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Improved experimental limit on the EDM of ^{225}Ra[1] MICHAEL BISHOF, KEVIN BAILEY, Argonne National Laboratory, MATTHEW R. DIETRICH, Northwestern University, JOHN P. GREENE, ROY J. HOLT, Argonne National Laboratory, MUKUT R. KALITA, WOLFGANG KORSCH, University of Kentucky, NATHAN D. LEMKE, Argonne National Laboratory, ZHENG-TIAN LU, Argonne National Laboratory, University of Chicago, PETER MUELLER, TOM P. O'CONNOR, Argonne National Laboratory, RICHARD H. PARKER, University of Chicago, TENZIN RABGA, JAIDEEP T. SINGH, Michigan State University — Searches for permanent electric dipole moments (EDMs) in fundamental and composite particles are sensitive probes of beyond-standard-model symmetry violation that could explain the dominance of matter over anti-matter. The ^{225}Ra ($t_{1/2}$ =15d, I=1/2) atom is a particularly attractive system to use for an EDM measurement because its large nuclear octupole deformation, closely spaced ground-state parity doublet, and large atomic mass make ^{225}Ra uniquely sensitive to symmetry-violating interactions in the nuclear medium. We have developed an experiment to measure the EDM of ^{225}Ra and demonstrated the first "proof-of-principle" measurement, giving a 95% confidence upper limit of 5E-22 e-cm. After implementing a vacuum upgrade, we have observed nuclear spin coherence after 20 s of free evolution – a factor of ten improvement over our earlier results - and have lowered the ^{225}Ra EDM limit by over an order of magnitude. Upcoming experimental upgrades have the potential to further improve our EDM sensitivity by many orders of magnitude, allowing us to test symmetry violation at an unprecedented level.

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