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Observation of top-quark pair production in proton-lead collisions in ATLAS

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Top-quarks, tau leptons, and Higgs boson are the only elementary particles that have not been observed in heavy-ion collisions in the ATLAS detector yet. In particular top quarks, the heaviest elementary particles carrying colour charges, have been argued to be attractive candidates for probing the quark-gluon plasma produced in heavy-ion collisions. In proton-lead collisions, top-quark production is expected to be sensitive to nuclear modifications of parton distribution functions (PDF) at high Bjoerken-x values which are hard to access experimentally using other probes available so far. In 2016 the ATLAS experiment collected proton-lead collisions at centre-of-mass energy of 8.16 TeV per nucleon pair. The high integrated luminosity of the sample amounting to 164 nb-1 allows for top-quark pair production measurement for the first time in this data set with ATLAS. In this poster, we discuss the inclusive cross-section measurement for the top-quark pairs production using dilepton and lepton+jet decay modes with electrons and muons in ATLAS. The measurement will be compared to the NNLO predictions for top-quark production using various PDF sets.

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