

Abstract Submitted  
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**Measurement backaction on a spinor condensate from off-resonant light** STEVEN STEINKE, College of Optical Sciences, University of Arizona, SWATI SINGH, ITAMP, Harvard-Smithsonian Center for Astrophysics, PIERRE MEYSTRE, College of Optical Sciences, University of Arizona, KEITH SCHWAB, Applied Physics, California Institute of Technology, MUKUND VEN-GALATTORE, Laboratory of Atomic and Solid State Physics, Cornell University — We study the quantum backaction of spin precession imaging measurements on a Bose-Einstein condensate by off-resonant light. Two main results are the derivation of a quantum jump operator describing the small, abrupt change in the spin state of the atoms caused by the detection of a single photon and a conditional stochastic master equation for the evolution of the condensate subject to a particular measurement record. We examine the implications of these backaction effects for magnetometry and also evaluate their utility in quantum state preparation.

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