

Searching for the Flavon in the diphoton channel at future super hadron colliders.

Content

We study the production of a CP-even flavon H_F in proton-proton collisions and the prospects for its detection via the diphoton channel at future super hadron colliders, i.e., $pp \rightarrow H_F \rightarrow \gamma\gamma$. The theoretical framework adopted is a model that invokes the Froggatt-Nielsen mechanism with an Abelian flavor symmetry, which includes a Higgs doublet and a complex singlet. We confront the free parameters of the model against theoretical and experimental constraints to find the allowed parameter space, which is then used to evaluate the production cross section of the flavon and the branching ratio of its decay into two photons. We find promising results based on specific benchmark points, achieving signal significances at the level of 5σ for flavon masses in the interval $200 \leq M_{H_F} \leq 450$ and integrated luminosities in the range $5 - 12 \text{ ab}^{-1}$ at the future High-Energy LHC. On the other hand, the Future hadron-hadron Circular Collider could probe masses up to 1 TeV if it reaches an integrated luminosity of at least 2 ab^{-1} .

Summary

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