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Assessment of the Dimension-5 Seesaw Portal and Impact on Non-Pointing Photon Searches from Exotic Higgs Decays

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The Dimension-5 Seesaw Portal is a Type-I Seesaw model extended by $d=5$ operators involving the sterile neutrino states, leading to new interactions between all neutrinos and the Standard Model neutral bosons. In this work we focus primarily on the implications of these new operators at the GeV-scale. In particular, we recalculate the heavy neutrino full decay width, up to three-body decays. We also review bounds on the dipole operator, and revisit LEP constraints on its coefficient. Finally, we turn to heavy neutrino pair production from Higgs decays, where the former are long-lived and disintegrate into a photon and a light neutrino. We probe this process by recasting two ATLAS searches for non-pointing photons, showing the expected event distribution in terms of arrival time t_γ and pointing variable $|z_\gamma|$.

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