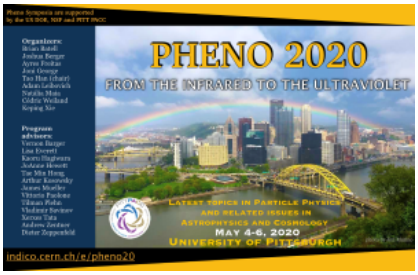

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Higgs troika for baryon asymmetry

Monday 4 May 2020 18:15 (15 minutes)

To explain the baryon asymmetry of the Universe, we extend the
Standard Model (SM) with two additional Higgs doublets with small vacuum expectation values. The additional Higgs fields interact with SM fermions through complex Yukawa couplings, leading to new sources of CP violation. We propose a simple flavor model with $\mathcal{O}(1)$ or less Yukawa couplings for quarks and charged leptons, consistent with current flavor constraints. To generate neutrino masses and the baryon asymmetry, right-handed neutrinos in the $\sim 0.1 - 10$˜TeV range couple to the "Higgs Troika." The new Higgs doublet masses are at or above the TeV scale, allowing for asymmetric decays into SM lepton doublets and right-handed neutrinos. The asymmetry in lepton doublets is then processed into a baryon asymmetry, similar to leptogenesis. Since the masses of the new fields could be near the TeV scale, there is potentially a rich high energy collider phenomenology, including observable deviations in the 125˜GeV Higgs decay into muons and taus, as well as detectable low energy signals such as the electron EDM or $\mu \to e\gamma$. Hence, this is in principle a testable model for generation of baryon asymmetry.

Summary

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