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Subwavelength Localization of Atomic Excitation Using Electromagnetically Induced Transparency JARED MILES, DIPTARANJAN DAS, ZACH SIMMONS, DENIZ YAVUZ, University of Wisconsin in Madison — The diffraction limit sets a minimum size for regions that can be resolved or addressed using light. We demonstrate an experiment where excitation of atoms to a specific hyperfine level is confined to small regions ∼100nm, about 8 times smaller than the excitation wavelength. The experiment is performed using 87Rb atoms trapped in an optical dipole trap and utilizes ∼100ns EIT pulses. The technique uses the nonlinear power dependence of EIT to coherently transfer atoms only near the nodes of a standing wave. Increasing the standing wave intensity can produce vanishingly small low-intensity areas about the nodes and as a result atomic transfer only occurs in these small areas. Since regions smaller than the diffraction limit cannot be directly imaged, confirmation of narrowing is provided by an autocorrelation measurement technique.

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