

SOCIETY OF PHYSICS STUDENTS (SPS) COLLOQUIUM

"Relativity and the Perihelion Precession of Mercury's Orbit"

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According to Johannes Kepler, the orbit of every planet revolving around the sun traces out an elliptical path. The center of the sun, or rather, the common center of gravity between the sun and the planet, will be at one focus of this ellipse. Thus, in the course of one year of the planet, the distance between the sun and the planet grows from a minimum to a maximum, and then shrinks back to a minimum. The point of closest approach, called the perihelion, was classically considered to be a fixed point in the orbit of the planet. In actuality, many different effects from celestial bodies in the solar system cause this perihelion to precess, or rotate around the sun. In particular, the precession of the perihelion of the planet Mercury, or rather, the non-agreement between measurements of the precession and calculations of the precession, was a longstanding problem, unexplained by the basic laws of Newtonian mechanics. This problem was, in effect, solved by Einstein's theory of relativity, which predicted the observed amount of perihelion shift for Mercury within experimental error. By utilizing a precise understanding of this theory, one can calculate the differences between Newtonian model for planetary mathematics and the Einsteinian model. This difference, surprisingly, considering the great differences between the two models, is only a small term in a differential equation. However, the theory of relativity drastically changed the way we understand the universe around us. With only a small technical addition, but with a vastly different outlook, Einstein solved Mercury's problem, and many others he never even dreamed of.

WHERE

SI – 117 (next to the Physics Computer Lab)

WHEN

Noon- 1pm

Tuesday, April 22, 2008