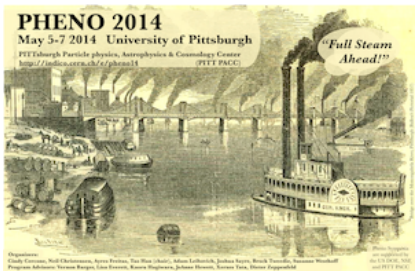

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Electroweak-scale Right-handed Neutrino Model, 126 GeV Higgs boson and BSM scalars

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A model of electroweak-scale right-handed neutrino (EWν_R) model was put forward a few years ago, in which the right-handed neutrinos are members of mirror fermion weak doublets and where the Majorana masses of the right-handed neutrinos are found to be naturally of the order of the electroweak scale [P.Q.Hung, Phys. Lett. B. 249 (2007)]. This model contains, in addition to the mirror quarks and leptons, extra scalars transforming as weak triplets. We have showed that this model does not contradict with the constraints from the electroweak precision parameters S, T, U [V.V.Hoang, P.Q.Hung, A.S.Kamat, Nucl. Phys. B. 877 (2013) 190]. In a simple extension of the EWν_R model, a light CP-even neutral physical scalar (which we call $\tilde{H}_1^0$) arises, which can have mass 126 GeV and the decay properties ($\tilde{H}_1^0 \to ZZ, WW, \gamma\gamma, f\bar{f}$) in agreement with the data analyzed at CMS experiment. The measured properties of this scalar and the results of search for SM-like Higgs up to ˜700 GeV constrain the masses of other neutral CP-even scalars in this model to be heavier than ˜300 GeV. The constraints on the scalars also indirectly restrict the masses of the mirror quarks and leptons. We analyze these constraints on the masses and decay properties of these BSM scalars and mirror fermions and discuss mass ranges and signals to search for these BSM scalars.

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