Abstract Submitted
for the APR15 Meeting of
The American Physical Society

South Pole Lorentz Invariance Test MORGAN HEDGES, MARC SMICIKLAS, MICHAEL ROMALIS, Princeton University — Tests of Lorentz and CPT symmetries are important because they form a cornerstone of quantum field theory and general relativity. To test one of the consequences of local Lorentz invariance we have performed a precision test of spatial isotropy at the Amundsen-Scott station near the geographic South Pole. This location provides the most isotropic environment available on Earth. We use an atomic spin co-magnetometer to compare energy levels in ^{21}Ne and Rubidium atoms as the apparatus rotates with respect to the cosmos. Our experimental sensitivity is more than an order of magnitude greater than in previous such measurements, known as Hughes-Drever experiments. By operating at the South Pole we eliminate background signals due to the gyroscopic interactions of spins with Earth's rotation as well as diurnal environmental effects. The experiment has finished a 2-year data collection period and we expect to present the final results at the meeting. This is the first precision atomic physics experiment performed at the Pole and we will discuss the potential for future such measurements.

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Date submitted: 09 Jan 2015 Electronic form version 1.4