

Abstract Submitted
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A K-Rb-²¹Ne Comagnetometer for Tests of Fundamental Symmetries and Inertial Rotation Sensing¹ JUSTIN BROWN, MARC SMICIKLAS, LAWRENCE CHEUK, MICHAEL ROMALIS, Princeton University — The K-³He noble gas comagnetometer has already set the most stringent limit on possible Lorentz and CPT violation coupling to nuclear spin and on long-range nuclear spin-dependant forces. The comagnetometer is mounted on a rotating platform for reorientation of the sensitive axis in the horizontal plane that is a key to improved tests of spatial isotropy. Replacement of ³He with ²¹Ne provides an order of magnitude improvement in sensitivity to non-magnetic nuclear spin interactions due the smaller gyromagnetic ratio of ²¹Ne. Because ²¹Ne has $I = 3/2$, the experiment is also sensitive to tensor Lorentz-violating effects that do not break CPT symmetry. The comagnetometer also works as a sensitive gyroscope that is potentially competitive with fiber-optic and atomic Sagnac interferometers. We will describe our current development of the K-Rb-²¹Ne comagnetometer as a gyroscope and a precision measurement tool. Finally, we discuss the advantage and future plans for Lorentz Violation tests at the South Pole for removal of Earth's rotation rate as a background systematic effect.

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