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Effect of variation in relaxation time on elliptic flow in PbPb and AuAu collisions

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Hydrodynamics has been quite successful in explaining observables of heavy ion collisions especially in low transverse momentum regime across varied collision systems. Recently hydrodynamics has also been used satisfactorily to explain proton-proton collision. This has been puzzling and has led to the discussion about the smallest volume for which hydrodynamics can be applied. The meaning of hydrodynamics itself has been under scrutiny with non-requirement of local equilibrium or pressure isotropy for its applicability. The second order viscous hydrodynamics, requires a transport coefficient called relaxation time, to maintain casualty. This relaxation time acts as a regulator for non-hydro modes of the complete hydrodynamic evolution. In phenomenological studies this relaxation time has been taken as to be a constant and much attention has gone into fixing shear viscosity to entropy density ratio. But this regulator also serves as a tool to gauge the role of non-hydro modes especially in peripheral heavy ion collisions and small systems. In the present study, we analyze the effect of different relaxation times on elliptic flow of light mesons, for PbPb and AuAu collision systems with optical Glauber and IPGlasma initial conditions of hydrodynamics. We hence study sensitivity of non-hydro modes by varying relaxation time for different systems of collisions and energies.

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