Substituting a dynamic heliocentric astronomy for the ancient harmonies of static geocentrism, Kepler determined the mathematical and physical laws governing the motion of the planets in his *Astronomia Nova,* the most important of his many books, and the cornerstone of the study of celestial mechanics.

Kepler, Johannes. *Astronomia nova, sev Physica coelestis, tradita commentariis de motibvs stellae Martis*. [Pragae]: anno aerae Dionysianae cIo Io c ix [1609]. 15 3/8 inches (391 mm), 19, 337 pp.

The *Astronomia Nova* is the most important of Kepler's many books, the cornerstone of the study of celestial mechanics. Substituting for the ancient harmonies of static geocentrism a dynamic heliocentric astronomy, Kepler determined the mathematical and physical laws governing the motion of the planets, the *Physica Coelestis* of the title page **(Spread 3)**. In *Astronomia Nova,* he enunciated his first two Laws of Planetary Motion: the law of elliptical orbits and the law of equal areas. The first declares that planetary orbits are elliptical, with the sun at one focus, the second that planetary motion is not uniform, but that nonetheless the radius vector from the sun to a point on the planet's orbit traverses equal areas of the ellipse in equal times. This second law was not clearly and fully formulated until Kepler published the *Tabulae Rudolphinae* in 1627; the third and last law (that the square of the periodic time of an orbiting planet is proportional to the cube of its mean distance from the sun) was first published in *Harmonices Mundi*— both texts are available on **rarebookroom.org** as **keptab** and **kepharb**, respectively.

Johannes Kepler (1571–1630) had served as assistant and associate to Tycho Brahe in Prague, off and on during the last year of the Danish astronomer's life. His principal assignment was to construct a theoretical model that might explain Tycho's observations of Mars—this is the *De Motibvs Stellae Martis, Ex observationibus G.V. Tychonis Brahe* of the title page. On Tycho's sudden death in 1601, Kepler succeeded to his post as Imperial Mathematician to Rudolf II, the most notable patron of the sciences and pseudo-sciences of his day. It was at Rudolph's direction and expense (as the title page notes) that the *Astronomia Nova* was published. Appropriately, a portrait of the Emperor appears at **Spread 7**: this is, however, not an integral part of the book, and is not

present in many copies. There was friction between the "Tychonians" and the Emperor, whose enthusiasms outran his purse. Tycho's observational data were a very desirable property, and the heirs had not been properly paid for them. To maintain their value intact and unsuperseded, Tycho's son-in-law G.F. Tengnagel was allowed to add a prefatory warning to the reader **(Spread 14)** concerning Kepler's deviations from Tycho's observations that were promised in the forthcoming (but in the end, long delayed) *Tabulae Rudolfinae*. Kepler himself suffered from the Emperor's improvidence, and eventually sold back the entire edition of the *Astronomia Nova* to the printer in an attempt to recover part of his unpaid salary.

Other interesting features of the book are the Latin poems by Brahe and Kepler on **Spreads 13–14** and the folding table, *Synopsis Totivs Operis* on **Spread 5** that gives a plan of the entire work. The are some 300 wood-engraved illustrations scattered throughout the book, which, as so often in German and Central European works of the period, is printed on paper of wretched quality.