Contribution ID: **179** Type: **Plenary Presentation (by invitation only)**

An EDM search experiment with ultracold polyatomic molecules

Wednesday, 20 October 2021 09:45 (30 minutes)

Polar molecules, due to their intrinsic electric dipole moment and their controllable complexity, are a powerful platform for precision measurement searches for physics beyond the standard model (BSM) and for quantum simulation/computation. This has led to many experimental efforts to cool and control molecules at the quantum level. I will discuss our results on the laser cooling of molecules into the ultracold regime, the search for the electric dipole moment of the electron (EDM), and future prospects for the use of polyatomic molecules to greatly improve the search for the EDM, which would broadly probe for - in the not to distant future - PeV level CP violating new particles. I will briefly discuss the creation of an optical tweezer array of ultracold CaF molecules, as well as the search for the EDM using cold ThO molecules (the ACME experiment, which has already broadly probed for > 1 TeV physics). I will focus on the prospects for laser cooling of the polyatomic molecules, in particular the laser cooling of YbOH for a new experiment, dubbed PolyEDM. More broadly, polyatomic molecules have attracted new focus as potential novel quantum resources that have distinct advantages (and challenges) compared to both atoms and diatomic molecules. I will discuss how some key features of polyatomic molecules can be used to enhance applications in fundamental symmetry tests, searches for dark matter, and the search for CP-violating BSM physics.

Primary author: Prof. DOYLE, John (Harvard University)

Presenter: Prof. DOYLE, John (Harvard University)

Session Classification: Plenary Presentations

Track Classification: Plenary sessions: Plenary presentations