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A Cryogenic Torsion Balance for Tests of the Equivalence Principle[1] FRANK FLEISCHER, ERIC ADELBERGER, University of Washington, MASSIMO BASSAN, Università di Roma Tor Vergata, BLAYNE HECKEL, University of Washington — Almost all theories of physics "beyond the standard model" predict the existence of new, weak interactions that violate the equivalence principle (EP) at some level. Consequently, precise tests of the EP are a sensitive probe for new physics. The best limits on EP violations currently come from torsion balance experiments, where the dominant contribution to the error budgets are due to thermal noise. To achieve a higher sensitivity to extremely weak forces, we have built a cryostat designed to operate a torsion balance near liquid helium temperature. For cooling, we employ a commercially available pulse tube cooler. The extreme sensitivity of torsion balances to seismic noise required special attention to isolating the vibrations of the pulse-tube cooler from the torsion balance. Results from first tests of the noise performance of the apparatus will be presented.

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