



# Between Copernicus and Calcagnini: the Studium and the scientific environment in Ferrara

## Nicolaus Copernicus and the Culture of Remembrance

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#### The Este dynasty during the age of Copernicus and Calcagnini



The Duke Ercole I (1431-1505)



The Duke Alfonso I (1476-1534)



The Duke Ercole II (1508-1559)



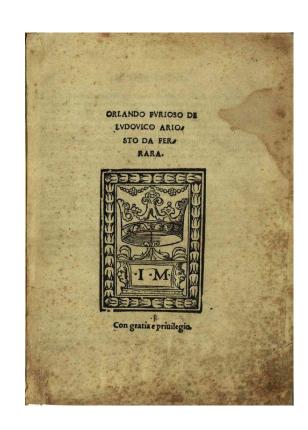
#### **Humanities in Ferrara**



The Cardinal Ippolito d'Este (1479-1520)



Ludovico Ariosto (1474-1533)



Editio princeps of Orlando Furioso (1516)

#### The cultural environment in Ferrara through the words of Ludovico Ariosto



Veggo il Mainardo, veggo il Leoniceno, il Pannizzato, e Celio e il Teocreno.

[...] Ecco il dotto, il fedele, il diligente

secretario **Pistofilo** 

[...] Poi cardinale appar, ma giovinetto sedere in Vaticano a consistoro, e con facondia aprir l'alto intelletto, e far di sé stupir tutto quel coro.

[...] Di filosofi altrove e di poeti

We see a honourable group of philosophers and poets

si vede in mezzo un'onorata squadra.

Quel gli dipinge il corso de' pianeti,
questi la terra, quello il ciel gli squadra:
questi meste elegie, quel versi lieti,
quel canta eroici, o qualche oda leggiadra.
Musici ascolta, e varii suoni altrove;
né senza somma grazia un passo muove.

(Orlando Furioso, 3° edition, 1532, XLVI)

# The Studium of Ferrara between the 15<sup>th</sup> and the 16<sup>th</sup> century

The Studium of Ferrara was divided into:

- the Universitas iuristarum
- the Universitas artistarum

Some important lectors of the Studium of Ferrara in the last decades of the 15° century were:

- Giambattista Guarini, professor of rhetoric
- Nicolò Leoniceno, professor of medicine, mathematics and moral philosophy
- **Pietro Bono Avogaro**, lector of astronomy and author of astrological papers and predictions.





#### Astronomy in Ferrara in the 15<sup>th</sup> century

Giovanni Bianchini was one of the most important mathematicians and astronomers of the 15<sup>th</sup> century. He was the author of the *Tabulae* astrologiae.

Scientific relationship with the astronomers **Georg Peurbach** and **Regiomontanus** 







Giovanni Bianchini introduced by Borso I d'Este offers Emperor Frederick III a copy of the Tabulae Astrologiae

Domenico Maria Novara (1454-1504) was student of Giovanni Bianchini in Ferrara.

In 1484 he graduated in arts and medicine in Ferrara.

Since 1483 Novara was professor of astronomy in Bologna (ad lecturam Astronomiae de mane diebus continuis et ordinariis et fiat Judicium et Tacuinum).

Dominici Mariae ferrariensis... qui vir divino ingenio praeditus fuit Nicolai Copernici praeceptor

Novara was professor of Copernicus during his stay in Bologna. Copernicus and Novara made some astronomical observations in Bologna (1497, 1500).

qui potuero, tibi Deo dante, dilucide recitabo. Cum D. Doctor meus Bononie,
citabo. Cum D. Doctor meus Bononie,
non tam dise pulus, quàm adiutor, & testis observationum doctissimi Viri Dostis observationum doctissimi Viri Dominici Marie Rome autem circa annum
D d Domin

Georg Joachim Rheticus, Narratio prima, 1540

Confirmatio eorum, quæ circa Lunæ parallaxes funt exposita. Cap. xxvII.

Vòd igitur parallaxes Lunæsic expositæ conformes sint apparentis, pluribus alijs experimetis positumus affirmare, quale est hoc quod habuimus Bononiæ septimo Idus Martij post occasum Solis, anno Christi M. cccc. xcvII. Considerauimus enim, quòd Luna

Copernicus, De revolutionibus

Ad Illustrissimum dominis. B. Jo. Benti. Dominici aldarie serf. de Mouaria pronosti con in annum domini. Ald. ccccciiii.



A rafon demostra ela experientia ecofermachel cielo no folamente opera nele cossi entrinsche zeo ne lisentimetri delcorpo. Ma anchora nele cossi extrinsche come end honore nel regno nel magisterio ne la moglitore si fagiso lini e le faculta e i altrictimile cossi. Peto chel cielo sempre agistado dista materia elemetare custi rissuli in lini en somo mosti demostra elemetare custi rissuli materia elemetare custi rissuli materia elemetare custi rissuli materia elemetare custi rissuli in acualte effecto elemente descriptiones de la construcción de la construcció

ma anchora cuffi qualificandolo talméte lo difponc chel fia come un meco că dițile effo cielo operii altriductif fietch! Per taito ucdemo alchuni p una certra naturalei dinatio cuffi apti e dipolit înte facilmête obtegăo gii che defiderăo. Et p una certra natural couniteta êt in nata îpetie damicică naturalmente fe inclinano luno a laitro efferte ppitio e fauoreulo. Et p cătrario uckrum alcii pinaturali epitudine cuffi inadi êt nel lor opare cuffi iepti che folo pur a guar darli fe fano abominabili êt odolof puna certra naturale dicioumietia e i inata îpecie de înimicicia. Vi nde ral couenientia êt dicioumietia nel coffe huma in fe fugilia ne li fentimenti del corpo da la uitru celefte nelhorache naforndo lhomo tira affect primo acer refipirando. Na quefta couenientia diconuenti

Luna occultatura stellam sulgentem Hyadum, quam Paliliciu uocant Romani, quo expectato, uidimus stellam applicatam parti corporis Lunaris tenebrofi, iamon delitefcentem inter cor nua Lunæ in hore quintæ noctis, propinquiorem uero Austri no cornu per trientem quali, latitudinis siue diametri Lunæ. Et quoniam stella secundum numerationem, erat in duabus part. & LII. Geminorum cum latitudine Austrina quincp graduum & fextantis, manifestum erat, quòd centrum Lunæ secundum uisum præcedebat stellam dimidia diametri, & idcirco locus es ius uisus in longitudine partium 11. scrup. xxxv1. In latitudis ne part. v. scrup. 11. ferè. Fuerut igitur à principio annoru Chri Rianni Ægyptij M.cccc.xcvII.dies LxxvI.horæ xxIII.Bos noniæ, Cracouiæ autem quæ orientalior est, gradibus fere 1x. horæxx111.fcrup.xxxv1.quibus æqualitas addit fcrup.1111. erat enim Sol in xxvIII.s.partibus Piscium, Motus igitur Lus nææqualisà Sole part, LXXIIII. Anomalia æquata part. CXI. scrup.x.Locus Lunæ uerus part. 111. scrup. xx1111. Geminoru. latitudo Austrina part. 1111. scrup, xxxv. Nam motus latitudi nis uerus erat part. cciii. scrup. x Li. Tuc quocy Bononiæ ascen debat xx vi. gradus Scorpij, cu angulo partium Lix.s.& erat Luna à uertice horizontis part. LXXXIIII, & angulus fectionis circulorum altitudinis & figniferi partium fere xxix.paralla= xis Lunæ pars una, logitudinis scrup. L1. latitudinis scru. xxx quæ admodum congruunt observationi, quo minus dubitaue rit aliquis nostras hypotheses, & quæ ex eisprodita sunt, recte Se habere.

# Portrait of Celio Calcagnini

#### Celio Calcagnini in Ferrara

- Celio Calcagnini (1479-1541) was a diplomat, humanist and scientist at the service of the Duchy of Ferrara.
- 1509. Calcagnini was appointed at the chair of *utriusque linguae* at the Studium of Ferrara
- 1510. He became Secretary of the Cardinal Ippolito d'Este.
- 1518-1519. Diplomatic mission in Hungary
- From 1520. Calcagnini devoted himself to literary studies and to the teaching in the University of Ferrara.

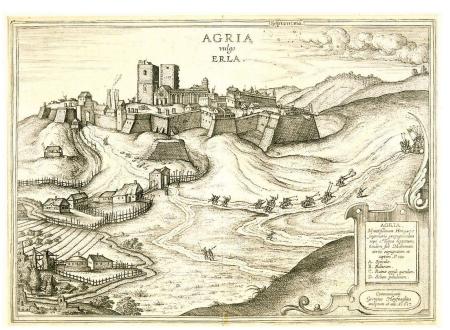
#### The diplomatic mission in Hungary

Since 1498 the episcopate of Eger was assigned to the Cardinal Ippolito d'Este.



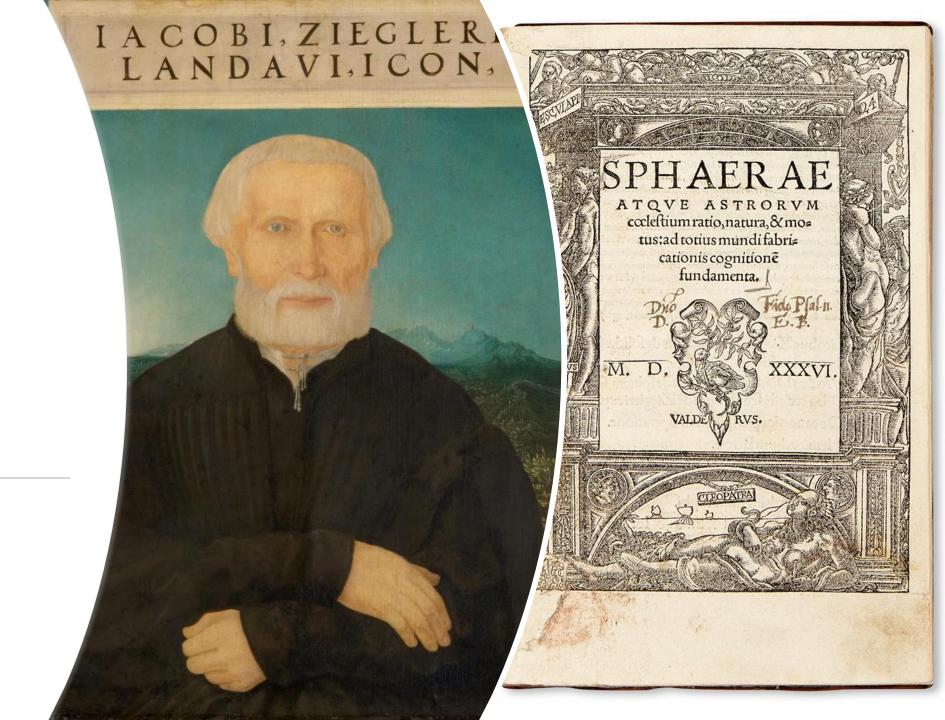


Renaissance fresco of the coat of arms of bishop Ippolito d'Este in the castle of Eger



The Eger Castle

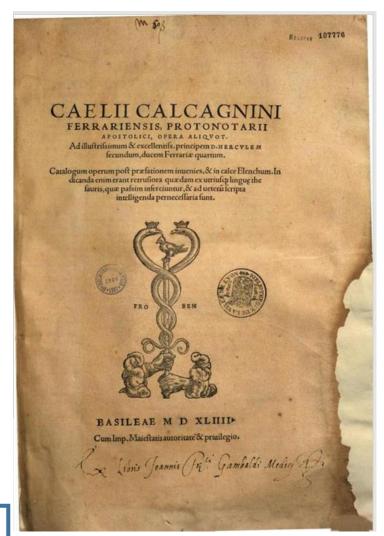
The scientific relationship with Jacob Ziegler



#### Opera aliquot (1544)

- After the death of Calcagnini, Giangirolamo da Monferrato was charged to select all the completed works of Calcagnini and to collect them in a single volume.
- The edition of the volume was superintended by Antonio Musa Brasavola.
- The volume was offered to the duke Ercole II.
- It contained both works and letters written by Calcagnini.

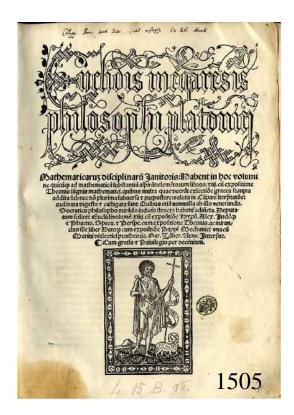
tatem sunt, sibi arrogantes. Quæ ita iuncta & copulata sunt inter se natura, ut sine piaculo disiungi no possint. Nam sicut in corpore humano nihil frustra positum est, quod ad suum opus sit institutum, cæterisés partibus respondeat, ut non sine pernicie auelli possitita disciplinæ, id est humanitatis membra, inter se connexæ sunt, ut seorsum positæ mancæ ac mutile sint. Nemo ergo physica sine logicis, nemo logica sine mathematicis, nemo omnia sine orationis præsidio assequat. Quare belle hanc harmoniam nonulli syxux diam dixere. Quod si philosophia est humanarum diuinarum errum cognitio, si humanitas est earum rerum quæ ad hominem perti

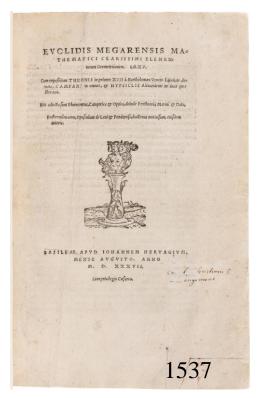


#### Calcagnini's library

[...] libros suos in publicam utilitatem reliquit.

Mathematical works



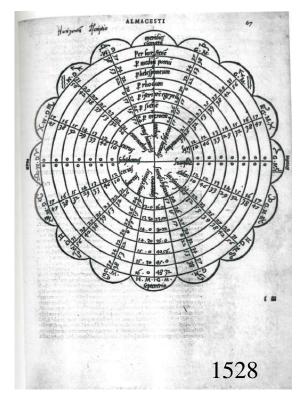


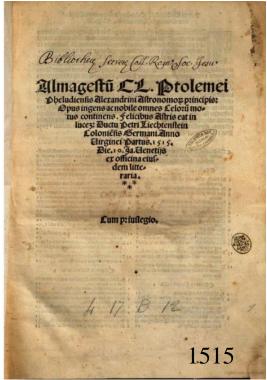


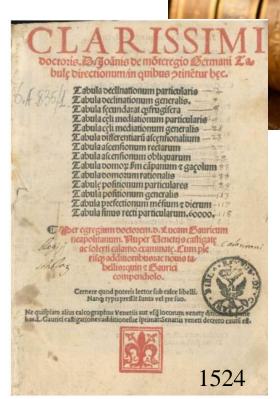
#### Calcagnini's library

[...] libros suos in publicam utilitatem reliquit.

Astronomical works









Luca Gaurico edited astronomical and mathematical works.

#### Calcagnini's library

[...] libros suos in publicam utilitatem reliquit.

1518

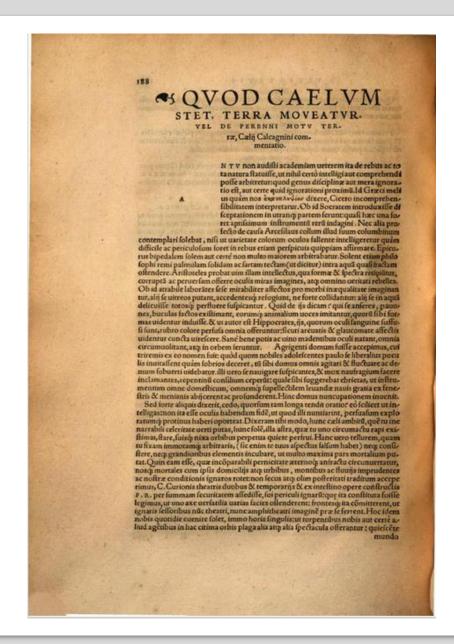
Cosmological works

Figura Eclipfium ad meri-



### Quod Caelum stet, Terra moveatur, vel de perenni motu terrae





Sed forte aliquis dixerit, cedo, quorfum tam longa tendit oratior eò scilicet ut intelligas:non ita esse oculis habendam fide, ut quod illi nuntiarint, persuasum explo ratum & protinus haberi oporteat. Dixeram tibi modo, hunc cæli ambitu, que tu ine narrabili celeritate uerti putas, hunc fole, illa aftra, quæ tu uno circumactu rapi existimas, stare, suis és nixa orbibus perpetua quiete perfrui. Hanc uero tellurem, quam tu fixam immotames arbitraris, (fic enim te tuus aspectus falsum habet) nees consistere, neg grandioribus elementis incubare, ut multo maxima pars mortalium putat. Quin eam elle, quæ incoparabili pernicitate æternoch anfractu circunuertatur, nosch mortales cum ipsis domicilijs atquirbibus, montibus ac fluuijs imprudentes ac nostræ conditionis ignaros rotet:non secus atq olim posteritati traditum accepe rimus, C. Curionis theatris duobus & temporarns & exintellino opere constructis P. R. per fummam fecuritatem affediffe, sui periculi ignaru: que ita constituta fuisse legimus, ut uno axe uersatilia uarias facies oftenderent: frontesci ita comitterent, ut ignaris sessoribus nuc theatrí, nunc amphitheatrí imagine præ se ferrent. Hoc idem nobis quotidie euenire solet, immo horis singulis;ut torpentibus nobis aut certe a liud agetibus in hac citima orbis plagaalia atqualia spectacula offerantur : quiescete

The celestial sphere, that you think moving with incredible velocity is immobile and lies in a state of rest.

This earth, that you think unmovable and motionless, rotates and rotates us mortals with incomparable speed and continuous rotation without noticing it.



PERNICI TORINENSIS DE REVOLVTIONIBUS ORBIS um coelestium, Libri vi.

Habes in hoc opere iam recens nato, & ædito, ftudiose lector, Motus ftellarum, tam fixarum, quam erraticarum, cum ex ueteribus, tum etiam ex recentibus observationibus restitutos: & nouis insuper ac admirabilibus hypothesibus or= natos. Habes etiam Tabulas expeditissimas, ex quibus eosdem ad quoduis tempus quam facilli me calculare poteris. lgitur eme, lege, fruere.

Ayempichatos solis cioita.





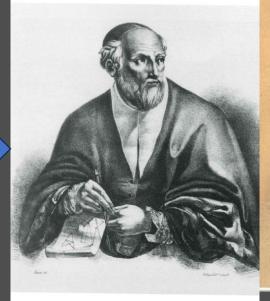
Norimbergæ apud loh, Petreium, Anno M. D. XLIII.





There was no direct link or relationship between Copernicus and Calcagnini





#### S QVOD CAELVM

STET, TERRA MOVEATVR. VEL DE PERENNI MOTY TER-

ræ, Cælij Calcagnini com-

N T V non audiffi academiam ueterem ita de rebus ac tos tanatura fratuiffe, ut nihil certò intelligi aut comprehendi poste arbitreturiquod genus difeiplina aut mera ignora-tio est, aut certe quid ignorationi proximii. Id Graci mell us quam nos exercitables dixere, Ciceto incomprebenfibilitatem interpretarur. Ob id Socratem introdussifie di feeptationem in utranqi partem ferunt: quafi hæc una fo-ret aprilsimum inflrumentii reru indagini. Nec alia profecto de caufa Arcefilaus collum illud fuum columbinum

lis inuitalient quaim fobrios deceret, til fibi domus omnis agitari & fluctuare ac demum fabuerti uidebatur.ilii uero fenauigare fufpicantes, & mox naufragium facere
inclamantes, repentinti confiliam cepertit quale fibi fuggerebat ebrietas, ut influmentum omne domefticum, omnemig fapelle culem leuzada naufs gratia ex fenefiris & menianis abricerentae profunderent. Hine domus nuncupationem inuenit.
Sed iotre aliquis discerie, cedo, quorium ram longa tendit oratore de feliciet ut intelligastnon ita effe oculis habendam fide, ut quod tili nuntiarint, perfualum exploratume) protinus haberi opotreat. Dixeram tibi modo, hune cæfi ambitit, que tu ine
narrabiti celeriate uerti putas, hune fole, illa aftra, que tu uno circumactu rapi extfiimas, flare, fuisió nixa orbibus perpetua quiete perfusi. Hane uero tellurem, quam
tu fixam immoramig arbitrarias, (fi e entim te tuus afpechus fallum baber) neg confiflere, neg grandioribus elementis ticubare, ut multo maxima para mortalium putat. Quin e am effe, que incoparabili pernicitate acternoly anfiracia circumuerratur,
noach mortales cum tiplis domiculti acquiribus, montibus a ellunija imprudentes
a e noftræ conditionis ignaros rotecnon fecus acq olim pofteritati traditum accepe
rimus, C. Curionis the atrais duobus & temporaris & ex intellino opere confiructis

P. R. per fummam fecuritatem affediffe, fui periculi ignarii efficioribus nic cheatri, nune amphitheatri imagine pra le ferrent. Hoc idem
nobis quotidie cuenire folet, immo horis fingulis; ut torpentibus nobis aut certe aliud ageilbus in hac citima orbis plaga alia atqualia feceratura offerantur i quiefecte
mundo

In ijsergo, in quibus sensus parū officio suo desungi possunt, & uel certo aliquo obij ce impediuntur, aut locorum distantia circunscribuntur: nihil expedit magis ad explorandam ueritate, quam prouocare ad rationem, & argumenta scrutari, qua rei dubiæ sidem saciant. Est enim uetus illa inclamatio apud Platone in Gorgia, de dubiæ sidem saciant. Est enim uetus illa inclamatio apud Platone in Gorgia, de dubiæ sidem saciant. Est enim uetus illa inclamatio apud Platone in Gorgia, de dubiæ sidem saciant. Est enim uetus illa inclamatio apud Platone in Gorgia, de dubiæ sidem saciant. Est enim uetus illa inclamatio apud Platone philosophum non oculos sed metem intueri. Tecum ergo sic cogita. An non ea quæ supra lunam posita sunt & cælo sinitima, æterna sunt, immortalia, ab omni commutationis iniuria longe aliena. An no quæ citima sunt, mortalia, caduca, ad uicissitudines alternationes si semper expositat. & qualia Plato in Timæo scripsit semper sieri, esse nuquam. Sane si hæc sentetia ita recepta est, ut ab omnibus coprobetur, non uideo quomodo æternis illis immortalibus ac semper sibi constantibus possit motus conuenire: præsertim quom nihil aliud sit motus, quam mutatio & ex loco ad locum migratio. Nega

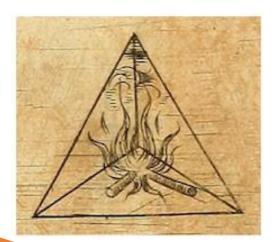
Calcagnini suggested to be led by reason and confirmed his attempts of proof showing the fallacy of the impressions due to the senses.

Talking about the Earth, Calcagnini quoted the calculations made by Eratosthenes to estimate the circumference of the Earth.

sionem, ad eam quam octava sphæram appellant præsertim relatam. Quantus enim eius sit ambitus, immesum est, & supra mortalem captū enuntiare, eam certe quom horis quatuor & uiginti suum spatium dicatur conficere, necesse erit supra millena centena passuum millia momentis singulis tranare: ut statis horis omne ansractum decurrat, & ueluti dimensum diurnū impleat. Quod posse sieri neg corporis quantumuis cocitati ratio, neg ipsa humani animi pernicitas, si modo per partes disterri intelligatur, persuaserit. Quicquid enim mouetur, priores semper partes excurrat, mox secudas, atq ita deinceps alias oportet, antequa ad meta & instituti cursus calcem attingat. Neq sane hoc loco Melissi more, instans & momenta excluserim: sed tanta orbis magnitudine, id quod rationi uehementer repugnat, euenire necesse est, utextremæ partes antè præterirent, quam primæ à carceribus promouissent. Est & hoc quidem in terræ uolutatione plenum admirationis: minus tamen habet miracu li, quòd terra ex coputatione Eratosthenis treceties quindecies centena millia passuum complectatur, ex quo sit ut horis singulis duodecies & amplius centena millia

lis facile dirimit, qualter motu affectibus, alter locali motu determinauerit. Ad hæc accedit illa quoq Pythagoreorum ratio, qua uniuerso aluantes aut inderso aluantes autinuersi turbinis imagine; quibus sane sora mis ad uolutatione peragendam nihil ineptius, nihil minus agitationi consentanes. Terram aute & si cubi, id est tessere, forma præsiniant, ob solidam compactamq: na turam: tame decedentibus angulis multo facilius circinari potest, & in mobile orbe concitati. nam quod paucissimas habet bases, hoc ocyssims esse geometrars etiam testimonio dijudicats est; quod & priscorum autoritas confirmat. Siquidem quod fa cile ac sponte sua illabitur, id magis uersatile tessera, hoc est, no aluantes autoritas autoritas autoritas confirmat. Siquidem quod fa cile ac sponte sua illabitur, id magis uersatile tessera, hoc est, no aluantes autoritas confirmat. Siquidem quod se cile ac sponte sua illabitur, id magis uersatile tessera, hoc est, no aluantes autoritas autoritas

Calcagnini made some references to the Pythagorean cosmological theory.



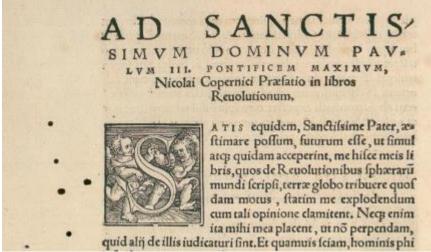
The Pythagoreans attributed the shape of a dodecahedron to the universe, and to fire that of a pyramid.



Heraclitus dixit, nech nostræ huicsententiæ desunt sua numina, suici adsertores. Nã & Archimedes Syracusanus recepit se terram architectonica arte alsum in locu de ducturum, si modo basem in quam transferretur inuenisset. Quam profecto sponsio nem nunquă uir grauissimus inijsset, nisi terră mobilem existimasset. Nicetas & ipse Archimedis popularis, cælum, solem, lună, stellas, supera denice omnia stare cen set; nech præter terră rem ullam in mundo moueri; que quom circum axem se summa celeritate conuertat & torqueat, eadem estici omnia, quæ si stante terra, cælum moueretur. Ates hoc etia Platonem in Timeo dicere quidam arbitrantur, sed paulo ob-

Hicetas of Syracuse stated that the earth, put at the center of the universe, moves around its axis along a circular trajectory, while the heaven, the sun, the moon, the stars and all the other superior things stand still.

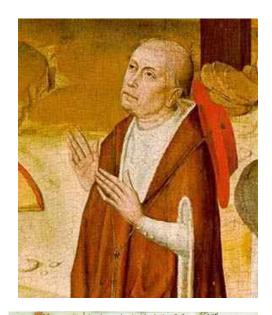




Mathemata profiterentur. Ac reperi quidem apud Ciceronem primum, Nicetum sensisse terram moueri. Postea & apud Plu

The ancients did not come to these truths because they lacked learned ignorance. But it is now clear to us that this Earth is really moving, even if we do not feel its movement.

De Docta Ignorantia, cap. XII



Nicolaus Cusanus (1401-1464)

Liber popuratus fri Viterbia de Enfra 1488°

Octorta Ignorantia

Joo amabile lieucend offine parte Die Juliano fande aplice fedes digniffino Caromali preprosi fuo metuedo

Threshie et veite ritarimit sus étams plant finui ingenus quot fils hor uchte ét, dum me as barbanss inspraes manune pande attèl po e es situeri en que fils hor uchte ét, dum me as barbanss inspraes manune pande attèl po e es situeris en quali tibs pur tuo Gravia Latius offices apub apisas (chen mpublins priaris negonis oramatifirmo alor oni fun mentra cernis quevous etta ad meti qui fortafis i epulfim notaria cernis quevous etta ad meti qui fortafis i epulfim notaria terni reguesa enta portis qui tub qual migrao fim ad dubu norifimi catie 5 ed her administo no qi pus toogati di truttinibu dume fimi anti tui fiteribi pata dum trufti fenfato in formado attigit di manti tui fiteribi pata que fenfato ettaria il tutti etta di mittire finuidata urbaca ila teta que fenfato en formado attigita di mitura finuidata urbaca il tutti que finuida en trataria ila teta puto administa, pres de plata facerdo deforta pueme.

Rata qual et fi mofina fir nos moue felena (Luamobac preptata ume po tua huantara alufo den he latiture espises et e quinamo un rebo duits tule dem tornaba modo futape que in labo mogens admodo giftifini fetar.

Quamo fare et imporare Capatulum permana.

uno fine ef amosase captularin permini unto mune obus investo naturale quodos deficiri intelle ospitativo ute sine maturale quodos descrit intelle ospitativo ute sine una captulari de quodos captulario intelle ospitativo ute si di captulario de intelle permitativo del poetita, cido ute su transato ponice proprie nature qualcon appetitus e e instanta ponice proprie nature qui esti si figuralise seus estiguir her examérerio esternir entre si superiori del matura del proprie del proprie proprie proprie uteriori esternir entre si superiori si contra si captulariori del attigi esteri applicatio del si superiori esternir del proprie del si superiori entre prima polici esta si superiori entre prima proprie del cata posteditati del si superiori entre si captulariori entre si captulariori entre si superiori entre si captulariori entre si captulariori

Calcagnini's paper draws its small strength from a long-held suspicion that the most obvious appearances of the movements of the largest bodies in the universe, captured from the narrow observation point of the Earth, are deceptive and illusory and that good reasons can be found not to rigorously demonstrate that all accepted points of view - those of stillness and movement - must be overturned, but at least to practice doing so.

[Bacchelli 2017]

#### Thanks for your attention