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Light scalar at the high energy and intensity frontiers

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In the minimal left-right symmetric model which could accommodate the tiny neutrino masses via TeV seesaw mechanism, the neutral scalar from the right-handed symmetry breaking sector could be much lighter than the electroweak scale. Limited by the meson oscillation and decay data, such a light particle is necessarily long-lived and decays predominantly into two photons, mediated by the heavy W_R boson. It could be searched for at the LHC and in the intensity frontier experiments via (displaced) photon signals, if its mass is of order GeV scale. This provides a unique test of TeV scale left-right models and the seesaw mechanisms.

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