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Probing the onset of hydrodynamic breakdown in heavy-ion collisions

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The energy momentum tensor from the system created in heavy-ion collision could be decomposed into an equilibrium and an out-of-equilibrium component. The out-of-equilibrium part of the energy momentum tensor when expressed using the linear response theory takes a form in terms of a complex singular frequency. The imaginary part of this complex frequency corresponds to non-hydrodynamic mode. An additional term with a coefficient called *relaxation time* (τ_π) has to be introduced in the consitutive hydrodynamic equations in order to restore causality in the Navier-Stokes equation. In the study presented, we look at the elliptic flow in peripheral heavy-ion collisions for all centrality classes for the two values of *relaxation time*. We use second order viscous hydrodynamics with IPGlasma initial condition which includes event-by-event fluctuations. From v_2 vs p_T results obtained for all centralities we found that the *relaxation time* acts as a regulator of non-hydrodynamic mode. And breakdown of hydrodynamics could be inferred by analysing the flow curves with the two *relaxation times*.

Session

Heavy Ions and QCD

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