

What Effect Does a Spinning Sun Have on the Advance of Mercury's Perihelion?:
a Comment on Arxiv:1106.1568

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Abstract

Mercury precesses 5600 seconds of arc per century. Newtonian celestial mechanics accounts for only 5557 arc seconds, leaving a discrepancy of 43". In 1859, Urbain Le Verrier, considering all the perturbations in the solar system, wrestled only 35 arc seconds more beyond the 5557". Had he thought about the effect of a spinning sun on Mercury's orbit, he would have gained another 6 arc seconds, for a total of 41", only 2.3% shy of General Relativity's calculation.

We might never have heard of General Relativity had Effective Theory been in place at the time. Arxiv:1106.1568 tells us that Effective Theory is taking present theory and adding to it.¹ For example, Effective Theory is taking Le Verrier's 35 arc seconds¹ as a starting point and looking for other factors. Had that been done in

Le Verrier's day, the 6 seconds of arc contributed by the spinning sun would have been found. It was not found because no-one looked for it. As the author of Arxiv:1106.1568 tells us, the problem was mindset.

General Relativity's calculation comes to

$$\delta_{GR} = \frac{6\pi G^2 M_s^2}{H^2 c^2} \quad (1)$$

in units of radians. H is angular momentum per unit mass; G is Newton's gravitational constant; M_s is mass of the sun; and c is the vacuum speed of light. For the purpose of quick comparison, we will place Le Verrier's calculation in terms of (1),

$$\delta_{LV} = \frac{5\pi G^2 M_s^2}{H^2 c^2} \quad (2)$$

which provides a little over 35 seconds.

The term provided by the spinning sun is

$$\delta_s = \frac{2\pi r_s^4 \omega_s^2}{25H^2} \quad (3)$$

where r_s is the sun's radius; ω_s is the sun's angular velocity at the equator, assuming a rotation period of 25 days.²

Le Verrier's total from the contributions, had Effective Theory been in force at the time, would have been $\delta_{LV} + \delta_s = 35'' + 6'' = 41''$, only about 2% short of General Relativity's calculation. As a matter of fact, we have used rough approximations in our calculations, and a more precise method would have come closer to the 43 seconds of arc produced by General Relativity.

Arxiv:1106.1568 is an interesting paper, which, although not the intention of its author, leads us to see that General Relativity Theory never would have arisen had physicists in Le Verrier's day considered the effect on Mercury of a spinning sun. Considering that the sun is 840,000 miles wide at the equator and has the mass of almost a million earths, it is extremely difficult to realize that the effect of such a huge rotating behemoth so close to Mercury was never thought about.

References

1. James D. Wells, “When effective theories predict: the inevitability of Mercury’s anomalous perihelion precession”, Arxiv:1106.1568v1.
2. Robert L. Carroll, The Eternity Equation, J.R. Rowell Printing Company, Charleston, South Carolina, 1976, pp.89-94.