

Towards compressed baryonic matter densities: thermodynamics and transport coefficients

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A theoretical investigation on the thermodynamic and transport properties of hot and dense quantum chromodynamic (QCD) matter has been carried out by **Dr. Sabyasachi Ghosh (SG)**, Associate Professor, Department of Physics, IIT Bhilai, along with his students, **Mr. Anand Rai**, **Ms. Dani Rose J Marattukalam**, **Mr. Prasanta Murmu**, **Mr. Ashutosh Dwibedi** and **Dr. Rishabh Sharma**. The study explores the behavior of strongly interacting matter expected to be produced in low-energy heavy-ion collision experiments, where nuclear matter reaches extremely high temperatures and baryon densities. The authors employed three effective QCD frameworks—the Nambu–Jona-Lasinio (NJL) model, the Chiral Effective Model (CEM), and the Hadron Resonance Gas (HRG) model—to investigate the thermodynamic and transport properties of strongly interacting matter over a wide range of baryon chemical potentials and net baryon densities. The Lorenz ratio is found to increase rapidly – indicating a strong violation of the Wiedemann–Franz law in the low- regime – while approaching the universal value at higher baryon chemical potentials or densities.

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