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Space probe confirms general relativity - May 04, 2011

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“We’ve tested Einstein’s universe, and Einstein survives,” said principal investigator Francis Everitt, at a press conference at NASA today to release the final results from Gravity Probe B, a spacecraft launched in 2004 to test predictions of Albert Einstein’s theory of gravitation. The new results, [accepted](#) for publication in *Physical Review Letters*, include a much-anticipated confirmation of frame-dragging, an effect in which the rotation of the Earth twists its gravitational field, causing gyroscopes orbiting in the field to wobble.

Gravity Probe B flew from 2004 until 2005, but unexpected electrostatic effects detected in its final 46 days of operation produced a systematic error that swamped the scale of the frame-dragging effect, and it has taken six years of data analysis to unpick that. In the end, the precision of the frame-dragging measurement is reported as 20%, which is several times what the mission had promised, and half the precision of an earlier frame-dragging confirmation claim by Ignazio Ciufolini at the University of Salento in Lecce, Italy and Ericsson Pavlis of the University of Maryland in Baltimore, who [reported](#) measurements of the precession of the orbit of the LAGEOS (Laser Geodynamics Satellites) that flew in 1976 and 1992. Ciufolini congratulates the Gravity Probe B team, “GP-B was a beautiful and challenging experiment,” he says. But he questions the level of confidence that it’s possible to have in their 20% result, given that the systematic error they had to reckon with was around 15 times the size of the effect they measured.

The NASA press conference highlighted the technological achievements of Gravity Probe B, which included the creation of the roundest spheres ever manufactured (pictured) to serve as the four gyroscopes whose precession was measured. In the five decades it took for Gravity Probe B to be conceived, developed, launched, and its data analyzed, Everitt said, 100 PhDs worked on the project and more than 353 undergraduates.



Posted by Eugenie Samuel Reich on May 04, 2011

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