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Measurement of W boson production in Pb+Pb and pp collisions at 5.02 TeV with the ATLAS detector

Lead-lead collisions at the LHC are capable of producing a system of deconfined quarks and gluons at unprecedented energy density and temperature. The production yields of W bosons decaying to leptons, which do not interact with the strongly-coupled medium, may be used to look for deviations from binary collision scaling, e.g. related to impact-parameter nPDF effects. Moreover, the W boson rapidity distribution is sensitive to the nuclear parton density modifications and thus provides a handle on nuclear shadowing effects. The ATLAS detector has recorded 0.49 nb⁻¹ of lead-lead data at the new center-of-mass energy of 5.02 TeV, where W boson production yields in lead-lead collisions are expected to increase by a factor of eight relative to the available Run 1 data at 2.76 TeV.

This study presents W⁺ and W⁻ boson production yields measured differentially in lepton pseudorapidity and as a function of centrality, as well as the pseudorapidity dependence of the lepton charge asymmetry. An additional reference dataset from proton-proton collisions collected at a center-of-mass energy of 5.02 TeV is used to test the binary collision scaling of W boson production.

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