Abstract Submitted
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Progress towards a force sensor using Bloch oscillations to constrain dark matter theories[1] CHANDLER SCHLUPF, ROBERT NIEDERRITER, KAYLA RODRIGUEZ, PAUL HAMILTON, University of California, Los Angeles — We are developing an apparatus to search for physics beyond the Standard Model, such as ultra light dilaton dark matter [1]. This apparatus will use laser-cooled ytterbium to measure forces by observing Bloch oscillations of the atoms in an optical lattice [2]. This technique permits continuous measurements in a small volume with long coherence times providing sensitivity to time-varying forces, such as those expected from axion-like dark matter candidates. We present progress towards this goal, including the development of an optical cavity to maximize the consrast of Bloch oscillations. [1] A. Arvanitaki, J. Huang, and K. Van Tilburg, Searching for dilaton dark matter with atomic clocks", Physical Review D 91, 015015 (2015). [2] B. Prasanna Venkatesh, M. Trupke, E. A. Hinds, and D. H. J. O'Dell, Atomic Bloch-Zener oscillations for sensitive force measurements in a cavity", Physical Review A 80, 063834 (2009).

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