

PHAS Colloquium:

A tabletop-scale probe for TeV-scale physics:
the electric dipole moment of the electron

ABSTRACT

Violation of time-reversal (T) symmetry is observed in K- and B-meson systems, and these measurements are explained within the Standard Model (SM) of electroweak interactions. However, additional sources of T violation are needed to explain the cosmological asymmetry between matter and antimatter. In the presence of T-violation, elementary particles such as the electron can have an electric dipole moment (EDM) along their spin axis. The SM prediction for the electron EDM is nonzero, but too small to detect. By contrast, extensions to the SM frequently predict EDMs within experimental reach. Our ACME experiment uses methods of atomic and molecular physics to detect the electron EDM, and we recently completed the most sensitive search for this quantity. Our result for the EDM is consistent with zero, but sets a limit ten times smaller than any previous work. Remarkably, the result of this tabletop-scale experiment sets strong constraints on theories of physics beyond the Standard Model. In many specific models, the ACME probes physics associated with new particles whose mass is well above the few-TeV scale explored directly at the Large Hadron Collider.

Image: Artist's rendition of quantum vacuum fluctuations around an electron.
Image Credit: Nicole R. Fuller, National Science Foundation.
Poster Designed By: Neil McCall (neilmcl@my.yorku.ca)

DATE: January 29th, 2019

TIME: 2:30 PM

LOCATION: PSE 317

SPEAKER

David DeMille

Yale University

**THERE WILL
BE SNACKS**

ALL ARE WELCOME

