Contribution ID: **49** Type: **not specified**

Singlet fermion dark matter and Dirac neutrinos from Peccei-Quinn symmetry

Wednesday 9 June 2021 16:20 (20 minutes)

In this work we study the one-loop realizations of the d = 5 operator $\bar{L}\tilde{H}N_RS$ that leads to Dirac neutrino masses, where S is a singlet scalar field that hosts the QCD axion, N_R represents three right-handed neutrinos, L is the lepton doublet and H is the SM Higgs boson. As usual, the axion arises from the breaking of the Peccei-Quinn symmetry, which in our setup we use to not only solve the strong CP problem, but also to forbid the operator $\bar{L}\tilde{H}N_RS$ (which generates Dirac neutrino masses at tree level) and the tree-level realizations of $\bar{L}\tilde{H}N_RS$. Thus, the neutrino masses are directly correlated to the axion mass (via the PQ symmetry breaking scale v_S) and their smallness is due to the radiative character besides the mass suppression of the loop mediators. Furthermore, the PQ symmetry breaking leaves a residual Z_N symmetry that allow us to guarantee the stability of the lightest of the
mediators in the one-loop neutrino mass diagrams (as happens in the scotogenic models), thus leading naturally to multicomponent DM scenarios with axions and WIMPs. We illustrate our proposal by considering a specific model, where simple numerical estimates allow us to show the effectiveness of the scheme regarding neutrino masses, DM and lepton flavor violating processes.

Author: RODRÍGUEZ, Óscar (Universidad de Antioquia)

Presenter: RODRÍGUEZ, Óscar (Universidad de Antioquia)

Session Classification: MOCa