

Abstract Submitted  
for the APR07 Meeting of  
The American Physical Society

**Gravity Probe B Science Instrument Assembly (SIA)**<sup>1</sup> SAPS BUCHMAN, BARRY MUHLFELDER, JOHN TURNEAURE, Stanford University — The SIA comprises the cryogenic elements of the GP-B instrument including the science telescope, the four gyroscopes, the quartz block assembly (QBA), and the four SQUIDS mounted on two brackets. SIA support systems include gyroscope magnetic shields, 8 gas connections for gyroscope spin-up, 8 UV fiber optic cables for charge management, and about 500 electrical connections; including 30 gyroscope coaxial suspension cables, 18 SQUID support cables, telescope detector electrical connections, heaters, germanium resistance thermometers, and silicon diode thermometers. The SIA performed to design in all areas. Mechanical stability was better than 0.1 marcsec/yr. The QBA temperature was limited by the superfluid helium bath and controlled to 2.7 K. The SQUID brackets were controlled to 2.8 K  $\pm$  5  $\mu$ K at roll, while the telescope silicon detectors were controlled to 72 K. New technologies were demonstrated by the SIA in space: potassium hydroxide optical bonding with strength superior to bulk quartz, matching of thermal expansion of quartz components to 3ppb, low temperature bake-out of the vacuum probe to about  $2 \times 10^{-12}$  Pa, and a dc magnetic field of 0.3 nT.

<sup>1</sup>Research supported by NASA under contract NAS8-39225

William Bencze  
Stanford University

Date submitted: 12 Jan 2007

Electronic form version 1.4