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Bjorken Hydrodynamics for Heavy Ion Collisions

High energy heavy ion collisions such as those at the Relativistic Heavy Ion Collider (RHIC), Brookhaven National Laboratory (BNL), Long Island, NY and those at the Large Hadron Collider (LHC), CERN, Geneva have produced a new state of matter called Quark-Gluon Plasma (QGP). This QGP filled the entire early Universe for a few microseconds (˜10 µs) after the Big Bang. This state of matter is also believed to exist in the central core of the neutron stars. In the QGP phase, the number of degrees of freedom increases drastically. Therefore, one can expect the produced matter to flow. Indeed, strong collective flow patterns have been measured at RHIC and LHC, which suggests that the hydrodynamical models are well justified during the QGP stage of the reaction: from the time when local equilibrium is reached until the hadronization. In this study, a scaling solution also known as Bjorken hydrodynamics was used to study thermodynamic properties such as number density, energy density, entropy density and temperature as functions of proper time. We also compared particle rapidity distribution from Bjorken hydrodynamics with that from Landau hydrodynamics. From the time evolution of thermodynamic quantities, it was found that the QGP expands like the Hubble expansion of the Universe.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

Primary authors: Ms SEABI, Magdeline Mohlao (University of the Western Cape); Mr NEMALILI, Ronewa (University of Witwatersrand); Ms PHAKOE, Mpho (University of the Western Cape); Dr NETSHIKWETA, Rendani (University of Venda); RAMOGAYANA, Brian (UL); Dr YOUNUS, Mohammed (Seacom Skills University); Prof. MURONGA, Azwinndini (Nelson Mandela University)

Presenter: Ms SEABI, Magdeline Mohlao (University of the Western Cape)

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