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Measurement of the Permanent Electric Dipole Moment of the ^{129}Xe Atom

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We present our recently published [1] measurement of the CP-violating permanent Electric Dipole Moment (EDM) of the neutral ^{129}Xe atom. Our experimental approach is based on the detection of the free precession of co-located nuclear spin-polarized ^3He and ^{129}Xe samples. The EDM measurement sensitivity benefits strongly from long spin coherence times of several hours achieved in diluted gases and homogeneous weak magnetic fields of about 400 nT. A finite EDM is indicated by a change in the precession frequency, as an electric field is periodically reversed with respect to the magnetic guiding field. Our result, $(-4.7 \pm 6.4) \cdot 10^{-28}$ ecm, is consistent with zero and is used to place a new upper limit on the ^{129}Xe EDM: $|d_{Xe}| < 1.5 \cdot 10^{-27}$ ecm (95% C.L.).

[1] Measurement of the permanent electric dipole moment of the ^{129}Xe atom, F. Allmendinger, I. Engin, W. Heil, S. Karpuk, H.-J. Krause, B. Niederländer, A. Offenhäusser, M. Repetto, U. Schmidt, and S. Zimmer, Phys. Rev. A 100 (2019). DOI: 10.1103/PhysRevA.100.022505

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