

Abstract Submitted
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Search for anomalous spin-mass coupling with a rubidium magnetometer¹ IAN LACEY, L.R. JACOME, LOK FAI CHAN, SAHAR MUHSIN, California State University - East Bay, ALEC BOYD, Pomona College, ERIC BAHR, SRIKANTH GUTTIKONDA, DEREK KIMBALL, California State University - East Bay — We report on progress of our experiment using a dual-isotope rubidium magnetometer to search for a hypothetical long-range coupling between Rb nuclear spins and the mass of the Earth. The valence electron dominates magnetic interactions and serves as a precise co-magnetometer for the nuclei in a simultaneous measurement of Rb-85 and Rb-87 spin precession frequencies, enabling accurate subtraction of magnetic perturbations. The construction and optimization of the apparatus is nearly complete, and we are now addressing several technical sources of noise and studying potential sources of systematic error. The optimized dual-isotope Rb magnetometer has sufficient shot- noise-projected sensitivity to improve experimental limits on long-range spin-mass couplings by an order of magnitude in general and by two orders of magnitude for the proton spin in particular.

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