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## New charged scalar contributions to $h \rightarrow Z\gamma$ in the 3HDM

In this talk, we will review a three Higgs doublet model (3HDM) and discuss its motivations and main properties. We especially focus on the Higgs sector in this model. Firstly, the scalar potential with a softly-broken discrete  $Z_2$  symmetries is analyzed. Kinetic and Yukawa part of the Lagrangian are also investigated and various Yukawa types are presented. Finally we focus on the  $h$  decay to  $Z\gamma$  in the 3HDM. Loops of new charged scalars ( $H^{\pm}(1,2)$ ) contribute to  $h \rightarrow Z\gamma$  decay in the 3HDM. We discuss that the contributions of ( $H^{\pm}(1,2)$ ) enhance the branching ratio of  $h \rightarrow Z\gamma$  relative to the SM prediction. Hence one would expect this decay to be observed in the high-luminosity run of the LHC if its branching ratio is close to that of the prediction in the Standard Model. Moreover, we study Type-I and Type-Z of 3HDMs and see that these types of 3HDMs cannot be distinguished via  $Z\gamma$  decay, since the contributions of the ( $H^{\pm}(1,2)$ ) loops are dominant to those of fermion loops. (The talk is based on a manuscript accepted for publication in the International Journal of Modern Physics A (IJMPA).)

### Your main area of your contribution

Theory

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