

Topic Page: [Ptolemaic system](#)

Definition: **Ptolemaic system** from *Collins English Dictionary*

n

1 the theory of planetary motion developed by Ptolemy from the hypotheses of earlier philosophers, stating that the earth lay at the centre of the universe with the sun, the moon, and the known planets revolving around it in complicated orbits. Beyond the largest of these orbits lay a sphere of fixed stars See also epicycle (sense 1) Compare Copernican system



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Summary Article: **Ptolemaic system**

From *The Columbia Encyclopedia*

(tŏl'Əmā'ĭk), historically the most influential of the geocentric cosmological theories, i.e., theories that placed the earth motionless at the center of the universe with all celestial bodies revolving around it (see cosmology). The system is named for the Greco-Egyptian astronomer Ptolemy (fl. 2d cent. A.D.); it dominated astronomy until the advent of the heliocentric Copernican system in the 16th cent.

The Roots of the Ptolemaic System

The ancient philosophers imagined the universe to resemble a complex clockwork consisting of concentric crystalline spheres, nested inside one another, which carried the sun, moon, and planets in their motions and made the “music of the spheres” as they revolved. Professional astronomers did not claim that such a mechanism physically existed; rather, they treated it as the hypothetical basis for constructing geometrical schemes that would allow them to make accurate predictions of the motions and future positions of celestial bodies.

However, the motions of the planets against the stars are not uniform and circular but exhibit a host of irregularities. For a superior planet (Mars and those farther from the sun), the most important of these is the planet's retrograde motion at the time of opposition. The planet seems to halt and then reverse its motion for a few months, so that its complete circuit of the ecliptic is attended by a series of yearly loops or switchbacks.

The Fundamentals of the Ptolemaic System

Partly on aesthetic grounds and partly because no other hypothesis suggested itself, Ptolemy generally retained the semimystical Pythagorean belief that nothing but motion at constant speed in a perfect circle is worthy of a celestial body. He combined simple circular motions to explain the complicated wanderings of the planets against the background of the fixed stars. Ptolemy explained retrograde motion by assuming that each planet moved in a circle called an epicycle, whose center was in turn carried around the earth in a circular orbit called a deferent. Thus the motion of all the planets around the earth in the Ptolemaic system was somewhat similar to the motion that modern astronomy ascribes to the moon as it revolves around the earth while the earth itself is revolving around the sun. The fact that the inferior planets (Venus and Mercury) never stray far from the sun was explained by the provision that the centers of their epicycles always had to lie on the line connecting the earth and sun.

In the final version of his system Ptolemy modified the postulate of uniform motion in order to explain the variations in the apparent speeds of the planets. He found that these variations could be reproduced most conveniently by displacing the earth from the center of the deferent to a point called the eccentric. He then assumed that the motion of the center of the epicycle along the deferent appeared uniform, not from the center of the deferent or from the eccentric, but from a third point symmetrically displaced from the eccentric, called the equant. This modification was tantamount to abandoning the postulate of uniform motion. Ptolemy considered it more important to achieve a closer agreement with the observed astronomical data than to adhere to any preconceived first principles. His work thus anticipates the positivist spirit of modern empirical science, which makes no ontological claim for its constructs but merely asserts that nature behaves “as if” these constructs lay behind appearances.

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