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Long-lived heavy neutral leptons at the LHC: probing N_R SMEFT operators.

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Interest in searches for heavy neutral leptons (HNLs) at the LHC has increased considerably in the past few years. In the minimal scenario, HNLs are produced and decay via their mixing with active neutrinos in the Standard Model (SM) spectrum. However, many SM extensions with HNLs have been discussed in the literature, which sometimes change expectations for LHC sensitivities drastically. In the N_R SMEFT, one extends the SM effective field theory with operators including SM singlet fermions, which allows to study HNL phenomenology in a “model independent” way. Within the framework of N_R SMEFT, we study the sensitivity of ATLAS to HNLs for four-fermion operators with a single HNL. These operators might dominate both production and decay of HNLs, and we find that new physics scales in excess of 20 TeV could be probed at the high-luminosity LHC.

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