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Thermal diffusion properties of a rotating QGP medium

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This work involves the study of the effects of rotation on the thermal diffusion properties of the QGP medium. The noncentral heavy ion collisions could possess finite angular momentum with a finite range of angular velocity, so, rotation gets induced in the produced medium. Like other extreme conditions, the rapid rotation can conspicuously alter various properties of the QGP medium including its thermal diffusion properties. The thermal diffusion is associated with the rate of heat transfer in the medium. This is characterized by both the thermal conductivity and the specific heat at constant pressure. In determining the thermal conductivity, we have used the novel relaxation time approximation for the collision integral in the relativistic Boltzmann transport equation within the kinetic theory framework in conjunction with the finite angular velocity. It is observed that the onset of rotation enhances the thermal conductivity of the medium. Additionally, the specific heat at constant pressure gets increased due to the emergence of rotation, leading to larger changes in enthalpy and energy density with temperature as compared to the nonrotating case. However, with increasing angular velocity, the growth in the specific heat at constant pressure surpasses the rise in the thermal conductivity, resulting in a decrease in the thermal diffusion constant at finite angular velocity. Smaller value of the thermal diffusion constant indicates slower heat transfer in a rotating medium as compared to that in a nonrotating medium.

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