

Accidental Peccei-Quinn symmetry and composite axions from chiral gauge theories

Friday, 17 February 2023 14:30 (30 minutes)

The axion solution to the strong CP problem is known to be sensitive to Planck scale effects, that give rise to the axion quality problem. We study a class of chiral gauge theories with a confining vector-like $SU(N)$ factor and a weakly interacting chiral $U(1)$ in which the Peccei-Quinn (PQ) symmetry is accidental and the axion arises as a composite Nambu-Goldstone boson. We clarify the selection rules under which higher-dimensional PQ-violating operators can generate a potential for the axion in the IR, and find analytically the general solution over the integers to the $U(1)$ anomaly equations. These results, of more general validity, allow us to identify and classify the models with an high quality PQ symmetry, protected up to operators of dimension 12, 15 or 18 depending on the charge assignments, irrespectively of the Planck scale dynamics. Our framework is compatible with a unified dynamics for the Standard Model sector, and we highlight the phenomenological signatures of such a scenario.

Presenter: PODO, Alessandro

Session Classification: Senior Session