Testing Lorentz Symmetry using Deuterium

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The Standard Model (SM) and the General relativity (GR) construct our best understanding of the fundamental forces of nature so far. There have been many effective field theory approaches, which try to close the gap between SM and GR at Planck Scale. However Planck scale suppression makes observable experimental signatures originating from such theories extremely tough to deal with. Based on effective field theory the Standard Model Extension (SME) [1] incorporates the SM and GR in the limit of vanishing Lorentz Symmetry and provides a basis for experimental and theoretical investigations of Lorentz symmetry violation [2].

Within SME framework the shifts in the hyper-fine energy levels in deuterium depend on the expo- nents of relative momentum of the proton in the deuteron core, which enhances the sensitivity to Lorentz and CPT violation for certain coefficients by 9- and even upto 18- orders of magnitude [3]. It also predicts the appearance of Lorentz violating signals at twice the sidereal frequency. These could be measured with transitions with $\Delta F \neq 0$. This poster would address the new spectrometer (Double split ring resonator [4, 5]) built for such measurements and the current experimental progress.

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