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Guiding atoms in a hollow-core photonic bandgap fiber
MATTHEW BIGELOW, TETSU TAKEKOSHI, CARL MAES, RANDY KNIZE, US Air Force Academy — We discuss the current progress of our experiment to guide rubidium atoms in hollow-core photonic bandgap fiber. The atoms are contained within the hollow region of the fiber by the dipole potential created with a strong red-detuned laser. This technique has several significant advantages over other atom guiding experiments using hollow core fiber. First, the design of the air/silica structure allows low attenuation propagation (< 0.1 dB/m) at certain wavelengths down the hollow core. As a result, the optical potential is uniform over the length of the fiber. Also, the light field is almost exclusively inside the hollow core, and it is relatively easy to couple light into the fiber. Since the field inside the fiber can be relatively high, it is possible to detune the laser far from resonance while maintaining a strong dipole potential, and thereby greatly reduce the scattering rate. We acknowledge support from the Air Force Office of Scientific Research and the National Science Foundation under Grant No. 0355202.

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