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Exploring thermalization and fluidity in a hadron gas using an excluded volume hadron resonance gas approach

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The existence of different phases of matter produced in relativistic heavy-ion collisions require a hadronic description, creating much interest in the hadronic phase. We explore the possibility of thermalization and applicability of hydrodynamics in a hadron gas medium using the Knudsen number (Kn). Kn « 1 implies a system with a large number of collisions, thus making the system thermalized. Further, we probe the nature of the system by studying its viscosity and compressibility through Reynolds (Re) and Mach (Ma) numbers. These dimensionless parameters are studied for different system sizes and baryochemical potentials (μB). The obtained values of these observables at high temperatures point towards the possibility of inviscid compressible flows in the system (Kn « 1, Re » 1, and Ma ~ 1). The comparable values of Kn over different system sizes indicate the applicability of hydrodynamics for different systems, from high multiplicity pp to heavy-ion collisions.

Session

Heavy Ions and QCD

Author: SAHU, Dushmanta (Indian Institute of Technology Indore (IN))

Co-authors: Mr SINGH, Captain R. (Indian Institute of Technology Indore (IN)); Dr ALAM, Jan-e (Variable Energy Cyclotron Centre, Kolkata (IN)); SAHOO, Raghunath (Indian Institute of Technology Indore (IN)); SCARIA, Ronald (Indian Institute of Technology Indore (IN))

Presenter: SAHU, Dushmanta (Indian Institute of Technology Indore (IN))

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