Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Earth-Field Self Oscillating Magnetometer ERIC CORSINI, APS + UCBerkeley, BRIAN PATTON, DMITRY BUDKER, UC Berkeley — Atomic magnetometers using ultra-narrow resonances based on coherences between Zeeman sublevels in alkali atoms, have been under development since the 1960s . Their high sensitivity makes them a possible alternative to SQUIDS without requiring the use of cryogenic equipment. While recent efforts have been dedicated to working in a magnetically shielded environment where the magnetic field can be tightly controlled, renewed interest in magnetometry in an unshielded environment leads to other challenges because of the fluctuations in the Earth magnetic field [1]. We will present experimental results on the performance of an all-optical self-oscillating atomic magnetometer/gradiometer based on alignment coherences operating at Earth magnetic field in an unshielded environment[2]. Our magnetometer combines amplitude modulated non-linear optical rotation (AM NMOR) and separate pump and probe beams. Its features are high projected sensitivity and wide bandwidth. Potential future applications range from geophysics to biomagnetic measurements in the field, and may serve as the basis of devices used in air- and space-borne platforms.

[1]D. Budker, M.V. Romalis, Nature Physics, **Vol. 3**, p.227-334, April 2007
[2]J.M. Higbie, E Corsini and D Budker, Rev. Sci. Instrum. **77**, 113106 (2006)

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Date submitted: 23 Jan 2009 Electronic form version 1.4