

Pion quenching and tomography from RHIC to LHC in the WHDG model

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We present parameter-free predictions from the WHDG (radiative+elastic+geometric fluctuation) energy loss model for high p_T pion suppression in A+A at 2.76 and 5.5 ATeV. The input density is constrained from a rigorous statistical analysis of RHIC π^0 quenching data. The predictions are consistent with the recent *charged* hadron RAA data from ALICE only within the current very large systematic uncertainty (due to the unmeasured reference p + p spectrum). However, our constrained prediction of central to peripheral pion $R_{cp}(p_T)$, in which reference p + p spectra uncertainties cancel, is found to be over-quenched by \sim two sigma relative to the charged hadron ALICE R_{cp} data at all $p_T < 20$ GeV. The basic tomographic assumptions in WHDG are (1) the energy loss scales linearly with the initial QGP density, ρ_0 , and (2) that ρ_0 scales linearly with charge particle multiplicity dN_{ch}/dy . Under these assumptions, WHDG predicts significant difference in magnitude and p_T slope of pion RAA between RHIC and LHC. Future ALICE identified π, K, p hadron RAA data (as well as accurate p + p and p + Pb reference data) will enable more quantitative jet tomographic tests of hard probe dynamics in strongly interacting quark gluon plasmas.

Primary author: GYULASSY, Miklos (Columbia University)

Co-author: Prof. HOROWITZ, William (University Cape Town)

Presenter: HOROWITZ, William (University of Cape Town)

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