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Progress Toward Coupling a Sample of Collectively Excited Atoms to a High Finesse Cavity[1] PATRICK ZABAWA, CHARLES EWEL, HARALD KUEBLER, SHAFFER JAMES, University of Oklahoma — Rydberg atom blockade, a phenomenon in which the excitation of more than one Rydberg atom in a certain radius is blocked due to long-range dipole-dipole and van der Waals forces, can be used to produce collective excitations within a sample of atoms. Given a small sample size and large blockade radius, this technique can be used to create non-classical states of light with a few or single photons without the need for addressing individual atoms. We report on our progress in the design and construction of an apparatus that will exploit the Rydberg blockade effect in a sample of ultracold ^{87}Rb atoms that is confined to the mode of a high finesse optical cavity. Magnetic transport will be used to move atoms from a magneto-optical trap to the cavity. Early experiments will involve confirmation of the Rydberg blockade effect, testing the magnetic transporter, and characterization of the coupling between the optical cavity and the sample.

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