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Hydrodynamic approaches to RHIC physics

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One of the most intriguing findings in the experiments at Relativistic Heavy Ion Collider (RHIC) in Brookhaven National Laboratory (BNL) is a large magnitude of momentum anisotropy in comparison with the ones observed at lower collision energies. The momentum anisotropy in noncentral collisions is characterized by the second Fourier coefficient v_2 of the azimuthal distribution for observed particles. The magnitude of v_2 and its transverse momentum p_T dependence for identified hadrons are comparable with results from *ideal* hydrodynamic simulations around midrapidity ($| \eta | <\sim 1$), in low transverse momentum region ($p_T <\sim 1$ GeV/c), and up to semicentral collisions ($b <\sim 5$ fm). This is evidence for a recent announcement of the discovery of the perfect fluidity in the strongly coupled/interacting quark gluon plasma (sQGP) as distinct from the weakly coupled/interacting QGP (wQGP) which had been assumed to be created for a long time. Though the ideal hydrodynamic description at RHIC is apparently successful, this in turn raises a couple of new questions about hydrodynamic behavior of bulk matter produced in relativistic heavy ion collisions. In this talk, I will present current understanding of matter produced at RHIC and discuss open issues in modeling dynamics of relativistic heavy ion collisions based on hydrodynamics.