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The Drell-Yan q_T Spectrum and Its Uncertainty at Third Order in QCD

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We present state-of-the-art SCETlib predictions for the W and Z/γ^* transverse-momentum (q_T) distributions at the LHC at complete three-loop order in resummed perturbation theory (N^3LL') and matched to available fixed order. We pay particular attention to the estimation of theory uncertainties via profile scale variations in such a way that perturbative uncertainties due to PDF evolution, perturbative resummation uncertainties, and nonperturbative uncertainties for $q_T \rightarrow 0$ are cleanly disentangled, and compare our predictions to high-precision measurements by the ATLAS and CMS experiments. The speed and versatility of our resummed calculation also allow us to study the dependence on the strong coupling, the PDFs, and their parametric uncertainties at this order. We find intriguing early evidence that the normalized ATLAS and CMS Z q_T spectra may prefer a lower strong coupling than the PDG value.

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