

# Pioneer Anomaly predictions confirmed

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The STOIE explains many mysterious phenomena from diverse observational disciplines. Some predictions of the STOIE in 2006 concerning the Pioneer Anomaly (PA) that no other model predicted have been published in 2009 and 2011.

Hodge (2006a) suggested that photons traveling between galaxies could lose energy caused by a  $\rho$  field. Hodge (2006b) applied the galaxy redshift equation to the PA. The PA is a well established unexplained blueshift in the radio signal from the Pioneer 10 (P10) and Pioneer 11 (P11) spacecrafts (Anderson et al. 2002; Toth and Turyshev 2006).

The predicted observations made are: (1) The data before the flyby encounters were insufficient to detect the PA (Turyshev and Toth 2009). The STOIE requires this rather than there was no PA before the encounters as suggested by several other models.

(2) “Although the Earth direction is marginally preferred by the solution (see Table III), the Sun, the Earth, and the spin axis directions cannot be distinguished.” (Turyshev et al. 2011). An Earth directed PA suggests a signal related cause that the STOIE calculates rather than acceleration of the spacecraft that all other models calculate. Anderson et al. (2002) examined commonly accepted models of the impact of various phenomena on the signal and conclude the commonly accepted models do not account for a signal blueshift effect. The STOIE model is a model of a signal effect and, therefore, is Earth directed. Because the vast majority of PA papers considers the PA to be sun directed, that the Earth direction is “marginally preferred” is remarkable.

(3) “The data favor a temporally decaying anomalous acceleration with an over 10% improvement in the residuals compared to a constant acceleration model.” (Turyshev et al. 2011). Equation (2) and Section 3.4 of Hodge (2006b) suggest the decline is exponential except when the signal passes near large mass such as during flyby maneuvers.

Calculating the 10 day intervals of the Saturn encounter may show variability over the 50 day period rather than the large uncertainty.

The STOIE is a self-consistent model that was devised based on observations including galaxy redshift. Other models leave unanswered or poorly answered many characteristics of the PA such as the cosmological  $cH_0$  connection, the Saturn encounter decrease, etc. The STOIE made predictions for a different observable characteristic of the PA that are being confirmed.

## References

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