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W boson production and the lepton charge asymmetry in lead-lead collisions in the ATLAS experiment

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Lead-lead collisions at the LHC are capable of producing a system of deconfined quarks and gluons at unprecedented energy density and temperature. Partonic-level interactions and energy-loss mechanisms in the medium can be studied with the aid of useful probes. One of these probes are W bosons, which do not interact with the strongly-coupled medium and may be used to benchmark the energy loss of quarks and gluons produced in hard scattering events. Moreover, the W boson rapidity is directly sensitivity to nuclear parton distribution functions (nPDFs), thereby providing a handle on disentangling the free nucleon PDFs from nuclear PDFs. This study reports on W production yields identified via the electron and muon decay modes as a function of centrality and pseudorapidity in Pb+Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the ATLAS detector. The measurements from both channels are found to be consistent and were used to construct the lepton charge asymmetry.

On behalf of collaboration:

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