Abstract Submitted
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Sub-picometer Laser Distance Gauge for SR-POEM and Astronomical Instruments[1] JAMES D. PHILLIPS, ROBERT D. REASENBERG, SAO/CfA — We report on a Semiconductor Laser version of the Tracking Frequency laser distance Gauge (SL-TFG). It will be the sensor for SR-POEM, a test of the weak equivalence principle with $\sigma(\eta) < 10^{-16}$, and for optical trusses in segmented- and distributed-aperture spaceborne astronomical instruments. The TFG locks a laser to the Measurement Interferometer (MI). This architecture gives it substantial advantages over the traditional precision instrument, the heterodyne phase gauge. The TFG is free of an important source of cyclic bias. Its readout is a radio frequency derived from an optical heterodyne, not an RF phase. Absolute distance can be measured with little or no additional hardware. We report on tests yielding an Allen deviation of 7 pm in 0.03 s. For SR-POEM, we will improve the deviation to 0.1 pm in 1 s.

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