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Improved indirect limits on muon EDM

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Given current discrepancy in muon $g-2$ and future dedicated efforts to measure muon electric dipole moment (EDM) d_μ, we assess the indirect constraints imposed on d_μ by the EDM measurements performed with heavy atoms and molecules. We notice that the dominant muon EDM effect arises via the muon-loop induced "light-by-light"CP-odd amplitude $\propto E^3 B$, and in the vicinity of a large nucleus the corresponding parameter of expansion can be significant, $eE_{\rm nucl}/m_\mu^2$ 0.04. We compute the d_μ-induced Schiff moment of the ^{199}Hg nucleus, and the linear combination of d_e and semileptonic C_S operator (dominant in this case) that determine the CP-odd effects in the ThO molecule. The results, $d_\mu(^{199}\mathrm{Hg}) < 6 \times 10^{-20} e\,\mathrm{cm}$ and $d_\mu(\mathrm{ThO}) < 2 \times 10^{-20} e\,\mathrm{cm}$, constitute approximately threefold and ninefold improvements over the limits on d_μ extracted from the Brookhaven National Laboratory muon beam experiment.

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