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The Electric Dipole Moment of Radium[1] MATTHEW DIETRICH, MICHAEL BISHOF, KEVIN BAILEY, JOHN GREENE, ROY HOLT, Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA, WOLFGANG KORSCH, Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506, USA, ZHENG-TIAN LU, Physics Department, University of Science and Technology of China, Hefei, China, PETER MUELLER, THOMAS O'CONNOR, Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA, TENZIN RABGA, ROY READY, JAIDEEP SINGH, National Superconducting Cyclotron Laboratory and Department of Physics and Astronomy, Michigan State University, East Lansing, Michigan 48824, USA — Due to its large nuclear octupole deformation and high atomic mass, the radioactive Ra-225 isotope is a favorable case for an electric dipole moment (EDM); it is particularly sensitive to CP-violating interactions in the nuclear medium. We have developed a cold-atom approach of measuring the atomic EDM of Ra-225 atoms held stationary in an optical dipole trap. We previously demonstrated this technique with an initial experimental upper limit of $|d(225Ra)|<5e\text{-}22$ e-cm (95% C.L.), and have since improved this limit 36-fold to 1.4e-23 e-cm. This is not only the first time laser-cooled atoms have been used to measure an EDM, but also the first time the EDM of any octupole deformed species has been measured. Upcoming improvements are expected to dramatically improve our sensitivity, and significantly improve on the search for new physics in several sectors. This work is supported by U.S. DOE, Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH11357.

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