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Coherent Interactions with Rubidium Atoms Confined in a Hollow-Core Photonic Band-Gap Fiber SAIKAT GHOSH, AMAR BHAGWAT, CHRISTOPHER KYLE RENSHAW, SHIREEN GOH, ALEXANDER GAETA, Applied and Engineering Physics, Cornell University, BRIAN KIRBY, Sibley School of Mechanical and Aerospace Engineering, Cornell University — The creation of a significant density of alkali atoms within a hollow-core fiber offers significant promise for applications in extremely low-light level nonlinear optics. However, such a system has proven to be challenging to realize experimentally. We use the phenomenon of light-induced atomic desorption in a surface-modified hollow-core photonic bandgap fiber to produce a significant density of Rubidium atoms throughout its length. A theoretical analysis of the system is in good agreement with our experimental observations. We use this system to demonstrate electromagnetically induced transparency in the fiber with control field powers as low as 20 nW. Issues regarding decoherence and optical delays are studied experimentally and theoretically.

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