

# Baryon and lepton number intricacies in axion models

*Thursday 17 September 2020 14:15 (45 minutes)*

Because the axion symmetry has to be anomalous to solve the strong CP puzzle, some colored and chiral fermions have to transform non-trivially under this symmetry. But when the SM fermions are charged, as in the PQ or DFSZ models, this symmetry ends up entangled with the SM global symmetries, baryon (B) and lepton (L) numbers. This raises several questions addressed in this talk. First, this entanglement will be described in details, showing how it induces some ambiguities in the PQ charges of the fermions, but that those ambiguities have no phenomenological impact. Then, the compatibility of axion models with some explicit B and/or L violating effects will be analyzed, including those arising from seesaw mechanisms, electroweak instanton interactions, or explicit B and L violating effective operators. At that stage, we will also quantify how many of these effects can be simultaneously present, and discuss the consequences for the axion mass and vacuum alignment if too many of them are introduced. In this way, large classes of B and/or L violating interactions leaving the axion phenomenology totally intact, thus undistinguishable, can be identified, like for example the various implementations of the type I and II seesaw mechanisms in the DFSZ context.

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