

Diphoton Resonances and a Flavored Axion Model

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Recent results from several experimental collaborations have reported deviations from the Standard Model predictions in di-photon final states, suggesting the presence of intermediate scalar resonances above the electroweak scale. The wide variety of such anomalies can be naturally accommodated within extensions of the Standard Model that feature an enlarged scalar sector. In particular, multi-Higgs doublet structures are well motivated in Flavored Axion Models (FAMs) proposed to explain the texture zeros of the quark mass matrices while simultaneously addressing the strong CP problem. In this work, we analyze a specific realization of a FAM and determine the scalar mass scale at which new resonances are expected to appear, based on the most theoretically motivated ranges for the vacuum expectation values and couplings of the scalar potential. Furthermore, we examine the phenomenological implications of the model, reporting flavor-changing neutral current constraints derived from semileptonic decays, together with the current experimental bounds on the axion–photon coupling from axion searches

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