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Continuous Observation of Spinor Dynamics in a Sodium Bose-Einstein Condensate STEPHEN MAXWELL, YINGMEI LIU, SEBASTIAN JUNG, LINCOLN TURNER, PAUL LETT, National Institute of Standards and Technology — Optically trapped BEC is almost ten years old, but the rich physics of ultracold spin- changing collisions is only now being studied in detail. While collisions in a thermal gas are often thought of as random, incoherent events, in a Bose-Einstein condensate (BEC) the coherent nature of collisions becomes clear. We make use of an optically trapped sodium condensate in the F=1 hyperfine state to explore equilibria and dynamics in a system allowing spin-changing collisions. This system is antiferromagnetic and stably forms a single domain across the full dimensions of the condensate (in contrast to ferromagnetic F=1 Rb). Previously at NIST, we studied the nonlinear dynamics of Zeeman population oscillations in this system. In a new series of experiments, we continuously monitor the evolution of our BEC using a Faraday polarimeter. We observe the collective Larmor precession of the BEC in real time, limited by the scattering rate of the probe beam. Spin-collision dynamics are manifest as modulation of the Larmor carrier.

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