

Abstract Submitted  
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**New Torsion Balance Search for Spin-Spin Forces** CLAIRE CRAMER, University of Washington, BLAYNE HECKEL, ERIC ADELBERGER — We report preliminary results from our new torsion balance search for interactions coupling polarized electron spins. We record the torque on a pendulum containing  $10^{23}$  spin-polarized electrons as a function of its angle with respect to large sources of spin-polarized electrons placed outside the torsion balance apparatus. Results can be interpreted as constraints on axion-like pseudoscalar couplings, the exchange of general low-mass bosons constrained only by rotational and translational invariance, and on forces mediated by the Nambu-Goldstone bosons that would arise in the context of spontaneously broken Lorentz symmetry. These Goldstone bosons, often referred to as the “ghost condensate” because they have a negative kinetic term in the Lagrangian stabilized by higher order terms, are particularly interesting because the energy scale accessible to our experiment is the scale on which they could contribute either to Dark Energy or Dark Matter. We will present the first experimental search for the unique signature of the ghost condensate’s interaction with Standard Model fermions.

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