Contribution ID: **380** Type: **Parallel contribution**

Triangularity and Dipole Assymetry in Ideal Hydrodynamics

Tuesday, 9 August 2011 17:15 (20 minutes)

We introduce a cummulant expansion to parameterize possible initial conditions
in heavy ion collisions. We show that the cummulant expansion converges and can
systematically reporduce the results of the Glauber type initial conditions.
At third order in the gradient expansion, the cummulants are described with the
triangularity
$llangle^3 \cos 3(\phi - \psi_{1,3})$
$rrangle$, and a dipole
assymetry,
$llangle^3 \cos(\phi - \psi_{1,3})$
$rrangle$. We show that the
orientation angle of the dipole assymetry $\psi_{1,3}$
has a 20% assymetry out of plane for mid-central collisons.
This leads to a small net v_1 out of plane.
In peripheral and mid-central collisions the
orientation angles $\psi_{1,3}$ and $\psi_{3,3}$ are strongly correlated, but this correlation disappears towards central collisions.
We study the ideal
hydrodynamic response to these cummulants and determine the associated v_1/ϵ_1
and v_3/ϵ_3 for a massless ideal gas. The space time development of v_1 and
v_3 is clarified with figures. These figures show that v_1 and v_3
develop towards the edge of the nucleus, and consequently the final spectra are more sensitive to the viscous dynamics of freezeout.
The hydrodynamic calculations for v_3 is provisionally compared to Alver and Roland fit of STAR inclusive two particle correlation functions. Finally, we propose to
measure the v_1 associated with the dipole assymetry by measuring
$llangle \cos(\phi - 3\Psi_{R3} + 2\Psi_{R2})$
$rrangle$ where Ψ_{R3}
is an experimental estimate for the triangular event plane while Ψ_{R2}
is the usual quadrupole event plane plane estimate.
This experimental measurement would provide convincing evidence for the
strong correlation between $\psi_{1,3}$ and $\psi_{3,3}$, and by association
the hydrodynamic interpretation of two particle correlations at RHIC.

Primary author: YAN, li (Stony Brook University)

Presenter: YAN, li (Stony Brook University)

Session Classification: Heavy Ion Physics/Hot and Dense QCD

Track Classification: Heavy Ion Physics/Hot and Dense QCD