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Higgs Parity, Strong CP, and Dark Matter

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An exact spacetime parity replicates the $SU(2) \times U(1)$ electroweak interaction, the Higgs boson H, and the matter of the Standard Model. This "Higgs Parity" and the mirror electroweak symmetry are spontaneously broken at scale $v' = \langle H' \rangle \gg \langle H \rangle$, yielding the Standard Model below v' with a quartic coupling that essentially vanishes at v': $\lambda_{SM}(v') \sim 10^{-3}$. The strong CP problem is solved as Higgs parity forces the masses of mirror quarks and ordinary quarks to have opposite phases. Dark matter is composed of mirror electrons, e', stabilized by unbroken mirror electromagnetism. These interact with Standard Model particles via kinetic mixing between the photon and the mirror photon, which arises at four-loop level and is a firm prediction of the theory. Physics below v', including the mass and interaction of e' dark matter, is described by *one fewer parameter* than in the Standard Model. The allowed range of $m_{e'}$ is determined by uncertainties in (α_s, m_t, m_h), so that future precision measurements of these will be correlated with the direct detection rate of e' dark matter, which, together with the neutron electric dipole moment, will probe the entire parameter space.

Summary

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