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Exotic Higgs decay into displaced heavy neutrinos

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Content :

We examine the observability of heavy neutrino (ν_h) signatures of a $U(1)'$ enlarged Standard Model (SM) encompassing three heavy Majorana neutrinos alongside the known light neutrino states at the the Large Hadron Collider (LHC). We show that heavy neutrinos can be rather long-lived particles producing distinctive displaced vertices that can be accessed in the CERN LHC detectors. We concentrate here on the gluon fusion production mechanism $gg \rightarrow H_{\{1,2\}} \rightarrow \nu_h \nu_h$, where H_1 is the discovered SM-like Higgs and H_2 is a heavier state, yielding displaced leptons following ν_h decays into weak gauge bosons. Using data collected by the end of the LHC Run 2, these signatures would prove to be accessible with negligibly small background.

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