

# Super-horizon fluctuations and acoustic oscillations in CMBR and in relativistic heavy-ion collisions

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## Abstract

We argue that there is a deep interconnection between the physics of initial state spatial anisotropies in relativistic heavy-ion collision experiments (RHICE) and the anisotropies observed in cosmic microwave background radiation (CMBR). This is due to the presence of superhorizon fluctuations in both cases which, for CMBR case, have origin in the inflationary phase of the universe. For RHICE, superhorizon fluctuations result from initial state fluctuations and due to very rapid thermalization leading to a finite size of the acoustic horizon. Following CMBR anisotropy analysis, we show that a plot of root-mean square values of the flow coefficients, calculated in a lab fixed frame for RHICE, can yield important information about the nature of initial state anisotropies and their evolution. In particular, the elliptic flow for non-central collisions can be directly determined from such a plot without any need for the determination of event-plane.