VISCOSITY AND THE SOFT RIDGE AT RHIC

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Measurements at RHIC reveal a near-side ridge in pseudorapidity and azimuthal angle for particle production associated with a high p_t particle [1]. This phenomenon has been attributed to interactions of the jet with matter. Interestingly, two particle correlation measurements show a similar ridge-like feature *without* the jet tag [2]. This soft ridge becomes broader in pseudo-rapidity with increasing centrality, while narrowing in azimuthal angle – trends shared by the jet-associated ridge.

In this talk we show that viscous hydrodynamic flow can explain the soft-ridge feature along with other characteristics of two particle correlation measurements. We have attributed the rapidity broadening of the soft ridge to viscous diffusion, and used it to extract a value of the shear viscosity to entropy ratio in the range $0.08 < \eta/s < 0.3$ [3]. This very small value is precipitously close to the AdS/CFT bound of $1/4\pi$. Here, we extend this work to address the full behavior of two particle-correlations in azimuthal angle and rapidity. Specifically, we solve viscous hydrodynamic equations including radial and elliptic flow. Results are shown to be consistent with the centrality dependence found in average transverse momentum $\langle p_t \rangle$ and elliptic flow v_2 measurements. We use these results to build a consistent picture of the soft ridge, and show how correlation measurements can greatly reduce the current uncertainty in the measured shear viscosity. We then discuss the relation of the soft ridge to its jet-associated cousin.

References

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