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Precision Search for Lorentz and CPT-violating Interactions in the Electron Sector CLAIRE CRAMER, University of Washington, BLAYNE HECKEL, ERIC ADELBERGER — We report recent results from an experimental search for Lorentz and CPT-violating forces coupling to spin-polarized electrons. We record the torque on a pendulum containing 10^{23} polarized electrons as a function of its angle with respect to large sources of spin-polarized electrons placed outside the torsion balance apparatus or with respect to a Lorentz-violating background field fixed in space. Our constraints on the background field are complementary to constraints in the proton and neutron sectors from maser and co-magnetometer experiments. Spin-spin results can be interpreted as constraints on axion-like pseudoscalar couplings, the exchange of 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 preliminary results from the first experimental search for the unique signature of the ghost condensate's interaction with Standard Model fermions.

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