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Magnetic phases in a spinor Bose-Einstein condensate subject to weak measurement HILARY HURST, Joint Quantum Institute and University of Maryland-College Park, I. B. SPIELMAN, Joint Quantum Institute, National Institute of Standards and Technology, and University of Maryland-College Park — Nondestructive imaging of spinor Bose-Einstein condensates (BEC) presents new opportunities for observing and manipulating macroscopic quantum phenomena in real time. In this talk I theoretically study harmonically trapped two-component BECs subject to weak measurement via phase contrast imaging. I discuss the application of weak measurement theory to spatially extended condensates and present a stochastic Gross-Pitaevskii equation for the condensate order parameter. I then examine the stability of spin-polarized and spin-unpolarized phases of the condensate subject to continuous weak measurement. Additionally, I demonstrate how weak measurement can be used to track the position of a domain wall between spin-polarized regions. I quantify the effects of measurement backaction on the stochastic dynamics of the domain wall and discuss how domain wall dynamics could be observed in experiment.

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