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Controlled generation of Rb-vapor in hollow-core photonic bandgap fibers AMAR BHAGWAT, AARON SLEPKOV, VIVEK VENKATARAMAN, PABLO LONDERO, ALEXANDER GAETA, Cornell University — Hollow-core photonic bandgap fibers (HC-PBGF) offer a unique geometry for performing strong nonlinear interactions with atomic vapors at very low light powers over long interaction lengths. The difficulties associated with generating, accessing, and maintaining stable atomic vapors within HC-PBGF remain the main challenges to such experiments. By chemically modifying the inner core walls of these fibers, we use light-induced atomic desorption to liberate surface-adsorbed Rb atoms. We perform time-resolved studies of atomic desorption dynamics to map out the characteristic timescales associated with the process. We find that by appropriately controlling the power and duration of the desorption beam we obtain metastable, optically-dense, and repeatable densities of Rb without appreciably depleting the fiber, and we demonstrate the use of this vapor for quantum optical applications at nanowatt optical powers.

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