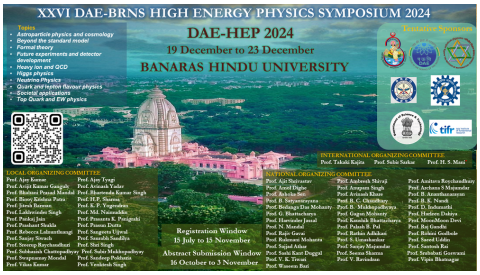

Contribution ID: **448** Type: **Postar**

Unveiling the role of color reconnection and QCD radiation in forward-backward multiplicity correlations in pp Collisions at LHC energies

Event-by-event density fluctuations in the initial stages of hadron-hadron, hadron-nucleus, and nucleus-nucleus collisions are believed to produce correlations among the final state particles in forward and backward regions of the collision beam axis. Diving deep into the study of forward-backward (FB) correlations can reveal insights into the underlying dynamics of particle production mechanisms. In the present investigation, we explore the FB multiplicity correlations in pp collisions utilizing the PYTHIA8 framework. The FB multiplicity correlation strength, $b_{\rm corr}(mult.)$ have been estimated as a function of pseudorapidity gap ($\eta_{\rm gap}$), pseudorapidity width ($\delta\eta$), and center-of-mass energy ($\sqrt{s}$). The correlation strength, $b_{\rm corr}(mult.)$, is also estimated across different azimuthal sectors. Our study concludes that the azimuthal sectors with $\varphi_{\rm sep} > \pi/4$ are predominantly affected by long-range correlations (LRCs), whereas sectors where $\varphi_{\rm sep} < \pi/4$ are primarily driven by short-range correlations (SRCs). Furthermore, the CR range 1.8 fails to explain ALICE results quantitatively across all azimuthal sectors. Overall, CR range 5.4 offers a reasonably good description of the data at $\sqrt{s}$ = 7 TeV, while both CR ranges 3.6 and 5.4 are consistent with the ALICE data at $\sqrt{s}$ = 0.9 and 2.76 TeV. This work further conducts a detailed analysis of the influence of MPI, as well as Initial and Final State Radiation (ISR and FSR), on the correlation strength. Our results indicate that MPI and CR play crucial roles in shaping correlations, with ISR having a more significant effect than FSR.

Field of contribution

Phenomenology

Author: Mr AGARWALA, Rohit (Bodoland University)

Co-author: Dr DEY, Kalyan (Department of Physics, Bodoland University)

Presenter: Mr AGARWALA, Rohit (Bodoland University)

Track Classification: Heavy ion and QCD