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Hadron production and forward proton measurements with ATLAS

Measurements of hadron production provide important insight about the quark and gluon fragmentation that are relevant for the simulation of kinematic distributions of high-energy collisions. The measurement of charged particle distributions using LHC proton-proton data collected at 13.6 TeV of centre-of-mass energy will be presented. The differences in the production with and without accompanying forward protons will be highlighted. In addition, the production of charged particle production in photo-nuclear interactions using lead-lead collisions at 5 TeV will be discussed and contrasted with photo-nuclear proton-lead events at the same collision energy. The spectra of correlated hadron chains are explored in p-p, p-lead, and lead-lead collisions and compared to the predictions based on the quantized fragmentation of a three-dimensional QCD helix string. Finally, the talk will describe a recent result of the search for Axion Light Particles utilising two photons and forward protons in the event.

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