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A Raman Waveplate for Spinor BECs JUSTIN T. SCHULTZ, AZURE HANSEN, NICHOLAS P. BIGELOW, University of Rochester — Bose-Einstein condensates allow for the study of cold-atom analogs of other systems, particularly coherent optical systems. One subject not often explored in the context of atom optics is atomic spin as the analog of optical polarization, which can be described via the Stokes parameters. We present a method for measuring the Stokes parameters of a BEC using a two-photon Raman interaction in conjunction with Stern-Gerlach state separation and absorption imaging. The Raman interaction can be described by a Jones matrix for an arbitrary waveplate acting on the atomic ground states. The retardance is set by the pulse area, and the waveplate angle is set by the relative phase of the optical beams. This technique allows access to the relative phase of the ground states and is important for characterizing exotic spin textures (e.g. Full Bloch BECs) and for measuring the Gouy phase in matter waves.

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