Contribution ID: **106** Type: **Oral**

Experimental search for Violation of Lorentz Symmetry

Monday, 11 October 2010 15:00 (30 minutes)

Violation of Lorentz symmetry arises in many extensions of the Standard Model aiming to include quantum gravity. Violation of CPT symmetry also necessarily leads to breaking of Lorentz symmetry, allowing CPT tests without the use of anti-particles. Spin coupling to a preferred frame naturally arises in many such models.
We use a K-^{3}He co-magnetometer to constrain neutron spin coupling to a Lorentz and CPT violating background field, $|b_n| < 3.710^{-33}$ GeV, improving previous limit by a factor of 30. I will also discuss future prospects for improving these limits by using ^{2}1Ne atoms and placing the experiment on the South Pole to eliminate the systematic effect due to Earth's rotation.

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Session Classification: Session Mo - 3

Track Classification: Searches for symmetry violations