# PHENIX Results on In-Medium Jet Modification Using $\pi^0$ and Direct Photon-Triggered Two-Particle Correlations

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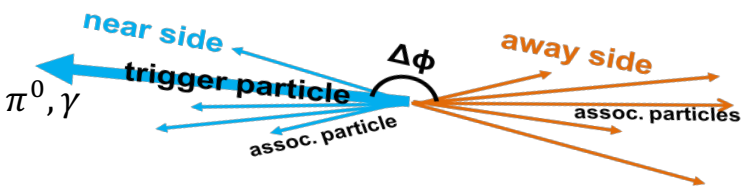
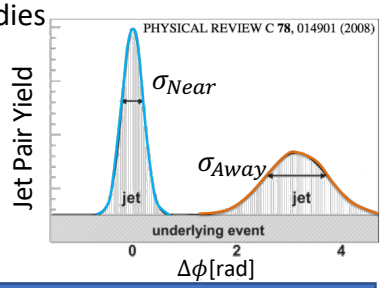
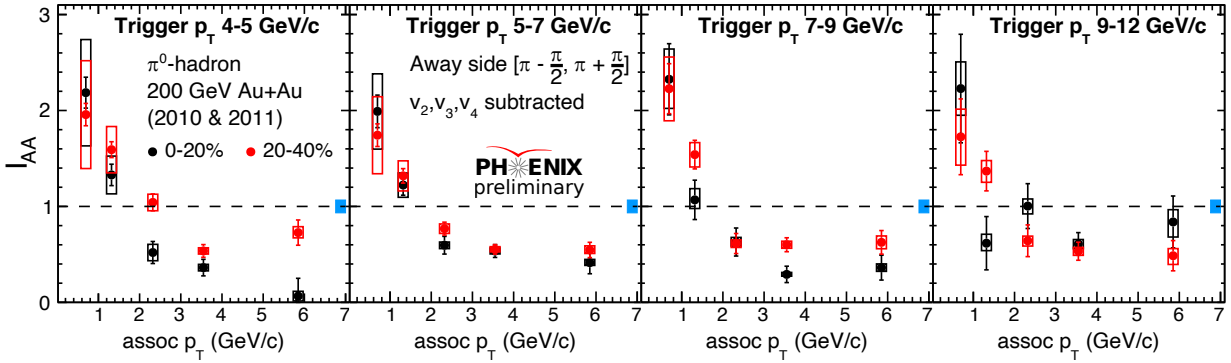
## Two-Particle Correlations

- Correlate all charged hadrons in an event to a high $p_T$ $\pi^0$ or direct photon via angular separation, $\Delta\phi$
- Resultant distributions can be used to quantify modification to the away-side charged hadron yield via $I_{AA} = (Y_{AA}/Y_{pp})$, where Y represents the away-side integrated yield
- Subtraction of decay photon correlations yields direct photon-hadron correlations
- Direct photons serve as well-calibrated probe for energy loss studies



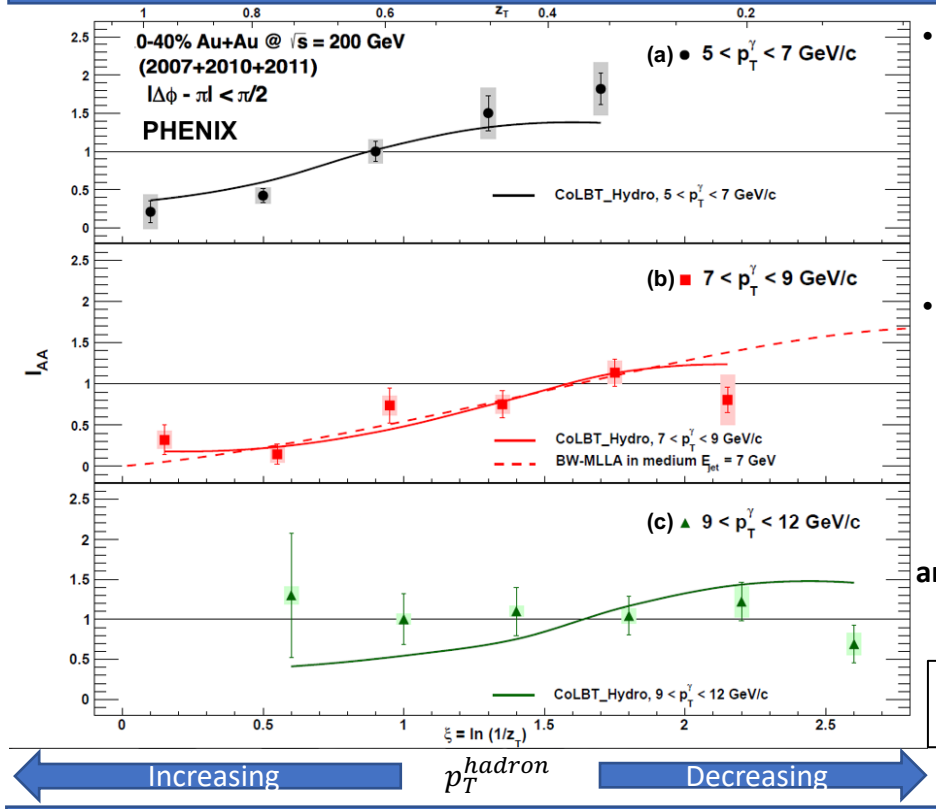




## $I_{AA}$ for $\pi^0$-Hadron Correlations




- $I_{AA}$ from $\pi^0$-triggered two particle correlations shows enhancement of soft particle yield and suppression of high $p_T$ jet fragments on the away-side
- Quenching of hard partons leads to production of soft particles as a medium response to the energy embedded in it
- No significant dependence on centrality observed

## $I_{AA}$ for Direct Photon-Hadron Correlations




- $I_{AA}$ in Au+Au collisions via both $\pi^0$-triggered and direct photon-triggered correlations show similar trends in away-side yield modification
- Transition from enhancement to suppression occurs at fixed $p_T$ (Fig. 1), but not at fixed $\xi$ (left)

arXiv:2005.14270

$\xi = \ln(1/z_T)$;
$z_T = p_T^{hadron}/p_T^\gamma$

## Summary and Outlook

- $I_{AA}$ from $\pi^0$ and direct photon-hadron correlations in Au+Au collisions show similar behavior
- Transition at fixed $p_T$ suggests soft particle enhancement is a medium response to energy deposited by quenched hard partons
- Measurements will be expanded to larger 2014 and 2016 Au+Au @ 200 GeV datasets for greater statistical precision

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