How important was religious affiliation to the reception of the Copernican account of the universe in the sixteenth and seventeenth centuries?

Nicolaus Copernicus' *De revolutionibus orbium colestium* was recognised as an extremely important book by the late sixteenth century, with its revolutionary heliocentric account of the universe, which Owen Gingerich argues to be 'the most significant astronomical treatise since antiquity.'[1] Throughout the sixteenth and seventeenth centuries, natural philosophy and Christian belief were heavily interwoven, with the 'Copernican Revolution' and the Reformation both causing the emergence of a 'new astronomy.'[2] Copernicus was a supporter of Erasmian humanism, not reform, as seen by him dedicating *De revolutionibus* to the first Counter Reformation Pope, Paul III. This demonstrates that the 'Copernican Revolution' did not originate from the reformation, although it was essential for the publication and wide scale distribution of *De revolutionibus*, with Adam Moseley arguing that without the Lutheran reformation, 'the astronomical revolution as traditionally understood might never have happened.'[3] This prompted a startling response to *De revolutionibus* from Lutherans, notably from the scholars at the University of Wittenberg, where they shaped their interpretation of the Copernican account of the universe by praising its mathematical proficiency, but denying the reality of Copernican cosmological models, which Peter Barker argues to have been essential in 'motivating Lutheran interest in astronomy.'[4] This caused the wide scale reception of Copernican ideas throughout protestant Europe.[5] It took much longer for the Copernican account of the universe to rise to prominence in Catholic Europe, most

[1] Gingerich (1993), p. 269.
[2] Mosley (2008), pp. 232-233.
[3] Ibid. pp. 234-235.
[4] Barker (2000), p. 62.
[5] Ibid.

notably with Galileo Galilee. Nevertheless, it is clear to see that religious affiliation with Galileo's attempts to interpret some areas of the bible to fit Copernican theories led to the famous 'Galileo Affair,' with the subsequent condemnation of heliocentric theory by the Catholic Church.[6]

Religious affiliation was important for the circulation of the Copernican account of the universe throughout reformed Europe in the late sixteenth century, as seen by the '*Ad Lectorem*' of *De revolutionibus*, added by its editor, Andres Osiander.[7] Osiander, a leading protestant reformer of Nuremberg, was given the job of editing *De revolutionibus* after Georg Joachim Rheticus' departure.[8] During this process, he added an *'Ad Lectorem,'* which alleged that astronomers were not making 'true claims' about the universe, but merely providing a basis for calculations regarding Copernicus' theory, which Osiander stated to 'not be true or even probable.'[9] The *Ad Lecturum* has traditionally been renowned for increasing the negative reception of *De revolutionibus*, although it has been interpreted more favourably by Bruce Wrightsman, who argues that by not signing it, and effectively branding it with the name of an infamous Protestant reformer, saved *De revolutionibus* from incurring 'criticisms had Osiander's name appeared on it.'[10] Osiander's name on Copernicus' work, a Catholic Cannon, would have increased scrutiny and the chances of an unfavourable theological reaction, as seen by Dennis Danielson, who contends that the *Ad Lectorem* brought 'time for heliocentrism.'[11] The *Ad Lectorem* protected the work in the politically unstable city of Nuremberg, where the independence of the city and Protestants were being threatened by the Catholic authorities.[12] Therefore, by not signing *Ad Lectorem*, Osiander succeeded in protecting *De revolutionibus* from controversy, meaning the work was studied by scholars

[6] Wisan (1986), p. 473.
[7] Gingerich (1993), p. 271.
[8] Mosley (2008), p. 235.
[9] Osiander (2002), p. 28; Mosley (2008), p. 235.
[10] Wrightsman (1975), p. 233.
[11] Ibid.; Danielson (2006), p. 107.
[12] Wrightsman (1975), p. 233.

throughout both Catholic and Protestant Europe, which is why Adam Mosley argues that 'the potential of *De revolutionibus* to excite controversy' was only 'properly realised' with the Galileo Affair of the seventeenth century.[13]

The Lutheran response to the Copernican account of the universe can clearly be seen in the northern universities, especially the University of Wittenberg, where scholars used Copernican theories to pursue practical mathematics.[14] This led Robert Westman to formulate the 'Wittenberg Interpretation,' showing how scholars at the University of Wittenberg and its satellite universities developed a 'consensus on how to 'read'' *De revolutionibus*.[15] The main aspect of Wittenberg scholar's interpretations of Copernicus' theory was by praising his cosmological models, but 'flatly denying' their representation of reality.[16] A key contributor to the 'Wittenberg Interpretation' was Philipp Melanchthon, a major Lutheran intellectual reformer and collaborator with Martin Luther, who was influential in reforming universities and whose religious affiliation for studying the heavens had a resounding impact upon the Lutheran adoption of *De revolutionibus*.[17] Melanchthon's main reasons for studying astronomy were because he thought celestial motions implied the existence of a creator, with natural philosophy revealing God's providential plan, as shown by Sachiko Kusukawa, who argues that Melanchthon's natural philosophy was 'shaped into a distinctive Lutheran formula.'[18] This interpretation was spread throughout the other reforming universities through scholars 'who carried with them Wittenberg models of teaching and scholarship,' which is why Robert Westman argues that satellite universities, such as Jena and Tübingen, 'reflected the Melanchthonian humanist spirit of education.'[19] This resulted in Lutherans, especially those at the Wittenberg universities, appropriating the new astronomy to support

[13] Mosley (2008), pp. 235-236.
[14] Westman (1975), p. 168; Mosley (2008), p. 236.
[15] Ibid. p. 166.
[16] Mosley (2008), p. 236.
[17] Westman (2011), p. 143.
[18] Kusukawa (1995).
[19] Westman (2011), p. 143.

their doctrines regarding the ubiquity of Christ, leading to their beliefs of a 'providential deity,' whose cosmic design could be discovered through studying natural philosophy.[20] This attitude towards natural philosophy in Lutheran Universities shows that Lutheran tradition was 'favourably inclined' towards Copernicus' cosmological models, as demonstrated by Melanchthon writing that he started 'to love and admire Copernicus more,' which is why Peter Barker asserts that 'Lutheranism was a positive force in the spread of the new science.'[21] This clearly shows that Lutheran religious affiliation was vital for the reception of the Copernican account of the universe in the late sixteenth century, albeit only to the extent of the cosmological models, meaning Melanchthon's legacy was inherited by future scholars such as Johannes Kepler, who explored Copernicus' astronomy further, along with other contemporary astronomers trying to find alternative systems to those explained in *De revolutionibus*.[22]

An example of scholarly use of Philipp Melanchthon's Lutheran reception of the Copernican model can be seen through Johannes Kepler, who Peter Barker and Bernard Goldstein argue to be an 'heir to a Lutheran project that succeeded in publicising Copernican astronomy.'[23] Kepler was trained in theology at the University of Tübingen, with the aim of becoming a Lutheran pastor, meaning his views on theology were 'well formed' and 'firmly held' from a young age.[24] This meant that Kepler adapted the Lutheran stance on *De revolutionibus* to suit his personal, religious, astrological and theological beliefs, such as his rejection of the Lutheran doctrine representing the ubiquity of Christ, with him referring to himself as a Lutheran astrologer 'throwing away the chaff and keeping the kernel.'[25] However, instead of using the Copernican account for the universe as a mere mathematical

[20] Barker (2000), p. 62.
[21] Ibid. p. 64.
[22] Ibid. p. 71; Mosley (2008), p. 238.
[23] Barker & Goldstein (2001), p. 89.
[24] Mosley (2008), p. 238.
[25] Ibid. pp. 238, 241; Caspar (1993), pp. 213-20.

tool for solving mathematical problems, Kepler produced the 'first major defence of heliocentrism after the death of Copernicus,' in books such as *Mysterium cosmographicum (Secret of the Universe).*[26] This was because Kepler believed that God fashioned the cosmos according to an 'intelligible plan' which he was discovering through mathematics and astronomy.[27] This can be seen through Kepler mentioning in the preface for *Mysterium* that he is searching for 'God's motive and plan for creating the universe,' showing that Kepler believed God was a 'geometric' entity, supporting the Lutheran belief of God's 'providential design.'[28] Kepler attributed the causes of the differing planetary positions to 'God's geometrical plan,' with the choice of the geocentric Ptolemaic system or the heliocentric Copernican system to demonstrate the patterns of the cosmos 'and the divine laws by which God regulated its moving parts' through mathematics.[29] Kepler postulated that only the Copernican system worked for the ordering of the planetary positions, therefore fitting in with God's providential plan. In 1619 he concluded that 'it is absolutely certain...that all the planets revolve around the sun.'[30] This shows that Kepler's religious affiliation was essential for his acceptance of the Copernican system because he believed that God's providential design was to be discovered through studying natural philosophy, which is why Barker argues that Kepler wanted to 'determine the divine blueprint underlying the cosmos.'[31] This demonstrates that without his religious affiliation, Kepler would not have given 'the strongest possible defence of Copernicus' system in the later sixteenth century,' although many of his views derived from teachings at the Lutheran Universities of Wittenberg and Tübingen.[32]

The 'Wittenberg Interpretation' not only inspired natural philosophers such as Kepler to defend the Copernican account of the universe, but also inspired natural philosophers to

[26] Barker & Goldstein (2001), p. 112.
[27] Barker (2000), p. 84.
[28] Barker & Goldstein (2001), p. 84.
[29] Ibid. 113; Barker (2000), pp. 85-86.
[30] Kepler (1619) trans. C. G. Wallis (1952), in Oster (2002), p. 57.
[31] Barker (2000), p. 240.
[32] Barker (2000), pp. 87-88; Methuen (1996), pp. 230-231.

develop rival cosmic systems which still held religious merits, such as the ubiquity of Christ.[33] The Danish astronomer, Tycho Brahe, introduced a geo-heliocentric celestial scheme in 1588, while using the argument of the immovability of the earth to 'undermine Copernicus'' account of the universe, causing some astronomers to renounce Copernicanism.[34] Tycho, like Kepler, was heavily influenced by the teachings of Melanchthon through his studies at the universities of Wittenberg and Leipzig, where he was first introduced to Copernican cosmology.[35] Although Tycho was a Lutheran, Adam Moseley argues that his piety was not readily apparent in his works or daily life, as opposed to Kepler's well-formed theology, because 'he made some efforts to distance himself' from theological disputes.[36] However, he referred to scripture in his efforts to prove the Copernican hypothesis to be incorrect, although he refused to 'treat religious matters... under the guise of mathematics.'[37] Despite this, Tycho did site scripture as a primary obstacle to the regular and perpetual revolution of the earth' which is why Ann Blair argues that Tycho took the Bible seriously when regarding 'its silence when concerning the reality of celestial spheres.'[38] This scriptural ambiguity prompted Tycho to question the existence of 'orbs' carrying the planets, although his main arguments focused on astronomical and mathematical problems with the Copernican system.[39] Christine Schofield argues that the combination of the physical problems with the motion of the earth along with scriptural evidence is what 'sealed Tycho's rejection to heliocentrism.'[40] This clearly shows that Tycho's Lutheran religious affiliation contributed to his rejection of the Copernican system, although his

[33] Barker & Goldstein (2001), p. 92.
[34] Ibid. p. 92; Christianson (2003), pp. 123-124.
[35] Westman (2011) 305-306; Mosley (2007), p. 82.
[36] Mosley (2007), p. 242.
[37] Ibid.
[38] Blair (1990), p. 362.
[39] Ibid. pp. 363-364.
[40] Schofield (2003), p. 38; Blair (1990), p. 364.

primary issues were with the physical and cosmological problems of Copernican cosmology.[41]

The Copernican account of the universe rose to prominence in Roman Catholic Europe later than that of Protestant Europe because the reformation had the effect of 'diminishing contact' with Catholic countries.[42] This became apparent with the increase in communication with northern Protestant Europe, with Tycho Brahe attempting to 'widen his circle of acquaintances,' to include Catholics, such as the Italian mathematician Giovanni Magni, which is why Isabelle Pantin calls Tycho a 'pioneer in scientific [natural philosophical] communication.'[43] Moreover, this was apparent with Johannes Kepler, who sent two copies of his *Mysterium cosmographicum* to Italy in 1597, where they found their way to Galileo Galilei, who admitted to be a Copernican to Kepler, although their correspondence dwindled, possibly because Galileo realised the flaws in Kepler's work.[44] Galileo's rise to prominence regarding cosmological issues spanned from the invention of the telescope in 1608, with his startling discoveries such as the phases of Venus, published in *The Slidereal Messenger* (1610) which saw the first occurrences of Galileo using scripture to support his views on celestial matters.[45] Galileo's *Letters on Sunspots* (1613) uses scriptural evidence in support of the Copernican theory was censored by the Catholic authorities, although they left the earlier passages where Galileo declared his 'open support' for Copernicanism.[46] This shows that at this stage, the Roman censors did not associate Copernicus' theories with heretical thought, although they did have significant problems with Galileo using it to interpret scripture. This was because the interpretation of scripture was reserved for the highest levels of Catholic clerical society, which is why Thomas Mayer

[41] Blair (1990), p. 362.
[42] Pantin (1999), pp. 239-241.
[43] Ibid. p. 239.
[44] Voelkel (1999), pp. 38-40.
[45] Lindberg (2003), p. 41; Blackwell (1991), p. 57, Gingerich (2005), p. 197.
[46] Blackwell (2008), p. 261.

argues that 'Galileo moved in a dangerous direction when he tried to interpret the bible to fit his Copernican views.'[47] However, it was not until Galileo visited Rome in 1615 to join the debate in support of Copernicus' ideas did the authorities begin to take an interest in heliocentric theory, especially when Galileo persuaded the young cardinal, Alessandro Orsini, to defend Copernicanism before Pope Paul V, who subsequently turned the matter over to the inquisition.[48] This resulted in the Roman inquisition finding the fact that the earth moved to be 'erroneous in the faith' and the sun to be at the centre of the universe 'heretical.'[49] This led to Galileo receiving a precept, which forbade him 'from defending or teaching' Copernican views 'in any way at all,' which gained importance in his later trials.[50] This shows that although *De revolutionibus* had not been prohibited in the seventy years since its publication in 1543, it was Galileo's actions which alerted the church to the dangers *De revolutionibus* posed to its authority, which is why Andrea Frova and Mariapiera Marenzana argue that Galileo 'forced the ecclesiastics into taking a stance.'[51] This suggests the root of Galileo's problems with the Catholic Church was the interpretation of scripture, not the theories expressed in *De revolutionibus*, which Winifred Wisan argues to be the problem of Galileo feeling 'quite sure that it was he himself who best understood God's creation,' ultimately leading to the condemnation of Copernicus' theory.[52]

Religious affiliation was important for the reception of Copernicus's account for the universe in the sixteenth and early seventeenth centuries, in both Protestant and Catholic Europe. Religious affiliation becomes apparent in Andreas Osiander's *Ad Lectorem*, which he wrote in an effort to cause opponents 'antagonism' to 'disappear' so they would 'go over to

[47] Mayer (2011), p. 5.
[48] Mayer (2010), pp. 237-238.
[49] Ibid. p. 238.
[50] Ibid.
[51] Frova & Mariapiera (2006), p. 279.
[52] Wisan (1986), p. 486.

the opinion of the author.'[53] Although Georg Rheticus felt this degraded *De revolutionibus*, with him crossing out the *Ad Lectorem* in every copy which came into his possession, the *Ad Lectorem* did save Copernicus' theories from theological scrutiny for the next seventy years.[54] Religious affiliation and Copernicanism were heavily intertwined in northern Protestant Europe, with the reformation being an essential element for 'spreading a special Lutheran interest in astronomy,' because of the Lutheran doctrines regarding the ubiquity of Christ and their belief that god's 'Providential design' could be discovered through studying natural philosophy.[55] This is why Barker and Goldstein argue that Lutheranism 'succeeded in publicising the new astronomy,' particularly through the reformed universities, to which Kepler owed a lasting legacy.[56] Lutheranism was essential in shaping the 'Wittenberg Interpretation of the Copernican Theory' with this family of scholars 'reading' *De revolutionibus* in a similar way, under the reformed curriculum of Philipp Melanchthon.[57] This meant that Phillippist teachings, which praised Copernicus' cosmological models and denied there reality, were 'reflected' in Wittenberg and its satellite universities such as Tübingen, which influenced Copernicans such as Kepler, allowing him to 'give the first defence of heliocentrism through his interpretation of Copernicus' scheme [being] nothing less than God's plan for the world.'[58] The 'Wittenberg Interpretation' also had a clear impact upon Tycho Brahe with the development of his Geo-heliocentric system, with his interpretation of scripture contributing to his rejection of heliocentrism, although it was not his primary issue with Copernican cosmology.[59] With an increase in contact between Catholic and Protestant countries, the issue of heliocentrism was brought to the attention of

[53] Danielson (2006), pp. 107-108.
[54] Ibid. pp. 109-110; Gingerich (2005), pp. 158-159; Mosley (2008), p. 235.
[55] Barker (2000), p. 62.
[56] Barker & Goldstein (2001), p. 89.
[57] Westman (1975), pp. 165-166.
[58] Barker & Goldstein (2001), pp. 88, 93.
[59] Blair (1990), p. 362.

the Roman inquisition by Galileo using the bible to 'fit his Copernican views.'[60] This clearly shows that Galileo's religious affiliation to Roman Catholicism was essential for his acceptance of the Copernican account of the universe, and its subsequent condemnation by the Catholic Church.[61] Religious affiliation to the Copernican account of the universe was essential for its acceptance and rejection throughout Europe in the sixteenth and early seventeenth centuries.

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[60] Mayer (2011), p. 5; Blackwell (1991), p. 58.
[61] Wisan (1986), pp. 473, 486.

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