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QED Corrections to Hadronic Observables

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When aiming at a percent precision in hadronic quantities calculated by means of lattice simulations, isospin breaking effects become relevant. These are of two kinds: up/down mass splitting and electromagnetic corrections. In order to properly account for the latter, a consistent formulation of electrically-charged states in finite volume is needed. In fact on a periodic torus Gauss' law and large gauge transformations forbid the propagation of electrically-charged states. In this talk I will review methods that have been used or proposed so far in order to circumvent this problem, while highlighting practical as well as conceptual pros and cons. I will also review and discuss various methods to calculate electromagnetic corrections to hadron masses and decay rates in numerical simulations.

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