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Cold atoms inside a hollow core fiber for few-photon nonlinear optics THIBAULT PEYRONEL, MIT Physics Dept, CUA, SEBASTIAN HOFFERBERTH, MICHAL BAJCSY, Harvard Physics Dept, CUA, SOFIA MAGKIRIADOU, Harvard Physics Dpt, CUA, QIYU LIANG, MIT Physics Dept, CUA, MICHAEL GULLANS, ALEXANDER ZIBROV, Harvard Physics Dpt, CUA, VLADAN VULETIC, MIT Physics Dpt, CUA, MIKHAIL LUKIN, Harvard Physics Dpt, CUA — Typically, interactions of light beams in nonlinear media are very weak at low light levels. Strong interactions between few-photon pulses require a combination of large optical nonlinearity, long interaction time, low photon loss, and tight confinement of the light beams. Here, we present an approach to overcome these issues that makes use of an optically dense medium containing a few hundred cold atoms trapped inside the hollow core of a photonic crystal fiber. In this poster we describe the experimental improvements to load, probe and manipulate cold atoms inside the hollow core of the fiber. We also discuss recent experiments regarding nonlinear optical interactions at extremely low-light levels. Especially, the use of EIT and slow-light opens the way to few-photon efficient all-optical switching.

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