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Toward Nonlinear Optics with Confined Photons and Atoms VLATKO BALIC, Physics Department, Harvard University, Cambridge, MA, MICHAL BAJCSY, Physics Department, Harvard University; DEAS, Harvard University, Cambridge, MA, ALEXANDER S. ZIBROV, Physics Department, Harvard University, Cambridge, MA; Lebedev Institute of Physics, RAS, Moscow, Russia, VLADAN VULETIC, Department of Physics, MIT, Cambridge, MA, MIKHAIL D. LUKIN, Physics Department, Harvard University, Cambridge, MA — Cold atoms trapped inside a hollow core photonic bandgap fiber create medium with unique optical properties, such as large optical depth and long coherence times. Furthermore, the fiber itself guides the interacting light in tight spatial confinement over distances not limited by diffraction and dramatically increases electric field intensity. Optical nonlinearities achievable under these conditions can be potentially used for coherent nonlinear interactions between single photon light pulses. In this work we present an atom cooling and trapping setup that loads cold Rb atoms into a dipole trap localized within the hollow core of the fiber and we study properties of the cold Rb atoms confined in the fiber.

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