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**Tom W. Bonner Prize In Nuclear Physics Talk: Jet Tomography of Quark Gluon Plasmas in High Energy Nuclear Collisions**

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The attenuation pattern of high energy jet fragments in ultra-relativistic nuclear collisions provides information on the space-time evolution and dynamical properties of the Quark Gluon Plasma (QGP) phase of matter discovered at the Relativistic Heavy Ion Collider (RHIC) and observed at higher densities at the Large Hadron Collider (LHC). First I review our jet tomography theory of quark and gluon energy loss in a weakly coupled picture of the QGP. While the average attenuation pattern of light and heavy quark jets were well accounted for in that picture, the predicted azimuthal elliptic asymmetry of jets was underestimated when realistic bulk collective flow effects were taken into account. I then show that the elliptic asymmetry of jet fragments can also be quantitatively understood when nonperturbative lattice QCD constraints on the suppression of color electric fluctuations and the enhancement of color magnetic fluctuations near the critical QCD confinement temperature, Tc $\sim$ 160 MeV, are incorporated into the theory. Our analysis provides a novel quantitative connection between the jet transport properties controlling the hard jet quenching observables and the bulk viscous transport properties controlling the remarkable "perfect fluidity" of QGP observed at RHIC and LHC.