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Electroweak boson and forward jet probes of the initial state in Pb+Pb and p+Pb collisions with ATLAS

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Measurements of electroweak bosons produced in Pb+Pb collisions as well as photon and jet production in p+Pb collisions are of great interest to understanding initial state effects. These channels are sensitive to a broad set of physics effects such as high-precision test of the binary collision scaling expected in Pb+Pb, the modification of the parton densities in nuclei, the onset of non-linear QCD or saturation effects at low- x , and the energy loss of partons in the nucleus before the hard scattering.

This poster presents the ATLAS final results on W and Z boson production in lead-lead collisions and photon and dijet production in p+Pb collision. W and Z boson yields are reported in 5.02 TeV Pb+Pb data, and the corresponding high-statistics pp data at the same collision energy are used as a baseline. The resulting W and Z nuclear modification factors are shown differentially in p_T , rapidity and centrality. Prompt photon yields are reported in 8.16 TeV p+Pb data, and an extrapolated pp reference from 8 TeV collision data is used as a baseline. The measured photon nuclear modification factors and forward/backward ratios in p+Pb are presented differentially in p_T and pseudorapidity. Forward-forward and forward-central di-jet production are reported in 5.02 TeV p+Pb, and pp data at the same collision energy are used as a baseline. The measured azimuthal angular correlations and conditional yields are presented.

The reported results are compared to various theoretical calculations to shed light on initial state energy loss, the modifications of parton distribution functions in nuclei, binary collision scaling, and decorrelation and suppression expected from saturation effects.

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