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Cold Atoms inside a Hollow Core Photonic Crystal Fiber SEBASTIAN HOFFERBERTH, MICHAL BAJCSY, VLATKO BALIC, Harvard University, THIBAULT PEYRONEL, MIT, ALEXANDER ZIBROV, Harvard University, VLADAN VULETIC, MIT, MIKHAIL LUKIN, Harvard University — Cold atoms confined inside a hollow core photonic crystal fiber are a promising medium for studying nonlinear optical interactions at extremely low light levels. Confinement of both atoms and photons inside the fiber core to a diameter of just a few wavelengths results in high electric field intensity per photon and large optical depths with a relatively small number of atoms. Additionally, the interaction length of atoms and photons is not limited by diffraction. We describe recent progress in our experiment that uses a combination of magnetic trapping and a red-detuned optical dipole trap to load cold Rb87 atoms into the hollow-core fiber. We present a detailed study of the loading process and characterization of the atomic ensemble in the fiber. Recent results of few photon nonlinear optics experiments are also discussed.

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