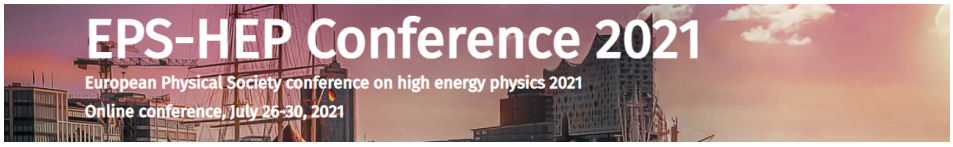

Contribution ID: **816** Type: **Poster**

Study of the thermodynamical parameters at kinetic freeze-out in relativistic heavy-ion collisions at RHIC and LHC energy using Tsallis statistics

The quark-gluon plasma (QGP), produced in relativistic heavy-ion collisions, freeze-out through multi-partonic interactions to final state hadrons. The transverse momentum (p_{T}) spectra study of the produced particles can ighten the thermodynamical properties of the QGP medium. In this work, a detailed study of the p_{T} spectra of the identified charged particles (pions, kaons, protons) and all charged particles in the heavy-ion system are done using the non-extensive Tsallis statistics. The Tsallis parameters q and T measure the degree of deviation of the system from an equilibrium state and the effective temperature at freeze-out conditions, respectively. The present formalism properly describes the nature of the non-exponential behavior of the p_{T} spectra at large transverse momentum ranges which is a drawback of the familiar blast-wave formula.

We present the thermodynamic properties at freeze-out using the experimental data of Au-Au collisions at the Relativistic Heavy Ion Collider (RHIC) energies (from $\sqrt{s_{\mathrm{NN}}} = 7.7$ GeV to 200 GeV) and Pb-Pb collisions at the Large Hadron Collider (LHC) energies ($\sqrt{s_{\mathrm{NN}}} = 2.76$ TeV and 5.02 TeV) in the framework of the Tsallis distribution. The extracted Tsallis parameters are found to be dependent on the particle species, collision energy, centrality, and fitting ranges of the p_{T}. With increases of the collision energies, q increases in a systematic manner whereas T has a decreasing trend. It is observed that the parameters q, T, changes with increasing p_{T} fitting ranges and at mid p_{T} region the parameter are found to be unchanged which can describe the physics of the systems. It is found that the Tsallis parameters follow mass ordering and the quality of fitting deteriorates with heavier mass particles.

Collaboration / Activity

Self contribution

First author

Email

Primary authors: Dr PATRA, Rajendra Nath (University of Jammu); Prof. MOHANTY, Bedangadas (National Institute of Science Education and Research, Jatni 752050, India); Prof. NAYAK, Tapan K. (CERN, CH 1211, Geneva 23, Switzerlan, National Institute of Science Education and Research, Jatni 752050, India)

Presenter: Dr PATRA, Rajendra Nath (University of Jammu)

Session Classification: T05: Heavy Ion Physics

Track Classification: Heavy Ion Physics