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Strong CP problem, neutron electric dipole moment, and the fate of axions

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The strong CP problem is one of the greatest puzzles in particle physics. It is fuelled by the absence of an electric dipole moment of the neutron. Peccei and Quinn proposed a new symmetry that suppresses CP-violating terms in the strong interactions, at the expense of predicting the existence of a new particle, the axion. In this talk I present a natural solution of the problem, arising entirely out of the long-distance properties of the theory. The QCD vacuum turns out to be unstable under the Peccei-Quinn transformation, which thwarts the axion conjecture.

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