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Progress towards a test of the universality of free fall using a ^{6}Li/^{7}Li atom interferometer GEENA KIM, University of California at Berkeley, PAUL HAMILTON, DENNIS SCHLIPPERT, HOLGER MÜLLER — Many extensions of the standard model of physics, e.g. Kaluza- Klein theories, string theory, and supersymmetry, introduce new interactions which lead to violations of the universality of free fall (UFF). We discuss progress towards a proposed dual matter-wave interferometer which will measure the differential acceleration of ^{6}Li and ^{7}Li atoms. The difference in the baryon-to-lepton number ratio and nuclear binding energy for these two species gives higher sensitivity than many other proposed tests of UFF. However, the high thermal velocity of lithium, due to its light mass, leads to large atom loss in a traditional interferometer. To overcome this, an optical lattice will confine the lithium atoms during the interferometry sequence. Manipulations of the optical lattice will split the matter waves and hold the arms of the interferometer apart for many seconds in a compact apparatus. This large separation time leads to an anticipated accuracy of 10^{-14} g in the differential acceleration. We discuss possible systematic effects and show that many will be common mode to the two species. Finally we will review technical progress on the experiment and recent investigations into novel cooling techniques for lithium.

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