EDM measurements on cold $^{225}\text{Ra}$ and $^{171}\text{Yb}$ atoms

TIAN XIA, University of Science and Technology of China, MATTHEW DIETRICH, Argonne National Laboratory, ZHENG-TIAN LU, University of Science and Technology of China, RA-EDM COLLABORATION — EDM measurements on diamagnetic atoms probe CP-violating effects in the nucleus. Some types of these Beyond-Standard-Model effects are known to be strongly enhanced in $^{225}\text{Ra}$ due to octupole deformation of the nucleus. Other favorable characteristics of $^{225}\text{Ra}$ include a high atomic number ($Z = 88$), a ground state of $^1\text{S}_0$, and a nuclear spin 1/2. An EDM search is carried out on this radioactive isotope (half-life 15 d) using laser-cooled atoms. Meanwhile, the stable isotope $^{171}\text{Yb}$ shares several characteristics, including $^1\text{S}_0$ and nuclear spin 1/2, and is particularly useful as a proxy of $^{225}\text{Ra}$ for developing laser trapping and probing techniques, for testing various measurement schemes, and for investigating systematic errors. Furthermore, $^{171}\text{Yb}$ atoms can be placed within 0.1 mm of $^{225}\text{Ra}$, and act as a co-magnetometer. A laser trap of Yb atoms for an EDM measurement is under development.

$^1$National science foundation of China, Chinese academy of science, Department of energy

Tian Xia
Univ of Sci & Tech of China