

# A Century of Astronomy

**A**stronomy was transformed when **Nicolaus Copernicus** replaced the Greeks' earth-centred system of planetary motion by a heliocentric one with the sun at the centre and the earth as just one of the planets in circular orbits around it. His book *On the Revolution of the Heavenly Spheres* was published in 1543; a copy was supposedly presented to him on his deathbed.

The Copernican system aroused much controversy, bringing its supporters into conflict with the Church whose leadership considered the earth to lie at the centre of creation. Several supporters were arrested during the Inquisition or were burned alive for heresy; indeed, at a famous Inquisition trial in 1633, **Galileo Galilei** was placed under house arrest after his *Dialogue Concerning the Two Chief*

*World Systems* presented the Copernican system as superior to Ptolemy's. Galileo was the first to make extensive use of a telescope, drawing the moon's surface and discovering the moons of Jupiter and Saturn. In his mechanics book *Two New Sciences* of 1638 he discussed uniform and accelerated motion and explained why the path of a projectile is a parabola.

Before the invention of the telescope, the greatest observer of the heavens had been the Danish astronomer **Tycho Brahe**. In his observatory of Uraniborg on the island of Hven, he designed instruments of unequalled accuracy and measured more than 700 stars, discovering a new star, or *nova*, in the constellation of Cassiopeia.

His assistant **Johannes Kepler** is mainly remembered for his laws of planetary motion. Tycho's observations led him to non-circular orbits, with the planets moving in elliptical orbits with the sun at one focus and the line from the sun to any planet sweeping out equal areas in equal times. Kepler was fascinated by conics and introduced the word "focus" into mathematics. Rotating such curves around an axis, he found the volumes of many solids of revolution by summing thin discs, thereby foreshadowing the integral calculus some years later.



Nicolaus Copernicus



Galileo Galilei



Tycho Brahe



Brahe's observatory



Johannes Kepler



Kepler's laws

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