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Naturally large Yukawa hierarchies

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The spontaneous breaking of the $SU(3)^5$ quark/lepton flavor symmetry by means of three multiplets of 'Yukawa scalar fields' admits vacua with one $O(1)$ and two vanishing vevs for each multiplet. With three generations, and only in this case, the vanishing entries are lifted to exponentially suppressed values by the addition of symmetry invariant logarithmic terms. A strong hierarchy for the Yukawa couplings and an approximately diagonal quark mixing matrix are generated in a natural way from order one parameters. This scenario also provides a concrete realization of the minimal flavour violation hypothesis.

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