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Full and approximated NLO predictions for like-sign W-boson scattering at the LHC

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The talk presents a new calculation of next-to-leading-order (NLO) corrections of the strong and electroweak interactions to like-sign W-boson scattering at the Large Hadron Collider, implemented in the Monte Carlo integrator Bonsay. The calculation includes leptonic decays of the W bosons and the whole tower of next-to-leading-order contributions. Confirming an earlier NLO calculation, we find large pure electroweak corrections of the order of ~ −12% for integrated cross sections and even larger corrections in high-energy tails of distributions. The electroweak corrections account for the major part of the complete next-to-leading-order correction, which amounts to 15–20% in size, depending on the details of the event selection chosen for analysing vector-boson-scattering. Moreover, we compare the full next-to-leading-order corrections to approximate results based on the neglect of contributions that are not enhanced by the vector-boson scattering kinematics (VBS approximation) and on resonance expansions for the W-boson decays (double-pole approximation); the quality of this approximation is good within ⊠ 1.5% for integrated cross sections and the dominating parts of the differential distributions. Finally, for the leading-order predictions, we construct different versions of effective vector-boson approximations, which are based on cross-section contributions that are enhanced by collinear emission of W bosons off the initial-state (anti)quarks; in line with previous findings in the literature, it turns out that the approximative quality is rather limited for applications at the LHC.

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