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Electromagnetically Induced Transparency in Buffer-gas-cooled Rb Vapor TAO HONG, DAVID PATTERSON, ALEXEY GORSHKOV, ALEXANDER ZIBROV, MIKHAIL D. LUKIN, JOHN DOYLE, MARA PRENTISS, Harvard-MIT Center for Ultracold Atoms, Department of Physics, Harvard University — We demonstrate a novel experimental system for coherent quantum and nonlinear optics. Using a He buffer gas to cool Rb vapor to 4.2 K produces an atomic sample with an optical depth (OD) exceeding 70 that supports electromagnetically induced transparency (EIT) with transmission as high 50%, allowing us to systematically study EIT at large optical depths. We find that the two-photon EIT resonance that is a single peak at low optical depths splits into several peaks as the optical depth increases above 20. Detailed theoretical modeling indicates that the splitting is due to four wave mixing. Finally, we report the observation of slow pulse propagation with pulse delays of 10 μs – exceeding three times the input pulse width.

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