Abstract Submitted
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Inhomogeneous broadening of optical transitions of ^{87}Rb atoms in nanofiber-based optical lattices[1] J. LEE, J.A. GROVER, J.E. HOFFMAN, P. SOLANO, L.A. OROZCO, S.L. ROLSTON, JQI, UMD and NIST, College Park, MD 20742, USA — We demonstrated nanofiber-based optical lattices [1] for ^{87}Rb atoms using two-color evanescent trapping fields of 750nm and 1064nm lights which are not magic wavelengths for Rb. Rb atoms in our lattices experience strong light shifts (to the blue) on $5P_{3/2}$ to all upper transitions, and the absorption profile is shifted to the blue. In addition, the ellipticity of a HE11 mode leads Zeeman broadening both on $5P_{3/2}$ and $5S_{1/2}$ due to vector light shifts. Here we present experimental results and a quantitative study of this inhomogeneous broadening based on light shifts, atomic temperature distribution, and population redistribution. The results can be used to estimate atom number and atom temperature with uncertainty of light polarization states, initial atom loading, and heating process in the experiment.

[1] E. Vetsch, et al., Phys. Rev. Lett. 104, 203603 (2010); A. Goban, et al., Phys. Rev. Lett. 109, 033603 (2012).

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