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Energy dependence of the freeze out eccentricity from azimuthal dependence of HBT at STAR

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Non-central heavy ion collisions at RHIC create an anisotropic participant zone of QCD matter under extreme conditions of energy and matter density. While this zone is initially out-of-plane-extended, pressure gradients cause the hot, dense medium to expand preferentially in plane. Over time, this expansion makes the shape more spherical, perhaps even becoming extended in the in-plane direction. The change in shape is determined by the expansion and freeze-out time scales which depend, in part, on the early pressure gradients. As a result, the freeze-out shape may provide a sensitive probe of the Equation of State of hot QCD matter.

The recent RHIC Beam Energy Scan at \protect $\sqrt{s_{NN}}$ of 7.7, 11.5, and 39 GeV provides an opportunity to

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