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Higgs as a probe of beyond the Standard Model physics

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The minimal $U(1)$ extension of the Standard Model (SM) is a simple and well-motivated extension of the SM, which supplements the SM with the seesaw mechanism for naturally generating the light neutrino masses and offers various interesting phenomenologies. In the model, the $U(1)$ charge of each SM field is characterized by the $U(1)$ charge of the SM Higgs doublet with a free parameter x and ϕ . Due to the $U(1)$ charge of the Higgs doublet, the Higgs boson has a trilinear coupling with the $U(1)$ gauge boson (Z') due to $\neq 0$. With this coupling, a new process for the associated Higgs boson production with Z' boson arises through a Z' boson in the s -channel at high energy colliders. In this paper, we calculate the associated Higgs boson production at high energy colliders and show the interesting effects of the new Z' boson mediated process, which can be tested in the future. Such models contains three SM singlet RHNs which generate the light neutrino mass through the seesaw mechanism after the $U(1)$ breaking. We will also study the prospect of such RHN productions through the Higgs boson at the colliders which can probe a suitable neutrino mass generation mechanism.

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