

Abstract Submitted
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Progress Toward Atomic Magnetometry Beyond the Conventional Heisenberg Scaling HEATHER PARTNER, BRIGETTE BLACK, JM GEREMIA, University of New Mexico — We describe an atomic magnetometer whose field estimation uncertainty is expected to decrease faster than the conventional Heisenberg ($1/N$) scaling with the number of atoms in the atomic sample. Our procedure makes use of the effective two-body atomic interactions obtained by double-passing an off-resonant probe laser through the atomic sample during atomic Larmor precession. Performing balanced polarimetry on the transmitted probe field provides a continuous measurement signal that can be used to estimate the value of the magnetic field. We report on numerical simulations of our proposed quantum parameter estimation procedure and describe our ongoing efforts to implement our proposal using room-temperature Cs atoms.

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