

The Radium-225 Experiment

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Due to its large nuclear octupole deformation and high atomic mass, the radioactive isotope ^{225}Ra is a favorable case to search for an electric dipole moment (EDM); it is particularly sensitive to CP-violating interactions in the nucleus. However, its scarcity and low vapor pressure present significant challenges. To measure this rare isotope, we have developed an approach to measuring atomic EDMs by using lasers to cool radium atoms to 40 micro-Kelvin, and then we trap those atoms in an optical dipole trap. The atoms are then allowed to precess in magnetic and strong electric fields. Using this method, we have found the EDM of radium to be less than 1.4×10^{-23} e-cm (95% C.L.). Upcoming improvements are expected to dramatically improve our sensitivity, and significantly improve on the search for new physics in several sectors.

E-mail

mdietrich@anl.gov

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Primary author: Dr DIETRICH, Matthew (Argonne National Laboratory)

Presenter: Dr DIETRICH, Matthew (Argonne National Laboratory)

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