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Spectator nucleons in the Zero Degree Calorimeter (ZDC)

Theoretical modelling of the neutron and proton ZDC signals in heavy ion collisions is in its infancy due to its unique dynamics of spectator nucleons. Spectators, often forming clusters with varying charge-to-mass ratio, may fail to reach either ZDC and also single proton spectators are challenging to model due to the beamline magnetic fields. Despite these challenges, spectator production reveals rich physics that includes the neutron skin of Pb-208, event shape engineering of QGP droplets and an independent centrality estimator for ultracentral collisions. In this talk we present Trajectum results that include a sophisticated Bayesian analysis of a clustering model, cluster decay using the Gemini code and matched to recent ALICE data that include neutron and proton ZDC signals as well as the event-by-event spectator asymmetry. We conclude by discussing implications for upcoming light ion collisions at the LHC.

Category

Theory

Collaboration (if applicable)

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