

Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Design and performance of a sub-nanoradian resolution Autocollimating optical lever¹ RAMANATH COWSIK, R. SRINIVASAN, S. KASTURIRENGAN, A. SENTHIL KUMAR, KASEY WAGONER, Washington University, St. Louis — Precision goniometry using optics has the advantage that it does not impose much stress on the object of investigation and, as such, is adopted extensively in gravitational wave detection, in torsion balances investigating fundamental forces and in specialized studies of biological samples. It has potential applications in condensed matter physics. We have developed an autocollimating optical lever which has a very high resolution and dynamic range. An array of 110 slits, of 84 micron width and a pitch of 182 microns, is located in the focal plane of a field lens, of focal length 1000 mm, and is illuminated by a CCFL-tube. This array is imaged back on to the focal plane after retro-reflection from a mirror placed just beyond the lens. The image was recorded on a linear CCD array at the rate of 1000 images per second and was processed through a special algorithm to obtain the centroid. The instrument has a centroid stability of $\sim 3.10^{-10}$ rad.Hz^{-1/2} and a dynamic range of $\sim 10^7$.

¹This research is supported by Washington University and The McDonnell Center for The Space Sciences

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Date submitted: 06 Jan 2006

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