

San Juan de Pasto, 9 de diciembre de 2021

Señores:

**Asamblea de profesores**

Departamento de física

Universidad de Nariño

Por medio de la presente, rindo informe de las actividades desarrolladas durante la comisión otorgada que me fue otorgada para participar en el "6th ComHEP: Colombian Meeting on High Energy Physics", que tuvo lugar en Santa Marta del 29 de Noviembre al 3 de diciembre del 2021. Las actividades desarrolladas son:

1. En ponencia presente el trabajo titulado "A Minimal Axion Model for Mass Matrices with Five Texture-Zeros".

**Resumen:** A model is proposed where the fermionic and scalar fields are charged under a Peccei-Queen (PQ) symmetry. The PQ charges are chosen in such a way that they can reproduce mass matrices with five texture zeros that can reproduce the masses of the Standard Model (SM) fermions, the CKM matrix and the PMNS matrix. To obtain this result, at least 4 Higgs doublets are needed. As we will see in the manuscript this is a highly non-trivial result since the texture zeros of the mass matrices impose a large number of restrictions. This model shows a route to understand the different scales of the SM by extending it with a Higgs sector and a PQ symmetry. Since the PQ charges are not universal, the model presents flavor changing neutral currents (FCNC) at the tree level, a feature that constitutes the main source of restrictions on the parameter space. By including a heavy quark it is possible to fit the anomaly reported by xenon as a consequence of light axions. We report the regions of the parameter space allowed by lepton decays and compare the strength of these constraints with those coming from the semileptonic decays  $K^{\pm} \rightarrow \pi^{\pm} \nu \bar{\nu}$ . We also show the excluded regions for the axion-photon coupling as a function of the axion mass and compare it with the parameter space of our model

2. Asistí a diferentes exposiciones durante el evento, en donde se mostraron trabajos en varias áreas de física de partículas.

Agradezco su amable atención.

Atentamente



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