

Peccei-Quinn Symmetry as a Flavor Symmetry

Thursday, 20 December 2018 16:00 (1 hour)

There has been recent interest in possible connections between a Peccei-Quinn (PQ) symmetry and quark flavour structures. I describe how a generic generation-dependent $U(1)$ symmetry acting on the quark Yukawa operators can reduce the number of free parameters in the quark sector. The maximal reduction compatible with CP violation yields nine real parameters and one phase, which matches the number of physical observables, implying that such models have no free parameters. This has several interesting consequences: (i) there are only two inequivalent textures, each one giving rise to six different models depending on quark flavour assignments, (ii) the $U(1)$ symmetries that generate these textures all have a QCD anomaly, and hence are PQ symmetries, (iii) the resultant axion has flavour-violating couplings to quarks, which can be probed in meson decays, (iv) in some cases the contributions to the QCD anomaly of two generations cancels out, opening up the possibility that the axion coupling to nucleons is strongly suppressed.

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