

# Oh my God, the Pioneer Anomaly again?

---

*Source:* <http://sci.tech-archive.net/Archive/sci.physics.research/2006-04/msg00349.html>

---

- *From:* "J. G. Waller" <[wallermax@xxxxxxxxxxxx](mailto:wallermax@xxxxxxxxxxxx)>
  - *Date:* Thu, 27 Apr 2006 21:17:49 +0000 (UTC)
- 

I think it would be a fine tradition to resume Pioneer Anomaly Discussions at this season. I'm not going to explain here what Pioneer Anomaly is, there is a lot of literature concerning this issue in internet, try some googles, or John Baez Open Question in Physics (<http://math.ucr.edu/home/baez/open.questions.html>)

Let me propose my own insight about this famous problem:

- A. The so-called anomalous acceleration,  $a_p$ , detected in Pioneer 10/11 spacecrafts, is a real acceleration towards the solar system barycenter.
- B. The "mysterious mechanism" accounting for it is the precession of open orbits, such as hyperbolic orbits!!!!.

We know that elliptical orbits exhibit periapsis precessions, but we assumed that open orbits, like hyperbolic or parabolic orbits were unable to exhibit those precessions, with orbital bodies keeping their trajectories stationary on their initial orbital curves. General Relativity (GR) Model shows us how spacetime is curved by gravitational systems, and how precessions can be accurately addressed. Anyway, the question is, can GR account accurately enough for any kind of orbit precession?. In the case of planet Mercury's anomalous precession, GR was success in the prediction, but in cases like hyperbolic orbits, it is not so clear how GR could accurately predict precessions, as there are few experimental data about evolution of hyperbolic orbits, along meaningly high time intervals. Maybe, a serious Quantum Gravity Theory could account for Pioneer Anomaly, and, of course, for other open questions in physics too. The galaxy rotation problem is tightly related to Pioneer Anomaly, both issues must really be the same phenomenon, that is, orbit precession effects.

So, if we assume hyperbolic orbits exhibit precessions, then there must exist an extra centripetal acceleration, in such a way that an hyperbolic orbit is no longer hyperbolic along time, but a kind of hypotrochoid curve. That extra centripetal acceleration would be the famous anomalous acceleration  $a_p$  observed in Pioneer Probes.

## Oh my God, the Pioneer Anomaly again?

It has been observed that acceleration is of order  $a_p = -cH$ , where  $H$  is Hubble constant and  $c$  speed of light in the vacuum. We must say that experimental value has been observed for positions beyond Jupiter and Saturn encounters. How can we interpretate that  $a_p = -cH$  value?. One interesting solution would be any value of order  $\pm cH$  must be a lower bound for any acceleration. Values of order  $\pm cH$  have been found in different scenarios, and at different scales, for example, the centripetal acceleration of solar system around the Milky Way is about that order. That would be the lower measurement uncertainty for any acceleration, and here is when Quantum Gravity might play its role. Symmetrically, an upper bound,  $a_h$ , for any acceleration, must be  $a_h = \pm c / t_p$ , where  $t_p$  is Planck time.

.