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Probing Flavor Dynamics at the LHC

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The observed family structure, along with the pattern of fermion masses and mixings, may be suggestive of a non-Abelian family gauge symmetry. A natural subgroup of the global symmetry of the Standard Model which can be gauged is $O(3)_L \times O(3)_R$, which must however be completely broken by a Higgs mechanism. Simple symmetry breaking patterns leave behind an approximate D_3 discrete flavor symmetry, which may survive down to the TeV scale. An interesting pattern of fermion masses and mixings would emerge, consistent with known flavor changing constraints. Additional Higgs bosons are present in this framework as partners of the Standard Model Higgs boson to generate the light fermion masses after D_3 symmetry breaking. Such Higgs bosons, especially the one that generates the up quark mass, may be produced at the LHC. An attempt will be made to explain the recently reported diphoton events with an invariant mass of 750 GeV as a Higgs particle associated with the flavor symmetry breaking. Other LHC tests of the framework will be presented.

Primary author(s) : BABU, Kaladi (Oklahoma State University)

Presenter(s) : BABU, Kaladi (Oklahoma State University)

Clasificación de la sesión : Plenary 4

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