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Heavy neutrinos in $e^+e^- \to W^+W^-$: future colliders constraints

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We study the sensitivity of future lepton colliders to heavy neutral leptons implemented within the seesaw type-I model through precision measurements of $e^+e^- \to W^+W^-$. Heavy–light neutrino mixing modifies the angular distribution and total cross section of W-pair production. We derive prospective 95% C. L. constraints for CEPC, FCC-ee, ILC, CLIC, and muon colliders, including the dependence on the heavy neutrino mass. We find that central angular region measurements can significantly improve the sensitivity for masses above the collider energy. At the same time we show that low energy precise measurement is competitive to high energy measurement.

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