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Search for a permanent electric dipole moment of the Ra-225 atom

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The observation of a permanent electric dipole moment (EDM) in a non-degenerate system would indicate violation of time reversal symmetry (T violation) or, equivalently, C(charge)P(parity) violation due to the CPT theorem. The diamagnetic Ra-225 atom is a favorable system in the search for a permanent EDM. This is because the experimental sensitivity to CP violation in radium is enhanced due to its high atomic mass and its octupole deformed nucleus. Ra-225 has nuclear spin I=1/2 and a half-life of 14.9 days. Due to radium' s low vapor pressure and its relative scarcity, we use techniques of laser cooling and trapping to enhance our sensitivity to small number of atoms. The experiment involves collecting laser cooled radium atoms in a magneto-optical trap (MOT), transporting them 1 meter with a far off-resonant optical dipole trap (ODT) and then transferring the atoms to a second standing-wave ODT in an experimental chamber. In this talk I will discuss the recent results from the experiment and plans for future improvements.

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