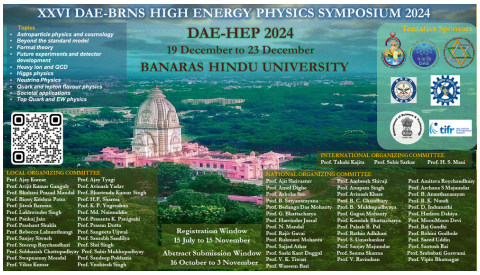


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# A study of forward backward correlations of identified particles using UrQMD hadronic transport model at FAIR energies

In high-energy collisions of hadrons or heavy-ions , conservation laws play an important role in particle production, most relevant being the conservation of electric charge, strangeness, and baryon quantum numbers. The phenomenological modeling of particle production has two primary approaches; statistical hadronization model (SHM) and string fragmentation. These models handle conservation laws differently. In SHM the conservation laws apply within a finite correlation volume, whereas in string fragmentation, quantum numbers are conserved locally. As a consequence, in SHM, the correlation strength between two particles, whether they have the same or opposite quantum numbers, decreases as the correlation volume increases. In contrast, the string fragmentation model shows a strong correlation predominantly between oppositely charged hadrons due to the imposition of conservation laws on each string breaking.

The event-by-event measurements of correlation between different hadron species can be used to probe this difference in the quantum number conservation between these two models. In this work, we use a strongly intensive quantity called $\Sigma_{FB}$ to study the forward(F)-backward(B) multiplicity correlations between different hadrons. Here F and B refers to forward and backward pseudorapidity ($\eta$) intervals, symmetrically placed around $\eta$=0. To test the sensitivity of this observable to the correlation strength between different particles, we use particles simulated from a model called Ultra relativistic Quantum Molecular Dynamics (UrQMD). UrQMD is a hadronic transport model, where particles are produced from resonance decays and fragmentation of excited strings. We study the role resonance decays on this observable and extend this study as a function of beam energy to decipher whether any change in the particle production mechanisms can be traced from this particular measure of forward-backward correlation.

## Field of contribution

Phenomenology

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