Contribution ID: **38** Type: **not specified**

# Event-by-event hydrodynamics + jet energy loss: A solution to the $R_{AA} \otimes v_2$ puzzle

*Monday 12 September 2016 09:15 (20 minutes)*

High $p_T > 10$ GeV elliptic flow, which is experimentally measured via the correlation between soft and hard hadrons, receives competing contributions from event-by-event fluctuations of the low $p_T$ elliptic flow and event plane angle fluctuations in the soft sector. In this paper, a proper account of these event-by-event fluctuations in the soft sector, modeled via viscous hydrodynamics, is combined with a jet energy loss model to reveal that the positive contribution from low $p_T$ $v_2$ fluctuations overwhelms the negative contributions from event plane fluctuations. This leads to an enhancement of high $p_T > 10$ GeV elliptic flow in comparison to previous calculations and provides a natural solution to the decade long high $p_T$ $R_{AA} \otimes v_2$ puzzle. We also present the first theoretical calculation of high $p_T$ $v_3$, which is shown to be compatible with current LHC data. Furthermore, we discuss how short wavelength jet-medium physics can be deconvoluted from the physics of soft, bulk event-by-event flow observables using event shape engineering techniques.

## Summary

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**Session Classification:** Monday Morning