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Turbulence, Vorticity and Lambda Polarization

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Due to the low viscosity and strongly interacting QGP at high LHC energies flow fluctuations were observed up to the 8th flow harmonics. Similarly rotation, turbulence and even Kelvin-Helmholtz Instability were predicted and these may be observable by different methods. Apart of the usual flow harmonics analysis, other methods like two particle correlations, or particle polarizations may arise as a consequence of these processes. The appearance of turbulent phenomena in these experiments would be additional direct proof of the low viscosity.

In particular we observed in 3+1D fluid dynamical calculations at LHC energy that Lambda polarization arising from thermal and mechanical equilibrium, can provide measurable signal in given azimuthal directions. This mechanism is considerably stronger than the polarization arising from the direct electro-magnetic effect of the strong and rapidly changing fields during the collision.

Summary

The talk is based on the following publications:

L.P. Csernai, V.K. Magas, H. Stoecker, and D.D. Strottman, Phys. Rev. C 84, 024914 (2011).

L.P.Csernai, D.D.Strottman, Cs.Anderlik, Phys.Rev.C 85, 054901 (2012).

L.P. Csernai, V.K. Magas, D. J. Wang, Phys. Rev. C 87, 034906 (2013).

F. Becattini, V. Chandra, L. Del Zanna, and E. Grossi, arXiv:1303.3431

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