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What does a non-vanishing neutrino mass have to say about the strong CP problem?

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A new solution to the strong CP problem with distinct experimental signatures at the LHC is proposed. It is based on the Yukawa interactions between mirror quarks, Standard Model (SM) quarks and Higgs singlets. (Mirror quarks and leptons which include non-sterile right-handed neutrinos whose Majorana masses are proportional to the electroweak scale, form the basis of the EW-ν_R model.) The aforementioned Yukawa couplings can in general be complex and can contribute to $Arg\,DetM$ ($\bar{\theta} = \theta_{QCD} + Arg\,DetM$) at tree-level. The crux of matter in this manuscript is the fact that {\em no matter how large} the CP-violating phases in the Yukawa couplings might be, $Arg\,DetM$ can remain small i.e. $\bar{\theta} < 10^{-10}$ for reasonable values of the Yukawa couplings and, in fact, vanishes when the VEV of the Higgs singlet (responsible for the Dirac part of the neutrino mass in the seesaw mechanism) vanishes. The smallness of the contribution to $\bar{\theta}$ is {\em principally due} to the smallness of the ratio of the two mass scales in the seesaw mechanism: the Dirac and Majorana mass scales.

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