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Two invisible axion models with a non-minimal flavor structure

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In this talk I will present two invisible axion model implementations. The first one consists in an ultraviolet completion of the so-called aligned two-Higgs-doublet model that solves the strong CP problem. I will show that, for certain decoupling scenarios, mixing effects among the scalar fields allow for the possibility to obtain a rich scalar sector at the weak scale.

The second model implementation is given by a class of invisible axion models with Flavour Changing Neutral Currents at tree-level controlled by the fermion mixing matrices. In this model, the PQ symmetry is constructed as a horizontal symmetry which provides a solution to the Strong CP problem and gives rise to a rich phenomenology. The presence of Flavour Changing Axion Interaction and the possibility to avoid the domain wall problem stand as the main features of this class of models.

Right-handed neutrinos are also introduced to account for the smallness of active neutrinos masses via a Type I see-saw mechanism that relates the PQ symmetry breaking and the see-saw scales. Experimental limits on the axion couplings will also be discussed.

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