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HighPT: a tool for Drell-Yan tails beyond the Standard Model

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The high-pT tails in Drell-Yan processes can provide useful complementary information to low-energy and electroweak observables when investigating the flavour structure beyond the Standard Model. The Mathematica package HighPT allows to compute Drell-Yan cross sections for dilepton and monolepton final states at the LHC. The observables can be computed at tree-level in the SMEFT, including the relevant operators up to dimension-eight, with a consistent expansion up to $\mathcal{O}(\Lambda^{-4})$. Furthermore, hypothetical TeV-scale bosonic mediators can be included at tree level in the computation of the cross-sections, thus allowing to account for their propagation effects.
Using the Run-2 searches by ATLAS and CMS, the LHC likelihood for all possible leptonic final states can be constructed within the package, which therefore provides a simple framework for high-pT Drell-Yan analyses.
We illustrate the main functionalities of HighPT by deriving constraints on semileptonic dimension-six operators in the SMEFT, discussing also the impact of dimension-eight terms, and on the couplings of TeV-scale leptoquarks.
Finally, we revisit the leptoquark explanations of the charged-current B anomalies, showing the complementarity of high-pT constraints and low-energy observables.

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