Improved limit on the radium-225 electric dipole moment

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Searches for permanent electric dipole moments (EDMs) are sensitive to time-reversal, parity, and charge-parity (CP) violation, and, as such, are excellent probes for physics beyond the Standard Model. $^{225}$Ra ($t_{1/2}=15$d, $I=1/2$) is a particularly attractive system to use for an EDM search because its large nuclear octupole deformation makes it uniquely sensitive to CP-violating interactions in the nuclear medium. We have developed an experiment to measure the EDM of $^{225}$Ra based on laser cooling and trapping techniques, demonstrated a first proof-of-principle measurement [1], and, most recently, have significantly improved the sensitivity of our instrument to set an upper limit for the $^{225}$Ra EDM of $1.4 \times 10^{-23}$ e cm (95% C.L.)[2]. Upcoming experimental upgrades have the potential to improve our EDM limit by additional orders of magnitude.

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