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A comparative study of production of W± , Z-boson using muonic channel in p-p collisions at LHC energies.

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The W ± and Z-boson production is extensively studied at hadron colliders since it represents an important benchmark of the Standard Model (SM). In LHC energies, the measurements of W ± and Z-boson in p-p collisions had been done at $\sqrt{s}$ = 8 and 13 TeV. The Electroweak theory and Quantum Chromodynamics (QCD) calculations at Next-to-Leading Order (NLO) and Next-to-Next-to-Leading Order (NNLO) in perturbation theory described these measurements well. The study of p-p collisions provides a valuable test bench for validation of the analysis strategy in p-Pb and Pb-Pb collisions [1, 2]. The study using muonic channel in p-p collisions in ALICE experiment is done at $\sqrt{s}$ = 8 TeV only. The particle event generator, POsitive Weight Hardest Emission Generator (POWHEG) is used to generate hard events like the electroweak bosons (W ± ,Z) upto NLO (Next-to-Leading Order) calculation. In this work, a simulation study is done for the production of W± and Z-boson via muonic channel using PYTHIA8 event generator at lower and higher energies with respect to $\sqrt{s}$ = 8 TeV i.e. at $\sqrt{s}$ = 5.02 and 13 TeV. The PYTHIA8 event generator calculation has upgraded by adding perturbative calculation NLO recently [3]. The simulation results can be compared with the results obtained from POWHEG calculations.

[1]. JHEP 02 (2017) 077; ALICE Collaboration.
[2]. JHEP 09 (2020) 076; ALICE Collaboration.
[3]. Comput. Phys. Commun. 246 (2020) 106910; T. Sjostrand.

Session

Heavy Ions and QCD

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