

Abstract Submitted
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Gravity Probe B Timing System and Roll Phase Determination¹

JIE LI, Stanford University, JEFFERY KOLODZIEJCZAK, NASA/MSFC — An oven-controlled crystal oscillator at 16.368 MHz provides clock signals to all GP-B components and synchronizes the data collection, transmission and processing. The sampled science data signals are stamped with the vehicle time, a counter of the 10Hz data strobe divided down from the clock. The GPS receiver supplies an external reference for time transfer between the vehicle time and coordinated universal time. Ground and space flight tests show the time transfer error is within 1 μ s. The time latency between the effective sample time of science signals and the stamped vehicle time is verified to 1 ms in the ground tests. The GP-B satellite is controlled to roll with a period of 77.5 sec about an axis along the direction to the guide star to average out the disturbance torques fixed to the body of the satellite and reduce the gyroscope readout noise. The roll phase is determined on the ground to high accuracy with the telemetry data from two star trackers and used in the data analysis to separate the drifts of gyroscope spin axes in the orbital plane and perpendicular to the orbital plane. The flight data shows that the roll phase is controlled to within 40 arcsec with a measurement uncertainty of 7 arcsec.

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