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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 ($t_{1/2}=15\text{d}$, $I=1/2$) 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 1.4×10^{-23} e cm (95% C.L.) [2]. Upcoming experimental upgrades have the potential to improve our EDM limit by additional orders of magnitude.

[1] R.H. Parker et al., PRL 114, 233002 (2015)

[2] M. Mishof et al., PRC 94, 025501 (2016)

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