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## Triangularity and Dipole Assymetry in Ideal Hydrodynamics

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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  $llangler^3 \cos 3(\phi - \psi_{1,3})$ rrangle, and a dipole assymetry,  $llangler^3 \cos(\phi - \psi_{1,3})$ 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  $v_1/\epsilon_1$ and  $v_3/\epsilon_3$  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  $\Psi_{R3}$ is an experimental estimate for the triangular event plane while  $\Psi_{R2}$ 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.

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