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Probing for Lorentz Symmetry Violation in Electrons Using Trapped Yb^+ Ions NOAH SCHLOSSBERGER, PHIL RICHERME, Department of Physics, Indiana University Bloomington — Violations of local Lorentz invariance (LLI) are predicted by many physical theories beyond the standard model which attempt to unify gravity with other fundamental forces. Using an analogue of the Michelson-Morley test with trapped Ca^+ ions [Nature 517, 592–595 (2015)], the current bound for LLI of electrons is less than 1 part in 10^{-18} . By instead performing the measurements with Yb^+ ions, which exhibit enhanced sensitivity to LLI breaking effects and much longer measurement times, we can push the bounds lower by 5 orders of magnitude. In this presentation, I outline an experimental configuration for such an experiment, laying out a measurement algorithm, addressing experimental concerns, and discussing necessary hardware. The experiment is specifically designed to utilize the existing ion trap apparatus in place at the Richerme lab at Indiana University Bloomington.

Noah Schlossberger
Department of Physics, Indiana University Bloomington

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