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Measurement of $W^\pm Z$ boson pair production in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS Detector

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“New measurements of $W^\pm Z$ production cross-sections in pp collisions at a center-of-mass energy of 13 TeV are presented. The full Run 2 dataset recorded by the ATLAS experiment at the Large Hadron Collider, corresponding to an integrated luminosity of 140 fb^{-1} , is used. The $W^\pm Z$ candidate events are reconstructed using leptonic decay modes of the gauge bosons into electrons and muons.

The inclusive $W^\pm Z$ production cross-section is measured in the detector fiducial region with a relative precision below 4%, the best reached so far for this channel. Cross sections for W^+Z and W^-Z production and their ratio are measured as well.

The $W^\pm Z$ cross-section is also measured differentially as a function of various observables, including new observables sensitive to CP violation effects. All measurements are compared to Standard Model predictions from MATRIX, that incorporate corrections up to NNLO in QCD and NLO in electroweak, respectively. The experimental precision reached allows in particular to test the impact of NLO electroweak corrections.

An Effective Field Theory (EFT) interpretation is performed, considering both CP-even and CP-odd dimension-6 operators impacting the $W^\pm Z$ production. Limits are extracted on CP-even Wilson coefficients using the transverse mass of the $W^\pm Z$ system. For CP-odd coefficients a novel machine learning approach is used to design an observable with enhanced sensitivity to CP violation effects. Limits set on the studied coefficients are competitive and complementary to previously existing results.”

Secondary track

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