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Cold Atoms inside a Hollow-Core Photonic-Crystal Fiber

VLATKO BALIC, MICHAL BAJCSY, Harvard University, ALEXANDER ZIBROV, Harvard University; Lebedev Institute of Physics, RAS, VLADAN VULETIC, MIT, MIKHAIL LUKIN, Harvard University — Cold atoms confined inside a hollow-core photonic-crystal fiber with core diameters of a few photon wavelengths are a promising medium for studying nonlinear optical interactions at extremely low light levels. The high electric field intensity per photon, large optical depths, and interaction lengths not limited by diffraction are some of the unique features of this system. We describe recent progress in our experiment that uses a combination of magnetic trapping and a red-detuned optical dipole trap to transfer cold Rb87 atoms into the hollow-core fiber. We present data on transfer efficiencies as well as preliminary experiments towards nonlinear optics with few-photon pulses.

Michal Bajcsy
Harvard University

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