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Test of Lorentz Invariance at the South Pole Using a Rotating Co-magnetometer[1] MARC SMICIKLAS, MICHAEL ROMALIS, Princeton University — Among various experiments used to test Lorentz invariance, one of the most sensitive laboratory techniques is a measurement of nuclear spin-precession, descendant from the original Hughes and Drever experiments. In recent years, our rotating co-magnetometer has set the most stringent limits on vector and tensor Lorentz violation for fermions. A major limiting factor of spin-precession measurements is a large background signal due to the projection of the Earth's rotation onto the sensitive axis of the co-magnetometer, which also acts as a sensitive gyroscope. To greatly suppress this background, we present our plans to move the rotating co-magnetometer experiment to the South Pole Station, where the Earth's rotation direction and the direction of local gravity coincide. Rotating the co-magnetometer around this axis will eliminate any terrestrial background signals. We will present the latest results for the short-term sensitivity of the comagnetometer, which should enable an improvement of the current Lorentz-violation limits by three orders of magnitude at the South Pole.

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