

Abstract Submitted
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Evanescent wave magnetometer¹ Z. WU, K. ZHAO, Department of Physics, Rutgers University — We describe a new type of atomic magnetometer, the evanescent wave magnetometer, which uses evanescent wave to measure the Larmor frequency of Rb atoms within a distance $\sim 10^{-5}$ cm from the cell surface. The evanescent wave magnetometer has an extraordinarily small measurement volume of alkali metal vapor, which in our experiment is 5×10^{-7} cm³. It is less susceptible to field inhomogeneities than conventional atomic magnetometers, and consequently suited for measuring or mapping fields with a large spatial gradient. Under our experimental conditions the minimum detectable magnetic field change is 0.4 nT. The sensitivity of the evanescent wave magnetometer is 20 pT Hz^{-1/2} between 0.5 and 50 Hz. Its spin shot-noise limited sensitivity is estimated to be 1.8 pT Hz^{-1/2} for a measurement time of 1 second when the spin coherence time is limited by spin exchange collisions.

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