

Johannes Kepler Harmony of the Universe

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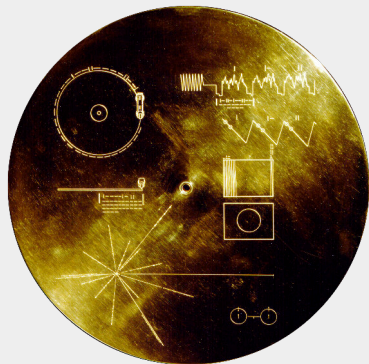
Johann Kepler, *Harmonices Mundi* (1619)

Kepler's Harmony of the Universe: Three Modern Realizations

Carl Sagan, *Cosmos* (New York, 1980).

The Voyager space probes launched in 1977 to explore the outer solar system and travel through interstellar space. Carl Sagan led a NASA committee that prepared two Golden Records to represent humanity and planet Earth to any extraterrestrial intelligence that might someday discover them. Each Golden Record contains hundreds of images and audio recordings, and was inscribed, “*To the makers of music – all worlds, all times.*”

The many works of Sagan, professor of astronomy at Cornell, ignited public interest in astronomy for a generation. *Cosmos* became the most widely watched series in the history of American public television, and with it came a deepening appreciation for the history of science.



“Kepler’s Harmony of the Worlds,” in Laurie Spiegel, *The Expanding Universe Unseen Words*, (2012).

On the Golden Records, dozens of musical recordings – from Bach

to Chuck Berry to the songs of Humpback Whales – were launched into the ocean of space to represent the music of a small planet. Among the recordings is Laurie Spiegel's interpretation of Kepler's *Harmony of the Universe*.

“Dance Suite,” Jonathan A. Annis (OU, 2015).

A different approach to recovering Kepler’s music of the spheres is that of OU School of Music graduate student Jonathan Annis. For Galileo’s World, Annis composed a suite for harp, flute (doubling alto flute) and oboe (doubling English horn) entirely comprised of musical themes from Kepler’s *Harmonices mundi*. Annis arranged the themes, but they derive from Kepler’s musical description of the harmonic law.

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In this work, Kepler integrated theoretical astronomy and music, showing that the motions of the planets employ the same numerical ratios as the most harmonious scales. Kepler's “harmonic law” still describes how planets and stars and satellites and galaxies revolve around one another in space.

Kepler's integration of theoretical astronomy and music fulfilled an ancient dream. Plato wrote, “As our eyes are framed for astronomy, so our ears are framed for the movements of harmony, and these two sciences are sisters” (*Republic*, VII 530d). From antiquity, music was a sister science to astronomy, with both subordinated to mathematics.

The beauty of music provided the context for what we now call Kepler's “third law.” The story of science reveals creative leaps across disciplinary boundaries; in this case, bringing together music and astronomy. Kepler's vision truly was cosmic, of a cosmic hope and consolation amidst earthly sorrow. In the midst of many trials during the writing of this book, Kepler affirmed that:

“The movements of the heavens are nothing except a certain every-lasting polyphony (intelligible, not audible)... Hence it should no longer seem strange that man, the image of his Creator, has finally discovered the art of singing polyphonically, which was unknown to the ancients. With this symphony of voices man can play through, the eternity of time in less than an hour, and can taste in small measure the delight of God the Supreme Artist...”

Kepler, *Harmonices mundi*, translated in Timothy Ferris, *Coming of Age in the Milky Way*, p. 77.

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