Progress towards Bloch Oscillations of Yb in an optical lattice to search for ultra-light dark matter

CHANDLER SCHLUPF, ROBERT NIEDERRITER, PAUL HAMILTON, University of California, Los Angeles — We present the latest developments of an atomic sensor sensitive to oscillating forces. The device consists of ytterbium atoms loaded into an in-vacuum optical cavity. The atoms undergo Bloch oscillations in the lattice potential driven by an external force such as gravity. Cavity parameters were optimized for efficient atom-light coupling, such that the output light of the cavity is modulated at the Bloch frequency [1]. New fields, such as ultra-light dark matter, can create oscillating forces which would be detected through oscillations in the Bloch frequency[2]. This technique allows for continuous measurements in a small volume over a long coherence time.
