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Flavor for SUSY and SUSY for flavor

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Flavor has been traditionally seen as a problem for supersymmetric theories, “the flavor problem”. Still, the Standard Model is not immune to this problem, also Yukawa couplings should be naturally $O(1)$.

Flavor symmetries are used to explain the structure of Yukawa couplings and, simultaneously, of soft-breaking couplings in supersymmetric theories. In this scenario, SUSY can help to determine the flavor symmetry at work: the measure of the supersymmetric spectrum can give us very valuable information on the mechanism responsible for flavor.

However, no SUSY has been found so far. Even if SUSY is not present at low energies, supersymmetry is usually required in flavor theories to obtain a correct alignment of the flavon fields from a general scalar potential. We will see that, even if supersymmetry is broken at low energies, it is still possible to maintain this, much simpler, supersymmetric flavon alignment.

In summary: SUSY needs flavor and flavor needs SUSY.

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