Cosmology and Astronomy in Newton's third Volume of the *Principia Geneva Edition* ([1739-1742]1822): *Propositions XIII-XIV*

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Abstract. Newton's concept of universal gravitation ended controversies over the correct world-system, which, still in the mid-seventeenth century, pitted Tycho Brahe's system against Copernicus', especially in Jesuit circles. Newton directly addresses the controversy in the third volume of the *Philosophiae Naturalis Mathematica Principia*. He intends to resolve it definitively, presenting his solution in continuity with the methods of classical astronomy: indeed, the techniques of observation and computation are preceded by the reiteration that the first model of the world is constructed by the naked eye (Newton [1739-1742]1822, pp. x-xii). Next, attention turns to explaining refraction, stellar parallax, and the operation of the refracting telescope. Newton is ready, at this point, to attend to the question *de mundi sistemate*. The rules of philosophizing (*regulae philosophandi*; *Ivi*, pp. 2-5),the list of crucial phenomena (*Ivi*, pp. 6-21) and some extra mathematical propositions (*Ivi*, pp. 22-58) are necessary to set the resolution correctly. Newton's world system is rooted in a first hypothesis: the center of the world is at rest. The hypothesis, however, must be defended. Newton makes no secret that opinions are divided between those who maintain that the center of the world is the Earth and those who believe that the center is the Sun: "Hoc ab omnibus concessum est, dum aliqui terram, alii solem in centro systematis quiescere contendant" (*Ivi*, p. 58). How to settle the issue? Propositions XIII and XIV and the *scholium* are crucial (*Ivi*, pp. 60-65). They concern the elliptical shape of planetary orbits and study the points of aphelion and orbital nodes for planets and comets. These problems had been tackled industriously by the Jesuits, particularly Giovanni Battista Riccioli. In the GE Edition, however, J. L. Calandrini deflated Newton's enthusiasm, rectified his calculations, and scaled back his deductions. Among his statements: "Error tamen omnis".

This talk analyzes the consistency of some of Calendrini's objections to Newton's astronomical interpretations of the science of motion.

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