Abstract Submitted
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Features of the Gravity Probe B Space Vehicle[1] WILLIAM REEVE, Lockheed-Martin Corp., GAYLORD GREEN, Stanford University; NavAstro Co. — Space vehicle performance enabled successful relativity data collection throughout the Gravity Probe B mission. Precision pointing and drag-free translation control was maintained using proportional helium micro-thrusters. Electrical power was provided by rigid, double sided solar arrays. The 1.8 kelvin science instrument temperature was maintained using the largest cryogenic liquid helium dewar ever flown in space. The flight software successfully performed autonomous operations and safemode protection. Features of the Gravity Probe B Space Vehicle mechanisms include: 1) sixteen helium micro-thrusters, the first proportional thrusters flown in space, and large-orifice thruster isolation valves, 2) seven precision and high-authority mass trim mechanisms, 3) four non-pyrotechnic, highly reliable solar array deployment and release mechanism sets. Early incremental prototyping was used extensively to reduce spacecraft development risk. All spacecraft systems were redundant and provided multiple failure tolerance in critical systems. Lockheed Martin performed the spacecraft design, systems engineering, hardware and software integration, environmental testing and launch base operations, as well as on-orbit operations support for the Gravity Probe B space science experiment.

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