vπ Wι Wμ Xγ; almucantha<sup>t</sup> Pν; almucantrath Kα; almucath Eζ; almuchanch Cε; almuchantharath Vψ Xδ; almuchantharath Wα; almu<sup>rat</sup> Eδ; almu<sup>rath</sup> Pι Pο; almuscantarath Pβ; almut Dδ; almutantarath Mν; almutanterath Mι Nγ; almuth Bβ; almuthanth’ Mη; almu<sup>th</sup> Bε; lalmucancarath Sη in] versus(?) Pξ oriente] *corr. in marg.* Pι; adunte(!) Vτ; occidente Vι; *add.* tunc Kε(*interlin.*) Vφ*
- 5-6 in ... almucantharath] *om.* Qζ; quia sol 15 gradus lucet ante se 2 partes Mι
- 5-7 Vel ... levis] *add. in marg.* Mλ Vφ; *om.* Bη Bι Bκ Cγ Cδ Cζ Dγ Eγ Eκ Eμ Eο Eρ Gα Lζ Lλ Mα Mγ Oβ Oη Oσ Pζ Pχ Qε Qη Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Vψ Wθ Wλ Xα; *rewritten in 10 lines* Cα

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<sup>1</sup> A minority of mss treat this as the beginning of a new chapter; hence the added titles in some.

Or thus: see [when] the nadir of the sun shall have come to the 18-degree almucantar in the east;

erit finis crepusculi vespertini; et cum venerit ad 18 gradum almucanthat in occidente, erit initium crepusculi matutini, quod est levius.

- 6 erit] *om.* Bδ Vπ; est Oφ Vβ(*add. interlin. erit*) Vφ; *add. sicut* Sk finis] *corr. in marg. from* sicut Mη vespertini] *om.* Ev Oγ; *om. /space* Bδ et ... almucanthat] *om.* Qδ et ... occidente] *precedes* 5-6 (vel ... crepusculi) Ev 18] 18<sup>m</sup> *some*; decimoocto Pσ; 16 Pρ; 19 Qθ cum ... almucanthat] *om.* Mo Vφ gradum] *om.* Oγ; gradus Kδ Lμ; *add. ad* Sη; *add. in* Bζ almucanthat] *om.* Lδ Ov; almi<sup>at</sup> Kε; almicancrath Mτ; almicantar' Dη; almicantarath Kδ Pσ; almicarath Vτ; almich Kθ; almichanth Lκ; almu Oξ; almu' Mπ Oζ; almu<sup>a</sup> Cε; almucancarach Sη; almucan<sup>rath</sup> Lε; almu' Eβ Fα Lη Qθ; almucantarach Bδ; almucantaraht Bζ; almucantarath Lγ Zα; almucantarath Eα Eλ Fβ Mδ Oγ Qi Tδ Vβ Vφ; almucanterath Nα; almucanth' Cι Lβ Lμ Pγ Pδ Pθ Vι; almucanthatrach Wβ; almucanthatrach Fζ Oτ Qλ Sk; almucanthatrach Bγ Cη Mo Mv Mφ Oi Pα Pμ Pν Pρ Pτ Pυ Qβ Sδ Vξ Vπ Wι Wμ Xγ; almucanthatrach Eη; almucath Eζ; almucha Xδ; almucanthatrach Vψ; almucanthatrach Wα; almu<sup>rath</sup> Mλ; almu<sup>rat</sup> Eδ; almu<sup>rath</sup> Eτ Pι Qγ; almuscantarach Pβ; almut Dδ; almut' Mη; almutantarath Mv; almutanterach Nγ; almutantrat Kα; almut Bβ; almu<sup>th</sup> Oφ; al<sup>th</sup> Bε; *add. quare sol 15 gradus lucet ante se et post* Nγ
- 6-7 finis ... erit] *om.* Pζ vespertini ... crepusculi] *om.* Ev
- 7 erit] *om.* Mo; est Bβ Bγ Bζ Cη Dη Eτ Kθ Mλ Mv Nα Ov Po Pτ Sη Vξ Vπ Wι Xγ; et Bδ; hoc Kα; iste modus Dη initium] finis Oφ; *add. vespertini* Eα initium ... matutini] crepusculum matutinum Vτ quod] et hec Bβ Bγ Cη Eα Eδ Eζ Mλ Mv Nα Pγ Pτ Vβ(hoc) Vξ(hoc) Wα Wι quod ... levius] *om.* Bζ Pι Vτ Zα; de omnibus [*illeg.*] sicut dictum est superius fac Xγ; et hoc est melius dicitur Mo; et hoc melius Bθ Ev Qδ Vπ Vφ est] *om.* Pγ Vξ; erit Cι Dδ Eβ levius] levis Cη Pγ; levus Bβ; melius Dη Nα Pυ Sη; melius quare levius precedente Bγ; *add. et cetera* Bβ; *add. et melius precedente* Eδ Eζ Mλ Mv Ov Po; *add. interlin. al* melius Vβ

this will be the end of the evening dusk; and when it shall have come to the 18-degree almucantar in the west, it will be the beginning of the dawn twilight, which is easier [to perform].

[ Comment:

When the place of the sun on the ecliptic for that day reaches the twilight line (or the twilight almucantar) in the west, the evening twilight is over and full night begins; when it arrives at the twilight line in the east, night ends and dawn begins.

Since working with the sun's position below the horizon might be difficult, the second method is to work with the opposite position (its nadir) above the horizon. Thus twilight ends at night when the nadir of the sun's position crosses the 18° almucantar in the east; and dawn begins when the nadir of the sun's position crosses the 18° almucantar in the west. ]

## [CAPITULA 5.] DE INVENTIONE ARCUS DIURNI ET NOCTURNI

Si vis scire arcum diei et noctis, pone locum solis, id est, gradum in quo est,

- 1 De ... nocturni] *om.* Bδ Bε Bζ Bκ Cα Cγ Cε Cδ Dδ Eα Eγ Eκ Eλ Eν Kε Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Sβ Sθ Si Sl Vα Vν Vτ Vυ Wθ Wλ Xγ; *illeg.* Eζ; *faded* Eδ; Ad extrahendum arcum diei vel noctis per gradum solis Eo Mγ Vξ; Ad habendam arcum diei vel noctis solis alterius Pτ; Ad inveniendum arcum diei et (vel Mυ Qθ Vi) noctis Eτ Mυ (*later hand*) Qθ Vi Wβ (*add.* Capitulum); Ad inveniendum arcum diei sive noctis per astrolabium niimoiuur Mν; Ad inveniendum arcum diei vel noctis per gradum solis Eρ Gα; Ad inveniendum arcum diurnum vel nocturnum Mλ; Ad (7. Ad Lλ) sciendum arcum diei et (idem Lμ) noctis Lλ Lμ Vγ; Capitulum 5<sup>m</sup>. De arcu diurno vel nocturno habendo Qδ; De arcu diei Mπ; De arcu diei et (sive Vβ) noctis Pζ Vβ Vψ; De arcu diei et (vel Eη) noctis inveniundo Eη Lδ Oγ Oτ; De invencione arcum diei vel noctis gradum solis vel alterius Sη Wι; De invencione arcus diei et noctis Dη; De invencione arcus diei et noctis per locum solis Po; De invencione arcus diurni et nocturni Oζ; De inventianda quantitatem arcus diurni sive nocturni per r<sup>ms</sup> Bι (*add. in marg.* 5 c<sup>m</sup>); De quantitate arcus diei et noctis et mora stellarum super terram Bη (*add. in marg.* 5<sup>us</sup>) Cζ Eμ (*add. in marg.* 5<sup>us</sup>) Oη; Inventio (Inventione Dγ) arcus diei vel noctis per gradum solis Bγ (*later hand*) Dγ Oφ (*add. in marg.* De sciendo arcum diei et noctis); Invencio arcus diurni et nocturni Mo; Inventio arcus (archus Xα) diurni sive nocturni solis vel stellarum Rα Xα; Modus inveniendi quantitatem arcus diurni et nocturni Vρ; Scientia arcum diei et noctis. Capitulum Q; Scientia inveniendi arcum diei et noctis Ov; Si volueris scire arcum diurnum vel nocturnum Bβ; *add. in marg.* 6 Qζ; *add. in marg.* 5<sup>m</sup> Vψ arcus] (*and elsewhere*) archus Xδ diurni] diei Pα Zα; dierum Mδ et] sive Bθ Pυ Vπ et nocturni] *om.* Sκ; atque noctis Zα *add.* Rubrica Cη Vπ
- 2 Si] Cum Eλ Mι Nγ Qη Wθ vis] volueris many diei diurnum Kδ et] vel Bβ Dγ Gα Mτ Pι noctis] nocturnum Kδ locum] *om.* Mα; gradum Cγ Eγ Kε Mτ Oβ Pξ Pσ Pτ Qζ Qη; *add. interlin.* id est gradus Vβ locum ... est<sup>2</sup>] gradum in quo sol fuerit in ista die Eλ solis] *om.* Nα Pγ id est] et Vγ Wλ; in Nγ Vτ; primi Eν id est gradum] *om.* Cγ Kε Mτ Pσ; *interlin.* Qζ; in primo gradu Pρ id est ... est] *om.* Pξ id est ... super] fuerit Bζ gradum] *add.* solis Nα Sη Vξ; *add. interlin.* diem Oι quo] *add.* sol Cγ Eγ Oβ Qζ (*interlin.*) est<sup>2</sup>] *interlin.* Mτ; erit Lδ; est sol Cζ Oγ; fuerit Bη Bι Bκ Cα Cγ Cδ Cζ Dγ Eγ Eμ Eο Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Oν Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sl Vα Vβ Vγ Vρ Vν Vτ Vυ Wθ; *add.* isto dic Vτ; *add.* sol Bη Cζ Eκ Eμ Gα Mι Nγ Oι (*interlin.*) Oφ (*interlin.*) Pι Pτ Qη Wλ Zα; *add. interlin.* in zodiaco Bγ



[CHAPTER 5.] ON FINDING THE ARC OF THE DAY AND OF THE NIGHT.

If you want to know the arc of the day and of the night, set the place of the sun, that is, the degree in which it is,

super primum almucanthat in oriente; et nota locum almuri inter gradus limbi. Post

- 3 super] *om.* Cζ Ev Pγ; *interlin.* Mπ primum] *om.* Dη Eο Mλ Oφ; *interlin.* Pτ; *add.* id est  
 orizontem Vψ primum ... locum] *margin.* Pτ almucanthat] orizontem Dη;  
 almi<sup>at</sup> Kε; almicancaraz Oν; almicancrath Mτ; almicanrath Vτ; almicantarath Eζ;  
 almicantarath Kδ Lδ; almicantaraz Cδ Oη; almica<sup>th</sup> Pσ; almich Kθ; almichanth Lκ; almic<sup>raz</sup>  
 Lζ; almi<sup>raz</sup> Bκ; almuc' Cε Mπ; almucancarach Sη; almucancarath Vρ; almucan<sup>at</sup> Bη;  
 almucancharath Mo Pα; almucan<sup>rath</sup> Rα; almucant' Eβ Fα Lη Lμ Qθ; almucantar~ Sβ;  
 almucantarach Bδ Bθ; almucantarath Cα Eκ Pζ Qε Sθ Sλ Vγ Wθ Zα; almucantarath Bζ Bι  
 Eα Eη Eλ Gα Lλ Mδ Oγ Pξ Po Pφ Qi Vα Vβ; almucantaraz Cζ Oσ; almucant<sup>at</sup> Qζ;  
 almucanterath Nα; almucanth' Cι Lβ Mλ Oζ Pγ Pθ Qβ; almucanthatrach Vπ Wβ;  
 almucanthatrat Eδ Mα Oτ Sκ; almucanthatrath Bβ Bγ Cη Eρ Ev Fβ Fζ Lγ Mv Mφ Oι Pμ Pν  
 Pρ Pυ Qδ Qλ Sδ Tδ Vν Vξ Wι Wμ Xα Xγ; almucanthatraz Eμ; almucantha<sup>t</sup> Oξ;  
 almucanth't Vι; almucanthat Kα; almuca<sup>rath</sup> Lε; almucatharat Oχ; almuch' Eο; almuchan  
 Xδ; almuchancarath Mγ; almuchantarath Oυ Vψ; almuchanth' Pδ; almuchanthatrath Wα;  
 almuc<sup>th</sup> Oφ; almu<sup>rat</sup> Eγ; almu<sup>rath</sup> Eτ Pι Qγ; almuscantarach Pβ; almut Dδ; almut' Mη Oβ;  
 almutantarath Mν Sι; almutantaraz Vυ; almutanterach Mι Nγ; almu<sup>th</sup> Dγ Qη;  
 almuthatharat Vψ; almutrantat Cγ; al<sup>th</sup> Bε in oriente] *om.* Cη Eτ Pγ Pξ Qη; *interlin.*  
 Bγ; in occidente Vι; in oientem Fζ; in orizonte Lβ et] *add.* loca Kα nota] *om.* Bε;  
 notate Cζ; notato Eμ Oη locum] *add.* in Pφ almuri] alamuri Oβ; almury Lδ;  
*add.* ex ei Mν; *add. and del.* eundem in ipsis gradibus Mδ almuri inter] almucanthat  
 Kα inter] et Eδ; in Pι; intra Lκ Mv Pμ inter gradus] in gradibus Bζ Bι Bκ Cγ Cδ  
 Cζ Dγ Eγ Eκ Eλ Eμ Gα Lλ Mα Mγ Mλ Nα Nγ Oη Oι Oν Oσ Oφ Oχ Pζ Qε Sβ Sη Sθ Sλ  
 Vα Vβ Vγ Vν Vρ Vτ Vυ Wθ; in gradu Pφ Rα; in gradum Sι; in ipsis gradibus Cα  
 gradus] gradum Cι Fβ Kδ Lκ Mη Oβ Oυ Pν Pρ Vπ limbi] labri Bκ Cα Lζ Mι  
 Mo Nγ Oσ Po Qε Rα Sβ Sθ Sλ Wθ; labri sive limbi Cγ; labtii Vυ; lymbi *some*; sriori(?) Sι;  
*add. interlin.* at labri Vβ; *add. interlin.* id est limbum [*illeg.* = astrolabii?] Bγ
- 3-4 almuri ... locum] *om.* Qη post hec] pone Sι post Qλ post hoc *some*; postea *some*
- 3-5 post ... gradibus] *om.* Oχ

on the first almucantar in the east; and mark the place of the muri among the degrees of the rim. After

hec move gradum solis usque ad occidentem; et nota etiam locum eiusdem in ipsis gradibus; et motus eius ab una nota in aliam est arcus diei. Reliqua vero pars circuli est

- 4 move] morie Sθ; *pone corr.* to move Qη; *add.* rethe et Qβ gradum] locum Qε gradum solis] almuri Lλ Mι Nγ Sβ Wθ; *add. interlin.* in aλ almuri Vβ solis] *om.* Wλ; *interlin.* Bε usque ad] ad Bε Bη Cε Eλ; super Eθ; *add. in marg.* almucantharath Oι occidentem] *add.* donec gradus solis cadat super ultimum almacantaraz ex parte occidentalis Cζ Oη et ... eiusdem] et positione eum sub primam almuri in occidente et tunc quod nota gradum almuri Cα nota] notato Cζ Eμ nota etiam] notent Qι etiam] *om.* Eκ Fβ Mτ Pι; in *corr. in marg.* to etiam Sκ locum eiusdem] *add. interlin.* almuri Bη; *add. interlin.* scilicet almuri Vβ; eiusdem Qη; locum [*illeg.*] (*add. interlin.* almuri) Xγ; locum almuri Bζ Dγ Eλ Eο Kε Mγ Mλ Oχ Qε Vν Vξ Vτ Wμ; locum almuri eiusdem (*or* eiusdem almuri) Bδ Cγ Dδ Dη Eβ Eγ Eη Eκ Fα Gα Kθ Lβ Mα Mυ Mφ Nα Oβ Oι Oυ Pι Qβ Sη Vι Wλ; locum almuri eundem Bγ Fβ Fζ Kα Lγ Lδ Lε Lη Lκ Mδ Mπ Oγ Oζ Oξ Oτ Pα Pβ Pμ Pν Pξ Pρ Qγ Qλ Sδ Tδ Wα Xδ Zα; locum almuri [*illeg.*] eundem Pσ; locum almuri et eundem Qι; locum almuri in lymbo Lμ Mτ Qζ Qθ; locum eius Pγ Wθ; locum eundem Cδ Cε Cη Cι Eτ Kδ Mη Pδ Pθ Sκ Vψ; locum huius almuri Bβ ipsis] *om.* Bζ Bη Cζ Dγ Eκ Eλ Eμ Eο Mγ Mλ Oη Oφ Pφ Sι Vν; eiusdem Sβ; hiis Mι Nγ; primis Pρ; temperis Bδ
- 4-5 et ... gradibus] et illud considera locum almuri in gradum limbi Bε
- 5 gradibus] gradu Pφ; *add.* limbi Cα Cζ Eκ Eμ(*interlin.*) Oβ Oη Pι et] *add.* subtrahe Pτ Xγ motus] motum Sθ eius] *om.* Bη; *corr. interlin.* to gradus eius Vψ; *add. interlin.* scilicet almuri Lζ una] *om.* Mλ nota] *om.* Pι; hora Oγ; natura *corr. in marg.* to nota Sκ; *corr. from* nonan Mη; *add.* usque Oσ Pτ Xγ in] ad Dη Mγ Mη(*interlin.*) Mλ Mπ Qη; usque ad Cα; *add. interlin.* ad Vβ aliam] *add.* notam Bδ Eβ Eη Fα Fβ Fζ Kε Lβ Lγ Lη Lκ Lμ Mδ Mπ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pμ Pν Pξ Pρ Pσ Qα Qβ Qζ Qθ Qι Qλ Sδ Tδ Wα Xδ Zα; *add.* notam secundo signatum versus dextro a parte Cα est,] *om.* Fζ Pμ; erit Cγ Lλ Mα Mδ Mι Nγ Oχ Pζ Qε Sθ Vγ arcus (*and elsewhere*)] archus Xα diei] *add.* horarum equalium Cα; *add.* scilicet que nota est super orizontem Mφ; *add.* similiter que nota est super orizontem Mυ Vι pars] *add.* est Lβ circuli] alii Cα; eius Dη; totius Lζ(*interlin.*) est,] *om.* Pτ; *illeg.* Mα; erit Cγ Lλ Mι Nγ Oχ Pζ Pτ Sθ
- 5-6 reliqua ... diei] *om.* Vβ

this move the degree of the sun until it comes to [first almucantar in] the west, and also note its place among these degrees; and its motion from one mark to another is the arc of the day. On the other hand, the remaining part of the circle is

arcus noctis, quia illa duo continebunt 360 gradus, que est quantitas diei et noctis.  
Et similiter facies de stellis fixis, si volueris scire earum moram super terram.

- 6 quia] et ΕΛ Οβ; qui Cγ Λλ Μι Νγ Οχ Ρζ Vγ; quod Sθ quia ... 360] *rep. and del.* Bδ  
quia ... noctis] *om.* Γα Μν Vψ illa] *om.* Εγ Λλ Ρζ Οχ Qε Sβ Sθ Vγ Wθ; *illeg.* Οβ;  
illi Kε; ista Nα Πι Qη; *add.* secundo Qη duo] *om.* Bκ Λζ; 2 / 2<sup>o</sup> *some*; secundo Si;  
zodiaco Kα; *add.* arcus Ελ Vτ; *add.* coniuncta Bθ Ev Vπ continebunt] *illeg.* Si;  
continent Dγ Ελ Ρφ 360] CCCLX Lκ Οχ Qε Sβ; 36 Cα; 38 Οβ; CCCC LX Sθ  
gradus] *om.* Eζ Lδ; *ms* Wθ *ends* que] qui Cγ Πα; quod Oγ que est] *illeg.*  
Cε est] sunt Cγ quantitas] *ms* Kι *begins*
- 7 similiter] *om.* Bθ Vπ facies] fac Kι Qζ; facias Lκ de] cum Ελ fixis] *add.* in  
nocte Ζα si v[oluer]is] *interlin.* Μτ volueris] *om.* Eκ; vis many scire] *om.*  
Bζ Cζ Dγ Eο Kα Μλ earum] horarum Bβ; *add.* ea Vπ earum moram] *om.* Οβ  
moram] *om.* Oη; nomina Kδ; *add.* arcum Qι; *add.* sub terra et Qη terram] *add.* et  
sub terra Bη Bθ Bι Bκ Cγ Cδ Cζ Dγ Eγ Eκ Ελ Εμ Eο Eρ Ev Bζ Γα Λζ Μα Μγ Μι Μλ Νγ  
Οβ Oη Oι(*marg.*) Oν Oσ Oφ Oχ Ρζ Πι Ρφ Qε Rα Sβ Sθ Si Sλ Vα Vβ Vν Vξ Vπ Vτ Vυ Vψ  
Xα; *add.* ponendo cacumen stelle super orizontem sicut gradibus solis Μτ; *add.* ponendo  
cacumen stelle super orizontem et operare similiter cum gradum solis KεKι Lμ Qζ; *add.*  
scire Fζ; *add.* vel sub terra VQ; *add.* 19 lines Cα

the arc of the night, since these two will contain 360 degrees, which is the quantity of the day and the night. And you will do similarly for the fixed stars, if you wish to know their duration above the earth.

[ Comment:

Place the sun's position on the ecliptic on the first almucantar (i.e., the horizon) to the east, and then to the west. Use the rule to find the two corresponding degrees along the rim and the number of degrees between them is the "arc of the day". The remainder of the circle will be the "arc of the night." ]

## [CAPITULUM 6.] DE QUANTITATE HORARUM DIEI INEQUALIUM

Si volueris scire quantitatem horarum inequalium diei, divide arcum diei per

- 1 De ... inequalium] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Sβ Sθ Si Sλ Vα Vν V Vτ υ Xγ; *illeg.* Eζ; Ad faciendum quantitatem horarum per arcum diei vel noctis Mγ; Ad inveniendum quanto pars hore inequalis habeat Lμ Qθ; Ad sciendum quantitatem horarum diei inequalium et equalium per arcum diurnum Dη; Ad sciendum quantitatem horarum inequalium diei et noctis Pτ; Ad sciendum quantitates horarum per arcum diei et noctis(*add.* inequalium Eo) Eo Eρ Vξ; Capitulum 6<sup>m</sup>. De quantitate horarum diei vel noctis inequalium Qδ; De quantitate horarum equalium diei et noctis et quot horas habeant dies. Capitulum 4<sup>m</sup> Oη; De invenienda quantitate horarum inequalium diei et noctis Mλ; De inventione horarum inequalium per arcum solis Vψ; De quantitate horarum diei inequalium habenda Fβ Oγ Oτ; De quantitate horarum inequalium et numero equalium(inequalium Pζ) Mι Pζ(*marg.*); De quantitate horarum inequalium diei et noctis Bη(*add. in marg. 7*) Cζ Eμ(*add. in marg. 7<sup>us</sup>*) Eτ; De quantitate horarum inequalium diei(*om.* Vγ) et(*add. de Vγ*) numero equalium Lλ(*add. 8.*) Nγ Vγ; De quantitate horarum inequalium diei vel noctis habenda(*om.* Kθ; Rubrica Vπ) Bθ Kθ Pυ Vπ; De quantitate hore inequalis Oν; Inventio horarum inequalium Eζ; Inventio quantitatis horarum inequalium Dγ Po; Inventio quantitatis horarum inequalium per arcum diei Oφ(*add. in marg. De sciendo quantitatem horarum inequalium diei*); Inventio quantitatis horarum inequalium per arcum diei vel nocte Bγ(*later hand*); Modus inveniendi quantitatem horarum inequalium Vρ; Scientia quantitatem horarum inequalium Qβ; Si vis invenire quantitatem horarum inequalium Bβ; *add. in marg. 6 c<sup>m</sup>* Bι; *add. in marg. 6<sup>m</sup>* Vψ; *add. in marg. 7* Qζ diei] *om.* Eη Kα Lη Mπ Vι Wι Zα; *add. vel noctis* Mυ Rα Xα inequalium] *interlin.* Vβ; *inequale* Fζ; *add.* Capitulum Mo; *add. habenda* Lδ Vβ; *add. sive noctis.* Capitulū Wβ; *add. sive noctis in [illeg.]* Mν; *add. vel noctis* Vι; *add. vel noctis hora* Pδ
- 2 *before* Si] *add. 50 lines* Oη Si] Cum Bη Bθ Bκ Cγ Cδ Eγ Eλ Eo Lζ Lλ Mα Mγ Mι Mλ Nγ Oν Pζ Pφ Oσ Oφ Oχ Qε Qη Si Sλ Vα Vβ Vγ Vπ Vτ Vυ; Cum autem Cζ Eμ Oη volueris] *vis many* scire] *om.* Eδ Eρ Po Qδ Rα Vα Xα; *interlin.* Vψ quantitatem] *interlin.* Eζ horarum] *om.* Sλ diei,] *om.* Eλ Pν Pρ; dierum Cγ Eγ Eμ arcum] *add. circuli* Pβ diei,] *om.* Vτ; diurnum Cζ Eμ Oη per] in Lκ Vυ
- 2-5 *rewritten as 17 lines* Cα



[CHAPTER 6.] ON THE QUANTITY [I. E., LENGTH] OF THE UNEQUAL HOURS OF THE DAY

If you wish to know the quantity/length of the unequal hours of the day, divide the arc of the day by

12, et habebis numerum graduum hore diurne; quem si subtraxeris de 30, remanebit numerus graduum hore nocturne, quia hora inequalis nocturna cum hora inequali diurna facit 30 gradus in omni die, qui sunt due hore equales.

- 3 12] *illeg.* Eζ; *marg.* Mη; xii Lκ Oχ Qε Sβ Sθ; duodecim Mα Pζ Pφ; 22 Bβ; [*lacuna*] Sλ habebis] habemus Pτ Xγ graduum] *add.* cui [*illeg.*] Eυ; *add.* qui respondent Bθ Bκ Lζ Ov Vπ hore diurne] diurne (?) Bβ; hore vel horarum diei Bε; hore vel horarum diurnarum Bδ Dδ Eβ Eη Fα Fβ Fζ Kα Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mυ Mφ Oγ Oζ Oι Oξ Pα Pβ Pμ Pν Oτ Ov Pξ Pφ Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Vι Wα Wμ Xδ; horarum diurnarum Dη Zα; *add. interlin.* scilicet inequali Lζ diurne] *om.* Sθ; *add.* inequali Bκ quem si] et Pι; quam si Dη Kδ Mγ; que Qδ; quod Qι; quos Bκ Eγ Lλ Mι Nγ Oχ Pζ Qε Sβ Sθ Vγ; quos si Bθ Eυ Vπ subtraxeris] *illeg.* Eγ Mα Wβ; delebis Bκ; demas Cδ; minues Lλ Mι Nγ Oχ Pζ Qε Sβ Sθ Vγ; subtraas Sι; subtrahas Bε Bθ Eκ Eρ Gα Mo Ov Pγ Pι Pυ Qδ Rα Sη Vβ Vπ Vρ Vψ Wλ Xα Xγ; subtraheris Fβ Sκ; subtrahas Bι; subtrahens Wα; subtrahes Eυ Nα Oφ Pφ; subtrahis Bβ Bγ Cη Mν Po Wι; subtrahis Dδ Eη Eτ Oβ; *add. interlin.* at minues Vβ de] *illeg.* Eγ; a many 30] xxx Lκ Oχ Qε Sθ; triginta Bβ; *corr. in marg. from* 9030 Mη
- 3-4 quem ... nocturne] *om.* Bη Cγ Cζ Eζ Eμ Oη Oσ Sλ Vα Vυ; aliud quod remanet erit quantitas hore nocturne Ov; quos delebis ex 30, et quod remanet erit quantitas (*add. interlin.* gradibus) hore nocturne Lζ; *add. in marg.* Cδ; *illeg. in marg.* Pτ remanebit numerus] et que remanet erit quantitas Bκ; habebis numerum Bζ Dδ Eλ Eo Mγ Mλ Vν remanebit ... nocturne] habebis gradum nocturnum Vτ
- 4 graduum] *om.* Fα; *add.* unius Cδ hore] *add.* sua Bκ Lζ (*interlin.*) nocturne] media Qδ; noctis Cδ quia] et Bθ quia ... nocturna] *om.* Vγ quia ... cum] et Vπ hora<sub>1</sub>] *om.* Vρ inequales] et inequales Pρ; *add. illeg.* Wμ nocturna] *om.* Eγ; diurna Cγ Sλ nocturna ... inequali] *marg.* Bθ; *om.* Lλ cum] et Cδ hora<sub>2</sub>] *om.* Vψ
- 5 diurna] nocturna Cγ Sλ facit] *om.* Mυ Mφ Vι; constituentur Bε; fac Qη Zα; faciunt Mι 30] xxx Lκ Oχ Qε Sθ; 300 Vυ gradus] [*lacuna*] Sλ in] *om.* Lκ omni die] ordine Mι Nγ die] *om.* Qθ qui] que Mτ Oγ Pφ; quo Kα qui ... equales] que etiam valent duas horas equales Dη due] *om.* Pδ Vα; *interlin.* Oφ; 2 many; *illeg.* Pι; [*lacuna*] Sλ; secunde Bβ; 12 Qι; 3 Pν equales] equalibus Eτ; inequales Mo Zα; inequales in die Pι; *add.* "cum hora inequali nocturna" et cetera ad lineam priam nō(?) Vπ; *add.* et cetera Kθ; *add.* et noctis Eτ; *add. 1-line gloss* Zα

12, and you will have the number of the degrees of a daytime hour; if you subtract this [number] from thirty, the number of degrees of the nighttime hour will remain, since an unequal nighttime hour with an unequal daytime hour amounts to 30 degrees in the whole /every day, which are two equal hours.

Si<sup>1</sup> horas diei volueris querere equales, divide arcum diei per 15, et habebis numerum horarum equalium; similiter in nocte.

- 6 *before* Si] *add. illeg.* Eζ; *add.* AD HABENDUM HORAS DIEI EQUALES ET NOCTIS MΛ; *add.* AD INVENIENDAS HORAS DIEI EQUALIS Lμ Po Qθ; *add.* DE HORIS DIEI EQUALIBUS SIVE NOCTIS Mv Wβ; *add.* (CAPITULUM 7<sup>m</sup> Qδ) DE HORIS DIEI VEL NOCTIS EQUALIBUS Rα Qδ; *add.* DE HORIS EQUALIBUS Mπ Ov; *add.* DE HORIS EQUALIBUS DIEI Lκ; *add.* DE HORIS EQUALIBUS DIEI SIVE NOCTIS Mv Vι; *add.* DE HORIS EQUALIBUS HABENDIS PER ARCUM DIEI VEL NOCTIS Oφ; *add.* DE INVENIENDO HORAS DIEI EQUALES Dγ; *add.* DE INVENTIONE HORARUM DIEI EQUALIUM Bι(*add. in marg.* 7 c<sup>m</sup>) Pβ; *add.* DE INVENTIONE HORARUM EQUALIUM Vψ Zα; *add.* DE NUMERO HORARUM EQUALIUM DIEI VEL(Aε Pv) NOCTIS Bθ Pv Vβ Vπ; *add.* DE QUANTITATE CONSTITUET(*om.* Cζ) HORARUM EQUALIUM DIEI ET NOCTIS ET QUOT HORAS HABET(HABIAT Cζ) QUALIBET(QUILIBET Cζ) DIERUM. Cζ Eμ(*marg.*; *add. in marg.* 6<sup>us</sup>); *add.* DE QUANTITATE HORARUM DIEI(*om.* Mη Mo Xδ) EQUALIUM(INEQUALIUM Fζ) Ci Eβ Fa Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Mδ Mη Mo Mφ Oζ Oi Oξ Ov Pa Pδ Pθ Pμ Pv Pρ Qγ Qλ Sδ Sκ Tδ Xδ Vψ Wα Wι Wμ; *add.* DE QUANTITATE HORARUM EQUALIUM DIEI ET NOCTIS ET QUOT HORAS QUILIBET HABEAT Bη(*add. in marg.* 6); *add.* INVENTIO HORARUM EQUALIUM Eo Eq Lδ Kθ(*add. dierum equalium [illeg.]*) Oγ Vξ; *add.* MODUS INVENIENDI HORAS EQUALES Vρ; *add.* SI VIS HORAS DIEI EQUALES IN ASTROLABII Bβ; *add. in marg.* De horis diei equalibus Oφ Si] *add.* autem Bη Bκ Cα Cγ Cδ Cζ Eγ Eμ Lζ LA Mα Mι Nγ Oη Oσ Oχ Pζ Qε Sβ Sθ SA Vα Vβ(*interlin.*) Vγ Vv; *add. in marg.* 7<sup>m</sup> Vψ; *add. in marg.* 8<sup>m</sup> Qζ horas] numerum horarum Bη Cζ Eμ Oη diei;] *om.* Eκ volueris] velis Lκ querere] habere Eκ; inquerere Cζ Eμ Oη Wψ; scire Bε Bη Rρ Oβ Pi Pξ Qη Vγ Vξ Xδ; scire et querere Cα; scire querere Xα; investi' [*illeg.*] Eλ; *corr. to* scires Qζ equalibus] equalium Cζ Eμ Oη divide] *om.* Mλ Vτ diei;] diurnum Bε 15] *illeg.* Dδ; xv Lκ Oχ Qε Sθ; 24 Vτ
- 6-7 *These lines precede line 1* Bκ Cζ Ci Eμ Oη Si ... nocte] *om.* Dη
- 7 numerum] *twice* Pv; *add.* graduum Vτ numerum ... equalium] *om.* Vξ horarum] *om.* Lλ Sλ Vγ; horam horarum Cε; *add. interlin.* diei Oφ equalium] *om.* Eκ; diei Oη; inequalium Cε; *add.* diei Bβ Bε Ci Dδ Eα Eβ Eη Fa Fβ Fζ Kα Kδ Ke Ki Lβ Lγ Lη Lκ Lμ Mδ Mη Mτ Mv Mφ Nα Oi Oτ Ov Pβ Pδ Pζ Pθ Pρ Qζ Qθ Qi Qλ Sδ Sκ Tδ Vi Vψ Wα similiter] per hoc erit Pξ; scilicet Sλ; *add.* fac Bε Eκ; *add.* facies Cα Cδ Cγ Eγ Pσ Vψ; *add.* etiam Dγ Mλ similiter in nocte] *om.* Zα; similiter facies de arcu noctis Pi nocte] octe Vα; *add.* de arcu nocturno Kα; *add.* qeras per arcum noctis earum numerum Bγ(*later hand*); *add.* dividendo arcum nocte Oβ; *add.* dividendo arcum nocte per 15 gradus Vξ; *add.* divides arcum noctis Qη; *add.* et cetera Xα; *add.* per arcum noctis Bζ Bθ Dγ Eλ Eo Ev Mγ Mλ Pτ Vv Vπ Vτ Vψ Wλ Xγ; *add.* per arcum nocturnum Gα; *add.* Nota per gradum solis in [*illeg.*] hore noctis sed per nadir eius hore diei super et hoc in astrolabio Qζ; *add. 4-line gloss* Mτ Zα

<sup>1</sup> As indicated by the added titles (or sometimes by an enlarged initial capital) many mss treat this as a separate capitulum.

If you wish to find out /know about the equal hours of the day, divide the arc of the day by 15 and you will have the number of equal hours; similarly in the night.

[ Comment:

If you know the arc of the day, it can be divided by 12 to give the length of an unequal daylight hour.

Subtracting the length of a daylight unequal hour from 30 will give the length of a night-time unequal hour.

Dividing the arc of the day by 15 will give the number of equal hours in the day and similarly for the number of equal hours in the night. ]

## [CAPITULUM 7.] DE PARTE HORE PRETERITA INVENIENDA PER ALMURI

Cum transierit pars hore et volueris scire quota pars hore sit, scito numerum

- 1 De ... almuri] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Dη Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Oν Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qι Sβ Sθ Sι Sλ Vα Vν Vξ Vν Xα Xγ Wλ; *illeg.* Eγ Eζ Lλ; *faded* Eδ; Ad habendum partem hore diei vel noctis transactam Mλ; Ad inveniendum partem hore preteritam vel futuram Bι(*add. in marg.* 8 c<sup>m</sup>); Ad inveniendum quota pars hore fuerit Lμ Qθ; Ad inveniendum quota pars hore transacta sit Pο; Ad sciendum quota pars hore sit transacta Qβ; Ad sciendum quota pars hore transierit Dγ; Ad sciendum quota pars hore transierit vel futura sit ad huc Bγ(*later hand*); Capitulum 8<sup>m</sup>. Ad habendum quota pars hore naturli(?) sit transacta Qδ; De hora invenienda preterita per almuri Mν; De inuentione parte hore die vel noctis transacta Rα; De parte Mπ; De partibus horarum Zα; De proportione cuius vis partis hore ad suam horam Mι Nγ Pζ(*marg.*) Vβ(*add. id est de parte preterita hore invenienda per almuri*) Vγ; Inuentio quota pars hore alicuius sit preterita Kθ Sη(*later hand*) Wι; Modus inueniendi partem horarum preteritarum Vο; Quota pars diei sit transacta de horis transactis Eη; Quota pars diei vel noctis transierit ultra horis perfectis omne tempore Oη; Quota pars hore diei vel(et Bη) noctis transierit vel et horas perfectas omne tempore Bη(*add. in marg.* 8) Cζ Eμ(*add. in marg.* 8<sup>us</sup>); Quota pars hore sit transacta de horis transactis Lδ Oγ Oτ; Quota pars hore transierit vel [*illeg.* = futura?] sit Pτ; Quota pars ipsius hore sit transacta Oφ(*add. in marg.* De sciendo partem horarum perteritarum hore pertransacta hore transacte); Quota pars transacta erit vel futura Eο; Si vis scire quota pars hore est elapsa Bβ; Scias quota pars hore transierit vel futura sit Eο; Ut scias quota pars hore transierit vel futura est Mγ; *add. in marg.* 9<sup>m</sup> Qζ parte] *om.* Qλ Mφ invenienda] inueniendo Fζ invenienda ... almuri] *om.* Eτ Mν Wβ(*add. Capitulum*) per almuri] *om.* Lγ Mδ almuri] al. Xδ; almuhantaruz Vψ; *add.* crespusculum Cη
- 2 Cum] Si Eκ; *add.* autem Bθ Bκ Cα Dη Eν Lζ Oσ Vπ Vν Cum ... hore<sub>1</sub>] *om.* Mτ Cum ... sit] Cum vis scire quota pars hore transierit Vγ transierit] pertransierit Cα Cδ Cε Cζ Oη Vψ; transient Bβ; transiverit Pφ pars<sub>1</sub>] ipse Sλ; partes Bβ; *add.* ipse Vα hore<sub>1</sub>] *add.* inequalis Kδ Kε(*interlin.*) Pθ Qζ Qη scire] *om.* Wλ quota] que Dγ Mλ; *add. interlin.* vel que Oφ quota ... sit] *om.* Lλ Mι Nγ Qε Sθ; *marg.* Pζ; quanta sit Cγ; quantitatem Mα; quota restat Oχ(*interlin.*) hore<sub>2</sub>] *om.* Eγ Gα; *corr. from* hora Sκ; *add.* inequales Kε(*interlin.*) Mτ Qζ pars<sub>2</sub>] *om.* Eγ; *add.* ipsa Bζ Bκ Cα Cζ Dγ Eλ Eο Lζ Mμ Mγ Mλ Oη Oν Oσ Pφ Vβ Vν Vτ sit] *om.* Bθ Eα Eμ Vπ; transierit Kι; *add.* pertransita Kε Mτ Qζ scito] scias Dη; signa Wβ; sue Vτ; sume Bζ Eλ Eο Mγ Mλ Vν numerum] numero Kε Qγ

[CHAPTER 7.] ON FINDING THE PART OF AN HOUR WHICH HAS PASSED USING THE MURI-  
ALIDADE

When a part of an hour has passed and you want to know what part of an hour it is, ascertain the number

graduum in limbo ab inicio hore usque in almuri; et quomodo ille numerus se habebit ad numerum totius hore, sic pars hore transacta se habebit ad totam horam.

- 3 graduum] *add.* et altitudinis Za graduum in labro] *om.* Bδ in ... hore] *om.* Xα  
 in limbo] *om.* Dη Pξ; *marg.* Qδ limbo] *illeg.* Ea Eδ; [margo]labro Bβ Bγ Cα Cδ  
 Cε Cη Cι Eγ Gα Lλ Mα Mη Mι Mo Nγ Ov Oσ Oχ Pα Pδ Pζ Po Pv Pφ Qε Rα Sβ Sλ Vα Vυ  
 Vφ Vψ Wι; labro *corr.* to limbo Lζ; labro id est in limbi Cγ; lambro Mν; libro Sθ;  
 lymbo *some; corr. from* labro Sκ; *add. interlin.* vel in margolabro Oφ; *add. interlin.* a[ labro  
 Vβ inicio] *add.* istius Qη hore] *om.* Mδ Rα; *interlin.* Oχ Vφ usque in]  
 illius usque Cα; in Mδ; iste usque ad Wλ; usque Ea; usque ad Bβ Bδ Cγ Dδ Eγ Eρ Gα Kε  
 Kι Mν Mτ Oβ Oχ Pι Pφ Qε Qζ Qη Qι Sθ Vτ Vυ Za; *add. interlin.* finem eius per Bκ Lζ  
 almuri] amuri Sθ; finem in almuri Eρ; lineam(?) Vτ; ~~lymbo~~ almuri Qδ; *add.* et  
 quomodo in almuri Eν; finis eiusdem tot prima pars graduum pertransita ab almuri vero  
 numerum graduum [*illeg.*] partem hore Gα almuri ... numerus] finem eiusdem hore  
 sunt sicut prima pars graduum pertransita ab almuri Pι et] *add. in marg.* vide Oι  
 quomodo] *interlin.* Wμ; quod Cζ; quoto Oη; vide quam Oβ; *add.* inveniens Cγ  
 ille] iste Kε Kι Nα Qι Qη Vτ Xγ Xδ numerus] *om.* Cγ Eλ Eo Sθ; *add.* ille Sι; *add.*  
 iste Cδ habebit] habet Kδ Lκ
- 3-4 usque ... hore,] *om.* Dη
- 4 numerum] *om.* Lδ; *add. interlin.* graduum Bγ totius] *om.* Pξ hore,] *om.* Pγ;  
*interlin.* Lζ sic] similiter Tδ sic pars hore] *om.* Eζ Pι sic ... transacta]  
 transacte ita Bη sic ... horam] *om.* Pζ pars] *om.* Cζ Eμ; partes Kα; *add. interlin.*  
 vel post equales Oφ pars hore] *om.* Oη hore,] *om.* Bβ Bγ Cζ Cη Eκ Eμ Eτ Eυ  
 Kθ Oγ Oζ Pβ Pγ Pξ Pρ Vξ Wβ Wι transacta] *om.* Qη; pertransacta Kε Qζ;  
 pertransita Kι Mι; transacte Kα Mη; transactum Cζ Eμ se] *om.* Bδ Kθ; si Wλ; *add.* Xα  
 se habebit] *om.* Lκ Qζ Qη habebit] habebunt Kα totam] *om.* Bδ Eγ;  
 noctam(!) Cγ; *add.* illam Pξ horam] *add. 3-line gloss* Za



of degrees on the lip/edge from the beginning of this hour to the muri-alidade, and in the way that number has to the number [of degrees] of the whole hour, so the part of the hour which has passed will have to the whole hour.

[ Comment:

Compare the current position of the pointer along the edge of the astrolabe to the whole distance the pointer would move in an hour, and that proportion will be equivalent to the portion of the hour which has elapsed. ]

## 1 [CAPITULUM 8.] DE NUMERO HORARUM DIEI EQUALIUM PRETERITARUM

Si volueris scire quot hore equales transierunt de die, accipe gradum solis et

- 1 De ... preteritarum] *om.* Bδ Bε Bζ Bκ Cα Cδ Cγ Cε Dδ Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Oβ Oν Oσ Oχ Pγ Pι Pξ Pφ Qε Qη Qι Sβ Sη Sθ Sι Sλ Vα Vν Vτ Vυ Wι Wλ Xα Xγ; *illeg.* Eγ Eζ Λλ; *faded* Eδ; *later hand* Mν; Ad inveniendum quot horae equales de die transierunt Lμ Qθ; Ad sciendum quot hore diei vel noctis sint transacte Mλ; Ad sciendum quot hore equales diei transacta sint Dγ; Ad sciendum quot hore equales diei transierunt Po Qβ(*add. de die. Capitulum*); Ad sciendum quot horas equales habeat dies Bγ(*later hand*); Capitulum 9<sup>m</sup>. De horis diei equalibus diei vel noctis equalibus preteritis Qδ; De horis diei equalibus transactis Oφ(*add. in marg. De sciendo quot hore inaequales transierint de die*); De horis equalibus diei vel noctis preteritis Rα; De horis equalibus in die Vγ; De(Die Pζ) horis equalibus in diebus preteritis Mι Nγ Pζ; Inveniundo horarum equalium diei sive noctis preteritarum Eτ; Inventio horarum diei sive noctis preteritarum Mν; Inventio quot hore diei inaequales (*corr. to equales*) sint iam transacte Bι(*add. in marg. 9 c<sup>m</sup>*); Quot hore equales de die transierunt Lδ Oγ; Quot hore equales de die vel nocte Oη; Quot hore equales die(*om. Pτ*) sint transacte Kθ Pτ; Quot hore equales in die aliqua transierint Vξ; Quot hore equales transierint de die Eη Oτ; Quot hore equales transierint de die vel de nocte Bη(*add. in marg. 9*) Cζ Eμ(*marg.; add. in marg. 9<sup>us</sup>*); Quot hore transierunt Mπ; Quot hore equales de die ipse transierint Eο Eο; Sciencia in inventione horarum diei sive noctis preteritarum Wβ; Si vis numerum horarum equalium Bβ; Ut scias quot hore equales de die ipsa transierint Mγ; *add. in marg. De horis equalibus in die preteritis Vβ; add. in marg. 10<sup>m</sup> Qζ numero] inventione Vψ diei] om. Sκ; marg. Lβ equalium] add. inveniundo Cη preteritarum] add. Capitulum Cη; add. Rubrica Vπ*
- 2 Si] Cum Bζ Bη Bι Bκ Cγ Cζ Dγ Eγ Eλ Eμ Eο Λλ Mα Mγ Mι Nγ Oη Oσ Oφ Oχ Pζ Pφ Qε Sβ Sι Sλ Vα Vβ Vγ Vξ Vο Vτ Vυ; Cum autem Cα; *add. vero Bθ Eν Vπ volueris] add. etiam Wλ scire] om. Eδ Qε quot] que Wλ; quo Pμ; quod Bδ Kα Kε Lβ Lκ Vξ hore equales] om. Vγ equales transierunt] illeg. Nα transierunt] fuerunt transacte(interlin. Lζ) Bκ Lζ; transeunt Mν; transeunt *corr. to* transierunt Sδ; transierint Mγ Sβ Vυ de] in Cγ Eγ Pο de die] *om. Vγ die] add. interlin. scilicet ab ortu solis Lβ accipe] accepta Cε; pone Cγ Eγ; add. altitudinem Pι gradum] gradus Qδ Pι Tδ; add. interlin. altitudinis Lβ solis] add. in signo Cα; add. interlin. in zodiacho Bγ**

[CHAPTER 8.] ON THE NUMBER OF EQUAL HOURS OF A DAY WHICH HAVE PASSED

If you wish to know how many equal hours have passed in a day, take the degree of the sun and

pone super almucanharat altitudinis et signa locum almuri in gradibus. Postea volue

- 3 pone] *om.* Cγ Eγ Oχ; *illeg.* Nα; *add.* eum Mι Oι Oφ Qε Vβ(*interlin.*) Vγ super] *interlin.* Cδ; *usue ad primum* Vτ; *add.* eum Ev Lλ almucanharat] alm<sup>ch</sup> Bζ; almucancaraz Ov; almucancrath Mτ; almucant' Lμ; almucantar<sup>a</sup> Cα; almucantarath Lδ; almucantaraz Cδ Oη; almucanharath Eζ; almucanharatz Dη; almucantrarch Gα; almi<sup>ch</sup> Pσ; almich Kθ; almucancarath Mγ; almichant' Lκ; almi<sup>th</sup> Bε; almi<sup>raz</sup> Bκ; almit' Oβ; almi<sup>th</sup> Qη; almi<sup>thrat</sup> Wλ; almi<sup>trat</sup> Kε; almi<sup>tt</sup> Qζ; almuc' Mπ Sβ; almu<sup>c</sup> Cε; almucan<sup>at</sup> Bη; almucancarach Sη; almucancarath Vρ; almucanch' Dγ; almucan<sup>rath</sup> Eτ; almucant' Fα Qθ; almucantarach Bθ; almucantarath Cζ Eκ Oχ Pζ Qε Sθ Sλ Vγ; almucantarath Bδ Bι Eα Eη Eλ Eρ Kδ Lγ Lλ Mδ Oγ Pξ Pφ Qi Vα Vβ Vπ; almucantaraz Eμ Vν; almucantaraz *corr. to* almucantarath Oσ; almucantherath Nα Oφ; almucanth' Cι Eβ Lβ Mλ Oζ Pδ Pθ; almucantha Pγ; almucanthanth Cη; almucanharach Bβ Wβ; almucanharat Eδ Lη Mα Qλ Sκ Zα; almucanharath Bγ Ev Fβ Fζ Lε Mν Mφ Oι Oξ Oτ Oυ Pα Pμ Pν Po Pρ Pυ Qβ Rα Sδ Vξ Wι Wμ Xα Xγ; almucantha<sup>th</sup> Tδ; almucanhrth Vι; almucantrat Kα; almucarath Vτ; almucatharath Pτ; almuch' Eο; almuchan Xδ; almuchancharat Mο; almuchantarath Qδ Vψ; almuchanharath Wα; almu<sup>raz</sup> Lζ; almu<sup>tantara</sup>'h Sι; almu<sup>rat</sup> Eγ; almu<sup>rath</sup> Pι Qγ Vν; almusantarach Pβ; almut' Dδ Mη; almutantarath Mν; almutanterach Mι Nγ; almutrantar Cγ; *add. sue* Cα Eγ Vν altitudinis] *add. solis* Bε Eη; *add. sue* Bγ(*interlin.*) Cγ Vτ signa] nota Mι Nγ; pone Eα; singna Eμ locum] *om.* Kε Kι Mτ; *interlin.* Qζ; *add. solis* Bε almuri] per almurum Bε in] ex Qδ in gradibus] *twice* Pθ gradibus] gradu Pφ; *add. marginis* Cα; *add. limbi* Bβ Bε Dη Gα Kθ Mν Mφ Oι(*marg.*) Pι Sι Vι Wλ volue] move Cγ Eγ; revolve Dη Sβ; voluis Fβ

set it on the almucantar of the altitude and mark the place of the muri-alidade on the degrees. Then turn

retro gradum solis usque ad primum gradum almucanthat in oriente;<sup>1</sup> et secundo

4 retro] *om.* Dη; *add.* id est contra motum diurnum Κι(*interlin.*) Qζ gradum] *twice* Vξ;  
 gradus Mτ ad] *om.* Κε Κι ad ... gradum] *om.* Cε primum] *illeg.* Nα  
 gradum<sub>2</sub>] *om.* Βη Βθ Βκ Cζ Dγ Eδ Eζ Eλ Eμ Eρ Eυ Γα Κθ Κι Lζ Λλ Mα Mγ Mλ Mν  
 Mo Mτ Oβ Oη Oφ Oχ Po Pφ Qδ Ρα Sλ Vβ Vγ Vξ Vρ Vτ Wλ Wμ Xγ; *interlin.* Cδ; *del.* Lη  
 Oι; sive gradum Κα almucanthat] almucancaraz Ov; almicanthat Mτ; almicanthat'  
 Lμ; almicanthatrath Lδ; almicanthatraz Βκ Oη; almica<sup>th</sup> Pσ; almicanthatrath Eζ; almicanthatratz  
 Dη; almicanthatrath Κα; almicanthatrath Γα; almich Κθ; almichantrum Lκ; almi<sup>at</sup> Κε Κι; almi<sup>t</sup>  
 Oβ; almi<sup>th</sup> Βε Qη; almi<sup>thart</sup> Wλ; almiutantarath Sι; almu<sup>ath</sup> Qγ; almuc' Cε Cι Fα Mπ Sβ;  
 almucancarach Sη; almucan Vν; almucancarath Vρ; almucan<sup>rath</sup> Eτ Ρα; almucanrath Vτ;  
 almucanthat' Lη Pθ Qθ; almucanthat<sup>at</sup> Eκ; almucantarach Ββ Βθ; almucantarath Cζ Mα Oχ Pζ Qε  
 Sλ Vγ; almucantarath Βδ Βι Eα Eλ Kδ Lγ Λλ Mδ Oγ Oι Pφ Qδ Qi Tδ Vα Vβ Vπ Wμ;  
 almucantaraz Cδ Eμ Oσ Vν; almucanthatrath Nα Oφ; almucan<sup>th</sup> Xα; almucanthat' Dγ Eβ Lβ  
 Mλ Pδ; almucanthat'a Pγ; almucanthatrach Wβ; almucanthatrath Fζ Oζ Sκ Zα;  
 almucanthatrath Bγ Cη Eρ Eυ Fβ Lε Mo Mν Mφ Oξ Oτ Ov Πα Pμ Pν Pξ Po Pρ Pτ Pυ Qβ  
 Qλ Vξ Wι; almucanthatrath Eη; almucanthat' Eo Mγ; almucanthat Xδ; almucanthatrath Vψ;  
 almucanthatrath Vι; almucanthatrath Wα; almu<sup>rat</sup> Eγ Eδ; almu<sup>rath</sup> Pι; almu<sup>raz</sup> Lζ;  
 almucanthatrach Pβ; almu<sup>t</sup> Dδ Mη; almutantarath Mν; almutanthatrach Nγ; almu<sup>th</sup> Bζ;  
 almutanthatrath Cγ; almu<sup>trat</sup> Qζ; calmucan<sup>at</sup> Βη in oriente] Ββ Bγ(*add. interlin. vel*  
*orizonte*) Βδ Cη Dη Eκ Eλ Eτ Fβ Kδ Ke Kθ Κι Lβ Lδ Lκ Lμ Mπ Mτ Oβ(*add. et in [illeg.]*  
*orizontem*) Oγ Oξ Pβ Pγ Qγ Vξ Wβ Wι Wλ; ex parte orientale id est orizontem Cα; id est  
 ad orientem Eμ Oη; id est ad orizontem Cζ Pι; id est ad orizontem Oσ(*add. in marg.*  
*orientalem*); id est in oriente Cγ; id est orientem Cε; id est orizonte Xα; id est orizontem  
 Βκ Cδ Cι Γα Eα Eδ Eζ Lζ Λλ Mα Mη Mν Mo Oχ Pδ Pζ(*id est interlin.*) Pθ Po Pυ Qε Ρα Sβ  
 Sθ Sλ Vα Vβ Vρ Vν; id est orizontem orientalem Ov; id est orizontis Mι Nγ; id est usque  
 ad orizontem Βη Vγ; in orientem Mλ Vτ; in orizonte/-em Bζ Βθ Βι Dγ Dδ Eβ Eγ Eη(*add.*  
*in marg. orientali*) Eo Eρ Eυ Fα Fζ Κα Lγ Lε Lη Mγ Mδ Mν Mφ Nα Oζ Oι Oτ Ov Oφ(*add.*  
*in marg. at id est orizontem*) Πα Pμ Pν Pξ Pρ Pσ Pτ Pφ Qβ Qδ Qθ Qi Qλ Sδ Sη Si Sκ Tδ  
 Wα Wμ Vι Vν Vπ Vφ Xγ Xδ; in orizonte orientali Βε Zα; orizontem Vψ; sive ad orizontem  
 Qη; supra orizontem orientalem in [*illeg.*] Qζ; *add. interlin* sive ad orizontem orientem Κε  
 secundo] *om.* Qη Sλ; *illeg.* Βδ; et etiam Sη; etiam Nα Pξ; sb Mν; similiter Wλ; sunt  
 pr[imo?] Vψ; sub Pυ; tunc Cα Κα Lμ Qζ; tunc etiam Βε Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kδ  
 Lβ Lγ Lδ Lε Lη Lκ Mδ Mη Mπ Mν Mφ Oγ Oζ Oξ Oτ Ov Πα Pβ Pδ Pθ Pμ Pν Pρ Pσ Qβ  
 Qγ Qδ Qθ Qi Qλ Sδ Sκ(*del. etiam; add. in marg. interim*) Tδ Vι Wα Wμ Xδ Zα

4-5 secundo nota] subnota Po

<sup>1</sup> It is not possible to choose definitively between “in oriente” and “in orizonte/m” in this instance. The scripts for both words are very close to each other, and scribes obviously also had trouble choosing between them. In any case, it makes no real difference to the meaning of the instructions.

the degree of the sun back as far as the first degree almucantar [i.e., the horizon] in the east; and then

5 nota locum eiusdem almuri. Post hec divide gradus qui sunt inter duas notas per 15, et habebis horas equales.

Similiter facies in nocte; postquam enim inveneris horam equalem<sup>2</sup> per

- 5 locum eiusdem almuri] eius locum Pγ Wβ; eiusdem locum Bγ( *add. interlin.* almuri) Cη Dδ Eκ Eτ; locum almuri Bε Eλ Qη Vβ( *add. interlin.* eiusdem) Vτ; locum cuiuslibet almuri Mτ; locum eius almuri Cι Kδ Mη Pδ Sκ Vψ; locum eius de almuri Vπ; *add. interlin.* in limbo Oι Post hec] Postea *some*; Post hoc *some*; Post Bη divide] *om.* Mτ; divides *some* gradus] *om.* Wα; *add.* per 12 gradus Mγ; *add.* solis Mv qui sunt] *om.* Mv sunt] fuerint Cα inter] *add.* illas Bε duas] 2 / 2<sup>as</sup> *some*; duas 2 Pξ; et Mτ; secundas Kα duas notas] et nota Pq; tanosß (?) Bβ per 15] *illeg.* Nα; *om.* Mγ Sλ Vα; xv Oχ Qε Sβ Sθ Si; et 15 Eδ Mv 15] quindecim Lκ; *add.* gradus Sη
- 6 equales] *add. 1-line gloss* Cα; *add.* per stellam super suam altitudinem positam retrahendo(detrahendo Vπ) gradum solis ad occidens(*add.* et Vπ) dividendo ut prius Vπ Xγ; *add.* Si vero fuerint gradus que non possent dividi per 15, pars quolibet gradum computa minuta 4 hore Kδ Pθ horas] *add.* pertransitas Mv Mφ Vι; *add.* transitas Vτ
- 7 Similiter] Sic Lζ Oη Ov Oσ Oφ(*add. interlin.* similiter) Pφ Vα Similiter ... nocte]  *marg.* Pτ Similiter ... equalem] *om.* Dη facies] fac Mτ Pξ in] *interlin.* Pζ; de Bγ Bζ Cη Kε Mτ Qζ nocte] *add.* per stellam Bκ; *add.* per stellam super suam altitudinem(latitudinem Eν) positam(*om.* Dγ) retrahendo(detrahendo Bθ Dδ Eν; retrog<sup>a</sup>do Gα; trahendo Dγ Mλ) gradum solis ad occidens dividendo(et divide Pι; et divide per 15 Vτ) ut prius Bζ Bθ Dγ Dδ Eλ Eο Eν Gα Mγ Mλ Pι Pτ Vν Wι Wλ; *add.* per stellam super suam altitudinem positam retrahendo gradum solis usque ad occidens vel orientem occidentalem quod [*illeg.*] et dividendo ut prius. Similiter facies in nocte Zα; *add. interlin.* scilicet per stellas Lζ postquam] post Oη Xδ enim] *om.* Bβ Bδ Bε Cγ Cι Dδ Eβ Eγ Eζ Eη Fα Fβ Fζ Kα Kδ Kε Kθ Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mv Mφ Oβ Oγ Oζ Ov Oξ Oτ Ov Pα Pθ Pι Pμ Pν Pξ Pο Pq Pσ Qβ Qγ Qζ Qη Qi Vi Vτ Vψ Wα; vero Cε Eα Eδ Gα Mv Mo Nα Pβ Pζ Pτ Pv Qδ Qθ Qλ Sβ Sδ Sη Sκ Tδ Wλ Xγ Xδ Zα inveneris] veneris Bβ; *add.* vel scieris Vξ horam ... per] *om.* Lδ equalem] *corr. from* inequalem Oι Sκ; *corr. to* inequalem Eη Wα; inequalem Bβ Bγ Bζ Bη Bθ Bι Bκ Cα Cγ Cδ Cε Cζ Cη Cι Dγ Dδ Eα Eγ Eδ Eζ Eκ Eλ Eμ Eο Eq Eτ Kδ Kε Kθ Kι Lζ Lλ Lμ Mα Mγ Mη Mι Mλ Mν Mo Mτ Mv Mφ Nγ Oβ Oη Ov Oσ Oφ Pγ Pδ Pζ Pθ Pι Pο Pτ Pv Qδ Qε Qζ Qη Qθ Rα Sβ Sθ Si Sλ Vα Vβ Vγ Vi Vξ Vν Vπ Vq Vτ Vv Vφ Wβ Wi Wλ Wμ Xα Xγ Zα; *add.* in nocte Cα per] *om.* Lδ; et Sλ

<sup>2</sup> As noted in the apparatus, the majority of the mss have “unequal hour” (“horam inequalem”) when it should be “equal hour.”



mark the place of the same muri-alidade. After this divide the degrees which are between the two marks by 15 and you will have the equal hours.

You will proceed similarly at night, for after you have found the equal hour using

gradum solis et altitudinem alicuius stelle, signato loco almuri, reduces gradum solis ad orizontem occidentalem, et notabis iterum locum almuri. Et spacium inter hec duo loca

- 8 gradum<sub>1</sub>] gradus Vπ; *add.* altitudinis Κε Κι Μτ Qζ; *add.* horam equalem Lδ solis] *om.* Βγ Cη Dγ Εκ Fβ Kα Pγ et] invenies Pq; vel Oι; *add.* ad Bβ; *add.* per Cγ alicuius] *om.* Oχ; illius Sι stelle] *add.* cum Pq; *add.* fixe Cα; *add.* quia Dη; *add.* (que Gα) inventam(*add.* et. Oβ) in dorso(*add.* astrolabii Κι) et positam in rethi ut oportet Bζ Dγ Ελ Eo Gα Κι Mγ Μλ Oβ Oφ(*marg.*) Pι Qζ(*add. illeg.*) Vv Vτ Wι Wλ Xγ; inventam in dorso astrolabii et positam in rethi ut oportet id est quantum hora excedit(excedat Κε) equalis(*om.* Κε) inequalem Κε Μτ loco] *add. in marg.* in quo tunc est Bγ almuri] *om.* Wμ; *add.* in qua motum diurnum Qζ; *add.* in limbo Oι; *add.* tunc Oσ reduces] *twice* Mφ Vι; induces Eo gradum<sub>2</sub>] arcum Ελ solis] *om.* Pξ; *illeg.* Vγ; *add.* ad orientem id est Qζ
- 8-9 reduces ... occidentalem] 24 gradus solis ad orientem id est ad orizontem orientalem interim Μτ reduces ... almuri] *om.* Bζ
- 9 orizontem] cai[*illeg.*] Cι; oriente Cγ; orientem Fβ Lβ Pq orizontem occidentalem] orientem ad orizontem orientem [*illeg.*] Κε Κι occidentalem] *add.* a quo incipit nox Dη; *add.* ibi incipit nox Lγ; *add.* quem ibi incipit Dδ Oξ; *add.* quem incipit nox Eη Lβ Lκ Pμ Pν; *add.* quem ibi incipit nox Bδ Bε Eβ Fα Fβ Fζ Kα Lδ Lε Lη Lμ Mδ Mπ Mυ Mφ Oγ Oζ Pα Pβ Pq Pσ Qβ Qζ Qθ Qι Qλ Sδ Tδ Vι Wα Zα; *add. illeg.* Qζ; *add. interlin. illeg.* Qζ notabis] nota Bε Eη interim] certum Μτ Qθ; totum Lγ interim locum] in locum interim Zα locum] *om.* Pq; *interlin.* Eκ; in loco Qδ almuri] *add. interlin.* in limbo Oι Et<sub>2</sub>] per Pτ inter] in Bβ Pγ; ut Eν hec] *om.* Oη Vψ hec duo] *om.* Cδ hec ... loco] duas notas Xα duo] *interlin.* Qλ; 2 / 2° some; Π° Qε; etiam Mυ loca] *om.* Pι; *add.* signata Ελ

the degree of the sun and the altitude of some star, and the place of the muri-alidade has been noted, you will bring back the degree of the sun to the western horizon, and you will mark again the place of the muri-alidade. And you will divide the space [i.e., the degrees] between these two places

10 divides, sicut prius, per 15, et invenies. Eodem modo scies<sup>3</sup> quot sint hore equales inter meridiem vel quemlibet punctum alium et quodlibet instans.

- 10 divides] *interlin* Cδ; divide *some* sicut prius] *om.* Bζ Bθ Dγ Eo Eν Vν Vτ; sicut primum Eα; ut prius Mτ; *add.* et scilicet Pγ; *add. interlin.* scilicet per 15 Vβ per 15] *om.* Bε Cγ Cδ Eγ Mι Oσ Oχ Pζ Sθ Sλ Vα Vβ Vγ Vν; *interlin.* Lζ; *illeg.* Eη; per quindecim Lκ et] *om.* Eγ Mι Nγ Qι; scilicet et] Bγ Bι Eδ Eρ Eτ Mν Pγ Pυ Pο Qδ Sη Wβ Vρ Xα Xγ; scilicet Bβ Cι invenies] *add.* horas noctis Nα; *add.* horas noctis preteritas Eρ Oβ Qη Pι Vφ Xα; *add.* horam Kδ; *add.* optatum Vα; *add.* quod queres Cγ Eγ; *add.* horas equales noctis preteritas Eλ Vτ; *add.* scilicet horas noctis preteritas Rα Sβ eodem] eo Bε Eη; Et habebis eodem Vβ; *add. in marg.* Hec littera “Et habebis eodem modo” et cetera est addita Vβ eodem ... sciens] et similiter Cγ modo] *om.* Lμ Qζ Qθ Xδ sciens] *om.* Bδ Bε Dη Eβ Eη Fβ Gα Kα Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mπ Mτ Mυ Mφ Oγ Oζ Oι Oξ Oτ Oυ Oφ Oχ Pα Pβ Pμ Pν Pξ Pρ Pσ Pφ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vβ Vι Wα Wλ Wμ Zα; scias Oβ; scieris Pγ; *corr. from* sciens Bγ quot] quod Bδ Eη Gα Lκ Wλ Pξ Sκ sint] sunt Cγ Dη Eβ Lβ Lγ Lη Mδ Mυ Oζ Oι Oτ Pβ Pγ Pμ Pρ Pφ Qθ Sδ Sκ Vβ equales] equinoctiales Eν inter] *marg.* Oξ
- 10-11 et ... instans] *om.* Eζ; unum et invenies scilicet horas noctis preteritas Bζ; et videas quo eius sint in 15 inter 2 notas et tot sunt hore transacte Cα Eodem ... instans] *om.* Bη Bι Cδ Cε Cζ Dγ Eα Eγ Eδ Eμ Eο Eρ Lζ Lλ Mα Mγ Mη Mι Mλ Mν Nα Nγ Oη Oσ Oχ Pζ Pι Pο Pτ Pυ Qε Qη Rα Sβ Sη Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Xα Xγ; *marg.* Vφ Wι; horas equales noctis [*illeg.*] Bκ equales ... meridiem] *illeg.* Zα
- 11 meridiem] meridionale Qδ vel] et Bβ Bγ Cη Dη Eκ Eλ Gα Lδ Mδ Mπ Oβ Oγ Pξ Qγ; vel inter Kε Qζ vel ... instans] *om.* Mτ Zα; et qualibet ∅ quod volueris Vφ quemlibet] quemcumque Qδ; quolibet Oβ; quodlibet Bβ Dη Eλ; *add.* horum Vψ alium] aliud Bβ Bθ Gα Pξ Pρ Pσ Vτ; almuri Bε Eη et] *om.* Pγ; in Dη; vel Bθ Dδ Eλ Eν Kα Vπ Vτ quodlibet] quolibet Dη; quolibet ad Dδ instans] *om.* Cγ Kα; *illeg.* Gα; in ∅ Vτ; instanti Dη; ∅ Qζ; *add.* et inter primam et [*illeg.*: repperis (?) Lδ, vapperis (?) Oγ] Lδ Oγ; *add. in marg.* Et hoc est verum si aliqua stella notabitur orietur in occasu solis Oι

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<sup>3</sup> The mss which omit the verb “scies” from this last sentence generally treat “invenies” as part of this sentence and therefore its verb.

as before, [that is], by 15, and you will find [the answer]. In the same way you will know how many equal hours are between mid-day or any other point and any moment you please.

[ Comment:

Find the current position of the sun and divide the degrees from there back to the sunrise by 15 and this will give the number of equal hours which have passed since dawn. At night divide the distance of the current position of a star back to the time of sunset and this will give the number of equal hours which have passed at night.

And you can do this for elapsed time from any (starting) point to the current point in time. ]

## [CAPITULUM 9.] DE CONVERSIONE HORARUM INEQUALIUM IN HORAS EQUALES

Si volueris reducere horas inaequales in horas equales, scito gradus horarum

- 1 *before De]* *add.* 11 Lλ; *add.* Capitulum 10<sup>m</sup> Qδ De ... equales] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eκ Eλ Eν Gα Kε Kι Lζ Mα Mτ Nα Oβ Oν Oσ Oχ Pι Pξ Pσ Pφ Qε Qη Qι Sβ Sθ Sι Sλ Vα Vτ Vυ Wλ Xγ Zα; *illeg.* Eγ Eζ; *faded* Eδ; 9<sup>o</sup> horarum inequalium in equales et e converso Nγ; Ad reducendum horas inaequales ad horas(*om.* Qθ) equales Lμ Qθ; Conversio horarum inequalium in horas(*om.* Mι) equales e converso Mι(*later hand*)Rα Vι Xα; Conversio horarum inequalium in equales Mο; Conversio horarum inequalium in horas equales [*illeg.*] Vι; De reductione horarum inequalium Wι; De reductione horarum inequalium in(ad Po Sη Vγ) horas(*om.* Vγ) equales Bη(*add.* et e converso; *add. in marg.* 10) Mλ Oη(*add.* et inaequales) Po Vγ(*add.* et e converso) Sη; De reductione horarum inequalium in horas equales et inaequales(*add.* e converso Eμ) Cζ Eμ(*marg.*; *add. in marg.* 10<sup>us</sup>); De reductione horas inaequales ad horas equales Mπ; Modum reducendi horas inaequales ad equales Bβ; Reductio horarum equalium in inaequales Mγ Eο; Reductio horarum inequalium Eο; Reductio horarum inequalium in(ad Bζ Mυ Oφ Vξ) horas(*om.* Bζ Eτ Mν Pτ Vζ) equales Bι(*add. in marg.* 10 c<sup>m</sup>) Bζ Dγ Eτ Mν Mυ(*later hand*) Oφ(*add. in marg.* Ad reducendum horas inaequales ad horas inaequales) Pτ Vβ(*add. in marg.* Conversio horarum inequalium in equales et e converso) Vζ Vο Wβ(*add.* Capitulum); Reductione horas inaequales ad equales Lκ; Scientia reductionis horarum inequalium in horas equales Qβ; *add. in marg.* 11<sup>m</sup> Qζ in] *om.* Oξ Pθ Pμ inequalium] equalium Qλ Wα horas] *om.* Oζ Pζ Pθ Pυ Pψ in ... equales] *om.* Kα equales] *add.* et econverso Lλ; *add.* Rubrica Cη Vπ; *add.* ut pie(?) Fβ
- 2 Si] Cum Bζ Bη Bθ Bκ Cα Cγ Cζ Dγ Eγ Eλ Eμ Eο Eν Lζ Lλ Mα Mγ Mι Mλ Mυ Mφ Nγ Oη Oφ Oχ Pζ Pφ Qε Sθ Sι Sλ Vα Vβ Vι Vν Vπ Vτ Wι; *add.* autem Zα Si ... equales] *om.* Vγ volueris] vis many; *add.* scire Oβ reducere] ducere Kα Sλ; scire Eο inaequales] equales Dη Kε Kι Mτ Qζ Vα inaequales in horas] *om.* Eζ in] *illeg.* Zα; ad some; et Qθ in horas] *corr. in marg. from* et horas Wα in ... equales] *om.* Cε Mα Mγ Oχ Pγ Qγ Qε Rα Sλ Vτ Vψ Wβ Wλ horas] *om.* Bε Bζ Cδ Eη Eκ Kα Mι Mυ Mφ Nγ Pζ Pσ Qι Sθ Vι; *interlin.* Sβ equales] inaequales Dη Kε Mτ Qζ; *add.* et econtra Dη Kι scito] *om.* Oβ; scias Cα Kα; vide per x<sup>mum</sup> Qη; *add.* per 8<sup>m</sup> canonem Bζ Eο Gα Pι Rα Sβ(*interlin.*); *add.* tunc vide per 8<sup>tum</sup> canonem Oβ scito gradus] scitis gradibus Bε Bζ Dγ Dδ Dη Fζ Eβ Eη Eλ Eο Fα Fβ Kε Lβ Lγ Lδ Lη Lκ Lμ Mγ Mλ Mπ Mτ Mυ Mφ Oγ Oζ Oι Oξ Oσ Pα Pμ Pν Pξ Pο Pσ Qβ Qγ Qζ Qθ Qι Qλ Sδ Tδ Vι Vν Vτ Wα Wι Xδ Zα; s [*lacuna*] gradibus Mδ gradus] gradum Bι Mν Sθ; graduum Oη; *add.* inequalium Cε horarum] *interlin.* Sβ; *add.* diei vel noctis Zα

[CHAPTER 9.] ON THE CONVERSION OF UNEQUAL HOURS INTO EQUAL HOURS

If you wish to restore unequal hours into equal hours, ascertain the degrees of the unequal hours

inequalium, quot sint, et divide eos per 15 et habebis horas equales; similiter facies de horis equalibus.

- 3      inequalium] equalium Eα Eζ Po Qζ; *add.* scilicet(.6. Lδ) multi[plican]do numerum graduum in quantitatem horarum Lδ Oγ      quot] que Qζ; qui Sη; quod Bδ Bζ Kε Vξ Qη Qθ Qi Sk Wλ      quot sint] *om.* Dη; id est in quot gradibus hora equalis excedat inequalem vel e converso Pi      sint] est Vγ; sunt Eμ Lλ Mν Oη Rα Sθ Vν Vρ Xγ; *add.* gradus Bζ; *add.* gradus quos Eγ      divide] divides *some*; dividesque Bθ Ev Vπ; *add.* eum Vτ      eos] *om.* Bζ Eγ Pi; eas Cα Pξ Qγ; eos gradus Oβ; gradus earum Bη Cζ Eλ Eμ Oφ Pφ Si Vν Vτ; gradus eorum Dγ Eo Mγ Mλ Oη Wi; quos Cγ; *add.* quota sit Qε 15] xv Oχ Qε Sβ Sθ; quindecim Lκ Tδ; 1 Pγ      et habebis] *om.* Cε      horas] *om.* Cγ Eγ Mν Qλ Wα Wi Wλ Zα      equalibus] *marg.* Pζ; inequales Dγ Xγ; *add.* horas inequales dividendo per 12 Lε Tδ      similiter] *twice* Mι; *add.* etiam(?) Kθ      facies] *om.* Mα; fac Eγ
- 3-4      Similiter ... equalibus] *om.* Oη      de ... equalibus] *om.* Bζ
- 4      horis] *om.* Bβ Bη Bθ Bκ Eα Eδ Eζ Eλ Eo Eρ Cδ Cζ Dγ Eμ Ev Gα Lλ Mα Mγ Mλ Mν Nα Nγ Oβ Oσ Oφ Oχ Pζ Qδ Qη Rα Sθ Si Vγ Vρ Vν Wλ Xα Xγ; cuiuslibet Eγ equalibus] dequalibus(!) e converso Pi; inequales dividendo per 12 Eγ; inequalibus Zα; *add.* ad horas inequales Bκ; *add.* dividendo gradus per 12 Oβ; *add.* dividendo per 12 Qη; *add.* equales dividendo per 12 Oξ; *add.* horas inequales Bε Eη; *add.* horas(*om.* Cγ Kα Pξ; in horas Pβ) inequales(equales Lμ Qθ Zα) dividendo per 12(1 [illeg.] 2 Qζ; duodecim Mτ Oφ Pφ Qθ) Bδ Cγ Eβ Dη Fα Fβ Fζ Kα Kδ Kε Ki Lβ Lγ Lη Lκ Lμ Mδ Mπ Mτ Mν Oζ Oi Oτ Ov Oφ Pα Pβ Pθ Pμ Pν Pξ Pρ Pφ Qβ Qγ Qζ Qi Qλ Sδ Vi Wα Xδ Zα; *add.* horas inequales dividendo per 12. Et habebis partes horarum inequalium Vβ(*add. in marg.* “horas inequales” et cetera est littera addita); *add.* horas inequales dividendo ~~horas equales~~ gradibus horarum equalium per 12 Wμ; *add.* in horas inequales dividendo per illa Pρ; *add.* in inequales dividendo numerum graduum equalium horarum per gradus [illeg.] hoc in equales Kθ; *add.* inequales Bθ Eλ Vπ; *add.* inequalibus Ev; *add.* 2.5-line gloss Cα; *add.* 3-line gloss Dδ; *add.* 4-line gloss Oγ; *add. in marg.* Scilicet numero graduum horarum equalium divide eos per numerum graduum hore inequalis qui tunc est et habebis Bγ; *add. interlin.* scilicet reducendo Kθ



how many there are, and divide them by 15, and you will have the equal hours. You will do the same with equal hours.

[ Comment:

Take the length in degrees of a day or some part thereof in the unequal hour period and divide this by 15, and this will give the number of equal hours in that period. Note: it is the number of degrees in the period and not the number of unequal hours which are divided by 15.]

## [CAPITULUM 10.] DE ALTITUDINE SOLIS IN MERIDIE HABENDA

Si volueris scire altitudinem solis in media die, quod est initium recessionis,

- 1 De ... habenda] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eκ Eλ Eμ Gα Kε Kι Lζ Mα Mτ Nα Oβ Ov Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qη Qi Sβ Sθ Si Sl Vα Vv Vτ Vυ Wλ Xγ; *illeg.* Eγ Eζ Lγ; *faded* Eδ *cut off* Pζ; Ad habendum altitudinem solis in meridiei Vζ; Ad habendum altitudinem solis Eo Eo(*add. later hand* in meridiei) Mγ; Ad habendum solis altitudinem meridianam Pτ; Ad inveniendum altitudinem solis in meridie Lμ Qθ; Ad sciendum altitudinem solis in media(*om.* Wι) die Kθ Po Sη Wι; Capitulum undecimum. De altitudine solis meridiana vel stellis Qδ; De altitudine solis meridiana et stellarum Bη; De accipienda altitudine in media die Vγ; De altitudine solis invenienda. Cap. Qβ; De altitudine solis meridiana(meridina Cζ) et stellarum Cζ Eμ(*marg.*; *add. in marg.* 11<sup>us</sup>) Oη; De altitudine solis in media die Lκ; De invenienda altitudine solis in meridie Bι(*add. in marg.* 11 c<sup>m</sup>) Vβ(*add. in marg.* De altitudine solis in media die); De inuentione solis in meridie Wβ; Inuentio altitudinis solis in meridie Bγ(*later hand*) Dγ Et Mv Oφ(*add. in marg.* De sciendo altitudinem solis in meridie) Vq; Inuentio hore diei per allidadam Sκ<sup>1</sup>; Si altitudinem solis vis scire in astr[olabi]ea Bβ; *add. in marg.* 12<sup>m</sup> Qζ habenda] *om.* Dη Kα Mι Mλ Mπ Nγ Zα; invenienda Bθ Pv Vπ; *add.* Capitulum Cη; *add.* Rubrica Vπ
- 2 Si] Cum Cα Cγ Cδ Cζ Dγ Eγ Eλ Eμ Eo Lζ Lλ Mα Mγ Mι Mλ Nγ Oη Ov Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Sl Vα Vβ Vv Vτ Vγ Vυ Wι; Et si Bκ volueris] *vis many*; *volu. vin* volueris Bζ scire] *om.* Eδ Lδ Lλ Mα Qε Sθ Vα Vγ Vτ; *interlin.* Oσ; *marg.* Pζ; *add.* manifeste Fβ solis] *interlin.* Qi in] *om.* Sβ; *interlin.* Pζ Qξ in ... die] *interlin.* Vξ media die] medio die Vv; meridie Eλ Mι Mτ Nγ Pq; meridie hoc est media die Dη die] *interlin.* Oσ; nocte *corr. later hand* to die Eo quod] qui Dγ Mγ Vv; quot Oβ est] *om.* Bβ; *add. in* Sβ; *add.* spacium Eυ recessionis] *add.* a chenith Bγ; *add.* [*illeg.*] a meridie Qζ; *add.* dicatur Bβ; *add.* eius a loca meridiana Cα; *add.* a meridie Mτ; *add.* scilicet ipsius diei W; *add. in marg.* etiam si non luceat sol super terram Oι
- 1-4 *different text (12 lines)* Pι

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<sup>1</sup> This is actually the title of Cap. 11.

[CHAPTER 10.] ON HAVING KNOWLEDGE OF THE ALTITUDE OF THE SUN AT MIDDAY

If you wish to know the altitude of the sun at mid-day, which is the beginning of its decline [i.e., the beginning of its afternoon descent to the horizon],

pone gradum solis super lineam medii celi; et numerus graduum almucanthat a loco solis in orizontem est altitudo eiusdem medie diei. Similiter facies cum stellis fixis.

- 3 pone] *om.* Pγ gradum] gradus Vπ; *interlin.* Sθ solis] *om.* Pα; *illeg.* Vγ; illius Bε Eη lineam] *add.* mediam Bδ; *corr. in marg. from medium* Mλ medii] *add.* vel Mα medii celi] meridiei Vγ celi] diei Cγ Oχ Pζ Sβ Sθ Vβ(*add. interlin.* α celi) et] in Cγ Eγ almucanthat] alenchabuth Qη; almi<sup>at</sup> Kε; almicancaraz Ov; almicancharach Mγ; almicancrath Mτ; almicanrath Eζ; almicantar' Lμ; almicantarath Lδ; almicantaraz Bκ Cδ Oη; almicanter' Cα; almican<sup>th</sup> Pσ; almicanthar' Dη; almicantrath Gα; almichanth Lκ; almic<sup>raz</sup> Lζ; almit' Oβ; almiutantarach Sι; almu<sup>c</sup> Cε Mπ; almucan Sβ; almucancarach Sη; almucancarath VQ; almucancrath Vτ; almucan<sup>rath</sup> Rα; almucant' Qθ Sλ; almucantarach Bθ; almucantarath Cζ Ek Pζ Qε Sθ Vγ Zα; almucantarath Bδ Bι Eα Eη Eλ Kδ Lγ Lλ Mδ Oγ Oι Pξ Pv Pφ Qγ Qδ Qi Tδ Vα Vβ Vπ; almucantaraz Vυ; almucant<sup>t</sup> Qζ; almucanterath Nα Oφ; almucan<sup>th</sup> Xα; almucanth' Cι Eβ Lβ Lη Mλ Pγ Pθ; almucanthatrach Pq Wβ; almucanthat Fζ Mα Oζ Sκ; almucanthatrach Bβ Bγ Cη Eq Ev Fβ Lε Mo Mv Mφ Oξ Oτ Oυ Pα Pμ Pν Po Pτ Qβ Qλ Sδ Vν Vξ Wμ Xγ; almucanthat Vι; almucanthat Kα; almuch Kθ; almuch' Bζ Eo Wι; almuchan Xδ; almuchantarath Vψ; almuchantaraz Eμ Oσ; almuchanthatrach Wα; almu<sup>rat</sup> Eγ Eδ; almu<sup>rath</sup> Eτ; almuscantarach Pβ; almut' Dδ Mη; almutantarath Mν; almutanterach Mι Nγ; almutanthatrach Cγ; almu<sup>th</sup> Bε Dγ; almu<sup>that</sup> Wλ; *add.* orizonte orientali ad locum solis Cα a] *om.* Kα; et Oβ; in Sη loco] *add. interlin.* orizonte Bι; *add. in marg.* in quo gradus solis tangebatur tunc orizont[*cut off*] scilicet sole oriente Bγ
- 3-4 a loco solis] *om.* Dη
- 4 solis] *om.* Bδ Bε Cι Cε Dδ Eβ Eδ Eη Eq Fβ Fζ Kδ Kε Kι Lγ Lδ Lε Lη Lκ Lμ Mδ Mν Mo Mπ Mv Mφ Oζ Oξ Pα Pβ Pθ Pv Po Pξ Pq Qβ Qδ Rα Sη Vι Vψ Wα Xα Zα; *interlin.* Oι; illa (*interlin.*) Lβ in] *interlin.* Pq; ab Dη Kα; usque ad Cα; usque in Cζ Oη; usque(*suprascr.*) in Eμ; *add. interlin.* α usque in Oφ orizontem] orizonte *some*; orizonte orientale Dη; occidente Bι; oriente Bδ Eo Kα Mπ Qθ Tδ Vβ(*add. interlin.* α orizonte) Vυ; orientem Oσ; orizonte Mδ Vα; *add.* quod idem Cα; *add. interlin.* id est usque ad lineam medii celi Qζ est] cum Mγ; erit Cγ Lδ Lλ Mι Ov Pζ Qε Vγ; *add. interlin.* α et Oφ eiusdem] *om.* Cι Xδ; eius Bε Dη Qι; solis Sβ medie diei] meridiei Cγ Eγ Eδ Kδ Mι Nγ Pβ Similiter] *lacuna* Sη facies] *om.* Cε Mη Pγ; *illeg.* Cι; fac *some*; operandum est Cα cum] *om.* Eτ; de Pζ Pξ; in Sλ fixis] *om.* Oη; scitis Fβ; *add.* de nocte Qη; *add.* in nocte Oβ Oι(*interlin.*); *add.* scilicet ponendo cacumen(acumen Mτ) stelle supra lineam medii celi cum(ostendit tunc Mτ; tunc Kι) gradus qui sunt ab alimba(almicancrath Mτ; almik Qζ; almik<sup>at</sup> Kι) primo in oriente(orizonte Mτ) usque ad locum solis in linea medii celi positum ostendit altitudinem stelle in medio diei(celi Mτ) Kι Mτ Qζ; *add.* si volueris habere altitudinem meridianam arcus stelle fixe Cα; *add.* ut s[imiliter(?)] Kδ

set the degree of the sun on the line of the mid-sky, then the number of the almucantar degrees from the place of the sun on the horizon is the altitude of the same at mid-day. You will perform the same action with the fixed stars.

[ Comment:

If you want to know the altitude of the sun at midday, place the point of the sun on the ecliptic (for that day) over the line through the middle of the sky (that is, the vertical diameter), and the number of the almucantar where it lies will be the altitude of the sun. ]

## [CAPITULUM 11.] INVENTIO HORE DIEI PER ALLIDADAM

Si per allidadam horariam vis scire horam diei naturalem, pone allidadam super

Cap 11: *om.* Bζ Bη Bι Bκ Cα Cδ Cζ Dγ Eγ Eμ Lζ LL Mα Mγ Oσ Oχ Pζ Qε Rα Sβ Sθ St SA Vα Vγ VQ Vv; *after Cap. 15 with insertion mark:* Mλ

- 1 Inventio ... allidadam] *om.* Bδ Bε Cγ Cε Dδ Eα Eζ Eκ Eλ Eν Gα Kι Lκ Mτ Nα Oβ Pγ Pι Pξ Po Pσ Pφ Qζ Qη Qi Sη Vτ Vφ Wλ Xα Xγ Zα; *faded* Eδ; *illeg.* Mv; Ad habend' horam diei naturalem per allidadam inchorariam Qβ; Ad inveniendum horam naturalem diei Lμ Oφ(*marg.*) Qθ; Ad horam diei naturalem per allidadem horariara(!) Eq; Ad sciendum horam naturalem diei Vξ; Ad sciendum horam per allidadam Pτ; Capitulum 12<sup>m</sup>. De hora diei naturali per allidadam Qδ; De accepta horarum per allidadam Kθ; De hora diei naturalis habenda per allidadam horariam Mλ; De horis naturalibus Mπ; De inventione horarum inequalium per alliladam horariam Ov; De inventione hore diei(*add.* naturalis Vβ) per allidadem Dη Kδ Mι(*alldidam*) Vβ; Invenio eiusdem per lineas horarias in dorso Vι; Inventio horarum per allidadam que dicitur horaria Bγ(*later hand*); Inventio hore(horarum Vψ) diei per allidadam Cι Eβ Eτ Vψ; Inventio hore per allidadam horariam Mv; Si per allidadam vis scire horam diei Bβ; Verto 3 folia ca. Wι hore] horarum Lδ Oγ; *add.* naturalis Bθ Pv Vπ diei] naturalis Wβ allidadam] alldidam Nγ; *add.* Rubrica Sδ Vπ *add. in marg.* 12<sup>m</sup> Vφ; *add. in marg.* 13<sup>us</sup> Qζ; *add. in marg.* c. 13 Sδ; *add. in marg.* Hoc capitulum "Si per allidadam" et capitulum subsequens "Item per alidadam" sunt ambo addita Vβ
- 2 Si] Et si Ev; Ut si Eλ Vπ Vτ; *add.* autem Eα per] quod Wλ allidadam\_] alldidam Mι Nγ; alhidadem (*and elsewhere*) Pι Zα; alidadam Eα Eζ; alidandam Mτ(*and elsewhere*); alilada Ov(*and elsewhere*); alyadam Qη horariam] *om.* Cγ Eδ Fζ Lδ; *add.* iam Lκ scire] *om.* Cε Eα Eδ Eκ Eτ Kδ Mη Mλ Mv Nα Pγ Po Sη Wβ; *del.* Eζ Pθ; *interlin.* Sκ; habere Bδ Bε Dδ Eβ Eη Fα Fβ Kα Kε Kθ Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mo Mπ Mv Mφ Nγ Oγ Oζ Oi Oξ Oτ Ov Oφ Pα Pδ Pμ Pv Pq Pσ Pφ Qγ Qδ Qζ Qθ Qi Qλ Tδ Vβ Vι Wα Wμ Xα Xδ Zα; invenire Bγ(*interlin.*) Bθ Dη Eλ Eν Mτ Vπ Vτ Vψ Wι horam] hore Oγ diei] diey Xα; *add.* illius in dorso Xδ naturalem] talem Bβ; equalem Lδ Oγ; *add.* id est equalem Pι Zα; *add. interlin.* id est inequalem Kε; m<sup>a</sup>ent Fβ allidadam\_] *om.* Nγ Pθ; alididam Oγ Qθ; aliud Vψ; allid' Mη; alliladam Ov(*and elsewhere*) super] *om.* Mv; per Oγ
- 2-3 allidadam<sub>2</sub> ... altitudinem] altidadam(!) Mι super altitudinem] *om.* Mφ Vι
- 2-5 pone ... quesita] *om.* Xα

[CHAPTER 11.] FINDING THE HOUR OF THE DAY BY THE ALIDADE

If you wish to know the natural [i.e., unequal] hour of the day using the hour-alidade [or “time-telling” alidade], place the alidade on

5 altitudinem medie diei illius in dorso astrolabii suspensi; et verte dorsum ad solem tam diu donec umbra uniuscuiusque anguli superioris pinnule cadat in allidada, quelibet in directo sui lateris; et ubi ceciderit in divisionibus erit hora quesita.

- 3 altitudinem] allidadam Mo; hora Xγ; lineam sive arcum Pι; *add.* solis Wλ medie diei] medii diei *some*; meridiei Eδ Vτ illius] istius Qη Vτ; *add.* allidadam Pθ suspensi] *om.* Eϱ Gα Nα; *interlin.* Vφ; et fac punctum in qua ubi ipsam suspensat arcum hore 6<sup>te</sup> Pι et verte dorsum] vertendo illius Bβ Eα Eδ Eζ Kθ (*add.* scilicet dorsum); vertendo illud Mν Po dorsum] *om.* Eλ; *add.* illud Mλ Oν; *add. and del.* astrolabii Pυ; *add. interlin.* astrolabii Vβ ad solem] *rep.* Kι tam] *om.* Vξ
- 3-4 tam diu] *om.* Sκ
- 4 diu] *om.* Bδ uniuscuiusque] cuiuscumque Pθ; cuiuslibet Kε Kι Mτ Nα Qθ; cuiusque Kδ Lμ Pσ; uniuscuius Eϱ; unius cuiuslibet Vφ; utriusque Pφ; *add.* pinnule Dδ; *add. interlin.* at utriusque Vβ anguli] *om.* Kα Oφ; diei Mν Mφ Vι superioris] *om.* Sδ pinnule] *om.* Eϱ Gα Pι Vφ; *lacuna* Kδ Pβ; perinule Fβ; pinnule Bθ; pinnulle Eα Mν; pinule Eμ Mπ Qδ Sη Sκ Wλ; perinule Pφ allidada] alidida Mι Nγ; alididam Oγ Qθ; allidadam *some*; allilada Vψ; alyadam Qη; *add.* piah(?) in dorso Gα quelibet] *om.* Bδ Bε Cγ Cι Dδ Dη Eβ Eη Fα Fβ Fζ Gα Kα Kδ Kε Kι Lβ Lδ Lε Lκ Lμ Mδ Mη Mπ Mτ Mν Mφ Nγ Oγ Oζ Oι Oξ Oτ Oυ Oφ Pα Pβ Pδ Pθ Pμ Pν Pϱ Pξ Pσ Pφ Qβ Qζ Qη Qθ Qι Qλ Sδ Sκ Vι Vψ Wμ Zα; quolibet Vβ in<sub>2</sub>] *om.* Pφ; *interlin.* Oφ
- 5 directo] puncto Vψ; recto Qλ; recto *corr. to* directo Wα lateris] *lacuna* Fβ ceciderit] cecideris(!) Mo; occiderit Cη; *add.* punctus Pι; *add.* talis umbra Bβ Eα (tallis) Eδ Eζ Kθ Mλ Mν Oν Po in] et Xγ in divisionibus] *rep.* Lβ divisionibus] diebus Pξ; *add.* horarum Bβ Bγ (*interlin.*) Bε Cγ Eα Kθ Lδ Mλ Mν Oγ Pι Po Qζ; *add.* ibi Bθ Eλ Lδ Mo Oγ Pυ; *add.* regule Nα Pυ Vβ; *add.* si(?) Xγ erit] est *corr. to* erit Oφ; in Nα; *add.* ibi Sη Vβ hora] ipsa Oζ quesita] *add.* Ad horam diei naturalis per allidadam horariam cognoscenda Gα



the back of the suspended astrolabe on the altitude [of the sun] at the middle of that day; and turn the back to the sun until the shadow of each edge of the upper vane falls on the alidade, anywhere in line with its side. And where it falls in the divisions will be the desired hour.

[ Comment:

This chapter depends on the marking of the unequal hour-lines as outlined in the *Constructio*, Cap. 5. (Because, as noted there in the comment, few western astrolabes had these markings, Capitula 11 and 12 of the *Practica* are often omitted.)

Placing the time-telling alidade or rule (specifically the end along which the time-telling hours have been marked) on the maximum altitude of the sun for that day (noon, solar time) sets the two variables which determine the length of the natural day and of the 12 unequal hours for that day – the latitude of the observer and the day of the year (or the position of the sun along its annual orbit). Then, suspending the astrolabe, turn it so that the edges of the upper vane toward the sun will cast a shadow down the alidade, the edges of the shadow lining up along the rule. The unequal hour can then be read where the end of the shadow falls, according to the lines engraved across the alidade.

Note: since the alidade will be pointing more or less upwards toward the place in the sky where the noon-day sun would be, the early morning hour shadow or the late day hour shadow will cross the alidade close to the vane; and the nearer the hour is to noon, the more “vertical” will be the shadow and hence cross the alidade further from the vane. This is why the hour lines on the alidade are numbered from the vane outward toward the centre (1 to 6) and then back from near the centre to the vane (7 to 12).

Note: in modern practice, one must adjust the calculation by using the “solar noon” when the sun is indeed vertically overhead in the sky for the observer, rather than “civil noon” based on modern time zones. Solar noon can easily be calculated by dividing the length of time between sunrise and sunset by two, and adding this to the time of sunrise.

Thus if the sun rises at 6:34 a.m. and sets at 8:04 p.m. (or 20:04), the difference is 13:30 hours, half of which is 6:45 hours. Noon would then be at 6:34 plus 6:45 or 13:19 (i.e., 1:19 p.m.) Which would be the end of the 6<sup>th</sup> unequal hour and the beginning of the 7<sup>th</sup>. (It does not matter whether this is standard time or daylight saving/summer time as long as the calculations and the final reading all use the same time system.) ]

[CAPITULUM 12.]<sup>1</sup> DE EODEM INVENIENDO PER LINEAS

Item per allidadam etiam in dorso et lineas horarum inter latera gnomonis, si

Cap 12] *om.* Bζ Bη Bι Bκ Cα Cδ Cζ Dγ Eγ Eμ Eο Eρ Gα Lζ Lλ Mα Mγ Oβ Oη Oσ Oχ Pζ Pι Qε Qη Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Xα; *add. different version in bottom marg.* Eρ(*later hand*)

- 1 De ... lineas] *om.* Bδ Bε Bι Cγ Cε Dδ Dη Eα Eδ Eζ Eκ Eλ Eν Kε Lκ Mν Mτ Nα Oν Pγ Po Pξ Pσ Pτ Pφ Qζ Qi Vτ Vφ Wα Wλ Xγ; Ad sciendum horam naturalem in dorso astrolabii Vξ; Capitulum 13<sup>m</sup>. De eodem in dorso Qδ; De eodem Kθ Mι Mπ Nγ Sη; De eodem habenda per allidadam et lineas horarias Mλ; De eodem inveniando etiam per allidadam Qβ; De eodem inveniando per lineas Oι Tδ; De eodem per lineas horarias in dorso Vβ; De eadem per lineas horarum Kδ Vπ(*add. Rubica*); De inventione horarum inequalium in dorso astrolabii Zα; Inventio de eodem per lineas Qγ; Inventio eiusdem per lineas horarias in dorso Eτ Wι; Item ad capitulum de eodem Lμ; Item alio modo fit supple Bγ(*later hand*); Item de eodem Oφ(*marg.*); Item de eodem ad ca<sup>lum</sup>(*calculum?*) Qθ; Item per alia in horarias in dorso Wβ; Si horam vis scire per alidadam in dorso Bβ eodem] eadem Fζ Kα inveniando] *om.* Bθ Cι Mη Pδ Pθ Pυ Sδ Vψ lines] *add. horarum* Bθ Pδ; *add. horias* Mo; *add. Rubrica* Bθ *add. in marg.* 14<sup>us</sup> Qζ; *add. in marg.* c. 14 Sδ
- 1-7 De ... quadrante] *marg.* Vφ
- 2 Item] Et est Lβ Lκ Wμ; Tunc Fβ per] *om.* Wλ; qui Bθ Vπ allidadam] alhidadam Zα(*and elsewhere*); alidadam Qδ; allidadam Oγ(*and elsewhere*); allididera Mι; *add. interlin. in astrolabio* Zα etiam] *om. some dorso*] *add. astrolabii* Bδ Cγ Eβ Kα Lγ Lλ Mδ Mι Nα Oι Pξ Oν Sη Vβ Wβ et] ad Lκ; per Eτ Xγ; si Eκ(*deleted*); *add. in* Pβ; *add. per* Bθ Vφ inter] in Eν latera] *add. et cetera latera* Eα gnomonis] *lacuna* Kδ; g[*illeg.*]monis Pβ; gno'is Cη Pγ Wι; gnomonibus Pφ; gomonis Eλ Mπ; *cut off* Eζ; *add. descriptas vel super* Eν; *add. vel super* Bθ Eλ Mo Nα Pτ Pυ Qδ Sη Vβ Vτ; *add. vel supra si*] *om.* Cε; sic Cγ Eβ Eη Fα Fβ Lβ Lε Lη Mδ Mι Nγ Oζ Oξ Oτ Oυ Pα Pβ Pμ Pρ Pσ Pφ Qβ Qγ Qθ Qi Qλ Tδ Xδ; vel supra Vπ Xγ(*ms skips to Cap. 28*)
- 2-3 inter ... sic] in dorso poteris illud idem invenire. Pone ergo Dη inter ... super] *marg.* Eζ(*later hand*) si sint] sicut Lκ; sit sicut Fζ Lγ Oι Wμ

<sup>1</sup> In many mss this capitulum continues on without title from Cap. 11.

## [CHAPTER 12.] ON FINDING THE SAME THROUGH THE [HOUR-]LINES

Also by the alidade on the back and the hour lines between the sides of the gnomon<sup>2</sup> as if

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<sup>2</sup> The use of *gnomon*, *-onis* here is not clear. Perhaps because gnomons cast shadows, it is an oblique reference to the shadow square on the back of the astrolabe, and hence to the unequal hour-lines which are usually drawn next to it – see variants “(add. vel super)”.

See also Cap. 43.

5 sint posite ut in quadrante, sic. Super altitudinem solis meridianam in illa die pone allidadam; et nota ubi meridianus circulus, id est, linea finis 6<sup>e</sup> hore, secuerit lineam fiducie ipsius allidade; et pone ibi signum de incausto; et illud signum valet situationem

- 3 sint] sit Cε Pδ Wμ; sunt Oφ      posite] ponite Pβ; supponite Vφ; *add.* ibi Bβ Bδ Cι Dδ Eα Eβ Eη Fα Fζ Kδ Lγ Lδ Lε Lη Lκ Mη Mι Mφ Nγ Oγ Oζ Oι Oτ Oυ Oφ Pα Pβ Pδ Pθ Pμ Pν Pξ Pρ Pσ Qβ Qγ Qζ Qθ Qλ Qι Sδ Sκ Vι Vψ Wα Wβ Wι Wμ Xδ; *add.* linee ibi Mδ ut] *om.* Bθ Sκ Vπ      sic] *om.* Kθ Mλ Mν Oν Pο Vβ Wλ Zα; *del.* Sκ; sicut Mτ Mυ; sint(?) Qθ      super] *om.* Pφ; per Vφ Wμ; similiter Pγ; sit Lβ Lκ      solis] *om.* Kα in illa] gnilla(!) Bβ      illa] *om.* Lβ Lκ; alia Fα Pφ; ista Kι Mτ      illa diei] meridiei Lη      pone] *om.* Dη
- 4 allidadam] *marg.* Fα; a<sup>d</sup> Eβ Fβ Oι Oξ Oτ(*add. in marg.* allidadam) Oυ Oφ Pξ Qλ Sδ Wμ; a<sup>da</sup> Lε; ali<sup>d</sup> Fζ; aliud Cγ Kα Lκ Mδ Mι Nγ Pα Pμ Pν Pφ Qβ Qδ Qι Wα Xδ; *allud' corr. to allid'* Sκ; regulam Bδ      ubi] ibi *corr. to ubi* Oτ      meridianus] meridionalis Eδ circulus] *om.* Vφ      id est] est Cγ; in Mδ; *add.* que est Oγ      id est linea] *del.* *and add. interlin.* qui est Bγ      linea] *om.* Kε Kι Mτ; lineas Pγ; *add.* qua est Lδ; *add. interlin.* quia Oφ      finis] factas(?) Pγ      6<sup>e</sup>] 6 many; sexte some; 64 Cγ      hore] horarum Mτ      secuerit] *lacuna* Cγ; cecuerit Eζ; fecint *corr. in marg. to secuerit* Sκ; securrit Nα; secuit Pφ      lineam] *rep.* Oν
- 5 fiducie] *add.* 6 hore Dδ; *add. in* Qδ      ipsius] *marg.* Oι; illius Mν Oφ Pμ Pφ Qβ Sδ Wλ allidade] aldide Mι Nγ; alidade Qδ; allid' Mη Sκ      ibi] ibidem Kδ      de incausto] *om.* Dη; cum afcaūito(?) Tδ; de enclaustro Pφ; de incausto Mι; *add.* id est de atrameto Nγ; *add.* id est de atramento Mι      de ... signum] *om.* Pγ      et illud signum] et cetera Cγ Pφ      signum] *om.* Bβ Bε Cε Cι Dδ Dη Eβ Eη Eυ Fα Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mι Mπ Mυ Mφ Nα Nγ Oγ Oζ Oι Oξ Oτ Oφ Oυ Pα Pβ Pδ Pθ Pμ Pν Pξ Pτ Pυ Qβ Qγ Qδ Qζ Qθ Qι Qλ Sδ Sκ Tδ Vβ Vι Vπ Vφ Vψ Wα Wλ Wμ Xδ Zα      valet] videlum Nγ; *add.* ad Bβ Bε Bθ Dδ Eη Eλ Eυ Kδ Kθ Lμ Mτ Oφ(*interlin.*) Pσ Qζ Qθ Qι Vπ Vφ Wλ      situationem] *om.* Eα; situationi Nγ

they were placed on a quadrant, thus. Place the alidade on the midday altitude of the sun on that day and note where the midday [unequal hour] circle, that is, the line of the end of the 6<sup>th</sup> hour, cuts the trusted line<sup>3</sup> of this alidade, and place there a red mark;<sup>4</sup> and this mark takes the place of

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<sup>3</sup> *lineam fiducie*: the line down the “centre” edge of the alidade must be accurate and trustworthy since measurements depend on it. See *Comp. Cap.* 4 line 13.

<sup>4</sup> The term *incausto* usually denotes the use of red wax. *Encausto* would be ink or dye. Here one needs to make a temporary mark on the alidade, and a dot of wax would be one (temporary) way of doing this. Note that *M<sub>1</sub>* suggests “blacking” (*atramentum*).

margarite in quadrante. Deinde accipe altitudinem solis in quacumque hora vis, et illud signum inter horas dabit horam naturalem, ut in quadrante.

- 6 margarite] *lacuna* Cγ; margharite Mτ; *add.* ut Eδ in quadrante] *directe* Fζ  
 quadrante] *qua divide* Pφ Deinde] *twice* Pγ accipe] *om.* Zα; *lacuna* Cγ  
 quacumque] *qua* Dη Qι; *qualibet* Oζ hora] *illeg.* Qλ; *add.* tu Vφ
- 6-7 et ... horam] *ad*<sup>et</sup> signum inter horas dabit horam *corr. in marg. to* et huius signum dabit  
 horas inter ceteras horas naturales Sκ
- 7 signum] *add. interlin.* ubi cadit Kι inter] *add.* has Kα horas] *has lineas* Eλ; *add.*  
 quam [q3] Pγ dabit] *illeg.* Eλ; *lineas* oūdet Vτ; *add.* tibi Pδ horam] *add.* diei Bβ  
 Eα Eζ Kθ Mv Ov Qζ(*marg.*) naturalem] *add.* inaequalem Zα ut] *om.* Dδ; *vel* Nα  
 ut ... quadrante] *om.* Eκ Kε Kι Mτ Vφ quadrante] *om.* Qθ; *add.* Et nota si quevis  
 ante meridiem debet numerando incipere de prima hora versus sextam. Si quevis post  
 debet incipere a sexta versus primam Dδ; *add.* margarita Oφ; *add.* sit Kδ

the bead<sup>5</sup> in a quadrant. Then take the altitude of the sun at whatever hour you want and that mark between the hours will give the natural hour, as in a quadrant.

[ Comment:

To find the unequal hour for any point of time in the day, first note the altitude of the sun at midday for the day in question by rotating the ecliptic circle on the rete so that the position of the sun in the ecliptic on that day is on the vertical midday line, and then by reading the altitude using the almucantars.

On the back of the astrolabe set the alidade to that midday altitude, and mark (temporarily) on the alidade (along its “centre line” edge) the point where it cuts the sixth unequal hour-line arc (found above or below the shadow square). Next rotate the alidade to the altitude of the present time; the temporary mark will now sit on or between other unequal hour-line arcs, and from this you can read (or estimate) the present time in unequal hours.

One would follow similar steps if one were ascertaining the present time using a quadrant. ]

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<sup>5</sup> Although the actual meaning of *margarita* is an oyster’s “pearl”, it is also the name commonly given to the sliding bead on the plumbline of a *quadrans vetus*.

## [CAPITULUM 13.] CAPITULUM PREAMBULUM AD QUEDAM SEQUENCIA

Amplius scito quod circulus signorum dividitur in duos semicirculos, quorum

- 1 Capitulum ... sequentia] *om.* Bδ Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eζ Eκ Eλ Eν Gα Kε Kι Lζ Lκ Lλ Mα Mτ Nα Oβ Oγ Oν Oσ Oχ Pγ Pζ Pι Pσ Pξ Pφ Qε Qζ Qη Qθ Qι Sβ Sθ Sι Sλ Vα Vγ Vν Vτ Vυ Vφ Wι Wλ Xα Zα; *faded* Eδ Eο; *illeg.* Lμ; Ad cognoscendum sequentia Vξ; Capitulum 14<sup>m</sup>. Preambulum ad capitula sequentia Qδ; Capitulum preambulum ad sequentia, et est de gradibus equedistantibus a solsticiis Vβ; Consideratio solsticiorum in ipso rethi Bγ (*later hand*); Cum gradus solis habeant altitudines meridianas et umbras equales Cζ; De divisione circuli signorum Mπ; Divisio circuli Bβ; Duos gradus solis habent altitudines meridianas et umbras equales Eμ (*marg.*; *add. in marg.* 12<sup>us</sup>); Equatio solis per halhancabuth Oφ; Nota preambulum ad quedam sequentia vel de gradibus equidistantibus ab equinoctio Vι; Notabilia capitulorum sequentibus utilia Sη; Notabilia de gradibus equidistantibus a solsticii Eτ Mν Wβ; Notabilia per capitulis sequentibus utilis Kθ Pο; Nota preambulum ad quedam sequentia vel de gradibus equidistantibus Mυ; Notabilia precedentia ad sciendum gradum solis per alhantabut Dγ; Notabilia precedentia ad sciendum gradum solis per alhantabuth et quemdem alia Rα; Quedam distinctio partium zodiaci utilis ad sequentia Vο; Quedam divisio signorum utilis ad sequentia Bι (*add. in marg.* 12<sup>c<sup>m</sup></sup>); Qui gradus solis habeant altitudines meridianas et umbras equales Bη (*add. in marg.* 12) Oη; Quid precognosci habet ad sequentia Mγ Pτ; Quod pre[*illeg.*] ad sequentia Eο Capitulum] *om.* Mδ Pβ Pμ Pο Vψ Xδ; Nota Oφ preambulum] preambulatorum Kδ; preamolom(!) Mι Nγ quedam] *om.* Bε Mλ; quod Pα sequentia] sequentiarum Vπ; *add.* a dicenda Pα; *add.* et de zodiaci divisione Qβ; *add.* necessarium Mδ *add. in marg.* 13<sup>m</sup> Vφ; *add. in marg.* 15<sup>us</sup> Qζ; *add. in marg.* Amplius capitulum Lζ; *add. in marg.* c. 15 Sδ
- 2 Amplius] Et Bκ; Et tunc amplius Qη; Nota et amplius Zα; *add.* autem Mυ Mφ Vι Wα scito] nota Kε Mτ; scias Cα circulus] aliqua Cγ Eγ in ... semicirculos] solsticia Cγ Eγ duos] 2 / 2<sup>os</sup> some; duo Mα Sθ Vα; *add.* rizcalis Vπ semicirculos] circulos *corr. interlin. to* semicirculos Oγ; semicircula Sθ
- 2-4 Scito ... estivale] *om.* Dη



[CHAPTER 13.] PRELIMINARY CHAPTER TO CERTAIN THINGS WHICH FOLLOW

Further know that the circle of signs is divided into two semicircles, of which

5 unus est a capite Capricorni in caput Cancri, et alius a capite Cancri in caput Capricorni; et caput Capricorni est solsticium hyemale, caput Cancri estivale. Scito etiam quod omnes duo equidistantes gradus ab aliquo horum solsticiorum sunt unius declinationis

3 est] *om.* Xα capite<sub>1</sub>] *om.* Mo capite<sub>1</sub> ... Capricorni<sub>2</sub>] *margin.* Eζ (*later hand*)  
 Capricorni<sub>1</sub>] Cancri Bζ Dγ Eo Mγ Mλ Vv Vτ in<sub>1</sub>] usque ad Eλ in<sub>1</sub> ...  
 Cancri<sub>1</sub>] *om.* Pφ; usque ad caput Cancri Wβ (*margin.*) in<sub>1</sub> ... alius] et Mι Nγ in<sub>1</sub> ...  
 Capricorni<sub>2</sub>] *om.* Ev Po; usque ad caput Cancri Eδ (*margin.*) caput<sub>1</sub>] *om.* Pδ  
 Cancri<sub>1</sub>] *margin.* Cε; Capricorni Bζ Dγ Eo Mγ Mλ Vv Vτ; Capricorni *corr.* to Cancri Qζ  
 et ... Capricorni<sub>2</sub>] *om.* Eα Mv; *lacuna* Lβ alius] illius Qγ; *add.* est Pζ a<sub>2</sub>] in  
 Kδ; in *corr. interlin.* to a Sk Cancri<sub>2</sub>] Capricorni Bζ Dγ Eo Mγ Mλ Vv Vτ in<sub>2</sub>] ad  
 some; usque ad Eλ Qι caput<sub>2</sub>] capite Cι Pδ Capricorni<sub>2</sub>] Cancri Bζ Dγ Eo Mγ  
 Mλ Vv Vτ

3-4 et ... Capricorni] *margin.* Qδ

4 et ... Capricorni] *om.* Gα Lγ Mo Pφ Pξ Pv Qδ; *margin.* Rα Sk Wα; quod Pβ caput<sub>1</sub>] *interlin.* Eα caput Capricorni] *om.* Bβ Eδ caput<sub>1</sub> ... estivale] caput Cancri est solsticium estivale (stivale St), caput (*add.* vero Eλ) Capricorni (*add.* est Cα Mλ Oφ Pφ St Vv) solsticium hyemale Bζ Cα Eλ Eo Mγ Mλ (caput Cancri *margin.*) Oφ Pφ St Vv; caput Cancri est solsticium hyemale Vτ; et solsticium estivale, et capud Capricorni est solsticium yemale Dγ Capricorni] Cancri Lλ est] in Lκ solsticium] *om.* Dδ Mπ hyemale] hiēle Sδ; hiemale Ek Qγ Sθ Sλ Xδ; hiemamale Qε; yemale many; ymale Xα hyemale ... Cancri] *om.* Pζ caput<sub>2</sub>] *om.* Mα Mι Mτ Nγ Oχ Qε Sβ Sθ; *add.* vero Bθ Cγ Vπ Cancri] *add.* solsticium Eα Zα; *add.* est Qδ Vv; *add.* est solsticium Oγ Oη Qι estivale] hestivale Mλ; stivale Pβ Scito] Nota Dη; Scias Cα etiam] *om.* Bη Dη; *interlin.* Xδ; ea Sη; vero Pσ quod] *om.* Kα

4 - Cap. 21 line 4: solsticium ... meridiem] *from 15% to 30% of each line of ms Gα is cut off or too tightly bound to be read*

5 omnes] *om.* Nα Sη duo] *om.* Bη Cδ Eμ Ev Gα Kα Pθ; 2 / 2° many equidistantes] equales distantes Cα; eque distantes Dγ Kα Lκ Mv Oφ Qη Sλ Vφ Xα gradus] duorum graduum Ev aliquo] aliquorum Pξ; altero Cγ; latero Eγ aliquo ... solsticiorum] anterior duorum solsticiorum versus meridiem vel alicuius Vτ horum] eorum Sθ; istorum Bζ Cα Dγ Eλ Eo Mγ Mλ Pφ St Vv Wι; *add.* duorum Dη Oβ Qη solsticiorum] *add.* scilicet Cancri et Capricorni Dη sunt] *om.* Pα; sint Sθ; sint sint Oχ unius] *add.* alius Bη declinationis] et equalis convitionis Mτ

one is from the beginning of Capricorn to the beginning of Cancer, and the other from the beginning of Cancer to the beginning of Capricorn; and the beginning of Capricorn is the winter solstice, the beginning of Cancer the summer [solstice]. Know as well that every two degrees equidistant from any of these solstices are of one declination [*or have the same declination*]

versus septentrionalem vel meridiem; et dies eorum vel noctes sunt equales, et umbre et altitudines sunt equales in media die semper.

- 6 versus] ad Sk(*interlin.*); ut Cγ versus ... meridiem] *om.* Vτ septentrionalem] aquilonem(!) Mτ vel<sub>1</sub>] et *some*; per Pτ; *add.* versus Cα et<sub>1</sub>] *add.* omnes Cα Oφ Pφ eorum] horum Cγ Eγ Pξ vel<sub>2</sub>] *om.* VQ; et *some* noctes] *add.* eorum Eα sunt equales] *om.* Bθ Eν; *add.* si gressa comparacione(?) Oβ umbre] *add.* quoque eorum Eγ Lλ Mα Nγ Oχ Pζ Qε Sβ Sθ Vβ Vγ et<sub>3</sub>] *add.* similiter Bθ Eο Eν Mγ Vπ Vτ Wι
- 6-7 et<sub>2</sub> ... altitudines] *om.* Dη et<sub>2</sub> ... equales] *om.* Eβ Gα Qι Qλ Sλ Vα Wα; *illeg.* Cε
- 7 altitudines] altitudo Qε; latitudines Pν VQ sunt] *om.* Bβ Bη Bθ Cδ Cι Eα Eδ Eμ Eο Eρ Eν Fζ Kδ Kθ Lζ Lλ Mα Mγ Mι Mλ Mο Mν Nα Nγ Oβ Oσ Oχ Pζ Pι Pο Pν Qδ Qη Rα Sβ Sη Sθ Sι Sκ Vγ Vν Vξ Vπ VQ Vτ Vν Vφ Vψ Xα; similiter Wι sunt equales] *om.* Bζ Dη Lκ Mν Mφ Oν Pδ Vι media] *rep.* Oχ media die] *illeg.* Kθ; meridie Eδ die] nocte Wλ; nocte die Wι semper] *om.* Bγ Cη Eλ Eκ Eο Lβ Eτ Wβ Wι; simpliciter Dγ; *add.* et illud est quia archus quos facit sol experiens in talibus gradibus sunt equales adminetur Lδ Oγ

toward the north or the south; and their days and nights are equal, and the shadows and altitudes at midday are always equal.

[ COMMENT:

Astronomical information useful for the following chapters:

The ecliptic can be divided into two semicircles at the solstices, with the winter solstice at the beginning of Capricorn and the summer solstice at the beginning of Cancer.

And pairs of points on the ecliptic equidistant from the either solstice will have the same declination (north or south of the celestial equator), and equal days and nights; and at midday the sun will have the same altitude and cast equal shadows. ]

## [CAPITULUM 14.] DE GRADU SOLIS IGNOTO PER RETHE HABENDO

Cap. 14] *om.* Dη Qη

- 1 De ... habendo] *om.* Bδ Bζ Bκ Cα Cγ Cδ Cε Dδ Eα Eγ Eζ Eκ Eλ Eν Gα Kι Lκ Lζ Mα Mτ Nα Oβ Oν Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qι Sβ Sη Sθ Si Sλ Vα Vν Vτ Vυ Vφ Wλ; *faded* Eδ Eο Lλ; Ad cognoscendum gradum ignotum Bη(*add. in marg.* 13); Ad cognoscendum gradum solis etc. Xα; Ad habendum gradum solis ignotum Vξ; Ad [*illeg.*] gradum solis ignotum Λμ; Ad inveniendum gradum solis ignotum Bγ(*later hand; add. qualibet die*) Kθ Mλ Pο Qθ Wι; Capitulum 15<sup>m</sup>. De gradu solis ignoto Qδ; Capitulum de gradu solis ignoto Bε; De arte cognitionis ignotum gradum solis Eο; De cognoscendo gradum solis(*om.* Oη Eμ) ignotum Cζ Eμ(*marg.; add. in marg.* 13<sup>us</sup>) Oη Pτ; De inventione gradum solis ignotum Eζ; De investigatione gradus solis(*om.* Pζ) ignoti Nγ Pζ(*marg.*) Vβ Vγ; Ignotum gradum solis qua arte cognoscas Mγ; Inventio gradus solis ignoti Dγ Oφ Vο; Inventio gradus solis ignoti et cetera Bι(*add. in marg.* 13 c<sup>m</sup>); Inventio gradus solis ignoti per alhatas[*i.e.*, alhantabuz] vel per rethe habendo Mυ; Inventio gradus solis ignoti per alhantaz Rα; Invenio solis gradus(*add. marg.* ignoti Wβ) per alhantabuth Mν Wβ; Si vis scire gradum solis ingnotum(!) Bβ ignoto] *om.* Kα ignoto ... habendo] *om.* Mπ per ... habendo] *om.* Zα rethe] re[*del.*] Pμ; recte Fβ; rete Mδ Oγ Vψ; rethi Sδ habendo] habendum Lβ; inveniendo Kα; *add.* Rubrica Pμ Vπ; *add.* Capitulum Qβ *add. in marg.* 14<sup>m</sup> Vφ; *add. in marg.* 16<sup>us</sup> Qζ; *add. in marg.* c. 16 Sδ

[CHAPTER 14.] ON FINDING THE UNKNOWN DEGREE OF THE SUN BY THE RETE  
[i.e., finding the position of the sun along the ecliptic using the rete]

## Si volueris cognoscere gradum solis ignotum, pone notam super altitudinem

- 2 Si] Cum Bη Bθ Bκ Cα Cδ Cζ Dγ Eλ Eμ Mα Mγ Mι Mλ Nγ Oη Ov Oσ Oφ Oχ Pζ Pφ Qγ Sβ Sθ Sι Sλ Vα Vγ Vν Vπ Vυ Wι volueris] vis *many* cognoscere] *om.* Sλ Vα; agnoscere Eλ; scire Bκ Cγ Cδ Cζ Eα Eγ Eζ Eκ Eμ Gα Lζ Lλ Mα Nγ Ov Oσ Oχ Pσ Pτ Qε Sβ Sθ Sι Vγ Wι Zα; scire vel cognoscere Kα; *add. interlin.* a] scire Vβ solis] *om.* Cγ Eγ ignotum] in notum Mι Nγ pone] ponam Mυ; *add.* gradum solis Xδ; *add.* regulam Pφ; *add. 7 lines* Cα notam] nota Mι Nγ; regulam Mγ Vν; *add.* scilicet Kθ; *add.* super almucantarāt Zα super] solis meridianam Pι; supra Lκ altitudinem] *illeg.* Pσ; lineam Bζ; solis Kθ; *add.* in linea Pι; *add.* in rethi et regula regionis Wλ; *add.* inventum per dorsum Cζ; *add.* scilicet solis Bβ
- 2-3 Si ... astrolabii] Cum volueris cognoscere gradum solis ignotum id est si nolueris in quo gradus signi in rete in quocumque die sit sol debes accipere per dorsum astrolabii maiorem altitudinem in meridie illius diei et scias quot gradus ascendit et numera tot gradus in almucantarāt et in fine illorum graduum in linea meridiana pone notam. Et post modum volve rethe donec aliquis gradus cadat super notam et ille gradus vel eius nadyr est gradus solis illius diei. Et pone regulam vel notam super altitudinem medie diei in mediate scilicet quam sumpsisti prius per regulam in dorso astrolabii. Oφ; Cum volueris cognoscere gradum solis ignotum id est si [*illeg.*] in quo gradus signi in rete in quocumque diei sit sol debes accipere per dorsum astrolabii maiorem altitudinem in meridie illius diei et scias quot gradus ascendit [*illeg.*] numera tot gradus inter almucantarāt et in fine illorum graduum in linea meridiana pone notam. Et post modum volve rethe donec alius gradus cadat super notam et ille gradus vel eius nadyr est gradus solis in signo per illo die. Et postea pone regulam et notam super altitudinem medie diei imediate quam sumpsisti prius in dorso astrolabii. Cα notam ... medie] [*illeg.*] g<sup>re</sup> in soli super altitudinem in rethe et [*illeg.*] omnis Gα



If you wish to learn the unknown degree of the sun, place a mark on its midday altitude

5 medie diei, quam sumpsisti prius per regulam in dorso astrolabii. Deinde volve rethe, cadentque duo gradus super ipsam notam; quarum unum scies esse gradum solis per signum mensis cuius fuerit dies.

- 3 medie] *marg.* Lδ medie diei] diei in medie Cγ Eγ; diei in medietate Sλ; meridiēi Kε Kι Mτ diei] die Nγ; *add.* illius in dorso astrolabii suspensi Bδ Pξ; *add.* in medietate solis Pτ; *add.* scilicet Bκ Gα Mλ Vτ; *add.* scilicet in medietate Vα; *add.* sive medietate scilicet Eο; *add.* solis diei super almīcantarath Lδ; *add.* super almucantarath Oγ quam] in medietate scilicet a qua Bη Eμ Oη; in medietate a qua Cζ Eλ; in medietate(mediate Pφ Wι) scilicet quam Bθ Cδ Eν Mγ Eο Lζ Oν Pφ Vβ Vι Vπ Wι; quamquam Eδ Eζ; quia Lζ; si qua Dγ; *add. in marg.* “In medietate” etc. usque “Deinde voluens” est littera addita Vβ quam ... regulam] *om.* Pι quam ... astrolabii] *om.* Cγ Eγ Lλ Mα Mι Nγ Pζ Qε Sθ; *marg.* Sβ; sumpsisti] invenisti Bδ Dδ Eβ Eη Fβ Fζ Kα Kδ Kε Kι Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mν Mφ Oγ Oζ Oι Oξ Oν Pα Pβ Pδ Pθ Pμ Pν Pξ Qβ Qγ Qζ Qθ Qι Qλ Sδ Sκ Tδ Wα Xδ; scilicet Sλ prius] *om.* Bε; primum Eα; *add.* altitudinem Cζ Oη per regulam] *om.* Cα Pφ; per regulas Qγ; per tabulam Mν; *add.* signando diligenter punctum ultima quam non ascendit tunc notam illum Lδ Oγ per ... astrolabii] *add. interlin.* va...cat Lε astrolabii] abstrolabii Pα volve] move Kε Mτ Qζ Qθ; volvens Mι Nγ Qε Sθ Sλ Vβ; volves *some* rethe] recte Cγ Oχ Kε Vν; recte *corr. to* rete Wα; rete Bη Bκ Cδ Cζ Eγ Eμ Lλ Mα Nα Oν Oν Pζ Pφ Sθ Sλ Vα Vγ Vψ; rthe Oγ; rotam Mι Nγ; *add.* donec Eγ; *add.* donec aliqui gradus cadent super illam notam in predictam lineam [*illeg.*] Zα
- 4 cadentque] candendem Oη; cadent *some*; cadent quoque Pι; caderit Eγ; cadet Mα; eodem et Sθ; et cadent quot Kα; *add.* duo gradus qui erant equidistantes ab aliquo duorum solsticiorum Wλ cadentque duo] [*lacuna*].d. Sλ gradus] gradibus VQ; *add.* videlicet duo que equidistant ab aliquo solsticiorum non accipies signum pro notam sed pro duodecima parte zodiaci Oη duo] *om.* Pγ Qι; 2 *some*; duos Lκ Wβ; et Mτ ipsam] *om.* Kε Kι Mτ Qζ; illam Vτ notam] altitudinem Oβ; *add.* altitudinis Bζ Bθ Dγ Eλ Eμ Eο Mγ Mλ Pτ Vν Vπ Vτ Wλ; *add.* altitudinis solis Cα; *add.* ipsam altitudinis Wι; *add.* videlicet duo que equedistant ab aliquo solsticio Cζ quarum] quorum *many*; *add.* gradum Cζ Eμ(*interlin.*); *add. interlin.* altitudinem Oφ unum] unumque Vγ; utriumque Lλ(*add. interlin.* ali' unum) scies] scias Bκ Dδ Mτ Pζ Pι Pφ esse] *om.* Bβ Cγ Eλ Mν Oγ Vτ solis] *om.* Mδ
- 5 signum] *add.* non accipatur signum per nota vel 12<sup>a</sup> parte zodiaci Cζ; *add.* solis VQ cuius] cum Oχ fuerit] *add. illeg.* Qι dies] *om.* Vα

which you have previously taken with the rule on the back of the astrolabe. Then turn the rete and two degrees will fall on the said mark, one of which you will know to be the degree of the sun by the sign of the month of which it will have been the day.

[ Comment:

To ascertain the position of the sun along the ecliptic, measure the altitude of the sun at midday. Then rotate the rete until the ecliptic is over the intersection of the almucantar of that altitude and the midday line, i.e., the vertical diameter.

There will be two possibilities depending on how far you turn the rete, for instance, a degree in Gemini and a degree in Leo. Common sense will tell you which to choose, i.e., Gemini if it is springtime or Leo if it is autumn. ]

## [CAPITULUM 15.] QUIS DIES CUI DIEI SIT EQUALIS

Si volueris scire que dies cui diei sit equalis, scies hoc per gradus

- 1 Quis ... equalis] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Dη Eα Eγ Eκ Eλ Ev Gα Kι Lζ Lκ Lλ Mα Mι Mτ Nα Nγ Oβ Ov Oσ Oχ Pγ Pζ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Qλ Sβ Sθ Si Sλ Vα Vγ Vv Vτ Vυ Vφ Wλ; *faded* Eδ; *illeg.* Eζ; Ad inveniendum g<sup>o</sup>sse(= grosse?) qui dies sint equales Bγ(*later hand*); Ad inveniendum que(qui Qθ) dies sint equales Lμ Qθ; Ad sciendum quis dies cui diei sit equalis Dγ Mλ Oφ; Capitulum 16<sup>m</sup>. Que dies cui sit equales Qδ; Cognitio quis dies cui diei anni sit equalis Vβ Wβ; Quis] Que Bη Bi Cζ Fζ Mv Mφ Vξ Wμ; Cognosco qua dies cui dei sit equalis Mv Vi; De dictus que dies cuilibet diei sit equalis Kα; De equalitate dierum Mπ Zα; Invenio equalitatem dierum Kθ Po Sη Wi; Que dies circuli sit equalis Pτ; Qui dies anni cui diei sit equalis Eμ(*marg.*; *add. in marg.* 14<sup>us</sup>)  
 Quis] Que Bη Bi Cζ Fζ Mv Mφ Vξ Wμ dies] *add. anni* Bi(*add. in marg.* 14 c<sup>m</sup>)  
 Cζ Oη Vφ equales] *add. Capitulum* Qβ; *add. habendus* Kδ; *add. Rubrica* Bθ Vπ; *add. sequitur capitulum* Mo *add. in marg.* 14 Bη; *add. in marg.* 15<sup>m</sup> Vφ; *add. in marg.* 17<sup>us</sup> Qζ; *add. in marg.* c. 17 Sδ
- 2 Si] Cum Cα Cγ Cδ Dγ Eλ Eο Mλ Oφ Oχ Pφ Si Vβ Vv Wi; Cum enim Sβ; Cum etiam Bη Bκ Cζ Eμ Lζ Lλ Mι Nγ Oη Ov Oσ Pζ Qε Sθ Sλ Vα Vγ Vv; Cumque Eγ; *add. etiam* Bθ Ev Mα Vβ(*interlin.*); *add. vero* Dη volueris] *om.* Oχ; vis vel volueris Xα que] quis Bi Pξ Vv Vφ Vτ que dies] *om.* Kα dies] *add. presenti* Pι diei] *om.* Cγ Eγ Qγ cui] *om.* Oβ; cuius Qε; cuiuslebet Kα; que Bζ sit] *rep.* Pφ scies] *om.* Oχ Si Vτ Wβ; scias Bδ Dγ Eα Eβ Fζ Kα Mτ Mv Mφ Oζ Qβ Qγ Sκ Tδ hoc] *om.* Cε Dη Qi; hec Wβ; *add. quod per* Qη gradus] gradum Fζ Lλ Nγ; signa Eζ
- 2-3 gradus equidistantes] gradum equidistantem Bi Cη Eτ Mo Pγ Pτ Pv Qδ Si Sη Vξ Vφ Vτ Wβ; *corr. from* gradum equidistantem Bγ

[CHAPTER 15.] WHAT DAY IS EQUAL TO WHICH DAY

If you wish to know which day is equal to which day, you will know this by the degrees

equidistantes a solsticiis, quia eorum dies sunt equales, sicut dictum est superius.

- 3 equidistantes] distantes Pξ; eque distantes Bβ Bδ Kα Lκ Mν Qη Xα; eque distantem Vρ  
 a] *om.* Nα; per a Xα solsticiis] sostiō Cδ dies] *om.* Eλ; declinationes Vτ  
 dies ... superius] *om.* Vρ sunt] erunt Dη; *add.* declinationes Eλ equales]  
*Cap. 11 and 12 inserted here* Mλ; *add.* relinquiturque quod nocte noctibus preter modicum  
 sunt equale Ov; relinquiturque noctes noctibus et dies diebus equidistantes ab uno  
 solsticio sunt equales preter modicum Ev; relinquiturque quod noctes noctibus et dies  
 diebus equidistantium graduum ab uno solsticio noctibus graduum equidistantium ab  
 altero preter modicum Bζ Vν; relinquiturque quod noctes noctibus et dies diebus [*lacuna*]  
 noctibus graduum equidistantium ab altero preter modicum Bθ; relinquiturque quod  
 noctes noctibus et dies diebus alicui ab uno solsticio noctibus graduum equidistantium  
 ab alterorum preter modicum Eo; relinquiturque quod noctes noctibus et dies diebus  
 noctibus graduum equidistantium ab altero preter modicum Vπ; relinquiturque quod  
 noctes noctibus et dies diebus equidistantium graduum ab uno solsticio noctibus  
 graduum est ab uno solsticio noctibus graduum equidistantium ab altero preter  
 modicum Mγ; relinquiturque quod noctes noctibus graduum eque distantium ab uno  
 solsticio noctibus graduum equidistantium ab alterutro preter modicum Wι; ut dictum  
 est superius. Relinquiturque quod noctes noctibus et dies diebus equidistantium  
 graduum ab uno solsticio ab noctibus graduum equidistantium ab altero preter modicum  
 Oβ; delinquitur quod nocte noctibus preter modicum Dγ Mλ; relinquitur quod nocte  
 noctibus preter modicum Vτ sicut] *om.* Zα; sic Lβ; ut Bζ Bθ Bκ Cγ Dγ Eα Eγ Eo Ev  
 Mγ Mλ Ov Qη Vτ Wι; ut Vπ sicut ... superius] *om.* Eλ Eτ dictum] predictum  
 Bκ Kι Lε Ov est] *om.* Kι Oχ superius] *om.* Bε Bκ Cγ Eγ Lδ Lζ Mι Mν Nγ Oγ  
 Ov Pσ St Sλ; iam Cδ; prius Bδ Cα Dη Eβ Eη Fβ Fζ Gα Kα Kε Kθ Lε Kι Lβ Lγ Lη Lκ Mπ  
 Mτ Mφ Oζ Oι Oξ Oτ Ov Pα Pμ Pν Pξ Pρ Qβ Qγ Qθ Qλ Vι Wα Wμ Xδ Zα; supra Qη

equidistant from the solstices, since the days of those [degrees] are equal, as was said above.

[ Comment:

If you want to know to know which day is equal to which other day, look at the degree of the sun in the ecliptic for the day, and days which are equidistant from the solstices by the same amount are equal, as was said above (Cap. 13). ]

## [CAPITULUM 16.] DE INVENCIONE GRADUS STELLE CUM QUO CELUM MEDIAT

1 De ... mediat] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Eα Eγ Eκ Eλ Eν Gα Lκ Kε Kι Lζ Mα Mι Mτ Nα Oβ Oν Oσ Pγ Pι Pξ Pσ Pφ Qε Qη Qθ Qι Sβ Sη Sθ Sι Sλ Vα Vν Vτ Vυ Vφ Wλ Xα; *faded* Eδ Eο Lλ; *illeg.* Eζ; *partly in marg.* Pθ; Ad habendum gradum celi cum quo stella de linea mediat vel oritur Mλ; Ad sciendum cum quo gradu veniat stella ad lineam meridianam vel oriatur Vγ; Capitulum. Ad inveniendum que stella cum gradu zodiaci oriatur Lμ; Capitulum 17<sup>m</sup>. De gradu stelle cum quo celum [*illeg.*] Qδ; Cum quo gradu quelibet stella celum mediat vel oritur Bι(*add. in marg.* 15 c<sup>m</sup>) VQ; Cum quo gradu quelibet stella mediet(mediat Oη) celum vel cum quo oriatur Bη(*add. in marg.* 15) Cζ Eμ(*add. in marg.* 15<sup>us</sup>) Oη; Cum quo gradu sit stelle in ortu vel in medio celi(*om.* Mγ) EQ Mγ Vξ; Cum quo gradu stella celum mediat Pτ; Cum quo gradu stella veniat ad mediam lineam Pζ(*marg.*); Cum quo gradu stella venit ad medium celi(celum Vι) Mυ Vι Wβ; Cum quo gradu stella venit ad meridiem Eτ Mπ; Cum quo gradu venit stella ad mod' celi Mν; De gradu stelle Zα; De inventione gradus cum quo stella aliqua celum mediat Vβ(*add. in marg.* cum quo gradu veniat stella ad meridianam lineam); Ex quo gradu veniat stella ad meridianam lineam Mι Nγ; Invenio gradum cum quo stellam meridialis oritur Kθ; Invenio gradum cum quo stella(stellam Dγ Oφ) celum mediat Bγ(*later hand*) Dγ Oφ Wι; Invenio gradum cum quo stella celum mediat vel oritur Po Rα(*add. vel occidit*); Si vis scire cum quo gradu zodiaci aliqua stela venit ad meridiem Bβ De invencione] Inventio Mo stelle] *add. in nocte* Bθ Pδ Vπ; *add. note* Pυ; *add. Rubrica* Vπ cum ... mediat] per filum Fβ; *om.* Pν; *add. Capitulum* Qβ quo] *om.* Pβ mediat] *om.* Xδ; *medicat* Tδ *add. in marg.* 16<sup>m</sup> Vφ; *add. in marg.* 18<sup>us</sup> Qζ; *add. in marg.* c. 18 Sδ

1-4 Ms Kα inserts the following, then Cap. 16, line 5, then Cap. 17, then the standard Cap 16, lines 1-4:

## DE GRADU SOLIS INVENIENDO IN RETHE

Si vis invenire gradum solis in rethe considera altitudinem solis in meridiei et move rethe et videt duo gradus zodiaci super cenith altitudinem super almītrarat in linea meridionali vel meridiona quorum unum scias esse gradum per signum cuius fuerit dies.



[CHAPTER 16.] ON FINDING THE DEGREE OF A STAR WITH WHICH IT DIVIDES [I.E., COMES TO THE MIDDLE OF] THE SKY

Si volueris scire cum quo gradu aliqua stella venit ad medium diem, vel oritur, pone stellam super lineam medie diei, quia gradus qui ceciderit super eandem lineam

- 2 Si] Cum Bζ Bη Bκ Cα Cγ Cζ Dγ Eγ Eο Eυ Lλ Mα Mγ Mι Mλ Nγ Oη Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Sι Vα Vβ Vν Vπ Vυ Wι; *add.* autem Bκ Si ... medium] *om.* Xα Si ... oritur] *om.* Vγ scire] invenire Kα cum] *om.* Pμ Oχ; in Mι Qδ quo] *interlin.* Vτ gradu] *add.* accedit sive Cγ; *add.* zodiaci Bβ; *add.* *interlin.* signi Oι aliqua] *om.* Dη Pξ; ā Cδ stella] *om.* Oγ; *add.* celum mediat Fα venit] inieint Bγ; venent Vπ; venerit Oφ ad] *om.* Mτ medium] mediam *some*; *add.* *in marg.* [*illeg.*] medium celi Qζ diem] *om.* Qε; celi Eμ Eυ Gα Mγ Mλ Oη Vν Vπ Vτ Wλ; celi diem Eη; celi vel ad medium diem Oν Qβ(*add. illeg.*); celum Bε Bζ Dη Eλ; celum vel diem Lδ; diei Pφ; *add.* *interlin.* vel celi Bγ vel] *om.* Cα; quando Cγ vel oritur] partem Sθ oritur] *cut off* Eκ; ad hortum Nα; ad ortum Bδ Bε Cα Cε Cι Dδ Dη Eβ Eη Fα Fβ Fζ Kδ Lγ Lδ Lε Lη Lκ Lμ Mδ Mη Mπ Mτ Mυ Mφ Oι Oζ Oξ Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pφ Pσ Qγ Qθ Qλ Sδ Sη Sκ Tδ Vι Vψ Wα Wμ Xδ Zα; orizon Oχ; ortum Dγ Eλ Kε Kι Mγ Mλ Oγ Oφ Pφ Qβ Qζ Qι Sι Vν Vπ Vτ; *add.* eius orizontem occidentem Zα; *add.* vel occasum Cα Oφ Pφ; *add.* *interlin.* sive occidit Cδ
- 3 stellam] *om.* Kδ; *add.* meridie Sι super] *add.* eandem Bε lineam<sub>1</sub>] *add.* eandem est gradus quesitus Pμ lineam<sub>1</sub> ... super] *om.* Oτ medie diei] *om.* Bε(*add. interlin. illeg.*); diei superius Sι; medii diei Nγ; medii dies Qε; meridiei Cγ Eγ Eδ Oβ Pν Vγ; meridiei vel medie diei Bη Cζ Eμ quia] et Bβ Bε Cα Cγ Cδ Eγ Eλ Gα Lβ Oβ Oγ Oσ Qη Sλ Wμ Zα; ui Bθ; ut Pι; *add.* inehipticia(?) Dδ quia ... qui] qui gradus qui gradus Vπ gradus] *add.* i<sup>e</sup> qui zo<sup>oo</sup> Cα; *add.* signi Lβ(*interlin.*); *add.* zodiaci Bε Zα; *add.* zodiaci scilicet Sι qui] *add.* semper Xδ; *add.* tunc Wμ ceciderit] cecidit Bκ Eα Mτ Pγ eandem] *om.* Bδ Cε; eam Dγ Mγ Mλ Oφ Pφ Wι lineam<sub>2</sub>] *om.* Cα Eγ Lδ Oγ Oν
- 3-4 qui ... quesitus] *om.* Mη; *rep.* Lλ

If you wish to know with which degree any star comes to the meridian, or rises, set the star on the midday line, since the degree which falls on the same line

est gradus quesitus. Similiter fac ad lineam orientalem et occidentalem.

- 5 Gradum<sup>1</sup> vero longitudinis habebis per filum positum super polum zodiaci per totam declinationem inventum.
- 4 est] *om.* Eo; erit Cγ Cδ Eγ Λλ Mι Oχ Sθ Sλ Vγ est ... lineam] *om.* Bδ Eη gradus] *om.* Bκ Λε quesitus] *add.* medie diei Pμ Similiter ... occidentalem] Similiter facies in ortu alicuius stelle et occasum id est pone caput stelle in prima almicantera ex parte oriente et vide quis gradus zodiaco incadit super illam almicanteram primam capite illius stelle stante super illam almi<sup>raz</sup> et ille est gradus cum quo venit illa stella ad ortum et peritur de occasu alicuius stelle operandi est. Cα fac] *om.* Cγ Pζ; faciens Vτ; facies Bη Bθ Bκ Cα Cδ Cζ Dγ Eλ Eμ Eν Λζ Mα Mι Nγ Oβ Oσ Oφ Qε Wβ Sθ Sι Sλ Vα Vβ Vπ lineam] *om.* Kθ orientalem et] *om.* Eγ; orizontem Vν; *add.* de gradu ascendente et occidentalem Kα et] vel *some* et occidentalem] *om.* Bβ Bζ Bκ Cδ Dγ Eα Eμ Eο Eρ Kθ Λζ Λλ Mα Mγ Mι Mλ Mν Nγ Oσ Oχ Pζ Pο Pτ Qε Rα Sβ Sθ Sι Sλ Vα Vγ Vν Vρ Vυ Vφ Xα; *cut off* Gα; scilicet primum almicanteraz Oη; *add.* scilicet primum almucantaraz Cζ; *add.* [*cut off*] que stella orota cum gradu solis Gα; *add. in marg.* "et occidentalem" est litera addita Vβ
- 4-6 et ... inventum] *marg.* Eζ(*later hand*)
- 5 before Gradum] *add.* DE GRADU LONGITUDINIS STELLE (STELLARUM Kδ Pθ) Cι Kδ Mη Pθ Sκ Vψ Zα; *add.* DE GRADU LONGITUDINIS(LONGITUDINIBUS Sδ) STELLE(*om.* Kα; STELLARUM Oυ Pβ) PER FILUM Eβ Eη Fα Fβ Fζ Kα Lβ Lγ(*twice*) Lδ Lε Lη Mδ Mι Mυ Mφ Nγ Oγ(*add.* habendo) Oζ Oι Oτ Oυ Pα Pβ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Wμ Xδ; *add.* DE GRADU LONGITUDINIS STELLE HABENDO Pδ; *add.* DE INVENTIONE GRADUS LONGITUDINIS EIUDEM STELLE Vβ; *add. in marg.* 19<sup>us</sup> Qζ; *add. in marg.* c. 19 Sδ Gradum] Gradus Pφ vero] *om.* Xδ; quoque Mι Nγ; *add.* stelle P longitudinis] *illeg.* Pξ; latitudinis Bθ Vπ; *add.* stelle Bε Eη Lδ Oγ Oι(*interlin.*) Qι Vψ; *add.* stellarum Kδ habebis] *om.* Pβ; *marg.* Lη; habebit Pφ super] supra Mτ; *add.* stellam et Vξ polum] filum in polo Wλ; polus Eμ zodiaci] *om.* Pβ; zodyaci Bγ Fβ Lκ Wι; *add.* qui est centrum zodiaci Zα per] *add. illeg.* Qζ
- 5-6 Gradum ... inventum] *om.* Bζ Bη Bι Bκ Cα Cγ Cζ Dγ Eγ Eα Eδ Eο Eρ Gα Λζ Λλ Mα Mγ Mλ Mν Oη Oσ Oχ Pζ Pο Pτ Qε Rα Sβ Sθ Sι Sλ Vα Vυ Vφ Xα; *marg.* Eμ Oφ Wι; Quia gra Pι
- 6 inventum] *add.* et similiter a cume stelle Eλ Vτ; *add.* Iste modus non est omnino verus quia perietis proprie non est super polos zodiaci Lδ Oγ; *add.* per 23 gradus qui est proxima declinatio Zα

<sup>1</sup> Some mss treat this as a new capitulum, with or without an added title.

is the degree sought; do the same for the east line and the west [i.e., for the rising and setting of the star on the horizon].

Moreover you will have as a discovered fact the degree [or the discovery of the degree] of longitude through a string placed on the pole of the zodiac across the whole declination.

[ Comment:

To find the degree of the ecliptic which crosses the meridian at the same time as a particular star (i.e., mediation), turn the rete so that the star is on the meridian line and then observe what degree of the ecliptic is also on the meridian line.

This can also be found by running a string from the pole of the zodiac to the star and on to the ecliptic. ]

## [CAPITULUM 17.] DE ALTITUDINE CENITH SOLIS HABENDO

Si volueris cenith altitudinis solis scire, accipe altitudinem eius qua hora volueris

- 1 De ... habendo] *om.* Bδ Bε Bζ Bκ Cα Cγ Cδ Cε Dδ Eγ Eα Eκ Eλ Eν Gα Kε Kι Lζ Lκ Mα Mτ Nα Oβ Oν Oσ Oχ Pγ Pι Pξ Pσ Pφ Qε Qζ Qη Qi Sβ Sθ Si Sλ Vα Vν Vυ Vφ Wλ; *faded* Eδ Eο Lλ; *illeg.* Eζ; Ad habendum cenith ortus(*del.*) solis Mλ; Ad habendum altitudine(*interlin.*) cenith solis(*add. in marg.* vel alicuius stelle) per azimuth Eq; Ad habendum cenith solis per azimuth Mγ Vξ; Ad inveniendum cenith altitudinis solis vel alicuius(*om.* Mυ Vι) stelle Eτ Mν Mυ Vι Wβ; Ad inveniendum cenith(cenit Lμ) in qualibet altitudinis solis Lμ Qθ; Ad sciendum zenith solis Vγ; Capitulum 18<sup>m</sup>. De zenith altitudinis solis Qδ; De altitudine cenith ipsius sive solis capitulum Qβ; De altitudine cenit solis Kα; De cenith(cenit Zα; chenith Mπ) altitudinis solis Mπ Pτ Zα; De cenith(cenich Mι Nγ) solis Mι Nγ Pζ(*marg.*); De cenith(czenit(Bη) solis et stellarum in qua parte orizontis(orientis Cζ) oriuntur vel occidunt Bη(*add. in marg.* 16) Cζ Eμ(*marg.*; *add. in marg.* 16<sup>us</sup>) Oη; De eodem Sη; De inventione altitudinis cenith solis vel stelle Vβ(*add. in marg.* Hoc capitulum “Gradum vero longitudinis” est additum); Doctrina ad inveniendum cenith vel centrum(?) solis in qualibet hora Bι(*add. in marg.* 16 c<sup>m</sup>); Inventio cenith Oφ; Inventio cenith alti Wι; Inventio cenith altitudinis solis vel stelle Kθ Pο; Inventio chenith ipsius solis Bγ; Invenio cenit solis Dγ; Inventio cenith vel centh vel sunt in omni altitudine Rα; Inventio cenith vel centri(?) solis in qualibet hora Vq; Si cenit solis scire desideras Bβ cenith] cenich Xα habendo] *om.* Cι Dη Eβ Eη Fα Fβ Fζ Kδ Lβ Lγ Lδ Lε Lη Mη Mφ Oγ Oζ Oτ Pα Pβ Pθ Pμ Pν Pρ Qλ Sδ Sκ Tδ Vτ Vψ Wα Wμ Xα Xδ; *illeg.* Oξ; habenda Mo; invenienda Bθ Pυ Vπ; inveniundo Pδ *add. in marg.* 20<sup>us</sup> Qζ; *add. in marg.* c. 20 Sδ
- 2 Si] Cum Bδ Bζ Bη Cα Cγ Cδ Cζ Dγ Eγ Eλ Eμ Eο Lζ Lλ Mα Mγ Mι Mλ Mο Nγ Oη Oν Oσ Oφ Oχ Pζ Pφ Qε Sβ Sθ Si Vα Vτ Vν Vυ Wι; Cum autem Bκ Vι; *add.* vero Bθ Vπ Si ... scire] *om.* Vγ cenith] *and elsewhere* cenit Sθ; cenit Bζ Eρ Fβ Kα Pμ Qε Wλ; cenich Eο Mι; cent Eγ; centrum Eμ(*add. interlin.* Id est cenith); chenith Vτ; tuch Cδ(*add. interlin.* vel ascenth) zenit Bη Cγ; zenith Kδ Kι Lκ Pρ Pσ Qδ Vα Vν Vφ cenith ... solis] solem Sλ altitudinis] *om.* Bβ Bγ Bζ Bη Bι Bκ Cζ Cη Eγ Eδ Eμ Eο Eρ Eν Gα Kθ Lδ Lζ Lλ Mα Mγ Mι Mν Nγ Oγ Oη Oσ Oχ Pζ Pι Pο Pτ Pυ Qε Qη Rα Sβ Sθ Si Vα Vν Vξ Vρ Vυ Wι Xα; *interlin.* Cδ Eζ; altitudinem Eη Kδ Vψ; corporis Dγ Mλ Vτ; gradus Bθ Eλ Vπ Vφ(*interlin.*); id est versus ortus ipsius Cγ(*interlin.*) solis] *om.* Pγ Rα Wλ Xα; *interlin.* Kε scire] *om.* Vq; invenire Lδ Nα Oγ Sη Vβ; *add.* hoc est de quo azimuth solis sit Zα accipe] *interlin.* Eζ; *illeg.* Oβ altitudinem] *om.* Eο; altitudinis altitudinem Fβ; in latitudine Oχ; *add.* scilicet Eρ; *add.* scilicet solis Rα Xα eius] hore Eρ; solis Gα Pι Qυ; *add. in* Bκ Dη qua hora] in hora qua Sλ; que hora Pβ

[CHAPTER 17.] ON FINDING THE CENITH [I.E. AZIMUTH]<sup>1</sup> OF THE SUN BY THE ALTITUDE

If you wish to know the cenith of the altitude of the sun [i.e., its azimuth], take its altitude for which hour you wish

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<sup>1</sup> From the content of the capitulum the azimuth of the sun is being sought and not its zenith. Why “zenith” is used here is not clear; perhaps because azimuths run up to the zenith and might thus be considered to be “zenith lines”.

hoc scire, et pone gradum solis super almucantherat altitudinis in parte qua fuerit sicut facis ad inventionem horarum. Post hoc, accipe quid congruit gradui solis de azimuth,

- 3 gradum] gradus Mτ gradum solis] *om.* Dδ et] est Wι solis] *om.* Bζ Bη Cζ Eo Oη Oφ Pγ Pφ Sι; *add.* in signo Cα Vv almucantherat] alimrat Oβ; almi<sup>at</sup> Kε Kι Qζ; almicacraθ Mτ; almicanch' Mγ; almicanlerā Cα; almicantarach Kδ; almicantarath Eζ Gα Lδ Pσ Sι; almicantaraz Cδ Oη; almicanteraz Ov; almicantherath Bβ Po; almicantrat Kα; almich Kθ; almichant' Lκ; almi<sup>chī</sup> Wλ; almikanthrat Qη; almi<sup>rat</sup> Eδ; almi<sup>rath</sup> Eτ; almi<sup>raz</sup> Bκ; almi<sup>th</sup> Bζ; almu<sup>c</sup> Cε Mη Mπ Pθ; almucan<sup>at</sup> Bη; almucancarath Pξ; almucancharath Mo Pα; almucanrath Vτ; almucant' Lμ Qθ Sλ; almucantarach Bδ Sβ Sη; almucantarath Cζ Oχ Pζ Qε Sθ Vγ Zα; almucantarath Bθ Bι Eα Eλ Lγ Mδ Mν Nα Oγ Oι Pφ Qi Qλ Tδ Vα Vβ; almucantaratz Dη; almucantaraz Oσ; almucantatatz Eκ; almucantherath Oφ; almucan<sup>th</sup> Dγ; almucanther' Cι Eβ Oζ; almucantheranth Cη; almucantherach Pτ; almucantherat Fζ Lβ Lη Mα Sκ; almucantherath Bγ Eρ Ev Fα Fβ Lγ Lε Mv Mφ Oξ Oτ Ov Pδ Pμ Pν Pρ Pv Qβ Vv Vξ Vπ Wβ Wμ Rα Sδ Xα; almucantherath Vι; almu<sup>cat</sup> (?) Eγ; almucatarach Eη; almucatharath Qδ; almuch' Eo; almuchan' Xδ; almuchancaraz Eμ; almuchantarath Vψ; almuchantherath Wα; almuch't Wι; almu<sup>raz</sup> Lζ; almu<sup>rath</sup> Pι Qγ; almustantarath Pβ; almut' Dδ; almutantaraz Vv; almutanterach Mι Nγ; almutarath Pγ; almutcantar Cγ; almuthantherat Vφ; almu<sup>th</sup> Bε; alucancarath Vρ; aliud cenith *corr. in marg. to almucanrat Mλ; add. eadem Pι; add. sue Cα Vv; add. sui Dη altitudinis [illeg.] latitudinis Pι; add. accepte Bθ Bκ Cδ Eλ Lζ Vπ Vτ; add. sic Oβ in parte] om. Pδ; in Pι; add. in Dδ Kδ Nγ Ov Pφ Sκ(interlin.) in ... fuerit] om. Cα qua fuerit] sua [illeg.] fuerit in oriente vel occidente Zα sicut] marg. Xα; sic Nγ Vv Wα*
- 4 facis] *interlin.* Eζ; facies Cε Pθ Oχ; fa[lacuna] Mv; fecisti Mι Nγ; *add.* ww Bκ ad] in Oβ; in ad Lζ horarum] *add.* mot(?) si de oriente pone super orientem [illeg.] Zα Post hoc] Post hoc hoc Oβ; Post quo Zα; Postea *some*; Postea hoc Pτ accipe] aspice Bζ Bη Bκ Cα Cδ Cζ Eγ Ev Eμ Eρ Gα Kε Kθ Lζ Lλ Mλ Mτ Oβ Oι Oσ Oφ(*add. interlin. at accipe*) Oχ Pζ Pι Oη Pφ Qζ Rα Sβ Sθ Sι Sλ Vα Vβ(*add. interlin. at accipe*) Vγ Vι Vv Xα; accipe *corr. to* aspice Bθ Qε; *add.* aspice Vπ; *add.* vel aspice Dδ quid] qui Mη; quod Dδ Lκ Lλ Pξ Sβ quid congruit] [*cut off*] in parte orientali vel occidentali Gα congruit] contigit Sι; convenit Lζ Ov Vγ gradui] altitudinem Cε; gradibus Mτ Pτ solis] *cut off* Pβ solis de azimuth] *add.* id est super quod gradum de azimuth cadet gradus solis in signo Cα de] *om.* Oφ; et Cε de azimuth] *interlin.* Eμ azimuth] alzemut Cγ; ascimith Eγ; asimut Bη Lλ Pζ; assumut Mι Nγ; azimuc Oη; azimut Vv; *add.* incipiendo a primo azimuth usque ad gradum solis Pδ



to know this, and set the degree of the sun on the almucantar of the altitude on the side [i.e., to the east or west, whether it is morning or afternoon] which it was just as you do for finding the hours. After this take what coincides with the degree of the sun in the azimuths

## 5 et super quem gradum sit cenith et de quarta que opponitur ei similiter; et necesse est

5 et<sub>1</sub>] *add.* scies Tδ; *add. in marg.* scies Lε super ... cenith] super quem ceciderit Mτ; super quem gradum vel ceciderit cenith solis Mo; super quod gradus Fa; super quot gradus sit Mι Nγ; super quot gradus ceciderit Bβ Bε Bζ Bθ Bι Bκ Cδ Cζ Dδ Eζ Eκ Eλ Eμ Eο Eρ Eτ Eυ Gα Kα Kθ Mγ Mλ Oβ Oη Oι Oσ Oφ Pι Kι Lζ Ov Pτ Pφ Qζ Qη Rα Sβ Si Sλ Vα Vβ Vν Vπ Vρ Vτ Vυ Vφ Wι Wμ Xα Zα

quot] quantus Xα; quem Eκ Eτ Kα Oι Pτ Qζ; quod Bε Bζ Bκ Eζ Eο Eρ Kθ Qη Vτ gradus] gradum Pτ; quare in eodem azimuth est gradus solis qui erit in parte opposita in eadem [altitud]ine et sic habebit solem idem cenith altitudinis in quartis oppositus Sδ ceciderit] ~~posueris~~ ceciderit Wι; *add.* cenith Kθ

*add. in marg.* In aliis reperitur sic: “Et super quot gradus[*add. interlin.* quem gradum] sit cenith de quarta que opponitur. Et necesse est” etc. Vβ; *add. in marg.* quare in eodem azimuth est gradus solis qui erit in parte opposita in eadem altitudine et habebit sol idem zenit altitudinis in quartis oppositis Sκ super ... similiter] super quam sit zenit de 4<sup>a</sup> que opponitur ei similiter (sit ... similiter *corr. in marg.* to ceciderit de quarta in qua ponitur ibi est cenit solis) Kε quem] *illeg.* Oζ; eadem(?) Oχ; illum Kδ Pθ; quam Cγ Pβ Sη; quemque Lε; quod Cε Mπ Oγ Qδ; quot Dγ Lλ Mα Pζ Vγ gradus] gradum Kδ Mν; *add.* quia in eodem azimuth est(erit Fβ) gradus solis que(quando Fβ) erit in parte opposita in eadem altitudine et sic habebit solis idem cenith altitudinis in quartis oppositis Fβ Qβ sit cenith] *corr. in marg.* to ceciderit Eη cenith] cent Sθ; zenith Lκ Qδ et<sub>2</sub>] *om. many* de] *om.* Lγ de ... similiter] de gradus que(*add. interlin.* ei Pζ) opponitur Eα Pζ; de quarta in qua ponitur et illi erit cenit solis Oβ; de quarta in qua ponitur ibi est cenith solis sic cenith. De quarta que ei opponitur Bβ; de quarta in qua ponitur ibi est cenith solis similiter Mτ Qζ; de quarta in quarta ponitur et ibi est cenith solis Vτ; de quarta que opponitur erit cenit altitudinis solis Eκ; de quarta que opponitur ei, et ibi est cenrus sive cenith solis Kθ; de quarta que opponitur et ibi est cenith solis Bζ Bη Bθ Bι Bκ Cδ Cζ Dδ Eλ Eμ Eο Eρ Eυ Kι Lζ Mγ Mλ Mo Oη Ov Pτ Oσ Qη Rα Sβ(et ... solis *marg.*) Vα Vν Vπ Vρ Vφ Vυ Wι Wμ Xα Zα

que] in qua Kι Qη; qui Vπ; *add.* ei Cδ Lζ Mo; *add.* eius Ov opponitur] apponitur *corr.* to pponitur Oσ; opponit ei Vπ; ponitur Kι Qη; supponitur Bκ; supponitur eum Dδ; *corr.* to supponitur Lζ et] ei Wμ Xα; ei et Eυ; eius(?) Vφ; soli Oη et ibi] et in Bζ; sibi Zα est] erit Bκ; *add.* gradus Vυ cenith] cent Oσ; zenit Vυ; zenith Vφ solis] *om.* Pτ; *add.* sit cenith de quarta(gradu Xα) que opponitur Rα Xα

de quarta que supponitur sibi erit gradus cenith solis Pι; de quarta super quam(qui Oφ) ponitur et ibi(ubi Pφ) est cenith solis Pφ Oφ Si Vβ; que opponitur et in 3[=est?] cenit solis Kα; que quarta que opponitur erit cenith altitudinis Eτ; quarta que op[*cut off*] cenith solis Gα; quarta que opponitur ibi cenit est sol Wλ de] *om.* Xδ quarta] iiiii<sup>a</sup> Qε

opponitur] *add. in marg.* 6-line gloss Bγ ei] *add.* est zenith Bε; *add.* quia in eodem azimuth erit sol qui erit in parte opposita eadem altitudine et sic habebis idem cenith altitudinis in quartis oppositis Mπ ei similiter] *om.* Bγ Cγ Cη Dγ Eγ Lλ Eδ Eζ

[continued on the next page]

and on this degree is the cenith [i.e. azimuth of the sun at that hour] and likewise of the quarter which is opposite to it; and it is necessary

[*apparatus criticus for line 5 continued*]

Mα Mι Mν Nγ Oχ Pγ Po Pv Qδ Qε Sη Sθ Sλ Vγ Vξ; *marg.* Wβ(*add. illeg.*); erit Vψ; vel ponitur Nα; *corr. in marg. to ibi est cenith solis Oι similiter] om.* Cε Mη; *interlin.* Eη; *add.* et ibi erit cenith solis quia in eodem azimuth erit gradus solis qu erit in opposita parte in eadem altitudine et sic habebis sol idem cenith altitudinis in quartas oppositas Dη et<sub>3</sub>] similiter et Bβ Kι

5-6 que ... quarta] *om.* Fβ

5-7 quem ... occidentalis] 7½ -lines Cα

ut hec quarta sit meridiana orientalis, vel septentrionalis orientalis; aut occidentalis meridiana, vel septentrionalis occidentalis. Et similiter facies de stellis fixis per earum altitudines.

6 ut] quod Bι Pξ Qη Sβ hec] *om.* Sη quarta] iii<sup>a</sup> Qε sit] *om.* Bθ Eζ; quo opposita sit quarta Sβ; scilicet per Pφ; *add.* aut / vel *many* vel] *om.* / aut *many* orientalis<sub>2</sub>] *om.* Bζ; occidentalis Kθ aut] *om.* / vel *many* occidentalis] *om.* Qζ

6-7 meridiana ... occidentalis] meridiana [*lacuna*] occidentalis meridiana(*del.*) aut occidentalis meridiana vel septentrionalis occidentalis Mν; meridiana occidentalis vel septentrionalis Eo Wι; meridiana occidentalis vel septentrionalis orientalis vel septentrionalis occidentalis Sλ; meridiana orientalis aut/vel meridiana occidentalis Mo Pτ Qδ Qη; meridiana orientalis, aut meridiana occidentalis, vel septentrionalis orientalis vel septentrionalis(*om.* Wλ) occidentalis Bι Cγ Cζ Eγ Eλ Eν Mι Nγ Oβ Ov Oσ Pζ Pι Rα Sθ Vα Vν Vφ Wλ Wμ Xα; meridiana orientalis(occidentalis Eδ) aut occidentalis meridiana aut septentrionalis occidentalis Eα Eδ Eζ Pγ Po Pυ VQ; meridiana orientalis vel orientalis septentrionalis et cetera Vτ; meridiana orientalis vel septentrionalis Mγ Mλ Pφ Sι Vν; meridiana orientalis vel septentrionalis, meridiana vel septentrionalis occidentalis Lκ; meridiana orientalis aut/vel septentrionalis occidentalis Bη Eμ Mτ Oχ Qι Vγ; meridiana orientalis vel septentrionalis orientalis aut occidentalis Lγ; meridiana orientalis(*written over, illeg.*), vel septentrionalis orientalis vel septentrionalis occidentalis EQ; meridiana vel septentrionalis occidentalis Pξ; meridiana vel septentrionalis orientalis vel septentrionalis Bθ Vπ aut occidentalis meridiana] *om.* Lλ

7 meridiana] *add.* et est occidentalis Mη vel] *om.* / aut *many* vel septentrionalis] *rep.* Lδ occidentalis] *add.* et cetera Cε similiter] sempter Wλ de stellis fixis] *rep.* Eκ fixis] *om.* Cζ; *marg.* Eμ

7-8 per ... altitudines] *om.* Xδ

8 altitudines] altitudinem Eo Pτ; *add.* et cetera Mτ; *add.* 4 lines Zα; *add.* 12 lines Cα; *add.* Mτ Qζ(*add. in marg.* 21<sup>us</sup>):

Cum volueris(*add.* etiam Qζ) habere maximam elevationem vel maximum appropinquationem solis ad cenith nr̄m(minimam?) pone principium Cancrī ad medii celi lineam et gradus almicanrath(almitz Qζ) ut prius(*add.* dictum est Mτ) ostendit tibi maximam elevationem solis.

Et si volueris scire quantum distat ad huc a cenith subtrahe elevationem maximam a 90 gradibus(*om.* Qζ) et residuum erit differentiam(*add.* inter cenith et maximam elevationem [*illeg.*] in quolibet elevatione poteris in [*illeg.*] distancia Qζ) inter cenith et elevationem solis.

Et si volueris scire iuxta(*om.* Qζ) minimam(maximam Qζ) altitudinem et maximam depressionem pone caput Capricorni ad lineam medii ifm(celi in eorum Qζ) almicanrath(almitz Qζ) exteriora id est extra istum punctum extencia numerando qui gradus sunt altitudo solis yma(ima Qζ).

that this quarter be the north-eastern, or the south-eastern, or the north-western, or the south-western. And similarly you will do this for the fixed stars through their altitudes.

[ Comment:

To find the azimuth of the sun at any time, take its altitude at that time. Then rotate the rete so that the position of the sun on the ecliptic for that day sits on the appropriate almucantar of the altitude. This intersection will also indicate the azimuth on which the sun lies at that time. (It will be to the east if the hour is in the morning and to the west if it is in the afternoon.) ]

## [CAPITULUM 18.] DE CENITH ORTUS SOLIS HABENDO, ET ALIORUM PLANETARUM

Et si volueris scire cenith ortus solis, vel alicuius stelle fixe, pone gradum solis

Cap 18: *om.* Eλ; Cap 18 repeated: M<sub>1</sub> and M<sub>2</sub>, N<sub>γ1</sub> and N<sub>γ2</sub>

- 1 De ... planetarum] *om.* Bδ Bε Bζ Bη Bκ Cγ Cδ Cε Cζ Dδ Dη Eα Eγ Eκ Eμ Eν Gα Kε Kι Lζ Lκ Lλ Mα Mι Mπ Mτ Nα Nγ<sub>1</sub> Oβ Oη Ov Oξ Oσ Oχ Pγ Pζ Pι Pξ Pφ Qε Qζ Qη Qi Sβ Sδ Sθ Si Vα Vγ Vν Vο Vτ Vυ Vφ Wλ Xα; *faded* Eδ Eζ; Ad habendam cenith(cenich Eo) ortus solis Eo Eφ Mγ Mλ; Ad habendum cenith solis ortus vel stelle Vξ; Ad inveniendum cenith(cenit Lμ) in ortu solis Lμ Qθ; Ad inveniendum cenith ortus solis Eτ; Ad sciendum cenith(cenit Dγ) ortus solis Dγ Oφ; Capitulum 19<sup>m</sup>. De zenith ortus solis vel occasus vel stellis Qδ; De cenit ortus solis vel alicuius stelle scire inveniendum Mυ; De cenith ortus vel occasus solis Rα; De inventione cenith ortus solis vel alicuius stelle Vβ; Inventio cenith ortus Wι; Inventio cenith ortus solis Bι(*add. in marg.* 17 c<sup>m</sup>); Inventio cenith ortus solis et stellarum Vο; Inventio chenith ortus solus per azimuth Bγ(*later hand*); Inventio cenich ortus solis vel alicuius aliarum stellarum Vβ; Inventio cenich ortus solis vel alterius stelle Mυ; Inventio cenith ortus vel occasus solis vel alterius stelle Pτ; Invenio cenith ortus solis vel stelle Kθ Po Sη; Si cenit ortus solis vel alicuius stelle scire desideras Bβ cenith] *and elsewhere* cenit Pμ solis] *om.* Pμ QλVι Wα habendo ... planetarum] *om.* Zα et aliorum planetarum] *om.* Sκ; et alicuius stelle fixe Bθ Vπ; et alterius stelle Pυ; *add.* et alius stelle fixe Pδ; *add.* vel stelle invencion~ Vι *add. in marg.* 18<sup>m</sup> Vφ; *add. in marg.* c. 21 Sδ
- 2 Et] Ut Eη si] cum Bζ Bη Bθ Bκ Cα Cδ Cγ Cζ Eγ Eμ Eο Eν Kι Lζ Lλ Mα Mι Mλ Nγ<sub>1</sub> Oσ Oφ Oχ Pζ Oη Ov Pφ Vβ(*added interlin.*) Vγ Vν Vπ Vτ Qε Sβ Sθ Si Sλ Vα Vυ Wι scire] *om.* Eο Wμ cenith] cenit Bζ Qε Sβ Sδ Vα Wλ; cent Oσ Sθ; centrum Sλ; zenit Cγ; zenith Bε Kδ Lκ Nα Pσ Vα Vφ; *add. interlin.* id est azimuth Eμ; *add. interlin.* id est versus ortus qua non semper habere eundem locum ymo dieti transiantur Cγ ortus] *rep.* Rα ortus ... fixe] *inerlin.* Lδ vel] *om.* Xα; et Mγ alicuius] *om.* Eδ; alie Vα; altitudinis Lκ fixe] *om.* Qη; oriens Pξ; *add.* id est archum transitem per cenith capitum et archum solis in horizonte Lδ Oγ(*repeated in marg.*) gradum] gradus Oη; *add.* cuiuslibet Vι solis<sup>2</sup>] *om.* Lμ Pσ Qθ; *interlin.* Kε; *marg.* Wα
- 2-3 pone ... stellam] *om.* Eσ

[CHAPTER 18.] ON FINDING THE [POINT]<sup>1</sup> OF THE RISING OF THE SUN, AND OF THE OTHER PLANETS

And if you wish to know the [point] of the rising of the sun, or of any fixed star, take [i.e., observe or locate] the degree of the sun

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<sup>1</sup> This is a different (and uncommon) meaning for the word “zenith” – not the point directly overhead, but the point on the horizon where the sun (or a star) rises.

5 vel stellam super horizontem orientalem, et aspice quid sibi accidat de azimuth, super quam sit ortus; et hoc est cenith ortus. Et super simile eius erit occasus in simili eius quarta, sive septentrionalis sive meridionalis fuerit.

- 3 vel] sive *some* vel stellam] *om.* Bζ Cγ; vel alicuius stelle fixe Wι; vel/sive stelle Kα Sι; *add.* fixam Cα Eυ Vπ super<sub>1</sub>] *om.* Xα horizontem] orientem Qγ; *add.* scilicet Oχ orientalem] *om.* Bδ Eδ Vγ VQ; *add.* *illeg.* Vξ aspice] accipe Dγ Lη Nα Pυ Sη Vξ Pτ Wλ; respice Sλ; vide Qη quid] quem Dδ; quod Pφ sibi] *om.* Wλ; ea Oν; ei Bκ Lζ; scilicet Eα; si Sη; sit Oχ; tibi Dη accidat] abscidat Vυ; accedat Oξ; accideat Cγ; accideat *corr.* to accidat Kε; accidit Mι<sub>1</sub> Mι<sub>2</sub>; accipiat Nα; congruat Bδ; congruit Bζ Bθ Eo Eυ Mγ Mλ Vν Vπ Vτ Wι; *add.* vel congruat Cα de] *om.* Cδ; *add.* gradibus Pι de azimuth] decenit Qε Sθ; id est cent Mα azimuth] alzemut Cγ; ascemuth Eγ; azemut Bκ Pβ; azim<sup>t</sup> Lβ; azimut Bζ; cenich Nγ<sup>1</sup>; cenit Oχ; *add.* vel Cα super<sub>2</sub>] similiter Cη
- 3-4 azimuth ... est] *om.* Lλ Vγ
- 4 quam] *om.* Pθ; quem Bβ Cγ Dη Kδ Lβ Mν Mπ Pδ Vν Vφ Xα; quo Pι; quod Bε Cα Lε Mι<sub>2</sub> Oγ Pν Qθ Sδ Xδ sit] est Bκ Oν; fit Lζ Oφ(*add.* *interlin.* aī sit) Pβ Pι ortus<sub>1</sub>] *om.* Mυ Xδ et<sub>1</sub> ... ortus<sub>2</sub>] *om.* Bε Bη Eα Eη Eυ Lδ Mι<sub>2</sub> Oγ Oτ Pθ hoc] hec/hic *some* est] *om.* Bζ; *interlin.* Sκ; erit Cα Cγ Mα Mι<sub>1</sub> Nγ<sub>1</sub> Pζ Qε; *add.* *interlin.* vel erit Oφ cenith] cenit Pφ Qε Sβ Sδ Vυ Wλ; zenith Qδ; cent Sθ; centrum Sλ; zenit Cγ Kε; zenith Vα Vφ ortus<sub>2</sub>] *om.* Pξ; *add.* solis Pγ Zα super] in Mυ Mφ; si Bθ Pμ Vπ; secundum Bκ Cζ Eμ Lζ Pζ Oη Oι Oσ Sι Vα Vν; secundum ip Vτ; secundum hoc Mλ; similiter Kε(*add.* *interlin.* id est super similiter cum qua eius occasus) Kι(*add.* *interlin.* id est super 9sais 9 q<sup>a</sup> eius occasus) Lκ Qθ; *add.* *interlin.* in hoc Oφ; *add.* secundum Rα super simile] secundum similiter Pφ; similiter similis Mτ simile] similem Vγ; similem gradum Oβ Qη; solem Kα simile eius<sub>1</sub>] sine si nulle/simille Mι<sub>1</sub> Nγ<sub>1</sub> eius<sub>1</sub>] *om.* Bζ Eo Oγ Oη; *interlin.* Wι; idem Sλ; illius Tδ; *add.* gradum Bκ Oι(*marg.*) Oν; *add.* quarta Mφ Vι erit] *om.* Wλ; est Bζ Cδ Cζ Eμ Eo Mγ Mλ Oη Oφ(*add.* *interlin.* aī erit) Pφ Sι Sλ Vβ Vν Vτ; gradum et Lζ erit ... eius<sub>2</sub>] *rep.* Wα occasus] occasum Lζ; *add.* eius Vυ in simili] si similis Mτ simili] simulrter(!) Oη eius<sub>2</sub>] *om.* Oβ Qη
- 4-5 Et<sub>1</sub> ... fuerit] 7 lines Cα in ... quarta] *om.* Mυ Mφ Vι eius quarta] *interlin.* Eζ
- 5 quarta] *om.* Eδ; 4<sup>a</sup> / 4<sup>ta</sup> *some*; ē Po; *add.* *interlin.* scilicet opposita Oφ quarta ... meridionalis] orōlis(?) Kα sive<sub>1</sub>] *om.* Mπ; *add.* sit Kδ septentrionalis] orientalis Cη sive<sub>2</sub>] *om.* Eo; aut *some*; vel *few* meridionalis] meridiā Mα; meridiā Bη Dγ Cζ Eγ Lλ Mγ Oχ Pθ Vβ(*add.* *interlin.* meridionalis) Vγ Vν; *add.* occit Vτ fuerit] *om.* Bκ; *add.* et similiter facias de stellis fixis per earum altitudinem Mι<sub>1</sub> Nγ<sub>1</sub>; *add.* 8 lines EK



or the star on the eastern horizon, and observe which azimuth falls near it, on which it rose; and this is the [point] of the rising. And on its corresponding [degree] will be the setting in its corresponding quarter – it will be either north or south.

[Comment:

Relate the day of the year with the position of the sun in the zodiac, as before.

To find the degree of the eastern horizon where the sun (or a star) rises, rotate the rete until that point on the zodiac is on the eastern horizon. The degree of sunrise will be shown by the azimuth of that point.

The degree of sunset will be the same azimuth but along the western horizon. ]

## [CAPITULUM 19.] DE QUATUOR PLAGIS MUNDI

Ad habendas quatuor mundi plagas veraciter, accipe altitudinem solis ut supra, et vide in qua quarta sit. Deinde vide in qua altitudine ipse gradus solis sit inter lineas

Cap. 19] *om.* Bη Cα Cδ Cζ Eγ Lζ Lλ Mα Oη Oσ Oχ Pζ Qε Sβ Sθ Si Sλ Vα Vγ Vυ

- 1 De ... mundi] *om.* Bδ Bε Bζ Bκ Cγ Cε Dδ Eα Eλ Eκ Eμ Eυ Gα Kε Kι Lκ Mτ Oβ Oν Pγ Pι Pξ Pσ Pφ Qη Qi Vτ Vφ Wλ; Ad habendum mundi plagas in(*om.* Pτ) qualibet die Mγ Pτ; Ad habenda 4/4<sup>or</sup> mundi plagas Dη Kδ; Ad habenda 4/4<sup>or</sup> plagas mundi qualibet die Eο; Ad inveniendum 4<sup>or</sup>/quatuor plagas mundi Lμ Mλ Qθ; Ad sciendas certe quatuor plagas mundi principales Bγ(*later hand*); Capitulum 20<sup>m</sup>. De 4<sup>or</sup> plagis mundi habendis Qδ; De inveniendis 4/quatuor mundi plagas Dγ Oφ Rα; De inventione 4<sup>or</sup> plagarum mundi Vβ; De plagis mundi inveniendis Mδ; De quarta plaga mundi Xα; Inventio 4<sup>or</sup> plagarum Eτ; Inventio 4/4<sup>or</sup> plagarum mundi Kθ Mυ Po Sη Vi Vρ Wβ; Inventio quatuor plagarum mundi per astrolabio Mν; Si 4<sup>or</sup> mundi plagas cupis habere Bβ quatuor] *om.* Kα; 4/4<sup>or</sup> *many* mundi] *om.* Lγ Zα; *add.* habendis Capitulum Mo; *add.* inveniendis Bθ Fβ Pυ Vπ Wμ; *add.* inveniendo Pδ; *add.* Rubrica Vπ *add. in marg.* 19<sup>m</sup> Vφ; *add. in marg.* 22<sup>us</sup> Qζ; *add. in marg.* c. 22 Sδ; *add. in marg.* hoc deficit capitulum de 4 plagis mundi Lζ
- 2 Ad habendas] Cum autem volueris habere Bκ; Regionis Zα; *add. in marg.* 25-line gloss Bγ quatuor] *om.* Cγ Vξ; 4 / 4<sup>or</sup> *some*; iiii Eμ mundi] *om.* Oβ veraciter] *om.* Dη Eμ Kα; qualibet die Vξ accipe] recipe Oφ(*add. interlin.* ał accipe) Pφ ut supra] *om.* Eκ supra] gradus Eα Qθ; 8<sup>o</sup> *corr. in marg.* to supra Sκ; *add.* et pone eam in almu<sup>rath</sup> Pι
- 2-3 ut ... sit<sub>1</sub>] *om.* Eμ
- 2-18 Ad ... predictas] *marg.* Eμ
- 3 vide<sub>1</sub>] in die Mτ; m Eδ qua quarta] qua gradum Lμ Pμ; quo gradu Dη Pσ quarta ... qua<sub>2</sub>] *om.* Cε sit<sub>1</sub>] *om.* Bδ; *add.* altitudo Pγ Zα; *add.* Postea(Posita Cγ) pone gradum solis(*om.* Kε) in rethe(reta Mι; rete Vψ; rethi Fβ Fζ Kα Lε Lμ Mυ Mφ Oi Oτ Pρ Pσ Qβ Qγ Qδ Qθ Qi Sδ Vβ Xδ; rethy Lκ; reti Kδ Mδ Ou Oφ Pφ Vi Wα; rheti Oγ; rota Nγ) in sua altitudine Bβ Bδ Bε Cγ Dδ Dη Eη Fα Fβ Fζ Kδ Kθ(*deleted*) Lβ Lγ Lδ Lε Lη Lκ Lμ Mδ Mι Mυ Mφ Nγ Oγ Oζ Oi Oτ Oφ Pα Pβ Pδ Pθ Pμ Pν Oζ Ou Pρ Pσ Pφ Qβ Qγ Qδ Qθ Qi Qλ(*faded*) Sκ(in rethe *marg.*) Tδ Vβ Vi Vψ Wα Wμ Xδ Zα; *add.* scilicet(?) altitudo si ante meridiem vel post Qδ Deinde] *add.* pone Lγ Deinde ... qua] *faded* Qλ Deinde ... altitudine] *marg.* Oφ vide<sub>2</sub>] *om.* Pγ ipse] *om.* Oγ Vυ ipse gradus] *om.* Wλ sit<sub>2</sub>] *om.* Vξ; *interlin.* Kε inter] super Bδ lineas] *om.* Wλ; *rep.* Nγ

[CHAPTER 19.] ON THE FOUR DIRECTIONS [CARDINAL COMPASS POINTS]<sup>1</sup> OF THE WORLD

To find the four [cardinal] compass points of the world with exactitude, take the altitude of the sun as before and see in which quarter it is. Then see in which altitude is this degree of the sun among the azimuth lines

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<sup>1</sup> Although *plaga* means an area as in an open expanse of land or sea, a territory or region, or a climatic region or zone, in this capitulum it must mean a direction or compass point.

- 5 azimuth a principio quarte orientalis, que incipit a coluro septentrionali sive a medie noctis linea, a qua incipies computare. Et quotus fuerit numerus, tantum sume in dorso astrolabii ab ipso coluro versus armillam, procedendo per orientem, si est ante meridiem, vel per occidentem, si est post meridiem; et ubi numerus idem finitur, ibi
- 4 azimuth] alzemut Cγ; azimuth Bζ; azumuth Nα Xα; azymuth Eϱ; *add.* si Oφ(*add. marg.* a[ sive) azimuth a principio] ab inicio Pξ a<sub>1</sub>] in *some*; si in Pφ principio] *illeg.* Zα quarte] 4<sup>te</sup> *some*; iii<sup>e</sup> Eμ a<sub>2</sub>] in Eo Vι coluro] colluro Bκ Pξ; *add. interlin.* id est a linea an<sup>li</sup>{anguli?} noctis Kε septentrionali] *om.* Bζ medie] meridie Cγ Pφ
- 4-5 que ... computare] *om.* Dη a<sub>2</sub> ... incipies] *om.* Kα sive ... linea] *om.* Pι a<sub>3</sub> ... linea] altitudo medie noctis Mτ
- 5 a] in Mι Nγ a qua] *om.* Bζ Eλ Qδ Wι; *interlin.* Eζ Vφ; *marg.* Kε; et ibi Bκ a ... incipies] incipiens Bι Bθ Cι Dγ Dδ Eo Eϱ Ev Mγ Mλ Mν Mo Pι Po Pυ Qη Rα Sη Vβ Vν Vπ Vϱ Vτ Vψ Xα qua] quantus Mτ incipies] incipiens Nα Pθ Sκ computare] *om.* Mγ; *add.* per ii<sup>2</sup> Kα Et] in Oφ(*add. interlin.* a[ ut) Et quotus] *rep.* Vπ fuerit] sint Vπ; sit Mτ numerus] *interlin.* Eζ tantum sume] cium sve (!) Vτ sume] sumpme Kθ in] de Vξ
- 6 astrolabii] abstrolabii Pα; *add. interlin.* id est Oφ; *add. in marg.* in eadem quarta Sκ ab ipso] vel ab ipso Qι; *corr. interlin. from* abu Eζ coluro] almero Pφ; colluro Bκ Cε Dη Mτ Nγ Pγ Pξ Vπ; *add.* a principio capricorni Zα; *add. interlin.* septentrionali Bγ armillam] *add.* computando Mτ procedendo] *illeg.* Eo; procedendum Cη; procedendum *corr. to* procedendo Bγ; procedentem Wι; procedentem Oξ per] ad Eo per orientem] *om.* Eδ Mν Po; per orientem Eζ(*interlin.*); pr orientem *corr. to* per orientem Bγ si est] sive Eα est] *om.* Mτ; fuerit Lδ Oγ ante] *add.* orientem Eϱ
- 6-7 si ... occidentem] *om.* Nα
- 7 meridiem<sub>1</sub>] medium diem Eκ Vξ vel] *om.* Pϱ vel ... meridiem<sub>2</sub>] *om.* Eλ Rα Xα vel ... idem] *om.* Pξ per] ab Pι; post Pθ Pφ per occidentem] postcedentem Eα est] fuerit Ev Vπ; sit Bκ Lδ Oγ meridiem<sub>2</sub>] *om.* Mτ et] ut Bθ ubi] *om.* Qθ; *interlin.* Rα; ibi Vϱ ubi ... finitur] *om.* Mν Mφ Vι Wα idem] *om.* Qι Wβ; ille Bβ Eμ Lδ; iste Qη finitur] finis Mπ; fuerit Oφ(*add. in marg.* a[ finietur) Pφ Qη ibi] *om.* Pι

from the beginning of the eastern quarter, which starts from the northern colure or the midnight line, from which you begin to count. And whichever the number is, take as much on the back of the astrolabe from the same colure towards the ring, proceeding to the east, if it is before midday or towards the west if it be after midday; and where the same number ends,

- pone regulam. Deinde astrolabium utraque manu tenens, sursum versa eius posteriori superficie, diligenter te oppone soli donec radius solis transeat per ambo foramina.
- 10 Tunc caute pone illud super terram, ut non moveatur ad aliquam partem; et habebis quatuor lineas in centro astrolabii concurrentes quatuor mundi plagas directe oppositas indicantes, scilicet orientalem, occidentalem, et cetera. Similiter operabis in nocte per stellam fixam.
- 8 pone] pones Bκ astrolabium] *om.* Kε Kι Mτ; *interlin.* Qζ; abstrolabium Pα; *add.* in Dη Oι(*interlin.*) tenens] *om.* Eλ Vτ; tociens/totiens Mτ Pq sursum] *deletion and add.* in marg. sursum Eζ(*later hand*); *add.* non suspend~ per armillam sed orpas idem alens sursum Zα eius] est eum Bθ Vπ; *add.* foramina Eμ(*add. interlin. facie*) posteriori] posteriora Lκ; posteriore Vπ; superiorem Qζ; superiori Eα Fβ Kι Lμ Mι Mτ Nγ Pσ Qθ; superiori scilicet Vξ; *add. interlin.* id est dorso Bγ
- 9 superficie] facie Bθ Ev Vπ; *add.* regule [*illeg.*] in eat statu Eμ diligenter] *om.* Wβ te] *om.* Dη Lλ; de Fβ(*add. interlin. bep(!)*) oppone] pone Oι Pξ solis] *om.* Oφ Qη; *interlin.* Kθ; solaris Bκ foramina] *add. illeg.* Zα; *add.* pinnularum Kε Kι Mτ Qζ
- 10 Tunc] Etiam Mτ caute] autem Vq pone] ponas Qη Vq Wλ; ponens Pγ; pones Bζ Bι Eτ Ov Pι Rα Vβ Vτ Vφ Xα; *add.* si Qλ illud] *om.* Bζ Dγ; illum Nα ut] donec Kθ non] *om.* Pι Eβ; *interlin.* Bγ Xα moveatur] *corr. from* moveantur Bγ; *add.* super Wλ ad] super terram seu Mτ aliquam] aliam Bκ; *add.* eius Mτ partem] *add.* et si Nα
- 11 quatuor<sub>1</sub>] *om.* Pν; 4<sup>or</sup> many; iii<sup>e</sup> Ev; *add.* mundi Kε Qζ quatuor<sub>1</sub> ... concurrentes] tunc Oφ(*interlin.*) lineas] *add.* mundi Mτ lineas ... quatuor<sub>2</sub>] *om.* Pσ Pφ in] a Kδ in ... plagas] *om.* Pξ centro] medio Qη; *add.* vel in medio Oβ concurrentes] contineus Mτ; *corr. in marg. from illeg.* Oξ quatuor<sub>2</sub>] *om.* Xδ; 4<sup>or</sup> many oppositas] *om.* Bε; opponas Pν
- 12 scilicet] *om.* Cγ Cε Dη Eβ Eη Fα Fζ Kα Kδ Lβ Lδ Lη Lκ Lμ Mδ Mη Mι Mπ Mτ Mν Nγ Oβ Oγ Oζ Oι Oτ Oφ Ov Pα Pβ Pδ Pμ Pν Pq Pξ Pσ Pφ Qγ Qθ Qi Qλ Sδ Sκ Tδ Vν Vψ Wα Xδ scilicet ... cetera] *om.* Eμ Qη Wμ orientalem] orientale Dη Lε Lκ Pμ occidentalem] *om.* Kθ Mν Oβ Oι Pδ; occidentale Dη Lε Lκ Pμ; oriente Eδ; orienti Mλ Vβ; *add.* meridionalem, septentrionalem Bθ Ev Kδ(*add. plagarum*) Qi Vν Vπ occidentalem ... similiter] *illeg.* Eφ et cetera] *om.* Bβ Bθ Eα Kα Mν Oβ Pι Vι Vν Vπ Wλ; et aliqua Pq; etiam Pξ; *ms.* Xα ends Similiter] sicut Wλ operabis] operaberis Vβ Dδ Mη in] de Fα Mι in nocte] *om.* Vι
- 12-13 per ... fixam] *om.* Vτ
- 12-18 Similiter ... predictas] *om.* Bκ
- 13 fixam] *om.* Bζ

place the rule there. Then holding the astrolabe in both hands, with its back surface turned upwards, carefully turn yourself toward the sun until a ray of the sun passes through both pin-holes. Then carefully place it on the ground [or place it horizontally] so that it [the rule or alidade] is not moved to either side; and you will have the four lines meeting in the centre of the astrolabe indicating the four [cardinal] compass points of the world directly opposite [each other], namely east, west, etc. Similarly you will work at night through a fixed star.

15 Vel<sup>2</sup> locata iam regula in dorso astrolabii, sursum versa eius facie, equidistanter  
 orizzonti ut in proximo dictum est, fac umbram amborum angulorum pinnule cadere  
 super duo latera regule, scilicet dextram umbram super latus dextrum, et sinistram

- 14 *before Vel]* *add.* CAPITULUM DE EODEM SED ALITER Bθ Vπ(*add.* Rubrica); *add.* DE EODEM Pν Xδ; *add.* (ITEM Vβ) DE EODEM SED(*om.* Vψ; secundum Sη) ALITER(aliquid Lβ) Cι Eβ Eη Fα Fβ Fζ Kα Lβ Lγ Lε Mδ Mη Mφ Oγ Oζ Oι Oξ Oτ Oυ Pα Pδ Pθ Pμ Pυ Qβ(*add.* Capitulum) Qγ Qλ Sδ Sη Σκ Tδ Vβ Vι Vψ Wα Wμ; *add.* DE EODEM DOCTRINA Oφ; *add.* DE EODEM SED ALIO MODO Pρ; *add.* ITEM Mπ; *add.* ITEM ALITER DE EODEM UT SUPERIOR Kδ; *add.* *in marg.* c. 23 Sδ Vel] *om.* Kθ Xδ; Item Dη; *Sel corr. in marg. to Vel Pα; add.* aliter Eμ; *add.* sit Bβ locata] loca Wι; positam Mι Nγ; *corr. from loca Bγ; add.* regula Cγ iam] *om.* Lη Vφ; illam Bβ iam regula] *om.* Pξ regula] ista Wα; tabula Qγ astrolabii] abstrolabii Pα sursum] *om.* Eμ sursum ... facie] ut eius superficie Dη facie] faciem Eμ Nα; superficie Bδ Cγ Cι Dδ Eβ Eη Fα Fβ Kδ Kε Kι Lβ Lγ Lε Lη Lκ Lμ Mι Mπ Mτ Mυ Nγ Oγ Oζ Oξ Oι Oτ Oυ Oφ Pα Pβ Pδ Pθ Pυ Pξ Pσ Pφ Qβ Qγ Qζ Qη Qθ Qι Qλ Sδ Σκ Tδ Vβ Vψ Wμ Xδ equidistanter] equidistans Pφ
- 14-18 Vel ... predictas] *om.* Bζ Bι Dγ Eα Eδ Eο Eρ Gα Mγ Mλ Mν Oβ Pι Pο Rα Vν Vρ Vτ Vφ; *add.* *in marg.* Eζ(*later hand*)
- 15 in] *om.* Bγ Cη Eκ Eτ Oν Pγ Vξ Wβ Wι; *del.* Lη proximo] primo Cι Pγ; *add.* *illeg.* Vφ dictum] predictum Eλ est] *om.* Kα Pξ amborum] *om.* Cγ angulorum] *om.* Pβ pinnule] lacuna Lβ Lκ; p[lacuna] Pα; pennule Pμ; pinnulle Mυ; pinule Mπ Qδ Σκ; plane Pφ; pnnile Bθ; prennile Mτ; presimilem/presimiliter Pυ; p<sup>l</sup>nile *corr. in marg. to pinnule Oζ; add.* eius Mη cadere] *om.* Qδ; cadet Kθ
- 15-16 amborum ... umbrum{1/2}] *om.* Pν
- 15-17 amborum ... latus] tus dextrum et sinistrum Xδ
- 16 duo] 2 many; *om.* Dη regule regulis Pρ umbram] *om.* Eζ; *add.* *interlin.* et sinistram Bε super<sub>2</sub> ... dextrum] *om.* Pβ Pδ Pθ Pμ
- 16-17 scilicet ... statim] et Dη dextrum<sub>1</sub> ... latus] faded Qλ; dextram umbram(*add.* *in marg.* super latus dextrum Qζ) et sinistram umbram(*om.* Kε Kι Mπ Pδ Pρ; *interlin.* Qζ Qη Tδ) super(sint Pφ) latus dextrum et sinistrum Bδ Cγ Cε Cι Dδ Eβ Fα Fβ Fζ Kα Kδ Kε Lγ Lδ Lε Lη Lκ Lμ(*add.* umbram) Mδ Mη Mπ Mυ(*add.* regule) Mφ(*add.* regule) Nγ Oγ Oζ Oι Oξ Oτ Oυ Oφ Pα Pδ Pθ Pμ Pξ Pρ Pσ Pφ Qβ Qγ Qζ Qη Qθ Sδ Tδ Vι(*add.* regule) Vψ Wμ Zα; dextrum umbrum et sinistrum umbrum super latus dextrum et ita quod dextra super dextrum et sinistra super sinistrum Σκ; si(*om.* Wα) dextram umbram et sinistram Mτ Wα

<sup>2</sup> Many mss treat this as a new capitulum, with or without a title.



Or having already set the rule on the back of the astrolabe with its face turned upward, parallel to [or level with] the the horizon as was said in the previous section, make the shadow of the two sides of the vane fall along the two sides of the rule, that is the right shadow along the right side and the left shadow

umbram super sinistrum latus; et statim habebis quatuor lineas et quatuor plagas mundi predictas.

- 17 umbram] *om.* Bθ Eζ Eλ Eμ Eν Mo Nα Pτ Pυ Qδ Sη Vβ Vφ Wλ umbram ... latus] *om.*  
 Lβ Pν Qι super ... latus] *om.* Bε sinistrum latus] latus depresum et sinistrum  
 Pβ latus] *om.* Bθ Eλ Eμ Eν Mo Nα Pτ Pυ Qδ Sη Vβ Vπ Vφ Wλ; *add.* ita quod  
 dextrum super dextrum et sinister super sinistrum Cε Cι Kε Mη Pδ Pθ Vψ statim]  
 sinistrum Fβ quatuor lineas et] *om.* Bδ Eζ Lδ Mτ Oγ lineas] *add.* plagas Vπ  
 lineas et] *om.* Wλ et quatuor] in Dδ; per Pφ Oφ; vel Bε Cγ Cε Cι Dη Eβ Eη Fα  
 Fβ Fζ Kα Kδ Lβ Lγ Lε Lη Lκ Lμ Mη Mι Mπ Mυ Mφ Nγ Oζ Oι Oξ Oτ Pα Pβ Pδ Pμ Pν Pρ  
 Pσ Qβ Qγ Qδ Qθ Qι Qλ Sδ Sκ Tδ Vι Vψ Wα Zα; vel quatuor Pθ plagas] *om.* Vπ
- 17-18 lineas ... predictas] mundi plagas Pξ; partes mundi Eμ
- 18 predictas] *om.* Bδ; ostendentes(?) Vφ; supra dictas Kε Kι Mτ Qη Qζ; *add.* indicantes Qδ

along the left side; and automatically you will have the four lines and the four [cardinal] compass points of the world, as mentioned above.

[Comment:

To find the 4 cardinal points of the compass at one's current location, take the altitude of the sun (at any given time) using the alidade, and then place the degree of the sun (along the ecliptic for that day) on the almucantar of that altitude. This point will then intersect with an azimuth line. Note how far this azimuth is east or west of the meridian (i.e., the vertical diameter).

Returning to the back of the astrolabe, set the alidade on that degree along the rim. Now set the astrolabe on a horizontal surface with its back facing up and, not letting the alidade move, rotate the whole astrolabe so that the sun's rays pass through the holes in the vanes (or fall along the alidade's centre line), that is, the alidade is pointing directly at the sun. The vertical and horizontal diameters on the back of the astrolabe will then point east/west and north/south.

Instead of letting the rays of the sun pass through the hole(s) in the vane(s), you can also turn the astrolabe so that the edges of the shadow of the vane toward the sun fall along the sides of the alidade, in order to line up the alidade (and astrolabe) with the sun. ]

## [CAPITULUM 20.] DE DECLINATIONE CUIUSLIBET GRADUS HABENDA

Si scire volueris declinationem cuiuslibet gradus signorum, pone eum super

- 1 De ... habenda] *om.* Βγ Βδ Βε Βζ Βκ Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eυ Gα Kε Λζ Lκ Mα Mδ Mτ Nα Oβ Ov Oσ Oχ Pι Pξ Pσ Pφ Qε Qη Qi Sβ Sη Sθ Si Sλ Vα Vν Vτ Vυ Vφ Wλ; *illeg.* Eζ; *faded* Eδ; Ad habendam declinationem cuiusque gradus Eo Eρ Mγ Pτ(*add. solis*) Vξ; Ad inveniendum declinationem gradus cuiuslibet signi Lμ Qθ; Ad sciendum declinationem cuiusque gradus signorum Mλ; Capitulum 21<sup>m</sup>. De declinatione gradus solis Qδ; De declinatione graduum Cα; De declinatione graduum ab equinoctiali et stellarum similiter(*om.* Bη) Bη(*add. in marg. 17*) Cζ Eμ(*add. in marg. 17<sup>us</sup>*) Oη; De graduum declinatione Pζ(*marg.*) Vγ; De invenienda(inventione Vβ) declinatione cuiuslibet gradus signorum Bι(*add. in marg. c 19<sup>m</sup>*) Mν Vβ; De latitudine regionis Mπ<sup>1</sup>; Inventio declinationem cuiuslibet gradus signi Oφ; Invenio declinationis cuiusque gradus signorum(signi Wι; solis Rα) Dγ Kθ Po Rα Vρ Wι; Si vis scire declinationem cuiuslibet gradus signorum Bβ De] *om.* Mυ declinatione] invenione Fα cuiuslibet] cuiuscumque Pρ; cuiusque Bθ Eτ Vπ Wβ Zα gradus] *om.* Kα; *add.* signorum Bθ Eτ Mυ Pδ Pυ Qβ Vι Vπ; *add. zodiaci* Kδ habenda] *om.* Eτ; signi Wβ; *add.* Capitulum Qβ; *add. et stellarum fixarum* Pβ; *add. Rubrica* Vπ *add. in marg. 20<sup>m</sup>* Vφl; *add. in marg. 24<sup>us</sup>* Qζ; *add. in marg. c. 24* Sδ
- 2 Si] *add.* autem Bη Bκ Cζ Eυ Lζ Lλ Mα Oη Ov Oσ Oχ Pζ Vβ(*interlin.*) declinationem] *om.* Sλ; *add. solis* Wβ cuiuslibet] *illeg.* Wα; cuius Eζ Sλ(?); cuiuscumque Bκ Cα Cγ Dη Eβ Eη Fα Fβ Fζ Kδ Lβ Lδ Lε Lκ Lμ Mδ Mo Mφ Oi Oτ Ov Oφ(*add. interlin. vel cuiusvis*) Pβ Pμ Pν Pσ Pφ Sδ Tδ Vψ Xδ; cuiusque Bγ Bζ Bι Cδ Cε Ci Eγ Eλ Eμ Eρ Eτ Gα Lη Mγ Mη Mλ Mν Mυ Oζ Oη Ov Oξ Oσ Pα Pδ Pι Po Pρ Qβ Qθ Qi Qλ Rα Si Sκ Vα Vν Vξ Vρ Vφ Wβ Wι Zα; cuiusvis Bδ Βε Bη Cζ Cη Eα Eδ Eo Kθ Lζ(?) Pθ signorum] *om.* Pρ; *add. interlin. vel stellarum fixarum* Qζ eum] *om.* Cη Dδ; eam *some; interlin.* Bγ Pζ; gra eum Pι(*interlin.*); illud Vψ; ipsum gradum Eλ super] versus Pζ

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<sup>1</sup> The titles for Cap. 20 and Cap. 21 have been switched in ms Mπ.

[CHAPTER 20.] ON FINDING THE DECLINATION OF ANY DEGREE [ALONG THE ECLIPTIC]

If you wish to know the declination of any degree of the ecliptic, set it on

- lineam medii celi vel diei, et scito eius altitudinem ab horizonte; postea scito altitudinem  
 5 capitis Arietis et Libre in eadem linea. Deinde scito altitudinem utramque et differentia  
 ipsarum altitudinum est declinatio eius gradus ab equinoctiali linea. Si autem gradus
- 3 lineam] *om.* Wλ; *marg.* Pν medii celi] meridionali Lβ; moridionalem Lκ; *add.* gradu  
 solis Dδ medii ... vel] meridionali Kα celi vel] *om.* Bδ Bκ Cδ Eγ Lζ Lκ Mα Oν  
 Oσ Oχ Pζ Pι Pφ Qε Sθ St Sλ Vα Vβ(*add. interlin.* aī medii celi) VQ Vν; *interlin.* Sβ; *add.*  
*interlin.* medie Pα; *add. in marg.* medie Oν vel diei] *om.* Bη Dη Lλ Mι Nγ Oη Pξ Vγ  
 Vξ Wμ; *interlin.* Eμ; *ut corr. to* vel Mη; vel medii diei Cα Oβ scito] scias Cα; scita  
 Mτ altitudinem<sub>1</sub>] altitudines Wλ; latitudinem Eα Vν; *interlin.* per almucanth'ath Bγ  
 eius] *om.* Lλ Vγ Vν eius ... scito<sub>2</sub>] *om.* Dη Mπ ab] in Dδ ab ...  
 altitudinem<sub>2</sub>] *om.* Mη; *marg.* Qι horizonte] oriente Cε Cη Lε Mτ Pγ Oσ Vξ; *corr. from*  
 oiente Bγ; *add. computando almutanterath* Mι Nγ; *add. oriente* Qδ; *add. per alumis*  
 numerus Zα; *add. posite* Vπ; *add. vel orientale* Fβ Oβ Pα(*interlin.*); *add. scilicet* Nα; *add.*  
*interlin.* id est horizonte orientali Kε Kι; *add. in marg.* non tunc assumas gradus sed in rethe  
 Lε(*later hand*); *add. in marg.* non tunc assimas tunc gradus altitudinis sed in rethe Tδ  
 scito<sub>2</sub>] *om.* Vγ Wλ; scias Cα; scies Eγ altitudinem<sub>2</sub>] *om.* Mτ; *add. est* Fζ
- 4 capitis] *om.* Qβ; capite Mτ; capitum Sκ capitis ... altitudinem] *om.* Pν Pξ Xδ  
 capitis ... utramque] scilicet equinoctialis utraque id est gradus et equinoctialis Bκ  
 et<sub>1</sub>] vel Bη Bι Cζ Dγ Eρ Kε Kι Lλ Mγ Mλ Mo Nα Oβ Oη Oσ Oχ Pζ Pτ Pυ Qδ Qζ Qη  
 Rα Sη Sθ St Vα Vν Vφ Wλ; aut Pι; *et corr. to* vel Wβ Libre] *add. id est equinoctialis*  
 Kδ; *add. interlin.* scilicet equinoctialis Pθ in] *om.* Wι linea] *add. ab oriente* Oβ;  
*add. medii celi* Cα Eλ Mι Nγ Deinde] Postea Eδ scito] *marg.* Eζ; scias Cα; scita  
 Mτ Qη; *add. differentiam* Eζ(*marg.*) Pζ scito ... differentia] *om.* Eλ altitudinem]  
*add. est* Pγ altitudinem ... et<sub>2</sub>] *om.* Eγ Sθ; *marg.* Sβ utramque] *corr. in marg. from*  
 initiam Oξ; *add. eum* Mη; *add. que est intra utrumque scilicet inter gradus signum quem*  
 vis et caput Arietis Mι Nγ et<sub>2</sub>] tam altitudinem gradus in ista linea medii celi quam  
 etiam altitudinem capitis Arietis seu Libre et istus scitas nuta duarum istarum  
 altitudinum sive quia Cα; *add. tunc* Kα differentia] declinatio Mν; r<sup>a</sup> Fβ
- 4-5 altitudinem ... ipsarum] differentiam utrarumque(utrumque Lλ) Lλ Mα Oχ Pζ Vβ Vγ;  
 utramque altitudinem Sλ
- 5 ipsarum] *om.* Ek Vφ; eorum Vν; ipsorum Mτ; istas Cα; utrarumque St; utriumque Eγ Sθ  
 altitudinum] *om.* Mo; altitudines Cα; latitudinem Oχ est] que erit Eγ Lλ Mα  
 Oχ Pζ Qε Sθ Sλ; que est Vβ est ... eius] *om.* Bθ declinatio eius] *om.* Vπ;  
 differentia eius Mν eius] *om.* Eλ Pβ; huius Cζ Eμ Oη; illius Cα Wμ; eiusdem Cη Ek  
 Eτ Lλ Mα Mo Oβ Oι Pζ Pι Pτ Qε Sβ Vβ Vγ Wβ Wι gradus.] *om.* Bζ ab ... linea]  
 alia equinoctiali Dδ linea] *add. que ducantur qū [illeg.]* Zα autem] enim Cα  
 gradus<sub>2</sub>] *add. ille* Kα

the line of the middle of the sky or of the day, and know its altitude above the horizon [using the almucantars]; afterwards know the altitude of the beginning of Aries and Libra on the same line. Then consider each altitude and the difference of their altitudes is its declination of the degree from the equatorial circle. If however the degree

signi fuerit septentrionalis, est declinatio septentrionalis; si meridionalis, meridionalis. Scito etiam quod gradus septentrionalium signorum sunt altiores equinoctio, quod est in capite Arietis et eius opposito; et meridionalium inferiores, secundum declinationes

- 6 signi] *om.* Mλ fuerit] *interlin.* Oγ; sit Pι; *add.* equalis Qη(*deleted?*)  
 septentrionalis<sub>1</sub>] *add.* tunc Lδ est] erit Cα Cδ Dη Λλ Mτ Oγ Pζ Sθ; et Pγ; quod  
 Bδ est declinatio] *om.* Wβ est ... septentrionalis<sub>2</sub>] *om.* Wλ est ...  
 meridionalis<sub>2</sub>] et si meridionalis Pι; et similiter de meridionali Nγ declinatio] *om.*  
 Eη; illa declinatio Cα septentrionalis<sub>2</sub>] *om.* Bζ Oχ; *interlin.* Fβ si] et Pζ; et si  
*many*; *add.* autem Mo si ... meridiana<sub>2</sub>] et similiter de meridionali Mι; et simul  
 meridiana Cε meridionalis<sub>1</sub>] *om.* Bζ; meridiana *some*; meridiani Cδ Eμ Oχ Pζ Sλ;  
*add.* declinatio est Gα Oβ Qη; *add.* erit Dη Mπ; *add.* est Lκ Lμ Mν Mφ Oν Pσ Pφ Qβ Qθ  
 Zα; *add.* ipsa est Pβ; *add.* iste declinatio est Cα; *add.* signi Kα meridionalis<sub>2</sub>] *om.* Bδ  
 Cγ Eο Kε Lβ Mτ Qζ Pγ; declinatio erit meridionalis Lδ Oγ; et cetera Kι; medii celi vel  
 medii diei Lκ; meridiana *many*
- 6-7 si ... septentrionalium] signorum Vι
- 7 Scito] Scias Cα; *illeg.* Pξ quod<sub>1</sub>] *om.* Mτ; quia Pφ; quot Cι Sλ septentrionalium  
 ... equinoctio] signorum septentrionalis signi est altior Mι sunt] *om.* Mν; sicut Qγ;  
*add.* *interlin.* versus cuspidem Bγ equinoctio] *om.* Oχ; equinoxio Oι; equi quia magis  
 appingentes ad cenith quam equinoctium noctio Fβ; *add.* quia(*add.* sunt Sκ) magis  
 appingentes ad zenit/zentith quam equinoctioem Cγ Nα Oν(*marg.*) Sη Sκ(*marg.*); *add.*  
 id est magis propinqua polo Mι Nγ quod<sub>2</sub>] ut Lκ est] *om.* Mι Nγ
- 8 in] a Eγ Kδ Kι Mτ Pφ Qζ Arietis] *om.* Sι; *add.* et Libre Zα et<sub>1</sub>] qui Bθ; *add.* in Cδ  
 et<sub>1</sub> ... opposito] *om.* Cα; *corr.* to Libre Bγ; et(*om.* Oβ) ex opposito gradus signorum  
 Oβ Qη eius] cum Libre Bβ; ex Kε Kι Mτ; *add.* et ex Kα opposito] oppositi Pζ;  
*add.* quod est in Libra Cζ Oζ; *add.* scilicet Libre Cδ Zα; *add.* usque ad Libram que  
 opponitur Arieti Mι; *add.* *interlin.* sunt Oφ et<sub>2</sub>] est Pθ; *add.* gradus Bθ Cα Eλ Eν Vπ  
 Vτ; *add.* signorum Pι meridionalium] meridianorum *many*; *add.* gradus Oγ; *add.*  
 gradus signorum Cζ Oι; *add.* graduum Bβ Kθ inferiores] *add.* sunt Bδ Bθ Cα Cγ Dδ  
 Dη Eβ Eη Eν Fα Fβ Fζ Kα Kδ Kε(*interlin.*) Kι Lγ Lε Lμ Mδ Mη Mι Mπ Mτ Mν Mφ Nγ Oβ  
 Oζ Oξ Oι Oτ Pα Pβ Pδ Pθ Pμ Pν Pξ Pσ Qβ Qγ Qδ Qη Qθ Qλ Sδ Sκ Tδ Vπ Vφ(*interlin.*)  
 Wμ Xδ; *add.* sunt equinoctio Lδ Oγ; *add.* *interlin.* versus limbum Bγ secundum] sunt  
 Bβ Lκ declinationes] declinationem Mτ Qβ Oφ(*corr.* *interlin.* -nes) Vβ; *add.* id est per  
 declinationem Cζ Oη



of the sign were to the north, its declination is northern; if to the south, southern. And know that the degrees of the northern signs are higher than the [celestial equator] which is through through the beginning of Aries and its opposite [point]; and of the southern signs, lower, according to their declination

10 eorum ab eo. Maior autem declinatio est in capite Cancri et Capricorni. Eodem modo invenies declinationem stellarum fixarum.

- 9 eorum] *om.* Qθ; horarum Pγ eorum ab eo] ipsarum ab equinocio Oβ; Libro scilicet equinoctiali Bκ eorum ... declinatio] *om.* Eo ab eo] *om.* Bε Eη eo] equinoctiali predicto Kα Kε Kι Mτ Qζ; equinoctio Bζ; *add.* scilicet equinoctiale Lζ  
 Maior] a<sup>or</sup> *some*; maxima Cδ; minor Oχ; q' Bη; *add. in marg.* Notabilia necessaria ad sequentia Lζ autem] *rep.* Vν; alia Oη; enim Bθ Eλ est] *om.* Qι Nα; erit Oγ Sλ; *add.* declinatio Qη in] a Kε Kι Mπ Mτ Qζ et] ad Kι Mτ Qζ eodem] eo Pρ; eodemque Oχ Sθ Sι Sλ; *add.* autem Vα Vν; *add.* quoque Bη Bκ Cδ Cζ Eγ Eμ Lζ Mα Oη Oφ Qε Vβ Vγ modo] *om.* Kθ
- 9-10 eodem ... fixarum] *om.* Dη
- 10 invenies] *om.* Oχ; *add.* invenire possis Cζ fixarum] *om.* Kδ Nγ Oξ; *add.* 3.5-line gloss Cζ

from it. Moreover the greatest declination is at the beginning of Cancer and of Capricorn. By the same method you find the declination of the fixed stars.

[ Comment:

To know the declination of some degree or point on the ecliptic, place that point over the meridian line and read its altitude (using the almucantars). Then place the beginning of Aries (or Libra) on the same meridian and read its altitude. The difference in altitudes will be the declination of the point from the equator.

The northern signs (Aries to Virgo) have northern declinations, and are above the equator; the southern signs (Libra to Pisces) have southern declinations, and are below the equator. The greatest declinations are at the beginning of Cancer (northern) and the beginning of Capricorn (southern).

Declinations of the fixed stars can be similarly found. ]

## [CAPITULUM 21.] DE ALTITUDE POLI VEL LATITUDE REGIONIS

Scito quod latitudo regionis sit latitudo cenith capitem eius ab equinoctiali

- 1 De ... regionis] *om.* Βγ Βδ Βε Βζ Cγ Cδ Cε Dδ Eα Eγ Eκ Eλ Eυ Gα Kε Lζ Lκ Mα Mτ Nα Oβ Oν Oσ Oχ Pι Pξ Pσ Pφ Qε Qζ Qη Qι Sβ Si Sλ Vα Vν Vτ Vυ Vφ Wλ; *faded* Eδ Eϑ; *illeg.* Eζ; Ad habendum latitudinem cuiusvis(*om.* Dη Vξ) regionis Dη Eο Vξ; Ad inveniendum latitudinem alicuius regionis Lμ; Ad precognoscendum ea que secuntur Mγ; Ad sciendum latitudinis regionis Vγ; Capitulum 22<sup>m</sup>. De latitudine cuiusque regionis Qδ; De altitudine poli Zα; De declinatione cuiuslibet gradus Mπ<sup>1</sup>; De declinatione(*corr. in marg. to latitudine*) regionis invenienda Bη(*add. in marg.* 18); De invenienda latitudine regionis Dγ(*add. Rubrica*) Qθ(*marg.*) Rα(*add. et cetera*); De invenienda(*om.* Wι) latitudine cuiuslibet regionis Oφ Wι; De inventione latitudinis cuiusque regionis Vβ; De latitudine cuiusque regionis invenienda Kθ Mν Po Wβ; De latitudine regionis invenienda Cζ Eμ(*add. in marg.* 18<sup>us</sup>) Eτ Mλ De latitudine regionis per gradum solis habendam Pτ; De latitudine regionis scientia ca<sup>ior</sup>/m<sup>ior</sup> (?) Sη; De regionis latitudine Pζ(*marg.*); Habendam latitudinem regionis cuiuslibet sive elevationem poli Bι; Inventio latitudinis regionis vel elevationis poli Vϑ; Si latitudinem regionis scire volueris Bβ De altitudine] *om.* Oξ; De latitudine Kδ poli] *om.* Bκ Lε Pβ Pγ Tδ vel] *om.* Mη; et Eη Pν; seu Cα latitudine] *om.* Kα; declinatione cuiuscumque Mν Vι; lat' Mη regionis] *add.* quod idem est habenda Mo; *add. Rubrica* Vπ; *ms.* Lδ *ends add. in marg.* 21<sup>m</sup> Vφ; *add. in marg.* 25<sup>us</sup> Qζ; *add. in marg.* c. 25 Sδ
- 2 Scito] Scias Cα latitudo<sub>1</sub>] altitudo Fβ Wβ regionis] *om.* Qβ Sδ; *add.* distancialis Qη; *add.* et altitudo poli Zα regionis sit latitudo] vel longitudo Mτ sit] *om.* Vα; est Dη Pϑ Qη Xδ latitudo<sub>2</sub>] *om.* Kα Vα; altitudo Mν Mφ Oγ Vι Vτ Wα; distancia vel longitudo Cγ Dδ Kε Kι Qζ; longitudinis Sθ; longitudo Bθ Eϑ Mα Mγ Oβ Oφ(*corr. interlin. at latitudo*) Oχ Pι Pφ Qε Qη Rα Sβ Si Vβ Vγ Vν Vπ Vφ; *corr. from longitudo* Eζ; *add. interlin.* scilicet distancia Bγ cenith] *om.* Bη Sθ; *illeg.* Bκ; cenit Oσ Qε Qη Sβ Vυ Wλ; cent Mα; zenit Cγ Vγ; zenith Bε Kδ Lκ Nα Qδ Vφ; *add.* seu distancia cenith Cα capitem] *om.* Eκ Qζ Qη; *illeg.* Eϑ; capitis Pι; civium/cunum Cη Dγ Eτ Mγ Mη Mλ Oβ Pτ Rα Vν Vϑ Vτ; *add.* civium Bγ Bθ Cζ(cunum) Eλ Eμ Eν Lζ Mα Oι(*marg.*) Oσ Oφ Oχ Pζ Pυ Pφ Qε Sβ Sθ Si(*and del.*) Sλ Vβ Vπ Vυ; *add.* initium Lλ Vγ; *add. interlin.* id est zenit Bη eius] *om.* Bε Mτ Pι Wλ; *del.* Oι; cuiuscumque Eγ
- 2-4 Scito ... equalis] *marg.* Cδ

<sup>1</sup> The titles for Cap. 21 and Cap. 20 have been switched in *ms* Mπ.

[CHAPTER 21.] ON THE ALTITUDE OF THE POLE OR THE LATITUDE OF A REGION

Know that the latitude of a region is the latitude of its overhead zenith from the celestial equator

circulo versus septentrionalem vel meridiem, que similis est altitudini poli septentrionalis et depressioni eius oppositi ab horizonte, que duo sunt semper equales.

5 Cum ergo latitudinem cuiusque regionis scire volueris, altitudinem solis in

- 3 circulo] *om.* Sβ; altitudo Pγ; linea vel circulo Bη Cζ Eμ Ev versus] *om.* Vα vel] et Oφ(*corr. interlin. to vel*) Pφ; *add.* versus Eδ vel meridiem] *om.* Eλ Sι que] qui Lζ; *add.* distancia Cα est] *om.* Fβ Mν Pξ Pφ Wλ altitudini] latitudini Mη
- 4 septentrionalis] *om.* Bθ Ev Vπ; unius Dη; *add.* ab oriente Pφ; *add.* ab horizonte Bη Bκ Cδ Cζ Eγ Eμ Lζ Lλ Mα Oι(*marg.*) Oν Oσ Oφ Oχ Pι Qε Sβ Sθ Sι Sλ Vα Vβ Vγ Vν; *add.* horizonte Pζ et] vel Lμ; *add.* cumque Vι depressioni] p'nsioni Nγ eius] *rep.* Eρ; poli Vβ; *add. interlin.* poli Oι eius oppositi] **om.** Wι; alterius Dη; eius per oppositi Lκ; poli meridionalis(meridiam Sθ; meridionali Sι) sub eo Sθ Sι Sλ Vα Vν Wμ; poli oppositi id est meridiani sub eo Vβ; *add.* poli australis Cα Oβ; *add.* predicto scilicet polo Mι eius ... horizonte] meridionali sub eo Lζ Pζ; meridionalis sub eo Bκ Oν; poli meridionalis sub eo Bη Cδ Cζ Eμ Mα Oσ Oφ(*add. interlin.* scilicet oppositi) Oχ Pφ Qε Sβ Vγ; poli meridiani Eγ oppositi] ex opposito Mτ ab] sub Pι horizonte] *add.* eiusdem regionis Eλ; *add.* illius regionis Vτ; *add. interlin.* scilicet meridionali Oι que] qui Wι; *add.* de Pγ; *add.* scilicet Oξ que duo] quo sic Qη que ... equales] que due partes similiter equales Lζ; que est similiter equales Mν duo] *om.* Bβ Qβ; due Bι Eα Eμ Mγ Mη Nα Oβ Pν Vβ Vπ Sβ Sι Sκ Vα Wλ; 3 Mφ Vι; tres Lγ Mα Oχ Pζ Qε Sθ(?) Vβ; tria Eγ; altitudo poli septentrionalis et depressio poli australis Cα; *add.* altitudines Wλ; *add.* partes Bθ Ev Oν; *add.* scilicet elevatio et depressio Mι Nγ; *add. interlin.* distancie Bγ sunt semper] simpliciter Eδ semper] *om.* Bζ Eλ Mφ Vι; *interlin.* Kθ; in partes *corr. to simpliciter* Bγ; partes Bκ Cε; seui(?) Lβ; simpliciter Bβ; simpliciter Mν Vξ Wι equales] *om.* Cε
- 5 Cum] *add. in marg.* Inventio altitudinis regionis Lζ; *add. in marg.* 1<sup>a</sup> regula Dδ ergo] *om.* Cδ; autem Dη Gα; enim Mι Nγ; igitur Kι Mτ Oβ Qζ latitudinem] altitudinem Bζ Cα Dγ Eδ Eζ Mν Rα Sβ Vφ; longitudinem Mγ cuiusque] *om.* Dη Sι; alicuius Eα; cuius Ev Pγ Pζ Sβ; cuiuscumque Cα Lη Qι Qθ Sλ; cuiuslibet Cγ Eδ Eκ Gα Kθ Kι Mν Mo Mτ Nα Oβ Oγ Pδ Po Pτ Pν Qδ Qζ Qη Sκ Vβ Vξ Vψ Wβ Wι Wλ; cuiusvis Bζ Bη Bι Bκ Cζ Dγ Eλ Eμ Eo Ev Lγ Lζ Mα Mγ Oν Oσ Oφ Oχ Pι Qε Rα Vα Vγ Vν Vφ cuiusque ... altitudinem] *om.* Sθ Xδ regionis] *om.* Ev volueris] desideras Eκ; *add.* in Mν; *add.* scilicet Eδ solis] *om.* Rα Wβ; poli *corr. in marg. to solis* Qδ; regionis Vτ in] *om.* Pβ

5–Cap. 22 line 6 altitudinem ... regione] 11 lines of different text Oχ

toward the north or the south, which is similar to the altitude of the northern pole (and its opposite depression) from the horizon, which two are always equal.

Therefore when you wish to know the latitude of any region, consider the altitude of the sun

media die considera, quam minues de 90, si fuerit sol in inicio Arietis et Libre, et quod est residuum erit latitudo regionis; tunc enim motus solis erit in equinoctiali linea. Si vero in alio gradu fuerit sol, eiusdem gradus declinationem considera per tabulam

- 6 media] ipsa *corr. interlin. to media* Εκ; medio *some* medie die] meridiē Βη(*add. interlin media*) ΒΘ Βκ Ευ Λζ Vπ Vψ; medio diei Cζ considera] *om.* Ρα; primo considera Cα; *add. per 2 canonem Bζ; add. per 11(ii?) canonem Oβ; add. per 12/12<sup>m</sup> canonem Eφ Gα Vφ; add. per 13 Mτ; add. per 13/13<sup>am</sup> canonem Kα Kε Kι Qζ Qη; add. per h<sup>m</sup>ra novm suppo<sup>m</sup>(?) Pι; add. quando sol est(fuerit Kδ) in primo Arietis vel Libre Kδ Pθ quam] *om.* Oβ; quid Pγ; *add. altitudinem solis Cα* minues] invenies Dγ Kδ Mv; invenies *corr. in marg.(interlin. Mη) to minues Cζ Mη* 90] 10 gradibus Cα; LX Sθ; LX *corr. to 90 Qε; nonaginta Lκ; add. gradibus Vα* 90 si] quo Mγ si fuerit] *om.* Pφ; si volueris Pξ si ... Libre] *om.* Kδ sol] *om.* Cζ Mv Mv Mφ Vι Wα in] *om.* Cζ Mv Pγ Pζ Pι inicio] stacione Sι et] vel *some**
- 6-7 quod est] *om.* Βγ Βη Βκ Cδ Cζ Eγ Eμ Kε Kι Λζ Λλ Mα Mι Mτ Nγ Oσ Pζ Qε Qζ Sβ Sθ Sλ Vα Vβ Vγ Vυ
- 7 est] erit Eφ Wλ; fuerit Dη Eo Oβ Pι Qη est residuum] remanet Cα residuum] *add. initii Arietis* erit] est Βη Βκ Cδ Eμ Λζ Oγ Oσ Pφ Vβ Vτ Vυ Wλ; *add. ibi Pσ; add. post talem subtractionem Cα* latitudo] *om.* Qι; longitudino Dδ Λλ Mγ Vγ latitudo regionis] *marg. Pβ* latitudo ... enim] *om.* Sη enim] *om.* Kθ Pδ Pφ Wλ; *lacuna Cγ* motus] *corr. from magus(?) Pβ* motus solis] id est que sol est in primo gradu Arietis seu Libre esse Cα solis] *om.* Pι; celi Bζ solis erit] *om.* Kα erit] est Cα Mv Ov Pγ erit in equinoctiali] *illeg. Cε* in] *om.* Wβ before Si] *add. DE ALTITUDE REGIONIS Cα* Si] *add. marg. 2<sup>a</sup> regula Dδ*
- 8 vero] autem Dη; *add. fuerit Oγ* alio] aliquo Bβ Pγ Qη; aliquo *corr. to alio Pι; aliquo aliquo Oβ; illo Pμ* gradu] signo Bδ; *add. linea Oβ* fuerit] *illeg. Eα; erit Qθ; est Lμ Pι* fuerit ... gradus] *om.* Pγ sol] solis quam primo gradu Arietis seu Libre Cα; *add. scilicet(?) quod in principio Arietis vel Libre Pι* eiusdem] cuiusdem Mπ; eius Βη Βκ Cδ Cζ Eγ Eλ Eo Eυ Λζ Λλ Mα Mγ Oσ Oφ Pζ Pφ Qε Sβ Sθ Sι Sλ Vα Vγ Vυ Vυ; illius Dη gradus] *lacuna Cγ* declinationem] *om.* Nα; *add. a linea equinoctiale Cα* considera] *add. et illam declinationem potes Cα* per] *add. in marg. Hec littera "Per tabulas" usque ad litteram "Quam minues" est addita Vβ* tabulam] liniam Eα; tabulas Bζ Pυ Qδ Sη Vβ Vι; *add. gradus Qβ Sδ; add. que ponitur post quadrantem Eφ Gα Rα( add. in) Vφ( add. interlin. scilicet)*
- 8-9 considera ... vel] *om.* Mτ per ... vel] *om.* Kε Kι Pι Qζ Qη per ... datas] *om.* Βη Βκ Cδ Cζ Eγ Eμ Λζ Λλ Mα Oσ Pζ Pφ Qε Sθ Sι Sλ Vα Vγ Vυ; *marg. Oφ Sβ*



at midday which you will subtract from 90 if the sun is in [the circle through] the beginning of Aries and Libra, and what is the remainder will be the latitude of the region, for then the motion of the sun will be on the equatorial circle. If, however, the sun is in some other degree, settle on the declination of the same degree through a table

10 declinationis solis, vel per regulas ante datas; quam minues de altitudine solis in medio die, si fuerit septentrionalis; si vero meridionalis, adde illam. Et habebis altitudinem inicii Arietis in regione illa, quam subtrahes, sicut predictum est, a 90, et quod

- 9 declinationis ... datas] id est per regulam proximam declinationem solis cum per regulas omnis declinationis Kα solis<sub>1</sub>] *om.* Bβ Dη Eλ Mι Qβ Vρ vel] *om.* Mπ Wα; et Bζ Eι Qβ Qγ Vξ vel ... solis<sub>2</sub>] *om.* Cε Eκ per] *om.* Mγ Ov Qδ regulas] tabulas Eo ante] *om.* Gα datas] dictas Eα Mγ Mι Mτ Nγ Oγ; *add.* capitulo proximo Vφ; *add.* cum ca<sup>so</sup> proximo Gα; *add.* cum proximo Rα; *add.* per precedentem et in mediae Mι Nγ; *add.* proxime Mτ Kι Oβ Pι Qζ; *add.* que ponitur post quadrante Bζ; *add.* t<sup>o</sup> proc<sup>o</sup>nno Eo quam] ista declinatione inventa Cα; *add.* declinationem Gα Mι Nγ minues] invenies Kδ Qβ; invenies *and corr. in marg. to* minues Cζ Sδ; minuta Mτ; *add.* eam Cα de altitudine] *marg.* Sκ; declinatione Xδ; de latitudine Cζ; *add. interlin.* inventis per regulam in dorso astrolabii Bγ solis<sub>2</sub>] *om.* Bζ in] *om.* Bι; de Fα Mτ medio] media *some*
- 9-10 medio die] meridiana Bε
- 10 si<sub>1</sub>] *om.* Mτ; *add.* gradus Oβ Pι Qη si<sub>1</sub> ... septentrionalis] *marg.* Oφ(*add.* quod) fuerit] sit Bθ Bκ Lζ; *add.* declinatio Eλ si<sub>2</sub> ... illam] vel adde eam illi si fuerit meridionalis Bθ Vπ; vel(et Pφ) adde illam si fuerit meridiana Eγ Lλ Mα Oσ Pζ Pφ Qε Sβ Sθ Sι Sλ Vβ Vγ Vν; vel adde illam si fuerit meridionalis Ov; vel adde illi si fuerit meridionalis Bκ Lζ; vel adde si fuerit meridionalis Bε Dη Vα; vel adde si fuerit meridiana declinatio Cδ; vel addes eandem si fuerit meridiana Bη Eμ; vel addes idem si fuerit meridiana Cζ vero] *om.* Pσ Qθ; *add.* fuerit Kε Kι Mτ Oβ Qζ Qη meridionalis] meridiana *many*; meridies Mτ; *add.* id est in signis meridionalibus Kα adde illam] *marg.* Oφ illam] ad illam Zα; ei illam declinationem Qη; illi Lζ Vν; istam Kι Mτ; *add.* declinationem Oβ; *add.* declinationem ~~illius gradus~~ altitudini solis in media die Cα et] *add.* tunc Oφ Pφ habebis] invenies Pι altitudinem] *om.* Bε Eη; latitudinem Qη; *add. in marg.* equinoctialis Qζ
- 11 inicii] *om.* Dη Lμ Pσ Qθ Sλ; *marg.* Sδ; in initio Wλ Arietis] *add. interlin.* et Libre Bγ illa] *om.* Lγ Pι; eius Bη; ista Kε Kι Mτ quam] *add.* altitudinem Arietis et Libre Gα; *add.* altitudinem inicii Arietis Cα subtrahes] minues Mδ; subtrahas Gα Wλ sicut] ut Bε Vα Vξ predictum] dictum Bη Bθ Dη Eν Kε Kι Mι Mτ Nγ Qζ Qη Sλ Vπ Wλ est] *om.* Qε a] de *some* 90] 10 gradibus Cα; LX Sθ; LX *corr. to* 90 Qε; *add.* gradibus Cδ Vα

of solar declinations, or through the instructions given above [in Cap. 20]; this you will deduct from the altitude of the sun at midday if it is northern; if, on the other hand, it is southern, add it. And you will [then] have the altitude of [the sun at] the beginning of Aries in this region, which you will subtract, as said before, from 90, and what

remanserit est distancia regionis ab equinoctiali linea.

- 12 remanserit] post talem subtractionem Ca est] erit Bt Cz Dη Eγ Λλ Nα Pβ Pζ Qε Sη Vγ Vq Zα; est vel erit Cz distancia] *add. interlin.* cenith Oφ distancia ... linea] altitudo poli et per conversus latitudo illius regionis Dη regionis] *add. illius Mτ; add. istius Kε Kι; add. interlin.* id est cenith Qζ; *add. interlin.* latitudo Bη regionis ... linea] cenith ab equinoctialis vel latitudo regionis Oγ ab ... linea] *illeg.* Cε equinoctiali] equinoxiali Oι linea] *om. Mτ; add.* vel latitudo regionis sive elevatio poli super orizontem qui idem sunt similitudo fac per stellas fixas Pι; *add. 4-line gloss Cz*

remains is the distance of region from the equatorial circle.

[ Comment:

The latitude of a location is the angle between the equatorial circle and the zenith of the location, and is also equal to the angle between the horizon and the north (or south) pole.

When the sun is at an equinox, that is, on the equatorial circle, the latitude of a location will be the complement of the midday altitude of the sun, or  $90^\circ$  minus the altitude of the sun at midday.

If the sun is at some other point along the ecliptic, determine the declination of the sun for that day (as outlined in Cap. 20, or from tables), and if the sun is north of the equator (between the spring and autumn equinoxes) subtract this declination from the midday altitude; if it is south of the equator (between the autumn and spring equinoxes), add this declination to the midday altitude. This addition or subtraction adjusts the current observed midday altitude of the sun to the midday altitude of the sun at the equinoxes, which then can be subtracted from  $90^\circ$ , as before, which will then be the latitude of the location. ]

[CAPITULUM 22.]<sup>1</sup> DE EODEM, SED ALITER, CAPITULUM

Vel si volueris accipere altitudinem cuiusvis stelle altiozem, et eius

Cap. 22] *om.* Οη

- 1 De ... capitulum] *om.*: Ββ Βγ Βδ Βε Βζ Βη Βι Βκ Βλ Βμ Βν Βξ Βο Βπ Βρ Βσ Βτ Βυ Βφ Βχ Βψ Βω Βμ Βλ Βδ Βζ Βα; De altitudine poli Ca; De altitudine poli in qualibet regione Wι; De eodem per stellam et declinationem eius [*cut off*] Οφ(*marg.*); De eodem per stellas Vξ; De eodem per stellas fixas Eo Eη Mγ; De eodem sed aliter Βθ Μη(*marg.*); De latitudine poli in qualibet regione Eτ Wβ Capitulum] *om.* Βθ; Rubrica Vπ *add. in marg.* 26<sup>us</sup> Qζ
- 2 Vel si] Et si Σλ; Si Κι Πξ Qη Vτ; Vel Οβ; *add. in marg.* 3<sup>a</sup> regula Dδ Vel ... eius] Vel accipere alicuius stelle altiorum Si volueris eius Κι si volueris] suis lineis Sθ accipere] accipe Sθ Sι Vφ Wι; scire Μι Νγ altitudinem] *om.* Cζ Ka; latitudinem Oσ; latitudinem per Οβ Qη; *add. interlin.* in dorso astrolabii Βγ cuiusvis] alicuius Λμ Ρσ Qθ Σλ; alicuiuslibet Κε; cuius Βη Cζ Ον Οφ Ργ Ρφ; cuiuslibet Οβ Qη Σβ; cuiusque Εμ Μο Ρυ; vel cuius Ρα cuiusvis stelle] *rep.* Fβ; alicuius regionis accipe altitudinem cuiusvis stelle non occidentis in eadem regione Μι cuiusvis ... altiozem] *corr. in marg. to* per cuiuslibet stelle fixe [*illeg.*] Qζ stelle] regionis *corr. in marg. to* stelle Oσ; stellarum Λμ Ρσ Qθ; *add. interlin.* fixe Βγ; *add. in marg.* non occidentis in illa regione Πζ altiozem] *om.* Eυ; declinationem Οβ Qη; *add.* meridionala Κα *add.* qui est divc(?) celi Ζα; *add. interlin.* in meridie Βγ eius] *om.* Ρο
- 2-3 si ... considera] *marg.* Σβ si ... est] si vero idem per stellas fixas scire placuerit Cδ; et fac ut prius Ελ accipere ... est] *om.* Cζ cuiusvis ... elongacionem] *om.* Βδ
- 2-4 Vel ... regione] Si altitudinem poli scire volueris accipe altitudinem altiozem alicuius stelle que stelle [*illeg.*] accidet in illa regione etiam accipe Ca altiozem ... stelle] *om.* Dη

<sup>1</sup> Most mss treat this as a continuation, without a break, of the previous chapter.

[CHAPTER 22.] CHAPTER ON THE SAME, BUT DIFFERENT

Or if you wish to take the higher altitude of any star,

elongacionem ab equinoctiali linea considera, cum qua fac ut supra dictum est.  
 Quere quoque cuiusvis stelle non occidentis in eadem regione altitudinem altiore et

- 3 elongacionem] longacionem Wβ; longitudinem Pv; longitudinem *corr. to* elongacionem Tδ; *add.* altiore Lμ; *add. interlin.* ponendo eam in linea meridiei Bγ ab equinoctiali] ab equinoxiali Oι; equinoctialem Mν; ab orientali Mτ linea] *interlin.* Kθ linea ... qua] *om.* Mν; et Pι considera] *om.* Bθ Eλ Eο Eν Eμ Lζ Lμ Mγ Oβ Pτ Vπ Wλ Zα; *interlin.* Sκ; *rep.* Lγ considera ... qua] *om.* Bη Bι Bκ Dγ Eα Eδ Kε Kι Mα Mo Mτ Nα Oφ(*add. interlin.* cum qua) Pσ Pυ Pφ Qζ Qη Sη Sθ Sι Sλ Vα Vβ Vγ Vρ Vυ Vφ; *add. in marg* Eζ(*later hand*) considera ... est] fac vel predictum est *corr. in marg. to* fac sicut predictum est supra Oσ cum qua] et Eρ Pζ Qε Rα Sβ; *add.* et Qδ; *add. in marg. 10-line gloss* Bγ cum ... est] fac sicut predictam est Lζ Oν fac] facit Bβ; fiat Pβ; *add. interlin.* cum illa Vφ ut] *rep.* Kθ; quod Lκ; sicut Bκ Kε Kι Mι Nγ Qζ Qη supra] *om.* Eμ Kι Lμ Mτ Pσ Pφ Qζ Qθ; prius Bβ Bδ Bε Cγ Cε Eβ Eη Fα Fβ Fζ Kα Lβ Lγ Lε Lη Lκ Mδ Mη Mι Mτ Mυ Mφ Nγ Oγ Oζ Oι Oξ Oτ Oυ Pα Pβ Pθ Pμ Pν Pξ Pρ Qβ Qγ Qι Qλ Sδ Sκ Tδ Vι Dδ Wα Wμ Xδ Zα; superius Kδ; *add.* ut Eδ dictum] predictum Bη Bκ Kε Kι Mτ Qζ dictum est] *om.* Lλ Mα Pζ Qε Sβ Sθ Vγ; *add.* prius Kθ; *add. in marg.* que est declinatio ipsius stelle Sκ; *ms* Qι ends
- 4 Quere] Si autem [*illeg.*] vise scire, quere Zα Quere quoque] Item quere Eγ Lλ Mα Pζ Qε Sβ Sθ Vγ; Que Mτ; Querere Cη; *add. interlin.* Vel Eμ; Vel quere Bγ Bζ Bθ Bκ Cη Eκ Eλ Eτ Eυ Lζ Mγ Oβ Oν Pγ Qη Vν Vξ Vπ Vτ Wβ Wι; *corr. to* <sup>vel</sup> quere Eζ; *add. in marg.* 4<sup>a</sup> regula Dδ Quere ... cuiusvis] Quere cuiusvis *corr. in marg. to* Quere quoque cuiusvis Oσ quoque] *om.* Bη Cδ Cζ Eμ Kα Kε Kι Pι Qζ Sι Sλ Vα Zα; *marg.* Oφ cuiusvis] alicuius Mo; cuius Cζ Cη; cuiuslibet Kε Kι Lλ Mα Mτ Pζ Qε Qζ Sβ Sθ Vγ Vν; cuiuscumque Oφ Sι Sλ; cuiusque Bζ Bκ Eο Lζ Mγ Pυ Pφ Vα Vβ(*add. interlin.* a] cuiuslibet] stelle] *add.* gradus polum Mτ Qζ non] in Dγ; numquam Kα occidentis] orientalis *corr. to* occidentalis Sλ; *add.* scilicet super apparentis Kε Kι; *add.* sed semper apparentis Mτ Qζ in ... regione] *om.* Dη eadem] illa Sλ regione] *om.* Pι; *add.* in puncto opposito(?) Qζ altitudinem] *add.* in linea meridiei Oγ; *add.* scilicet Dη
- 4-5 altiore et inferiorem] maiorem et minorem Eλ



examine its elongation from the equatorial circle, and do with it as was said above. And seek out the higher and lower altitude of any star which does not set in the same region [i.e., never dips below the horizon]

5 inferiorem, et utriusque collecte simul tolle medietatem, que est altitudo poli in eadem regione.

- 5 inferiorem] *om.* Ζα(*add.* 2.5 lines); *add.* sui circuli quem facit die et nocte Μτ Qζ; *add.* altitudinem conversa aliorum et inferiorem eius altitudinem altiorem scilicet altitudinem versas a<sup>orum</sup> et inferiorem eius altitudinem Οβ et] *add.* quere Βκ Lζ utriusque] *add.* altitudinis Cδ Ογ collecte] *om.* Si; colere Να; collecto tollecto Μι Νγ simul] in simul / insimul Ββ Βγ Cδ Cη Cι Dγ Eδ Eκ Eμ Eρ Eτ Γα Κθ Λλ Μη Μν Οσ Ργ Ρδ Ρζ Ρι Ρυ Ση Qδ Qε Ρα Sβ Sθ Sι Sκ SA Vα Vβ Vγ Vφ Vψ Wβ Wι; insibilis Να Ρτ; in simili Vυ; in similis Wλ; similis Cγ tolle] *om.* Βκ Lζ Μτ; accipe Eγ; collecte Wβ(*and deleted*) tolle medietatem] *interlin.* Κε que ... poli] *om.* Eδ est] *om.* Qλ; erit Eμ Λγ Ρζ Qε Sθ; *add.* ibi Ογ; *add.* vel erit Βη altitudo] elevatio Κα; latitudo Μτ Οβ Qζ; *add.* *and del.* regioni Λγ poli] *om.* Βι Βθ Dγ Eζ Eρ Eυ Κε Κι Μτ Ρι Vπ; *interlin.* Vφ
- 5-6 in ... regione] *om.* Ογ
- 6 regione] *add.* et est eadem cum(in Eυ) latitudine(longitudine Vπ) regionis Βκ Βθ Ελ Eυ Lζ(*marg.*) Ον Vπ Vτ; *add.* que est eius latitudo regionis Cδ

and take the mean of both collected at the same time, and this is the altitude of the pole in the same region.

[ Comment:

Or you can take the highest altitude of a star, calculating its distance from the equatorial circle as noted before. Measure its highest and lowest declinations on the same day twelve hours apart, and the average of the two will be the altitude of the pole above the horizon at that location (and therefore the latitude of the region, as indicated in Cap. 21). ]