

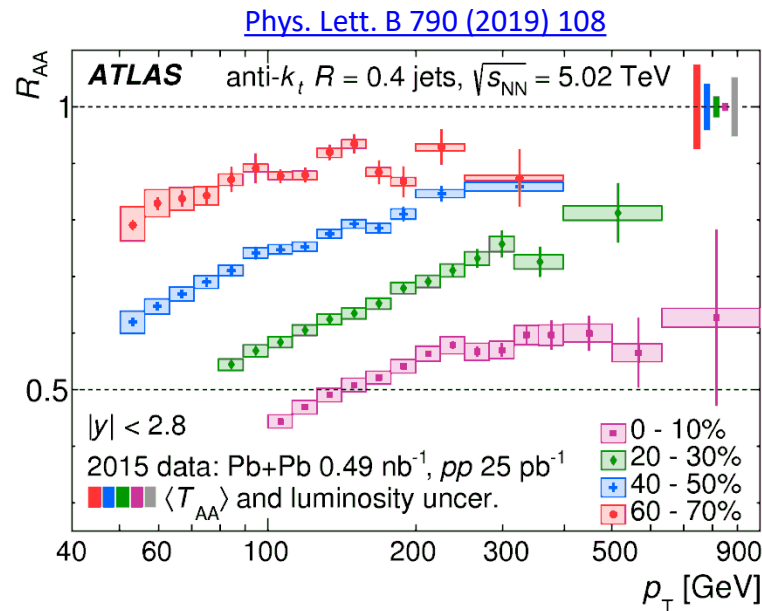
Exploring Jet Quenching Through the Measurement of the Dijet Momentum Balance with ATLAS

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For the ATLAS Collaboration

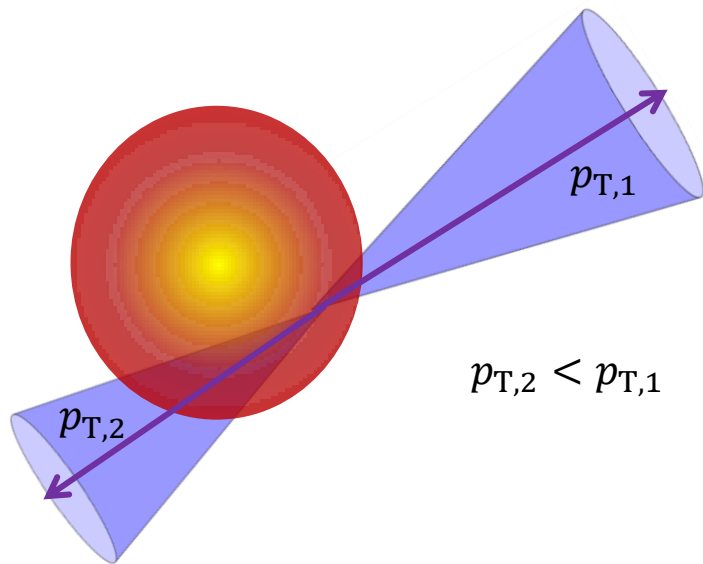
Motivation

- Inclusive jets experience significant energy loss up to 1 TeV
- Modification of the dijet momentum balance in Pb+Pb compared to pp provides direct insight on the role of fluctuations and path length to energy loss



Measurement

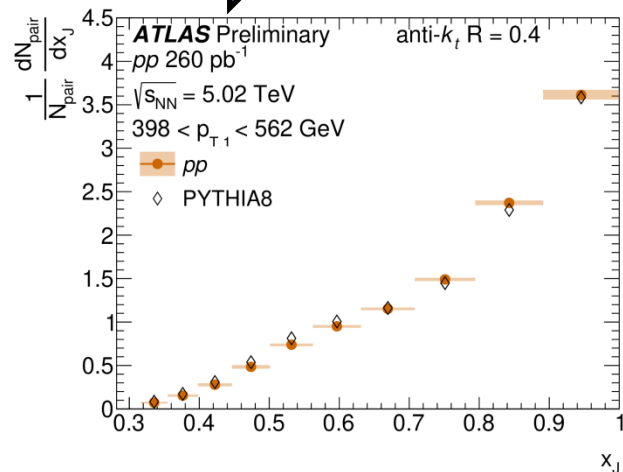
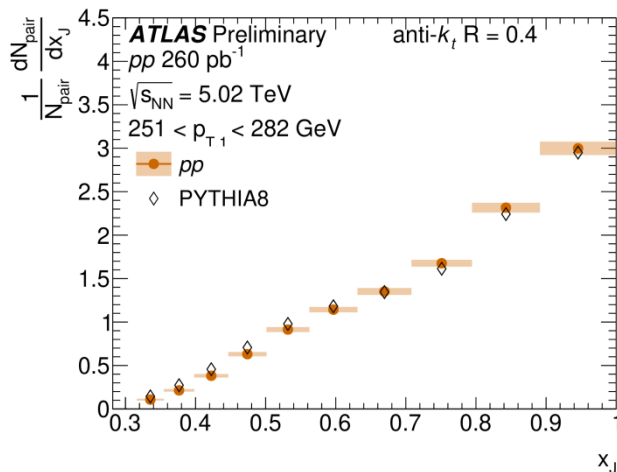
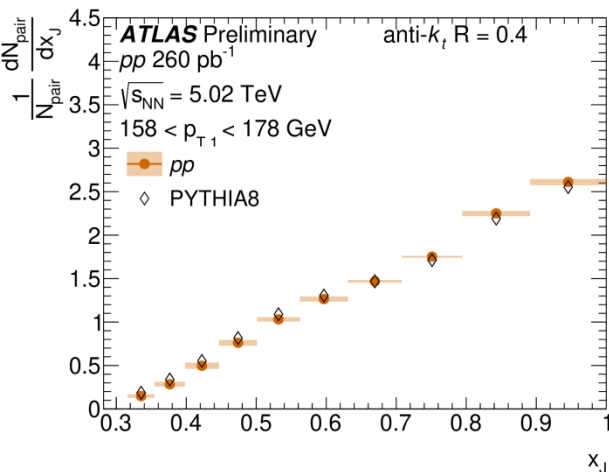
$$x_J = \frac{p_{T,2}}{p_{T,1}}$$



- Measurement of Dijet momentum balance (x_J) for Pb+Pb and pp collisions at $\sqrt{s_{NN}} = 5.02 \text{ TeV}$
 - As function of leading jet p_T ($158 < p_{T,1} < 562 \text{ GeV}$) and centrality in Pb+Pb
- Dijet pairs constructed from leading two jets with $|\Delta\phi_{1,2}| > \frac{7\pi}{8}$ and $|\eta| < 2.1$
- Results are unfolded to account for detector effects on both $p_{T,1}$ and $p_{T,2}$

pp comparison to Pythia8

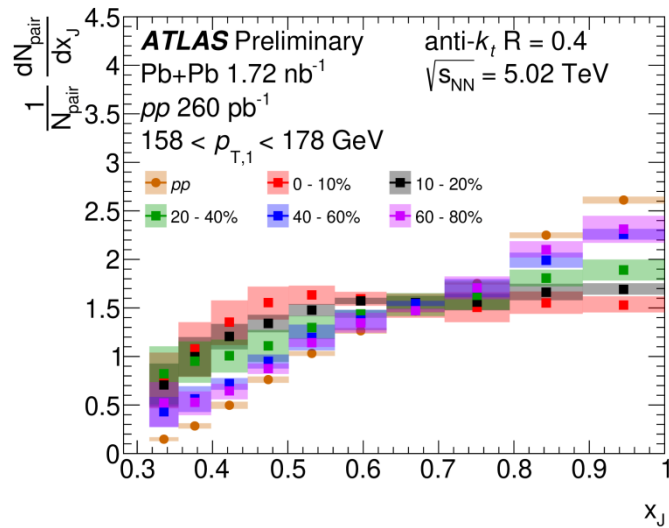
Increasing $p_{T,1}$



- With increasing $p_{T,1}$ the x_J distributions become steeper, more significantly favoring symmetric dijets
- Observe good agreement across the full $p_{T,1}$ range of the measurement PYTHIA8 (A14 tune, NNPDF23LO)

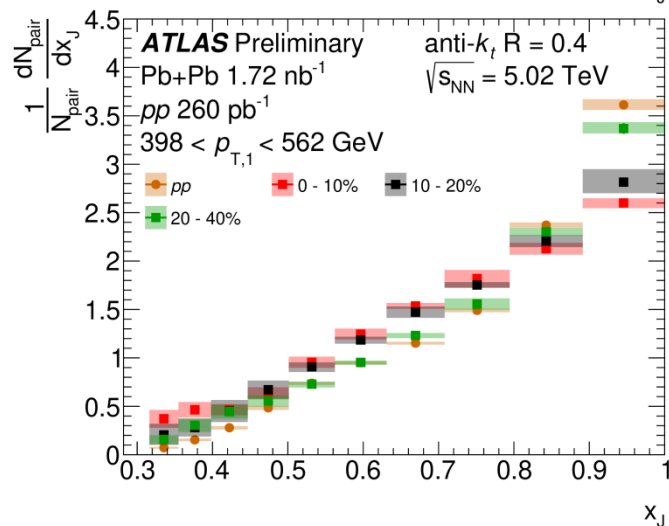
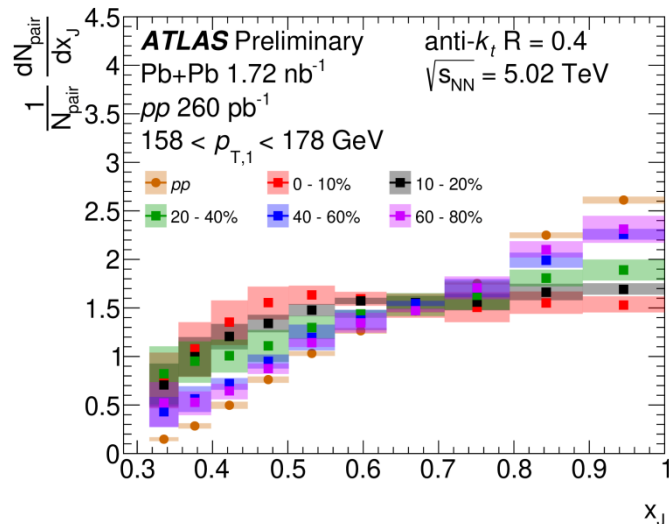
Centrality Scan

- Observe smooth evolution with centrality from pp to central Pb+Pb
- $158 < p_{T,1} < 178$ GeV:
 - 0-10% central Pb+Pb is consistent with flat for $x_J > 0.5$
 - Observe slight modification from pp in 60-80% Pb+Pb

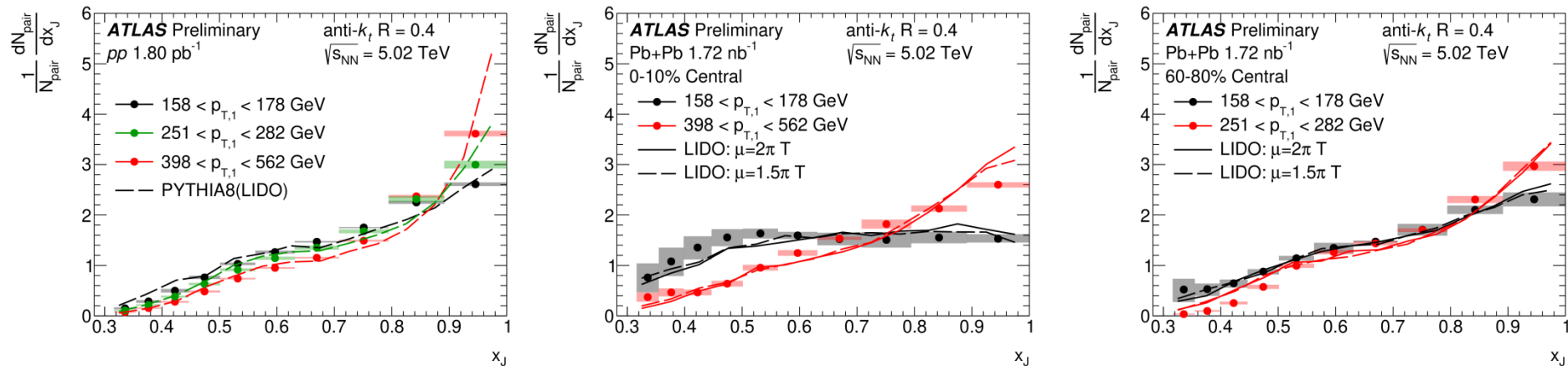


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 - 0-10% central Pb+Pb is consistent with flat for $x_J > 0.5$
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- Observe significant modification from pp for 0-40% Pb+Pb collisions out to $398 < p_{T,1} < 562$ GeV



Theory Comparison



- Predictions from the LIDO transport model (contains both radiative and collisional energy loss) observe agreement across both $p_{T,1}$ and centrality
- PYTHIA8 (4C tune) used in LIDO over-predicts symmetric jets at high $p_{T,1}$ in *pp* collisions
 - Similar over prediction observed at high $p_{T,1}$ in Pb+Pb collisions

Summary

- ATLAS measured the dijet momentum balance in Pb+Pb and pp collisions at $\sqrt{s_{NN}} = 5.02$ TeV
- Observe agreement with predictions from LIDO.
- Observe significant modification from pp collisions in 0-10% central Pb+Pb out to the highest $p_{T,1}$ measured ($398 < p_{T,1} < 562$) GeV
- For this and other ATLAS public results, please see:
<https://twiki.cern.ch/twiki/bin/view/AtlasPublic>

