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Radium-225: The Path to a Next Generation EDM Measurement[1]

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Permanent electric dipole moments (EDMs) in atoms or molecules are signatures of time (T)- and parity (P)-violation. Experimental searches for these EDMs represent an excellent window to physics beyond the standard model. In the nuclear sector, the best limits for EDMs are currently set by measurements on the neutron and the diamagnetic atom ^{199}Hg. A promising avenue for extending these searches is to take advantage of the large enhancement in the atomic EDM predicted for heavy octupole-deformed nuclei, as can be found in the radium and radon isotopic chains. One of these favorable case is ^{225}Ra, which is calculated to be two to three orders of magnitude more sensitive to T-violating interactions than ^{199}Hg. We are developing a next generation EDM search around laser-cooled and trapped ^{225}Ra, which involves measuring the nuclear spin precession of polarized ^{225}Ra atoms confined in an optical dipole trap. I will report on our recent experimental progress and on the impact of next generation isotope facilities on this line of research.

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