Title:	Neutrino jets from high-mass W R gauge bosons in TeV-scale left-right symmetric models
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Abstract:	We reexamine the discovery potential at hadron colliders of high-mass right-handed (RH) gauge bosons W R —an inherent ingredient of left-right symmetric models (LRSM). We focus on the regime where the W R is very heavy compared to the heavy Majorana neutrino N , and we investigate an alternative signature for W R → N decays. The produced neutrinos are highly boosted in this mass regime. Subsequently, their decays via off-shell W R bosons to jets, i.e., N → ℓ ± j j , are highly collimated, forming a single neutrino jet (j N) . The final-state collider signature is then ℓ ± j N , instead of the widely studied ℓ ± ℓ ± j j . Present search strategies are not sensitive to this hierarchical mass regime due to the breakdown of the collider signature definition. We take into account QCD corrections beyond next-to-leading order (NLO) that are important for high-mass Drell-Yan processes at the 13 TeV Large Hadron Collider (LHC). For the first time, we evaluate W R production at NLO with threshold resummation at next-to-next-to-leading logarithm (NNLL) matched to the threshold-improved parton distributions. With these improvements, we find that a W R of mass M W R = 3 (4) [5] TeV and mass ratio of (m N / M W R) < 0.1 can be discovered with a 5 – 6 σ statistical significance at 13 TeV after 10 (100) [2000] fb − 1 of data. Extending the analysis to the hypothetical 100 TeV Very Large Hadron Collider (VLHC), 5 σ can be obtained for W R masses up to M W R = 15 (30) with approximately 100 fb − 1 (10 ab − 1). Conversely, with 0.9 (10) [150] fb − 1 of 13 TeV data, M W R < 3 (4) [5] TeV and (m N / M W R) < 0.1 can be excluded at 95% C.L.; with 100 fb − 1 (2.5 ab − 1) of 100 TeV data, M W R < 22 (33) TeV can be excluded.
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