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An improved limit on the EDM of ^{225}Ra[1] MICHAEL BISHOF, KEVIN BAILEY, MATTHEW R. DIETRICH, JOHN P. GREENE, ROY J. HOLT, Argonne Natl Lab, MUKUT R. KALITA, WOLFGANG KORSCH, University of Kentucky, NATHAN D. LEMKE, Argonne Natl Lab, ZHENG-TIAN LU, University of Science and Technology of China, PETER MUELLER, THOMAS P. O'CONNOR, Argonne Natl Lab, RICHARD H. PARKER, University of Chicago, TENZIN RABGA, JAIDEEP T. SINGH, Michigan State University — Searches for permanent electric dipole moments (EDMs) are sensitive probes of symmetry violation that could explain the dominance of matter over anti-matter. The ^{225}Ra ($t_{1/2}$ =15 days, I=1/2) atom is a particularly attractive system to use for an EDM measurement because its octupole-deformed nucleus, closely spaced ground-state parity doublet, and large nuclear charge make ^{225}Ra uniquely sensitive to symmetry-violating interactions in the nuclear medium. In 2015, we reported the first "proof of principle" measurement of the ^{225}Ra EDM, giving a 95% confidence upper limit of $5*10^{-22}$ e-cm; representing the first EDM measurement using laser-trapped atoms as well as the first EDM measurement of an atom with an octupole-deformed nucleus. After implementing upgrades to our apparatus, we now observe nuclear spin coherence after 20 s of free evolution – a factor of ten improvement. A new EDM measurement based on the upgraded system improved the 95% confidence upper limit by a factor of 36. We also report on the progress of current experimental upgrades that 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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