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Phenomenology of a Flavorful Two Higgs Doublet Model DOUGLAS TUCKLER, WOLFGANG ALTMANNSHOFER, JOSHUA EBY, STEFANIA GORI, MATTEO LOTITO, MARIO MARTONE, University of Cincinnati — The discovery of the Higgs boson in 2012 gave us the final piece of the SM, and since then there has been a large effort to understand its properties. Current experimental sensitivities allow us to probe the couplings of the Higgs to the 3rd generation of quarks and leptons, and measurements tell us that the Higgs is responsible for generating their mass. However, a lot less is known about the origin of mass of the 1st and 2nd generations: measurements of their couplings to the Higgs are out of experimental reach. With limited experimental sensitivities, one might be led to ask: is the origin of mass of the 1st and 2nd generation fermions due to the SM Higgs at all? In this talk, the idea that the mass of the 1st and 2nd generation fermions is not due to the SM Higgs, but a second source of electroweak symmetry breaking, is investigated. This can be realized simply by a two Higgs doublet model (2HDM), where one doublet couples mainly to the 3rd generation fermions while the second doublet couples mainly to the 1st and 2nd generation. We will see how a non-standard Yukawa texture leads to phenomenology that is markedly different from well studied 2HDMs, enhancing the collider signatures involving 2nd generation quarks and leptons.

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