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Sixteenth Century Professors of Mathematics at the German University of Helmstedt

A Case Study on Renaissance Scholarly Work and Networks

SIXTEENTH CENTURY PROFESSORS OF MATHEMATICS AT THE GERMAN UNIVERSITY OF HELMSTEDT

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Pietro Daniel Omodeo

This paper investigates the research activity and the teaching of the professors of mathematics at the University of Helmstedt in the sixteenth century as well as their academic collaboration in Germany and abroad.[1] It moreover aims to evaluate the meaning of their work and networks for the development of early modern science, in particular astronomy. In order to obtain this overview, I (1.) briefly introduce the University of Helmstedt in its specificity, focusing on the chairs of mathematics. (2.) I consider in detail who the professors were who held the chairs of mathematics, what their education, scientific activity, publications and teaching were, and who the scholars were with whom they collaborated. Finally, (3.) I provide an outline of the academic network of Helmstedt mathematicians. This case study is part of a wider project on the mathematical research and teaching in early modern German universities and on the (national and international) networks of mathematicians (or scholars of disciplines related to mathematics, like cosmology, physics and natural philosophy).

A preliminary note on the sources of this overview

Documents concerning professors at the University of Helmstedt are preserved in the archive *Niedersächsisches Staatsarchiv Wolfenbüttel* under the signature 37 Alt. Further documents relative to academic curricula and lectures (the so-called *ordines lectionum*) are preserved partly in the *Herzog August Library* of Wolfenbüttel and partly in the *Hauptstaatsarchiv* of Hannover. They are now accessible on the web-site of the *Herzog August Library* dedicated to the history of the University of Helmstedt: http://uni-helmstedt.hab.de (4 Nov. 2010).

Significant secondary sources on the mathematicians of Helmstedt are: the memoirs (*Mathematicorum Memoriae*) on this issue written in the eigtheenth century by the philosopher and mathematician Johann Nikolaus Frobes (1701-1756), vol. 1 and 2 (1746 and 1747); the bio-bibliographical sections on the professors of the University of Helmstedt in Paul Zimmermann's *Album Academiae Helmstediensis*, vol. 1 (1926); and Sabine Ahrens's entries in her lexicon on the professors of Helmstedt, *Die Lehrkräfte der Universität Helmstedt (1576-1810)*, published in 2004.

For those professors who held a chair of medicine after that of mathematics, information can be derived also from Michaela Triebs's relatively recent *Die Medizinische Fakultät der Universität Helmstedt* (1995) as well as from the more dated memoirs by Iustus Christophorus Böhmer on the Helmstedt professors of medicine, *Memoriae professorum helmstadiensium in medicorum ordine* (1719).

1 This research was accomplished in Wolfenbüttel and Berlin with the support of fellowships from the *Herzog August Library* and the *Max Planck Institute for the History of Science Berlin* in 2010. Part of this research was presented in a talk delivered at the 4th International Conference of the European Society for the History of Science (Barcelona, 18-20 November 2010) and will appear in the proceedings. I am thankful to Professor Gerd Biegel and Professor Thomas Sonar of the Technical University of Braunschweig who encouraged my research on Renaissance science in Helmstedt. Last summer, I had the pleasure to organize with them a workshop on Magnus Pegel: „*Schatzkästlein auserwählter Dinge". Der erste Mathematiker der welfischen Landesuniversität Helmstedt: Magnus Pegel (1547-1618) und die Zukunftsvisionen des 16. Jahrhunderts* (Braunschweig, 27 June 2010).

For a general introduction to the study of the University of Helmstedt, the standard reference work is now the volume edited by Jens Bruning and Ulrike Gleixner following the exhibition "Das Athen der Welfen," which was organized at the *Herzog August Library* of Wolfenbüttel in 2010. A significant contribution to the reconstruction of the international network of the University of Helmstedt is Rolf Volkmann's booklet *Academia Julia. Die Universität Helmstedt (1576-1810*) which appeared in 2000.

(1.) The Academia Iulia Helmstediensis and the teaching of mathematics

The University of Helmstedt was founded in 1576 as the *Academia Iulia Helmstediensis* by Duke Julius of Braunschweig (1528-1589) in order to consolidate the Reformation which he had introduced into his realm (a decision which was in contrast with the policy of his father Heinrich der Jüngere (1489-1568) who had been a strenuous defender of Catholicism). In fact, Julius considered the university to be a powerful means to forge a new class of Lutheran theologians and administrators. One of the principal authors of the statutes of the new university was in fact the learned theologian David Chyträus (1531-1600). He was a professor at Rostock who endorsed Philipp Melanchthon's cultural program and thus organized the new university following the models of Wittenberg and Rostock. In particular, the curriculum was inspired by the so-called 'German late humanism,' or *deutscher Späthumanismus*.[2]

The University flourished especially after Duke Heinrich Julius (1564-1613) succeeded his father in 1589. Thanks to his patronage and his renown as a learned man, he attracted to Helmstedt some leading exponents of the humanist culture, science and philosophy of the time: the man of letters Johannes Caselius (1533-1613) in 1590, the mathematician Duncan Liddel in 1591 and the logician Cornelius Martini (1568-1621) in 1591. Moreover, the Renaissance philosopher Giordano Bruno resided in Helmstedt as a member of the university and a protégé of the Dukes from January 1589 until April 1590. It should be noted that these people were foreigners (or of direct foreign origins): as Caselius's family came from the Netherlands, Liddel came from Aberdeen, Martini from Antwerp, and Bruno from Nola by Naples. Duke Heinrich Julius himself was open to foreign cultural influences: among other things, he established at his court in Wolfenbüttel a company of English actors,[3] he personally visited the Danish astronomer Tycho Brahe at his observatory-castle on the island of Hven,[4] and resided at the magnificent court of Emperor Rudolph II in Prague from 1607 until his death in 1613, that is, when Kepler was imperial mathematician there.[5]

Following Melanchton's *ordo studiorum*,[6] the University of Helmstedt attached great importance to mathematics. Two chairs of the philosophical faculty were devoted to the teaching of mathematics, at least at the beginning. They were divided into a lower (or elementary) class and a higher: the first one mainly covered arithmetic, Euclidean geometry and spherical astronomy, whereas the second mainly included trigonometry, planetary theory and celestial computation.[7] This partition was not

2 Cf. Volkmann, *Academia Julia*, 16.
3 Friedenthal, *Herzog Heinrich Julius*.
4 Cf. Gassendi, *Opera*, V, 468. See also Thoren, *Lord of Uraniborg*, 335-6, and Christianson, *On Tycho's Island*, 140-1.
5 Lietzmann, *Herzog Heinrich Julius*.
6 Cf. Kathe, *Die Wittenberger philosophische Fakultät*, II, "Reformation und protestantische Humanismus 1517-1560".
7 According to Frobes, *Memoriae*, vol. 2 (1747), XXI, the partition of higher and lower mathematics was the following (rather imprecise though): "Nostis, auditores, bina ista, quibus academiae gavisae olim sunt, hodienumque passim gaudent, mathematicorum officia ita communiter divisa esse, ut *inferiorum mathematum, sive elementorum professor* arithmeticam practicam, geometriam elementarem, et primam eamdemque velut sensualem atque imaginariam astronomiae partem, quae sphaerica dicitur, tanquam prima matheseos elementa; *mathematum* vero *superiorum* professor sublimiores matheseos doctrinas, analysin puta sive algebram, geometricam item de lineis curvis et sectionibus conicis doctrinam, et alteram denique sive intellectualem astronomiae partem, quae theorica, seu planetarum theoria vocatur, publicis lectionibus exponat."

kept very strictly, as the extant syllabi or *ordines lectionum* witness. The following table sums up all available information on the lectures of the first professors of mathematics during the half century after the opening of the University:[8]

Semester[9]	**Lower mathematics**	**Higher mathematics**
1581 A	(Prof. Pegel) -**Geometrica** ex Euclide -**Astronomica** ex Cornelio Valerio	(Prof. Hofmann) -**Arithmetica** Frisii -**Theoriae planetarum** -Doctrina triangulorum
1582 A	vacant	-Elementa **geometriae** Euclideae -Precepta **arithmetices** Gemmae Frisii -Doctrina **secundorum mobilium** eorundemque usum in *Tabulis Prutenicis*
1587 B	(Prof. Parcovius) -**Arithmetica** vulgaris Gemmae Frisii -**Cosmographia** Honteri	-**Secundorum mobilium** theoria -**Doctrina triangulorum** planorum et sphaericorum -Praecepta arithmeticae cossicae
1594 B	(Prof. Menz) -**Geometriae** tractatus -**Arithmetici** libelli -Ratio conscribendi **calendaria** anniversaria de syderum motibus atque congressibus -Doctrina **sphaerica** e libello Ioannis de Sacrobusto	(Prof. Liddel) -Geometriae fundamenta figurarum usum et **geodesiam** una cum **triangulorum** doctrina -Theoriae **coelestium motuum** iuxta triplicem hypothesin una cum tabularum tum Alphonsinarum quam Prutenicarum explicatione
1595 B	-**Sphaericae** doctrinae elementa -Anniversaria **calendaria** -**Arithmetica** Gemmae Frisius	-Theoriae **coelestium motuum** iuxta triplicem hypothesin, una cum tabulis Alphonsinis et Prutenicis -*Quadripartitum* Ptolomei -*Tabulae Directionum*
1597 A	-De primo motu doctrina **sphaerica** -Rationes geometrice investigandi insignorum urbium, insularum et regionum intercapedines ex tabulis sinuum rectorum sive semichordarum -**Arithmetica** Gemmae Frisii	-Secundum et tertius liber Pomponii Melae una cum historia et descriptione regionum secundum recentiores -*Quadripartitum* Ptolemei et *Tabulae Directionum*.
1599 A	-Doctrina **Sphaerica** -Tractatus de **Iudiciis** ecclipsium et cometarum -**Arithmetica** practica	-Doctrina sinuum et **triangulorum** -**Theoriae planetarum**, secundum hypothesin Ptolomaei et Copernici, et illam Mundani systematis hypothesin, quam describit Tycho Brahe, lib. 2 De aethereis phaenomenis -praecepta **calculi** Alphonsini, et Prutenici,

8 Here and in the following information about lectures is derived from: http://uni-helmstedt.hab.de (7 Nov. 2010)

9 The capital letter A indicates the summer semester (from Eastern to S. Michael, in September) and B the winter semester (from S. Michael to Eastern). I am very thankful to Dr Jens Bruning and Mrs Franziska Jüttner, who are presently working at a project of the Herzog August Library on the history of the University of Helmstedt and are preparing the corresponding web-site, for helping me to trace the documents from which the information of this table is derived.

		ac praeterea supputatione apparentiarum coelestium in singuliis theoriis, ex observationibus Ptolemaei et Copernici, per doctrinam triangulorum
1600 B	-Tractatus quadripartitus -Quaestiones **sphaericae** Hartmanni Beieri -Doctrina de **calendariis** anniversariis conscribendis et prognosticis astrologicis subinde attexendis	vacant
1602 B	-Elementa mathematicis -**Arithmetices** practices (Gemma Frisius) -**Sphaera** a Iohanne de Sacrobusto conscripta	(Prof. Schaper) -Doctrina **secundorum mobilium**, iuxta hypotheses Copernici et Alphonsinorum
1603 B	-De **Sphaera** libellum -De tempestatibus praecognoscendis regulas **astrologicas** -**Arithmetica** practica -**Computus ecclesiasticus** Iohannis de Sacrobusto	-**Geographica** -Priores **Euclidi** libri
1604 B	-**Arithmetica** -**Sphaericum** libellum D. Casparis Peuceri de circulis coelestibus et primo motu	-**Euclidis** -Pomponius Mela de situ orbis
1613 B	vacant	-**Doctrina planetarum** iuxta Alfonsinos et Copernicum
1620 A		-Doctrina **Sphaerica** seu motus coeli primi
1623 A		-Regulae **arithmeticae** practicae vulgares -Doctrina primi mobilis
1625 A		-Doctrina primi mobilis seu **sphaerica**

From this overview, however incomplete it is due to the lack of documents relative to many semesters, it is possible to trace some relevant features of the *curriculum studiorum* at Helmstedt. Programs show a certain continuity over the years: Euclidean geometry, spherical astronomy and arithmetic in the introductory class, and trigonometry, planetary theory and astronomical computation in the higher. It should be remarked that geography also was part of the regular curriculum of mathematics. Some professors (Mencius and Liddel) taught astrology and calendar computation. Hofmann offered lectures on algebra. Beginning in 1594, thanks to Professor Liddel, Copernicus's planetary hypotheses were presented to students along with the traditional Ptolemaic system (and, in the case of Liddel, also the geo-heliocentic system of Tycho Brahe).

The following two tables sums the subjects of the classes and the textbooks mentioned in the syllabi:

Classes:

Semester	**2nd chair in mathematics**	**1st chair in mathematics**

1581 A	-Geometry -Sphere (Spherical astronomy)	-Arithmetic -Planetary theory -Trigonometry
1582 A	...	-Geometry -Arithmetic -Planetary theory
1587 B	-Arithmetic -Geography	-Planetary theory -Trigonometry -Algebra
1594 B	-Geometry -Arithmetic -Calendar and astrology (?) -Sphere	-Trigonometry and topography -Planetary theory
1595 B	-Sphere -Calendar -Arithmetic	-Planetary theory -Astrology -Trigonometry
1597 A	-Sphere -Geography and topography -Arithmetic	-Geography -Astrology -Trigonometry
1599 A	-Sphere -Astrology -Arithmetic	-Trigonometry -Planetary theory -Astronomical computation
1600 B	-Astrology -Sphere -Calendar -Astrology	...
1602 B	-Geometry (?) -Arithmetic -Sphere	-Planetary theory
1603 B	-Sphere -Astrology -Arithmetic -Calendar	-Geography -Geometry
1604 B	-Arithmetic -Sphere	-Geometry -Geography
1613 B	...	-Planetary theory
1620 A		-Sphere
1623 A		-Arithmetic -Sphere
1625 A		-Sphere

Textbooks:

Author/Textbook	**Semester**
Euclid, *Elements*	1581A, 1582A, 1603B, 1604B

Gemma Frisius, *Practical Arithmetic*	1581A, 1582A, 1587B, 1595B, 1597A, 1599A, 1602B, 1603B
Sacrobosco, *Sphere*	1594B, 1602B
Sacrobosco, *Computus ecclesiasticus*	1603B
Ptolemy, *Quadripartitum*	1595B, 1597A, 1600B,
Pomponius Mela, *Chorography*	1597A, 1604B
Alfonsine Tables	1594B, 1595B, 1599A, 1602B, 1613B
Reinhold, *Prussian tables*	1582A, 1594B, 1595B, 1599A, 1602B?, 1613B?
Regiomontanus, *Tabulae directionum*	1595B, 1597A
Valerius, *Physica*	1581A
Brahe, *De mundi aetherei recentioribus phaenomenis*	1599A
Copernicus, *De revolutionibus?*	1599A?
Peucer, *De circulibus coelestibus et motu primo*	1604B
Beyer, *Quaestiones in libellum de sphaera*	1600B
Honter, *Rudimenta cosmographica*	1587 B

To summarize, Helmstedt professors lectured on several standard works from antiquity and the Middle Ages: Euclid's *Elements* for geometry, Sacrobosco's *Sphere* for spherical astronomy, Ptolemy's *Tetrabiblos* for astrology and Pomponius Mela's *Chorography* for geography. Exercises of astronomical computations relied upon the *Alfonsine Tables* as well as the 'Copernican' *Prussian Tables* (*Prutenicae tabulae*) of the Wittenberg professor Erasmus Reinhold (1570-1625). Among sixteenth century textbooks, the *Arithmetic* (*Arithmeticae practicae methodus facilis*) of the Flemish mathematician, geographer and instrument maker Reiner Gemma Frisius (1508-1555), professor at Louvain, was used uninterruptedly. The textbook of astronomy employed in the summer class of 1581 refers to a work of the Louvain professor at the Trilingual College Cornelius Valerius (1512-1578), perhaps his *Physica seu de natura philosophiae institutio* (Antwerp 1572) which contains a traditional, that is, Aristotelian, description of the cosmos, celestial spheres, elements and meteorological phenomena. Apart from Reinhold's *Prussian Tables*, other works stemming from the Wittenberg academic milieu are the commentary on Sacrobosco, *Quaestiones in libellum de sphaera Ioannis de Sacrobusto*, of the theologian and mathematician Hartmann Beyer (1516-1577) and the *Elementa doctrinae de circulis coelestibus et primo motu* of the Wittenberg theologian and professor of mathematics Kaspar Peucer (1525-1602). The book on geography for the winter semester 1587 is plausibly the *Rudimenta cosmographica* of the fervent Lutheran Johannes Honter of Transylvania. Professor Liddel's lectures are apparently the most ambitious, as he lectured on advanced scientific books: Tycho Brahe's *De mundi aetherei recentioribus phaenomenis* (Uraniborg, 1588) for planetary theory and Johannes Regiomontanus's *Tabulae directionum* for trigonometry. It is also plausible that he used Copernicus's *De revolutionibus orbium coelestium*, of which he owned two copies,[10] to introduce the heliocentric hypothesis, as announced in the syllabi. Even relative to geography, he sought to integrate classical and modern sources, as he lectured on Pomponius Mela as well as on "histories and descriptions of lands according to the most recent [explorers]" (*historia et descriptione regionum secundum recentiores*). One can assume that he employed a book like Simon Grynaeus's *Novus orbis*, a collection of reports on Western as well as

10 Gingerich, *Annotated Census*, 264-7.

Oriental countries.

(2.) Helmstedt mathematicians

Here an overview follows of the first professors who occupied the chairs of lower and higher mathematics in the first years of the University of Helmstedt.

Year	**Chair of lower mathematics**	**Chair of superior mathematics**
1575	**1.** Magnus **Pegelius**	
1576		**2.** Erhardus **Hofmannus** up to his death (1593)
1581	Pegel abandons Helmstedt	
1582	Hofmann holds both chairs?	
1586	**3.** (3 October) Franciscus **Parcovius**	[John **Johnston**'s astronomical disputations]
1590	Parcovius moves to the Faculty of Medicine	[Giordano **Bruno** at Helmstedt, January 1589-April 1590]
1591	**4.** (24 July 1591) Duncan **Liddel**	
1593	**5.** Simon **Mencius**, already professor of Latin (dies in 1606)	Duncan Liddel up to 1600
1601		**6.** Heinrich **Schaper**
1606	vacant (Schaper both chairs?)	
1629		(October) Schaper's death

From 1576 up to 1629, six professors taught mathematics at the University of Helmstedt: (**a.**) Magnus Pegel, (**b.**) Erhard Hofmann, (**c.**) Franz Parcovius, (**d.**) Duncan Liddel, (**e.**) Simon Menz and (**f.**) Heinrich Schaper.

(a.) *Magnus Pegel* *(Rostock 1547-Stettin? 1618?):*

Short Biography: Son of the mathematician Konrad Pegel (1487-1567), Magnus was born in Rostock and studied in his hometown where he graduated in 1569. He was appointed at the University of Rostock as a professor beginning in 1572. Thanks to the support of his father-in-law David Chyträus and, perhaps, of Brucaeus, he was appointed at Helmstedt as a professor of mathematics already in 1575, that is, a year before its opening. He lectured geometry from Euclid's *Elements* and the basics of astronomy from the *Sphere* of Sacrobosco[11] or, more probably, from the

11 According to Frobes, *Memoriae*, I, 12, Pegel lectured in 1578 on Euclid's *Elements* and Proclus's *Sphere*, "seu prima geometriae atque astronomiae principia". This information integrates those on the lectures and the textbooks resumed in the above tables, as the *ordum studiorum* for the semesters of the year 1578 are presently lost and Frobes could have relied on documents of which we do not dispose anymore.

textbooks of the Flemish scholar Cornelius Valerius.[12] In 1581, he was dismissed for his dissipated behavior (very likely connected to alcohol abuse). Duke Julius wanted to keep him in Wolfenbüttel as a court mathematician, perhaps to benefit from his technical competencies, but Pegel preferred to return to his hometown. Back in Rostock, he took a degree in medicine and maybe worked for a while as a physician. In 1591, he became a professor of mathematics at Rostock and taught there until 1605 when he was dismissed, possibly also on account of his natural and cosmological views. He fled to Prague where he stayed at the court of Rudolph II until the Emperor's death in 1612. It is possible that he later moved to Stettin to reside under Duke Philip of Pomerania, where he could have died around 1618.[13] From his writings, we know that he was familiar with the Landgraves Wilhelm IV and Moritz of Hessen-Kassel, who were generous patrons of astronomy, and their instrument builder Jost Bürgi.[14] Pegel reported also that he visited Brahe whom he admired for his astronomical instruments and data recording but not for his geo-heliocentric cosmology which he, in fact, rejected.[15] He also sojourned at some point in Florence where he accomplished some stellar observations in order to compare the latitude of the Italian town with that of Rostock and measure the Earth's radius.[16]

Work and Views: Three publications of Pegel are still extant: *Universi seu mundi diatyposis* (Rostock, 1586) and *Aphorismi thesium selectarum de corporibus mundi totius primariis* (Rostock, 1605), both of which tackle astronomy and natural philosophy, and *Thesaurus rerum selectarum* (Rostock, 1604), which presents medical and technical inventions as well as considerations on jurisprudence. These publications reveal an extraordinary technical fantasy and very original natural views. Among the inventions presented in the *Thesaurus*, a work dedicated to the Emperor Rudolph II, some are quite ambitious and surprising, for instance the project of a submarine (*navigium submarinum sive subaquaeum singulare*), the feasibility of which is however quite difficult to believe. His most innovative philosophical and cosmological theses are: the cosmos is a finite sphere included in infinite space; the material spheres deputed, according to traditional cosmology, to transport planets, do not exist; the sky is homogenous, and constituted of air; all celestial bodies (stars, planets and comets) are made out of the same elements; stars and planets are alive; astronomy would do better without mathematical hypotheses because physical explanations should be preferred to mathematical ones. Moreover, Pegel supported the Capellan planetary system, according to which the inferior planets, Mercury and Venus, encircle the Sun. He also reassessed the possibility of physical vacuum, surprisingly identifying it with absolute space (*locus sine corpore*) and a vitalistic principle.[17] All of these theses are revealing of a radically anti-Aristotelian world view that has elements in common with Bruno's speculations (anti-Aristotelianism, vitalism, physical vacuum, principle of cosmological homogeneity, and space infinity) and Tycho Brahe (the fluidity of heaven and, to some extent, geo-heliocentrism). Additionally, the requirement of an astronomy *sine hypotheses* can be traced back to the French philosopher Pierre de la Ramée (*Ramus*, 1515-1572), who rejected the traditional mathematical approach to astronomy.[18] The publication of the *Universi seu mundi diatyposis* aroused immediate and negative reactions by some scholars at Helmstedt, as witnessed by the fact that in 1586 the Scottish *magister* John Johnston

12 *Ordo Lectionum* 1581: "M. Magnus Pegelius geometrica ex Euclide, Astronomica vero ex Cornelio Valerio hora octava proponit."
13 Cf. Hofmeister, "Conrad und Magnus Pegel," and Biegel, "Pegel."
14 Pegel, *Thesaurus*, 73-4.
15 *Ibid.*, 75-6.
16 Pegel, *Aphorismi*, ff. B1*r-v*: "Globi terreni circuitus integer seu circumferentia maxima 5400 miliaria germanica circiter complectitur […]. [tesi 45] Quod sic satis verum esse […] ego quoque Florentiis in Italia, utcumque quantum occasio tulit observatione deprehendi, latitudiem illius cum Rostochiana ex locorum inprimis hinc inde collata et in directum conformata intercapedine conferens. Intervalla enim locorum duorum remotiorum, et non multum ab eodem meridiano dissitorum convenienter assumuntur."
17 For a detailed analysis of Pegel's natural views see Omodeo, "Disputazioni."
18 See Jardine and Segonds, "Challange."

held two disputations in favor of the cosmology of Aristotle and fundamental concepts of the latter's physics (space, time and the untenability of physical void), which are apparently directed against Pegel's theses on spacial homogeneity, vacuum, and partial geo-heliocentrism.[19]

Connections: Rostock (education through Konrad Pegel, David Chyträus and Brucaeus); Hven (Brahe); Kassel (Wilhelm IV and Moritz of Hessen-Kassel, and Bürgi); Hven (Brahe); Florence; Prague; Stettin.

(b.) ***Erhard Hofmann*** *(Heidingsfeld, Unterfranken 1544-Wolfsburg 1593):*

Short Biography: Hofmann received his education at the University of Jena where he held private lectures as an adjunct professor of the philosophical faculty. In 1576, he was appointed as a professor of higher mathematics at the just opened University of Helmstedt. He taught there until his death in 1593.[20]

Work and Views: Hofmann published little. A still extant *Practica deutsch, auff das Jar... 1571* bears witness to his interest for astrology. In the eighteenth century, Frobes could only trace a disputation by Hofmann on spherical bodies of 1584, now lost.[21] In Helmstedt, he lectured on arithmetic from a textbook of the Flemish mathematician Reiner Gemma Frisius (1508-1555) and geometry from Euclid. For planetary theory (*doctrina secundorum mobilium*) he could have relied on the *Theoricae novae planetarum* of the German astronomer Georg Peurbach (1423-1461). He also gave classes on plane and spherical trigonometry (*doctrina triangulorum planorum et sphaericorum*) and on algebra (*arithmetica cossica*). According to Caselius's funeral oration in his honor (1593), he maintained a very friendly relationship with his colleague Duncal Liddel, with whom he discussed mathematical issues. From the same source, we know that Hofmann was particularly interested in algebra and in the so-called 'mixed' mathematical disciplines (*mixtae physica mathematicae*), which use mathematics to understand natural and not merely rational entities, like astronomy and optics. Moreover, he was a skillful producer of measurement instruments and mechanical tools.[22] This last information is confirmed by Ernst Zinner, who, in his extensive catalog of German and Dutch astronomical instruments, points at Hofmann's drawings of a heavenly globe printed in Jena in 1570.[23]

Connections: Jena (education)

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19 Omodeo, "Disputazioni."

20 Zinner, *Astronomische Instrumente*, 386, mistakenly confuses the biography of Erhard Hofmann with that of the instrument maker Heinrich Hofmann who worked in Marburg and Jena and died there in 1652. The correct date of E. Hofmann's death is 1593, precisely 18 March. This can be ascertained through consideration of two commemorative talks: one delivered by Pastor Gregor Marpach, *Concio funebris*, and one by Hofmann's collegue, the Helmstedt professor of humanities Johannes Caselius, *Elogium*.

21 Frobes, *Memoriae*, I, 20-1: "Scriptorum eius nihil usque huc impetrare potui, praeter unicam *dissertationem*, qua *theses quaedam geometricae de dimensione corporis sphaerici* continentur, Iona Latomo quodam respondente, anno seculi XVI octuagesimo quarto publice ventilatam."

22 Caselius, *Elogium*, f. A4*r*: "[...] in omni matheseos parte minime vulgariter ab adolescentulo versatus fuerat, ac primum in ipsis fontibus. Nam in geometricis demonstrationibus documenta multa dedit: quod ad arithmeticen, non solum in illa vulgari expeditus, sed multo magis in omnium abditissima schematistica, quae cossica vulgo dicitur, occupatus fuit. Ita praeterea versatus in mixtis physica mathematicis, astronomica, logistica, optica, ut nihil omnium ignoraret, quae in excellentissimo mathematico desiderari poterant: in locorum dimensionibus et in mechanicis instrumentis conficiendis summos artifices aequabat. Itaque ipsum etiam collega Duncanus Liddelius Scotus, qui ipse nulla parte philosophiae neglecta, in iisdem discipline longe excellit, pro artifice semper habuit, et hodie apud omnes clare voce praedicat. Postquam enim Duncanus huc ad docendum venit, de multis et singularibus saepe communicarunt."

23 Zinner, *Astronomische Instrumente*, 386: "Holzschnitte mit Segmenten einer Himmelskugel. Jena 1570."

(c.) ***Franz Parcovius*** *(Rostock 1560-Helmstedt 1611):*

Short Biography: Parcovius received his master's degree from Rostock, University in his home town. He was closely tied to Johannes Caselius, Heinrich Brucäus and the Melanchthonian humanist Nathan Chyträus (1543-1598), brother of the better-known David. The latter introduced him to mathematics and medicine and supported his candidacy for the position of professor of lower mathematics at Helmstedt. Accordingly, he was appointed after Pegel in 1586. In 1590, he graduated in medicine and left the teaching of mathematics for that of medicine. His competence in this field was so much appreciated, that he became ducal physician to Heinrich Julius.

Work and Views: Many writings of Parcovius are still extant, but they all concern medical issues (at least those which have been cataloged). It is therefore impossible, at the present state of the research, to say much about his activity as a mathematician. His lectures were in fact elementary: in 1587, he lectured from the 'vulgar' arithmetic of Gemma Frisius (*arithmetica vulgaris Gemmae Frisii*) and from Honter's *Cosmography* (plausibly the *Rudimenta cosmographica*).

Connections: Rostock (Nathan Chyträus, Johannes Caselius, Heinrich Brucäus)

(d.) ***Duncan Liddel*** *(Aberdeen, Scotland 1561-1613):*

Short Biography: Scottish mathematician and physician. Much information about his life can be derived from a letter (Helmstedt, 1 May 1607) of Johannes Caselius to the Scottish mathematician and court physician to King James VI of Scotland and I of England. Liddel left Scotland to study in Europe. He sailed to Danzig and reached Frankfurt on Oder, at which University he matriculated. He attended the classes of Craig, who was at that time professor there. Liddel was then in Breslau, where he entered the humanist and scientific circle of the Italo-Hungarian man of letters Andreas Dudith-Sbardellati (1533-1589) and the physician Crato von Krafftheim (1519-1585). There, he studied mathematics under Paul Wittich (c. 1546-1586), one of the most highly thought of German mathematicians of the time, who strongly influenced Brahe on his way to the invention of the geo-heliocentric planetary model.[24] Liddel then returned to Frankfurt on Oder (1582-1583) to study medicine and teach mathematics and philosophy. He subsequently headed to Rostock (beginning in 1585), at which University he was warmly welcomed by Heinrich Brucaeus, and met Caselius, who would later invite him to Helmstedt. In this period, Liddel visited Brahe on Hven (in 1587) and became familiar with the research projects accomplished at the latter's observatory. Caselius reports that Liddel already in Rostock taught Copernicus's planetary hypotheses along with the Ptolemaic and the Tychonic and that it was the first time that such doctrines were taught together at a German university.[25] This information about Liddel's lectures of astronomy is confirmed by a letter of a student of his, Daniel Cremer, who attended the courses of mathematics in 1588 and 1589 (*Docuit Duncanus Liddelius Scotus in Academia Rostochiana Mathemata, quando ego auditor fui anno 88 et sequenti*): in his classes, the professor taught planetary theory (or the doctrine of 'second motions') according to Ptolemy (the 'followers of Alfonso X of Castilla' are explicitly indicated), Copernicus and the 'third new' hypothesis, that is, geo-helicentrism (*prima [hypothesis] Alphonsinorum, secunda Copernici, et alia tertia nova*).[26]

Liddel came to Helmstedt on Caselius's advice. In a letter of recommendation to the Academic Senate preserved in the *Niedersächsisches Staatsarchiv Wolfenbüttel*, Caselius (on 1 January 1591)

24 Gingerich and Westman: "Wittich Connection."

25 Caslius, *Epistola ad Cragio,* f. †4*r*: "Rostochii quidem noster hic universam prope disciplinam plus una vice tradidit: sed quod iam sciam, primus in Germania, θεορίας motuum coelestium simul secundum Ptolemaei et Copernici hypothesin docuit: neque non singulorum planetarum theorias adiuxit, secundum tertiam hypothesin, cuius Διατύποσις libro de aetheriis phaenomenis proponit Tycho."

26 Daniel Cramer to Rosenkrantz (Stettin, 31 March 1598), in Brahe, *Opera*, VIII, 37-43.

emphasized Liddel's mathematical expertise and stressed his close connection to Brucaeus and the acquaintance with Brahe.[27] At Helmstedt, according to Caselius's report and the extant *ordines lectionum*, Liddel continued to teach the three concurring hypotheses on the planetary system. This is also confirmed by a note of Brahe on Liddel's teaching program in 1599.[28] The Danish astronomer was suspicious of him, and even accused him of plagiarizing the geo-heliocentric hypotheses without duly acknowledging his authorship.[29] Apart from this quarrel, Liddel was also involved, along with Caselius, Martini and the professor of Aristotelian philosophy Owen Günther (1532-1615) in a quarrel concerning the dignity of philosophy which burst out between 1598 and 1601, after the professor of theology Daniel Hofmann (1538-1611) accused philosophers of being the fathers of all heresies. The polemic, known as the '*Hofmannstreit*,' ended with the success of the professors of the philosophical faculty against the intransigent theologian, also thanks to the intervention of professors at the University of Rostock and Duke Heinrich Julius.[30] Liddel stayed in Helmstedt until 1607, when he returned to Aberdeen with his mathematical books, among which were two copies of *De revolutionibus* and a rare handwritten copy of Copernicus's *Commentariolus.*[31] He endowed the local University with a fund for the support of poor scholars in 1612 and the Marischal College with a chair of mathematics in 1613.

Work and Views: Liddel was very diligent in publishing his medical writings, for instance a collection of his numerous medical disputations, *Disputationes medicinales* (Helmstedt 1605), and an *Ars medica* (Hamburg 1607). By contrast, his mathematical writings are very rare. Still, two disputations by him are preserved in Wolfenbüttel: *Propositiones astronomicae de dierum et annorum differentiis et caussis* (Helmstedt 1591), and *De philosophia eiusque instrumentis* (Helmstedt 1592).[32] The latter was defended by Cornelius Martini, professor-to-be at Helmstedt, and a close friend of Liddel who reintroduced the teaching of Aristotle's *Metaphysics* in a Lutheran university and was a fervent supporter of Aristotelian logic against Ramism. The disputation *De philosophia* is revealing of Liddel's philosophical conception of mathematics, which he regarded as one of the three speculative disciplines together with metaphysics and physics. The corollaries (*coronides*) to the theses are a refutation of Ramism. In particular, the fourth corollary rejects De la Ramée's requirement of an astronomy 'without hypotheses' (*Sublatis hypothesibus, quibus salvantur et explicantur motus coelestes, nulla poterit esse Astronomia, ut Petrus Ramus voluit*) a program which, by contrast, had been embraced by the former professor of lower mathematics, Pegel. Liddel was also the author of a lost introduction to mathematics, titled *Parerga mathematica* (Helmstedt, 1595), mentioned by Brahe in a letter to Cramer in which the Danish astronomer protested, with quite rude expressions, that Liddel did not acknowledge his authorship of geo-heliocentrism.[33] Concerning Liddel's opinion on cosmology, very little can be said: he was probably

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27 *Nidersächsisches Staatsarchiv Wolfenbüttel*, 37 Alt 379, *Acta M. Duncani Liddelii*, Caselius's letter to the Academic Senate of Helmstedt (1 January 1591): "Novimus autem Duncanus probum virum et modestum acris ingenij et dextris iudicij, in omnibus partibus bonae doctrinae a puero cum Summa diligentia versatum logicum et physicum praestantem, et eximium imprimis mathematum quem ipse μαθηματκώτατος et vir integerrimus D. Henricus Brucaeus cum summis artificibus comparat et ingenue profitetur, se et eius consuetudine quoque profecisse. Meminj enim eos de hypothesibus Copernici multos menses inter se conferre. Contulit etiam Duncanus de subtilissimis quibusque in mathesj cum mathematicorum nostri saeculi principe Tychone Braha."

28 Brahe to Cramer (16/26 September 1599), in Brahe, *Opera*, VIII, 184-7: "Duncanus Liddelius Scotus D. publice proponit doctrinam sinuum et triangulorum, qua absoluta, aggreditur theorias Planetarum, secundum hypothesin Ptolemaei et Copernici et illam mundani systematis hypothesin, quam describit Tycho Brahe lib. 2 de aethereis Phaenomenis ."

29 Cf. Schofield, *World Systems*.

30 Friedrich, *Die Grenzen der Vernunft.*

31 Gingerich, *Annotated Census*, 264-7. See also: Dobrzycki, "Aberdeen Copy" and Dobrzycki and Szczucki, "Transmission."

32 A manuscript eulogy of mathematics by Liddel will be the subject of a further study.

33 Brahe, *Opera*, VIII, Brahe's letter to Cramer (16/26 September 1599), 184-7, 185: "Ista iste, egregia sane et honestissima de me mentio, imo vulpecula potius dolus; cum enim sibi conscius sit, se meas hypotheses sibi apud alios

a crypto-Copernican. To his classes he presented the heliocentric hypothesis from a mathematical point of view, that is, with no open commitment relative to its physical reality, as shown by the fact that he taught the Copernican system along with the concurring models of Ptolemy and Brahe. Nonetheless, from Cramer, we know that he was inclined to accept heliocentrism also from a physical point of view and objected the physical tenability of Brahe's model.[34]

Connections: Aberdeen, Frankfurt on Oder, Breslau (Dudith, Crato, Wittich), Rostock (Brucaeus), Denmark (Brahe), Hamburg (printing of the *Ars medica*), Edinburgh and London (Craig).

(e.) ***Simon Menz*** *(Quedlinburg 1538-Helmstedt 1606):*

Short Biography: Menz studied at the University of Wittenberg under the guidance of Philip Melanchthon (1497-1560) and of the theologian and mathematician Kaspar Peucer (1525-1602). He graduated in 1563 and, several years later, in 1581, enrolled in the philosophical faculty of Helmstsedt as a professor of Latin. After Hofmann's death in 1593, he was assigned the teaching of lower mathematics which he kept until his death in 1606.

Work and Views: Menz's lectures on mathematics are elementary, because he relied on Frisius's *Arithmeticae practicae methodus facilis* and on Sacrobosco's *Sphere*. He also taught calendar computation and provided students with elements of trigonometry applied to topography. Concerning his conceptions, there is a relevant publication of 1587, *Argumenta aliquot, erroneo falsoque posteriorum epicureorum de stellis dogmati opposita, cum veriore de iisdem opinatione, aliisque thematibus nonnullis ad astrologiam pertinentibus*. This contains a series of anti-Epicurean theses on cosmology and an apology for astrology. According to Menz, the Epicureans incurred a long list of philosophical errors, beginning with their hedonistic ethics and the denial of a Providential design in nature. Menz rejects the atomistic theory of matter, the birth and decline of stars and planets, that is, the elementary constitution of the sky, and the cosmological principle of homogeneity. Furthermore, he maintains the Aristotelian distinction between a 'corruptible' terrestrial realm below the Moon and an incorruptible heaven composed of material spheres above it. Theses 26 and 27 deny extraterrestrial life. The 21st reassesses the daily motion of the stars, and involves the denial of the physical reality of the terrestrial rotation against Copernicus. It is probable that this defense of the Aristotelian cosmos against vitalistic and atomistic conceptions was directed against Pegel's views on nature. It is even possible that Menz was already informed about the post-Copernican atomistic and vitalistic philosophy and cosmology of Bruno, who was then a professor of logic at Wittenberg and would soon move to Helmstedt.[35]

Connections: Wittenberg (education through Melanchthon and Peucer)

(f.) ***Heinrich Schaper*** *(Alfeld 1560-Helmstedt 1629):*

Short Biography: Born in a poor family in Alfeld, Schaper was able to study owing to a ducal

clam venditasse, et sic plagium commisisse, cum publice non audeat idem facere, neque meas esse fateri vult, ne contradicat ijs, quae prius commentus est, ideoque generaliter et astute loquendo, dicit saltem eas hypotheses, quas ego libro illo secundo [De recentioribus phaenomenis] describo; potest enim aliquis etiam aba lio inventa describere, nec ob id sua esse. Eadem vafrite usus est in thematibus quibusdam anno 95 Helmstadij editis, ubi inter Parerga Mathematica (sic enim vocat et recte, nam vere Parerga tractat, et de re inperspecta nugatur) propositione secunda sic habet: "Cum tres discrepantes hypotheses sint, quibus apparentiae coelestes solvuntur et explicantur, quarum una est Ptolemaei, altera Copernici, tertia est illa, cuius meminit Tycho Brahe lib. de Cometa anni 77, dubitatur, an aliqua ex his omnibus diversa dari possit, deinde quaenam harum apparentijs magis congruat."

34 *Ibid.*, Cramer's Letter to Rosenkrantz (Stettin, 31 March 1598), 37-43.

35 For details, see Omodeo, "Disputazioni."

fellowship. He took his master's degree in 1590 and, beginning in 1596, gave private lectures to students. In 1601, he obtained the chair of higher mathematics and, after his colleague Menz died in 1606, he remained the only professor of mathematics at Helmstedt until the end of his life in 1629. Given the small salary of a professor of mathematics, he and his family (he was the father of four children) lived a rather poor existence. The remarkable fact that, from 1606 up to 1629, he was the only professor of mathematics at Helmstedt, shows that, at the beginning of the the seventeenth century, the University had abandoned its previous attention to the teaching of mathematics.

Work and Views: No writing of Schaper is extant, with the exception of an oration, *Programma in illustrissima Academia Iulia luctuosissimo tempore*, which he delivered in 1613 as pro-rector of the University on the occasion of Duke Heinrich Julius's death (who nominally was the rector), and a similar address delivered in 1622, when he was pro-rector for the second and last time. Schaper was a diligent professor. Following Liddel's example, he taught planetary theory (*doctrina secundorum mobilium*) exposing the Copernican planetary theory along with the Ptolemaic (1602: *doctrina secundorum mobilium iuxta hypotheses Copernici et Alphonsinorum*; 1613: *theoricas planetarum iuxta Alfonsinos et Coprnicum*). After Menz's death he also taught spherical astronomy (*doctrina sphaerica seu motus coeli primi*, in 1620, 1623 and 1625). Moreover, he lectured on arithmetic (e.g. in 1623, perhaps relying on Gemma Frisius: *regulae arithmeticae practicae vulgare explicatae*), geometry from Euclid's *Elements*, and on geography from Pomponius Mela's *Chorography* (at least in 1604).

Connections: –

Further considerations on the scientific culture at Helmstedt

To the list of Helmstedt scholars one could add the name of Giordano Bruno, since it is plausible that he delivered private lectures on post-Copernican cosmology during his brief stay in Helmstedt. Furthermore, the professor of mathematics at Rostock, Heinrich Brucaeus, deserves special attention because, as we have seen, he taught and supported several of the just mentioned mathematicians (Pegel, Parcovius and Liddel) as well as the Flemish professor of logic Martini. To complete this overview of the mathematical culture at Helmstedt in the sixteenth century, I would like to add something on Julius's and Heinrich Julius's court mathematician, instrument builder, geographer and astrologer Johannes Krabbe, who received his education, at least partially, at Helmstedt.

Giordano Bruno *(Nola, Italy 1548-Rome 1600)* was an apostate of the Dominican cloister of Naples, where he received his education as a friar. He fled from Italy at the end of 1578 (or at the very beginning of 1579) and visited many foreign countries, beginning with Calvinist Geneva. He was later in Paris, where he soujourned and lectured at the *College Royal* (1582) and published his first works. Between 1583 and 1585, he was in England, where he tried without success to become a professor at the University of Oxford. He published in London some of his main philosophical works, in particular the so-called Italian dialogues. In these he defended the Copernican system and the infinite plurality of worlds (especially in *La cena de le Ceneri*) as well as the infinity of the universe (especially in *De la causa* and *De l'infinito*). Moreover, he considered space to be a homogeneous medium and other stars to be suns encircled by planets, all inhabited like the Earth. He considered Copernicus's achievement to be the outset of a new enlightened age after a dark period of ignorance and superstition. This is why he attached to the Polish astronomer a crucial importance in the history of mankind. Bruno also propagated his post-Copernican views along with Lullist logic in Germany between 1586 and 1591. He lectured at Wittenberg (1586-1588) and resided, among other places, in Prague, Helmstedt and Frankfurt on Main.[36] Bruno matriculated at Helmstedt on 13 January 1589 and was cordially welcomed by Duke Julius. After the Duke's death, on 3 May 1589, Bruno delivered a commemorative oration, *Oratio consolatoria* (1 July), which was highly appreciated by the successor Duke Heinrich Julius. Some tensions with professors of the theological faculty, even the 'excommunication' (whatever it meant) by the general superintendent and professor of theology Johannes Mebesius (1542-1592) hindered Bruno from obtaining a chair, which he probably desired.[37] Nonetheless he held private lectures to some students, among them Hyeronimus Besler, who had followed him from Wittenberg and would follow him to Italy, and Valens Havekenthal, or *Acidalius*, who published a poem for Bruno in Helmstedt in 1589.[38] The period in Helmstedt was very fruitful for the Italian exile; here he completed some of his major works: the so-called 'Latin poems,' *De triplici minimo et mensura*, *De monade* and *De immenso*, which appeared in Frankfurt on Main in 1591 with a dedication to Duke Heinrich Julius. Among other things, these works were a reassessment of atomism and an infinitistic cosmology. In 1591, Bruno returned to Italy where he was soon arrested by the Inquisition in Venice and burned at the stake in Rome on 17 February 1600 as a heretic, after a long trial.

Although Bruno was no mathematician, his natural views were of great importance for the history of post-Copernican astronomy. Just before coming to Helmstedt, he published in Wittenberg a long list of anti-Aristotelian theses under the title of *Camoeracensis acrotismus* (Wittenberg, 1588) in order to undermine the Aristotelian conception of the cosmos. In this work, he expounded his own eclectic philosophy which was a melange of elements stemming from Copernicus's *De revolutionibus* (the heliocentric structure of the planetary systems), Cusanus's *De docta ignorantia* (the principle of plenitude supporting the infinity and the homogeneity of space) and atomism (the atomistic structure of matter, the plurality of worlds, the infinity and homogeneity of space). Bruno also supported a vitalistic conception of nature, according to which everything is animated and alive in the universe.

Heinrich Brucaeus *(Aelst, Flanders 1530-Rostock 1593)* was born in Flanders. He studied at Gent, Paris and Bologna where he took his master's degree in medicine. He taught medicine and mathematics in Rome and Louvain and was then appointed physician to the house of Braganza. In 1567, he obtained the position of professor at the University of Rostock, when Brahe was matriculated there. Brucaeus later also became court physician to Johann Albrecht of Mecklenburg.[39] He published mainly on medicine: his work on scurvy, *De morbo scorbuto liber*, was printed several times, even after the author's death. He also wrote introductory books on mathematics: *De motu primo libri tres* (Rostock, 1573 and successive editions), *Mathematicarum exercitationum libri duo* (Rostock, 1575), and *Musica Theorica* (posthumous, Rostock 1609). He would maintain an intense and steady correspondence with his Danish pupil Brahe over the years: they constantly exchanged scientific opinions and data, Brucaeus provided Brahe with scientific books from Germany and approved, in 1588, his astronomical hypotheses.[40] Moreover, he educated and supported several future Helmstedt professors of mathematics and medicine: Franz Parcovius, Duncan Liddel and probably also Pegel. Thus, he had a relevant, although indirect, influence on the structuring of the teaching of mathematics (and partly of medicine) at Helmstedt.

Johannes Krabbe *(Münden by Hannover 1553-Wolfenbüttel 1616)* was an instrument maker, cartographer and astrologer to the Dukes of Braunschweig beginning in 1585. Already as a young man in his hometown Münden by Hannover, he began learning how to build mathematical and

36 For Bruno's biography, see Ricci, *Giordano Bruno*. For his cosmology, see above all: Michel, *La Cosmologie*, Tessicini, *I dintorni*, and Granada, "L'héliocentriscme."

37 For Bruno's stay in Helmstedt, the most reliable source is still: Koldewey, "Giordano Bruno."

38 Cf. Canone, "'Hic ergo sapientia," and Acidalius, *Ad Iordanum Brunum Nolanum Italum*, in id., *Epigrammata*, 11-2.

39 Cf. ADB (1876) *sub voce* and Krabbe, *Die Universität Rostock*, 708.

40 See Thoren, *The Lord of Uraniborg*, *passim*, in particular, 139, 211-2 and 274.

astronomical instruments, in particular astrolabes. He probably made friends with Jost Bürgi, the skilful instrument maker of the Landgrave of Hessen Kassel, already in his youth.[41] In 1581, Krabbe enrolled at the University of Helmstedt and in 1582 at Frankfurt on Oder, a flourishing center of mathematical studies. Between 1584 and 1585, he traveled to Berlin, Spandau and Görlitz, and became acquainted with the mathematician, astronomer and geographer Bartolomäus Scultetus (1540-1614), the craftsman Hieronymus Nützel and the pastor and the astronomer David Fabricius (1564-1617). Krabbe was appointed at the court of Wolfenbüttel beginning in 1585. There, he worked principally as a practical mathematician, that is, as a cartographer, an instrument builder and an astrologer, until his death in 1616. Several prognostics of Krabbe's are still extant. He published observations of comets and planets, projected and realized mathematical instruments,[42] and drew accurate maps.[43] In a book of his (*Cometa*, c. 1605), Krabbe reports a visit of Fabricius to Wolfenbüttel, probably in 1604. On that occasion, they exchanged observational data on comets.[44] It should be noted that Fabricius was renowned for his accurate heavenly observations and was held in high esteem by Brahe and Kepler. He had been a student at Helmstedt in 1583, but had almost immediately left the university for an ecclesiastical career.

(3.) Considerations on the work and networks of the mathematicians at Helmstedt

Work: Notable aspects of the research and teaching activity of the first professors of mathematics at Helmstedt are the following:

a. Praxis-oriented mathematics: A particular interest for applied mathematics and engineering is evident. This is the case with Magnus Pegel, himself apparently an ingenious inventor of machines, and with Erhard Hofmann, who is said to have been a skillful producer of mathematical instruments. Additionally, the University was frequented by craftsmen like Krabbe, later a courtier to the Dukes of Braunschweig in Wolfenbüttel, and David Fabricius. The teaching of geography and topography is also revealing of a praxis-oriented conception of mathematics. Additionally, ephemerides computation (by Menz and Liddel) was not separated from astrological forecasting since astrology, based on Ptolemy's *Quadripartitum*, was part of the basic education at the faculty of philosophy. Astronomical calculation was probably connected to medical practice. Remarkably, two of the first mathematicians at Helmstedt, Parcovius and Liddel, moved to the faculty of medicine and Pegel, too, became a physician. The reason for these careers as physicians is not only the higher prestige of a professorship of medicine, but also a genuine interest, as the amount of their publications in this field witnesses.

b. The cosmological interest: The cosmological interest, linked with the developments of contemporary astronomy, is characteristic of the first years of the university of Helmstedt. Several professors, as well as Duke Heinrich Julius, maintained contacts with leading astronomers and cosmologists like Brahe and with the main centers of Renaissance astronomy, namely Kassel, Hven and Prague. Moreover, some professors significantly contributed to the natural debate. Pegel's anti-Aristotelian views on nature are remarkable, in particular those concerning the planetary system, the airy and elementary constitution of the sky, the homogeneity of space, universal vitalism and the existence of void. Additionally, Bruno completed in Helmstedt some of the most daring natural and

41 Cf. Kertscher, "Johannes Krabbe," 112. In the preface to his *Newe astronomische Observationes* he called Bürgi a friend of his: "der fürtreffliche unnd in der Mathematica hocherfahrne Herr Jost Bürgi, Fürstlich Landgräfflicher Hessischer bestalter Mathematicus und klein Uhrmacher zu Cassel, mein alter bekandter guter Freundt."

42 Zinner, *Astronomische Instrumente*, 417-8. See also Karr Schmidt, *Krabbes Papierastrolabium.*

43 Cf. Krabbe, *Karte des Sollings*.

44 Krabbe, *Cometa*, ff. A3*r*-*v*: "Anno 1599 im Decem. und Anno 1601 im Aprillen, die Cometen erschienen sein, wie mir solchs der Herr David Fabricius Mathematicus zu Retserhofe, im Ost Frießland, wie er bey mir zu Wulfenbüttel war, selbst berichtet hat."

cosmological works of the Renaissance, that is, the above mentioned ‘Latin poems,’ proposing an infinite and homogeneous universe with an infinite number of solar systems (or ‘synodi ex mundis’), philosophical vitalism, the existence of physical void and the atomistic structure of matter. The influence of Liddel on the academic culture of Helmstedt was probably more decisive than that of Pegel and Bruno, who stayed at Helmstedt for relatively short periods. It is important to stress the fact that Liddel was one of the first professors who introduced the teaching of Copernicus’s system into a German university as part of the standard program in astronomy. His example was then followed by his successor Schaper. The presence at Helmstedt of Pegel, Bruno and, with more continuity over the years, of Liddel shows that this center played an active role in the dissemination and the discussion of issues pertaining to the post-Copernican cosmology.

Networks: In order to highlight the network of the professors of Helmstedt, I propose to consider here three elements: a. the provenance of the professors, b. their effective collaborations and exchanges with other scholars and their careers after Helmstedt, and c. the choice of textbooks for their classes. To stress the national and international importance of Helmstedt, it could be interesting to investigate also the provenances of those who matriculated at the University, but this aspect should be left for further research.

a. The provenance of the professors: All professors who occupied a chair of mathematics in the sixteenth century had received their education at a Lutheran university: Jena, Wittenberg, Frankfurt on Oder and Rostock (in the case of Schaper, Helmstedt itself). This already conveys the sense that Helmstedt belongs to a network of universities sharing a confessional background. In this framework, Rostock had a special importance. Pegel, Parcovius and Liddel, but also other eminent professors of the philosophical faculty like Caselius and Martini, came from there. In particular, the three mathematicians were tied with Heinrich Brucaeus and, following in his footsteps, they all chose a further career as physicians. The ‘Rostock professors’ of the philosophical faculty shared a humanist background and an inclination toward Melanchthon’s teaching, or ‘*Philippismus*.’ Menz had studied in Wittenberg under the guidance of the *praeceptor Germaniae*. It is therefore not surprising that he chose, for his classes on astronomy, a textbook of Melanchthon’s son-in-law Peucer. Another noteworthy aspect of the University of Helmstedt is the presence of many foreigners in the philosophical faculty. Liddel and Martini were born beyond the borders of the Empire, Caselius had Dutch origins, and their friend and supporter Brucaeus was Flamish. To the list of foreign scholars one could also add Bruno. Furthermore, it is remarkable that several Scotsmen seem to have studied, at least for a period, at Helmstedt: for instance master John Johnston who, around 1586, defended the Aristotelian cosmology in two above-mentioned disputations, and, a few years later, the alchemist Duncan Burnet of Aberdeen who took his degree in medicine under Parcovius in 1608.[45] Additionally, Caselius hosted in his house Duncan Liddel and, as we read in a letter of his, a nephew of John Craig.[46]

Scholar	**Education**
Magnus Pegel	Rostock
Erhard Hofmann	Jena
Franz Parcovius	Rostock
Duncan Liddel	Frankfurt (Oder), Breslau, Rostock

45 Burnet, *Propositiones*.
46 Caselius, *Epistola*, f. †8*r*.

Simon Menz	Wittenberg
Heinrich Schaper	Helmstedt

b. Collaborations: As emerges from their bio-bibliographies, Helmstedt scholars maintained contacts with the main centers of Renaissance astronomy: Hven (Pegel, Liddel); Kassel (Pegel), Prague (Pegel) and Wittenberg. Moreover, Duke Heinrich Julius, formally the rector of his university, visited Hven and moved to Prague beginning in 1607. Bruno came to Helmstedt from Wittenberg, after a short stay in Rudolph's Prague, and left for Frankfurt on Main to publish books dedicated to Heinrich Julius. His travels indicate his connections or, at least, the circulation of his ideas. The court mathematician Krabbe kept in contact with Kassel, in particular with the famous instrument builder Bürgi. The steady contacts of Helmstedt professors with Heinrich Brucaeus are also significant. Liddel is a special case, not only for his education in important centers of Renaissance scientific culture such as Breslau and Frankfurt on Oder, with which he plausibly kept up in contact, but also for his discussions (and quarrels) with Brahe and his mediation between Helmstedt and Scotland. He maintained a scientific correspondence with his teacher Craig in Edinburgh and London,[47] and personally acted as a cultural mediator in the transfer of scientific knowledge when he returned to Aberdeen and founded there a chair of mathematics.

c. Textbooks: Apart from the classics from antiquity and the Middle Ages, the choice of the textbooks for the teaching of mathematics clearly indicates a north-European cultural horizon. Some modern texts come from Flanders, as is the case with those of Valerius and Frisius. Others stem from the Wittenberg scholarly milieu, like Reinhold's *Tables*, Peucer's *Elementa* on spherical astronomy, Beyer's *Questiones* on Sacrobosco. Honter's geographical *Rudimenta* can also be ascribed to a Lutheran context. Moreover, Liddel lectured on some masterpieces of German mathematical and astronomical culture: on Brahe, Regiomontanus and perhaps even Copernicus.

Conclusions and perspectives of research

The teaching of mathematics played an important role in the first years of the University of Helmstedt which adhered to Melanchthon's cultural program. Brilliant scholars, well inserted in the actual scientific debate, were attracted to the newly-founded institution. The originality of their achievements is witnessed by the conceptions of Pegel, the ambitious lectures of Liddel and the writings of Bruno. After an initial flourishing of mathematical and cosmological investigation, the quality of mathematical studies seems, however, to have declined. In fact, after Hofmann's death, the chair of lower mathematics was occupied by the professor of Latin Menz, who apparently had a mediocre mathematical preparation. Moreover, after Liddel's transfer to the Faculty of Medicine, his chair was held by a less perceptive mathematician, Schaper, who left no scientific work. After Menz's death, his chair remained vacant, so that only one chair of mathematics was maintained at the beginning of the seventeenth century.

A special interest in the application on mathematical knowledge, topography, instrument building, ephemerides computation, astrology and medicine is characteristic for the study of mathematics at Helmstedt in the considered period. Another significant aspect is the cosmological interest

47 See Brahe, *Opera*, VIII, Craig's letter to Brahe (Edinburgh, 9 July 1589), 193: "In tua Hypothesi non alienum videtur, quod Terra luminarium et Sol caeterorum Planetarum sit centrumm, sed tamen absurdum implicat, quod Mars acronychus terris proprior fiat Sole; concinnior fortasse erit, si punctum Terrae vicinius quam Sol statuatur centrum, aut si id nolis, ut duplici epicyclo augeatur orbis Planetae superioris, quemadmodum ad me suam ea de recantationem scripsit M. Duncanus Liddelius; quae quidem Hypothesis nihil absurdi habebit; nam non solum hoc tuum vitabitur, sed etiam orbes Planetis asscribi poterunt. Sunt et plures modi, quibus ita supponi possunt, et ipse aliquando exponam, quid hac de re sentiam, plenius, omnino enim incumbendum statuo, ut Physicis et Mathematicis pariter satisfiat."

witnessed by some sixteenth century scholars who stayed there: Pegel, Bruno and Liddel contributed in a way or another to the post-Copernican debate of their time.

Concerning the network of the Helmstedt mathematicians, it is essentially northern-European; it includes Lutheran universities (Rostock, Wittenberg, Frankfurt on Oder, Jena), important centers of astronomical research (Hven, Kassel, Prague), as well as Flanders/Netherlands, England and Scotland. I would define it as a northern-European Protestant network. The confessional element seems to have played an indirect role in the international contacts of the Helmstedt professors, because the political and theological context determined their concrete possibilities of collaboration and scientific exchange. No significant connections with Catholic countries can be detected, apart from the fact that several Flemish scholars escaped from their country precisely for religious reasons and took refuge in Rostock and Helmstedt. In Rostock, Brucaeus, himself a Catholic, finally converted to Lutheranism on his death-bed.[48] Bruno was a kind of comet in the history of the University of Helmstedt, yet he could have influenced the atmosphere of tolerance and openness toward scientific novelties characteristic of the philosophical faculty and, in the seventeenth century, also of the theological.

As a natural continuation of the present research, I would propose to consider in detail other academic institutions, the activity of their professors and their collaborations to obtain an insight into the scientific culture of the early modern period. In fact, overviews of academic milieus and scholarly networks permit one to trace rare printings and handwritten documents of early modern science otherwise neglected (as I have shown in “Disputazioni cosmologiche” on Pegel and will seek to demonstrate in further publications). Moreover, this analysis on late-Renaissance mathematicians at Helmstedt is conceived as a contribution to the history of the University of Helmstedt, subject of attentive research at the Herzog August Library of Wolfenbüttel, as well as to the regional history of Braunschweig, in which context the *Institut für Braunschweigische Regionalgeschichte Braunschweig* (Technical University of Braunschweig) hosted a workshop on Magnus Pegel in 2010. The present research is also aimed at a better understanding of early modern German science and of the international transfer of knowledge in the sixteenth and seventeenth centuries (in particular, the case of Liddel exposes the contacts between scientists in Germany and Great Britain). It should be added that the analysis of archival documents, university curricula and maybe also of students’ matriculation records would lead to a clearer understanding of the ways in which scientific ideas were discussed, developed, supported and, last but not least, disseminated. A detailed analysis of the teaching of mathematics at German universities in the early modern period does not exist as yet and, given the relevance of German mathematics at that time, it is a desideratum in the history of science and scientific culture. Hence, this investigation of mathematics at Helmstedt in the sixteenth century should be regarded as a preparation for further studies concerning this and other universities, also in later times, beginning with the network of Lutheran academic centers.

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48 ADB, *sub voce*.

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