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Tom W. Bonner Prize Talk: Elliptic Flow at RHIC

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At the Relativistic Heavy Ion Collider (RHIC) it was found that the second harmonic of the anisotropic azimuthal particle distribution, called elliptic flow, was large, approaching the hydrodynamic limit. In a non-central collision of nuclei the initial overlap region of participants is lens shaped, but during expansion this initial anisotropy dissipates, and thus the elliptic flow reflects the early time of the collision. Also, the elliptic flow of the observed hadrons seem to scale with their number of quarks, indicating they are formed by coalescence of partons at early time. This large elliptic flow and its scaling are two of the pieces of experimental evidence for early equilibration and formation of a strongly coupled quark-gluon plasma with low shear viscosity – a perfect fluid.