Contribution ID: **19** Type: **Parallel**

Entropy scaling and thermalization in relativistic and ultra-relativistic heavy-ion collisions

Wednesday 17 February 2016 17:10 (20 minutes)

Observed dependence of multiplicity distribution on energy and rapidity window reveal that the secondary particles arise from two kind of sources: chaotic and coherent sources. Particles produced through chaotic sources are concentrated in relatively smaller rapidity intervals, while those coming from the coherent sources are spread over entire rapidity space. It has been observed that the scaling based on information entropy holds good for pp collisions in the energy range: from ISR ($\sqrt{s} \sim 19$ GeV) to LHC energy ($\sqrt{s} \sim 2.36$ TeV). Such a scaling of entropy has also been observed in ion-ion collisions at AGS and SPS energies. Furthermore, only a few attempts have been made to extend the entropy studies to evaluate higher generalized fractal dimensions. An attempt is, therefore, made to study Shannon information entropy ($S = -\Sigma(P_n ln P_n)$) scaling, Renyi information entropy ($I_q = \frac{1}{q-1} ln \Sigma(P_n)^q$) and generalized fractal dimensions of order q by analyzing several sets of experimental data on AA collisions at AGS and SPS energies. The findings are compared with the predictions of Monte Carlo model HIJING .

Variation of generalized dimensions, D_q , with q is observed to be expressible in the following form: $D_q \approx (a - c) + cln(\frac{q}{q-1})$. The slope parameter c is found to be nearly independent of beam energy and projectile/target mass; c is often referred to as multifractal specific heat. The value of c is calculated and its dependences on beam energy and target mass are investigated. Variation of entropy with mean charged particle multiplicity in limited rapidity bins is observed to be linear and independent of energy and identity of colliding nuclei, thus indicating a kind of entropy scaling.

Author: AHMAD, Shakeel (Aligarh Muslim University (IN))

Co-authors: IRFAN, Muhhamad (Aligarh Muslim University, India); KHAN, Shaista (Aligarh Muslim University, India)

Presenter: KHAN, Shaista (Aligarh Muslim University, India)

Session Classification: Session 12