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The unintuitive SU(3) flavor and chiral limits of hadron resonances

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Abstract

Contrary to naive expectations, poles used to define hadron resonances rigorously in the physical world may not evolve continuously to become degenerate in the SU(3)$_F$ and chiral limits of QCD. Instead, other shadow poles, usually ignored, may be the ones that degenerate and characterize the resonances in these limits. This feature is general, and we illustrate it first with the simple and familiar light-vector mesons, followed by the much-discussed light-scalar case. Their shadow poles and their degeneracy are found using the QCD low-energy effective theory unitarized to one loop.

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