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Flavor physics in the multi-Higgs doublet models induced by the Left-Right symmetry

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The matter unification, that is proposed by the Grand Unified theory (GUT),
predicts extra fields that couple to quarks and leptons, in order to realize the realistic Yukawa couplings. In a simple setup, many fields, in which Higgs $SU(2)_L$ doublets are built, are introduced and the realistic Yukawa couplings consist of the many Yukawa couplings between the Standard Model (SM) fermions and the lightest mode among the Higgs doubles. The GUT symmetry breaks down at the very high scale, and we can expect that the heavier Higgs fields do not also gain masses from the GUT symmetry breaking and survive up to the EW scale. Then, we could find the predictions of the matter unification for the low-energy observables. In this talk, we discuss the multi-Higgs doublet models, that could be effectively induced by the extended SM with the matter unification. In particular, we focus on the predictions in the supersymmetric left-right (LR) model. In this model, the down-type and the up-type Yukawa couplings are unified and the Yukawa couplings are expected to be hermitian. Besides, the heavy Higgs doublets have flavor changing couplings with quarks and leptons corresponding to the realization of the realistic fermion mass matrices. The LR symmetry is assumed to break down at high energy, to realize the Type-I seesaw mechanism, and the EW symmetry breaking is radiatively realized. In this case, the flavor-dependent interaction of the Higgs fields is one promising prediction, so that we especially discuss the flavor physics induced by the heavy Higgs fields in my talk.

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