

Quantum Physics

Stroboscopic back-action evasion in a dense alkali-metal vapor

G. Vasilakis, V. Shah, M.V. Romalis

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We explore experimentally quantum non-demolition (QND) measurements of atomic spin in a hot potassium vapor in the presence of spin-exchange relaxation. We demonstrate a new technique for back-action evasion by stroboscopic modulation of the probe light. With this technique we study spin noise as a function of polarization for atoms with spin greater than $1/2$ and obtain good agreement with a simple theoretical model. We point that in a system with fast spin-exchange, where the spin relaxation rate is changing with time, it is possible to improve the long-term sensitivity of atomic magnetometry by using QND measurements.

Subjects: **Quantum Physics (quant-ph)**; Atomic Physics (physics.atom-ph)

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