Abstract Submitted
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Searching for New Fundamental Physics with Polyatomic Molecules[1] NICHOLAS HUTZLER, Caltech — The fact that the universe is made entirely out of matter, and contains no free anti-matter, has no explanation. While we don't understand the process that created the matter in the universe, we know that it must violate a number of fundamental symmetries, including those that forbid the existence of certain permanent electromagnetic moments. We can search for signatures of these moments via precision measurements in polar molecules, whose extremely large internal fields can significantly amplify their signatures. These effects would arise from physics beyond the Standard Model, which enables table top searches for new, symmetry-violating particles and forces. These searches currently reach into the TeV scale, and offer many routes to even higher scales. In this talk, I will discuss ongoing efforts to extend these tabletop measurements to polyatomic molecules, whose complex structure offers a unique opportunity to combine robust precision measurement techniques with advanced cooling, trapping, and control techniques. This will enable experiments with high sensitivity in a variety of new physics sectors, both leptonic via the electron electric dipole moment and hadronic via nuclear moments enhanced by deformed nuclei, and offers several routes to exploring the PeV scale.

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