

## ADVANCING EDM SEARCHES WITH ULTRACOLD RADIOACTIVE MOLECULES AT FRIB

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Searches for non-zero electric dipole moment (EDM) in fundamental particles shed light on discrete symmetries of nature and constrain new physics beyond the Standard Model. The most sensitive electron EDM and many ongoing nuclear EDM searches are performed with molecules, benefiting from the substantial intra-molecular electric field. At the Facility for Rare Isotope Beams (FRIB), we are building a new generation of EDM searches using ultracold radioactive molecules. This project will leverage the unique opportunity to access pear-shaped nuclei (e.g.  $^{225}\text{Ra}$ ) at FRIB, and the state-of-the-art technology in precision measurement using polar molecules. The former amplifies the Nuclear Schiff Moment and hence the sensitivity to hadronic  $\mathcal{CP}$ -violation, thanks to the nuclear octupole deformation. The latter, built upon recent advances in atomic and optical physics, aims to bring the  $^{225}\text{Ra}$ -containing molecules into the ultracold regime, where both high phase-space density and seconds-long spin precession time have been demonstrated. With the nuclear enhancement and the quantum upgrades combined, this new project envisions to enhance the EDM sensitivity by orders of magnitude from the current best effort.