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The Case for Extra Yukawa Couplings

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With the first Higgs doublet established, a second doublet is rather likely. We give several arguments why the usual Z2 symmetry that removes extra Yukawa couplings should be discarded. We then show that this provides a rather robust mechanism for electroweak baryogenesis, by the combined presence of lambda_t ~ 1 and Im(rho_tt) ~ 1, where rho_tt is the extra top Yukawa, while rho_tc could provide a backup mechanism. We show that the prerequisite of Higgs quartic couplings, eta_i, also of O(1), can relatively easily give rise to the observed approximate alignment, that the observed h(125) appear so close to SM-Higgs. As a most likely next New Physics, extra Yukawas, whether flavor changing or conserving, are numerous, but they are quite well hidden by flavor hierarchies, alignment, and heavy Higgs at 500 GeV or higher. The remainder of the talk discusses where and how to unveil these couplings.

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