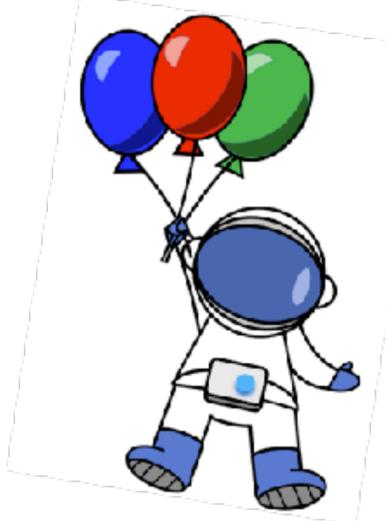


Yale



# Jet Modifications - Experimental Overview

Laura Havener, Yale University  
Quark Matter 2023, Houston, Texas  
Friday, September 8<sup>th</sup> 2023



Wright  
Laboratory

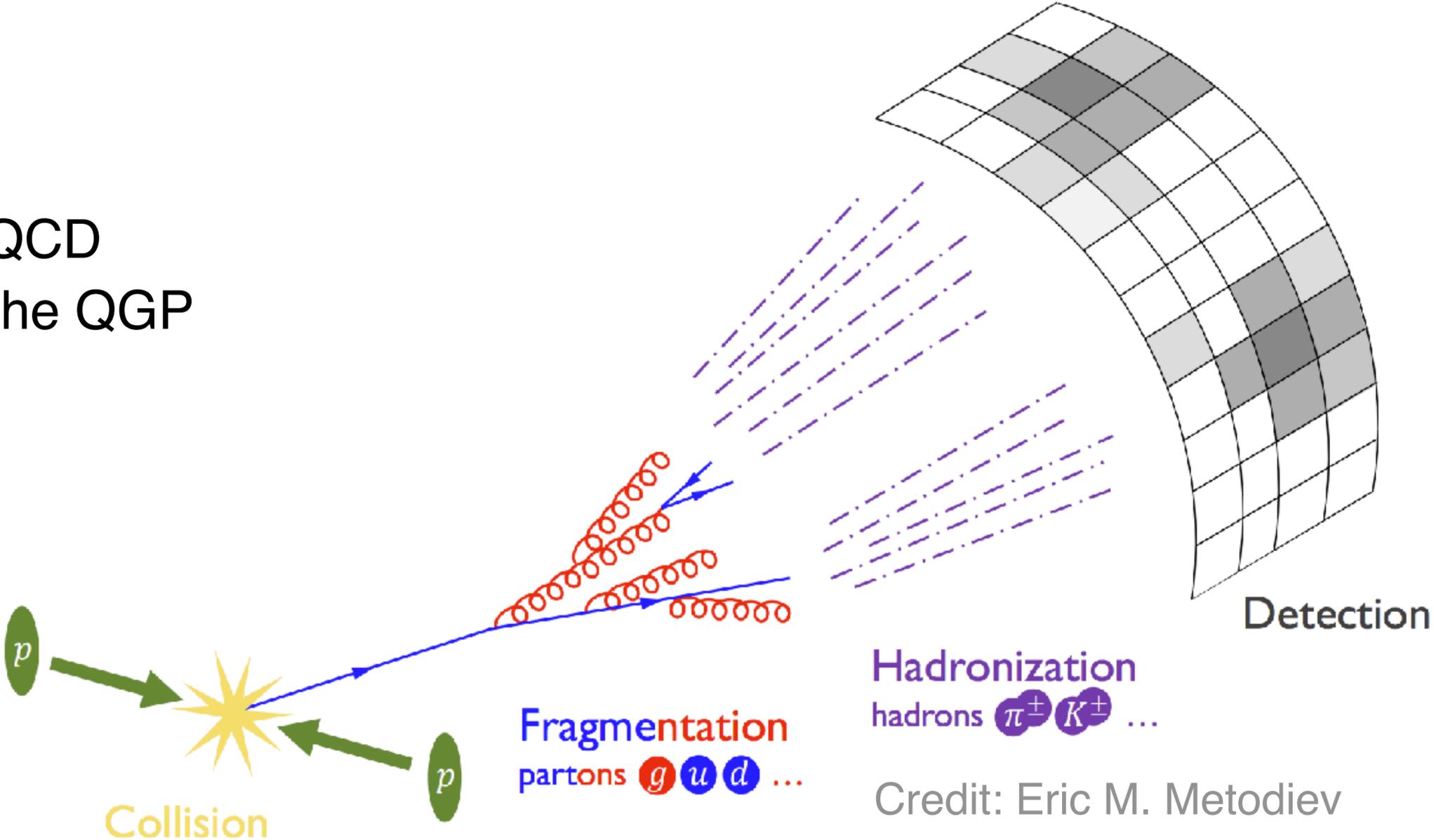
Image Credit:  
Isaac Mooney



# Jets are QCD probes

Jets connect **non-perturbative (np)QCD** to **perturbative (p)QCD**

- 1. Jets in vacuum to study QCD
- 2. Jets in medium to study the QGP



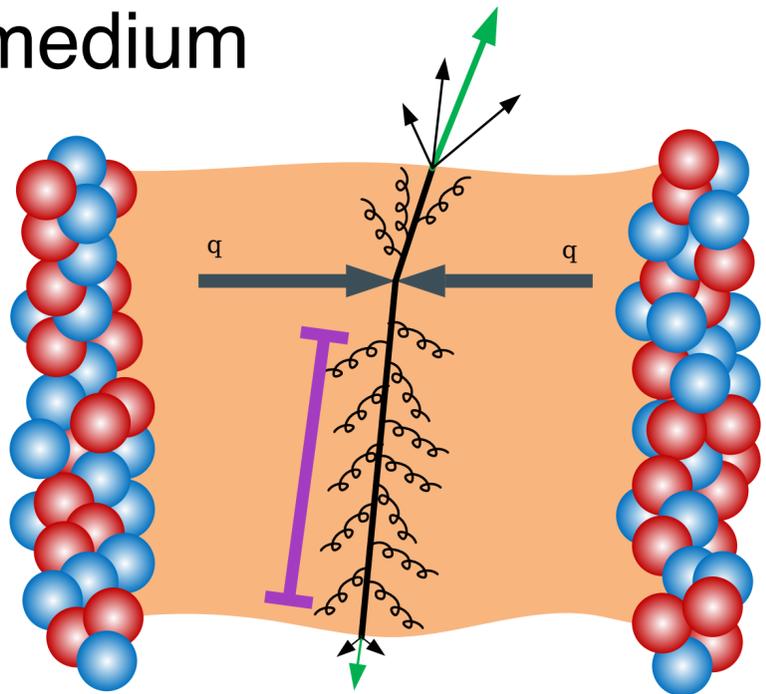
**Multi-scale dynamic objects whose complex structure contains QCD information**

# Jets as a probe of the quark-gluon plasma

Jet quenching: jet energy loss and substructure modification

Depends on the **path** traveled in the medium

Flavor dependence



# Jets as a probe of the quark-gluon plasma

Jet quenching: jet energy loss and substructure modification

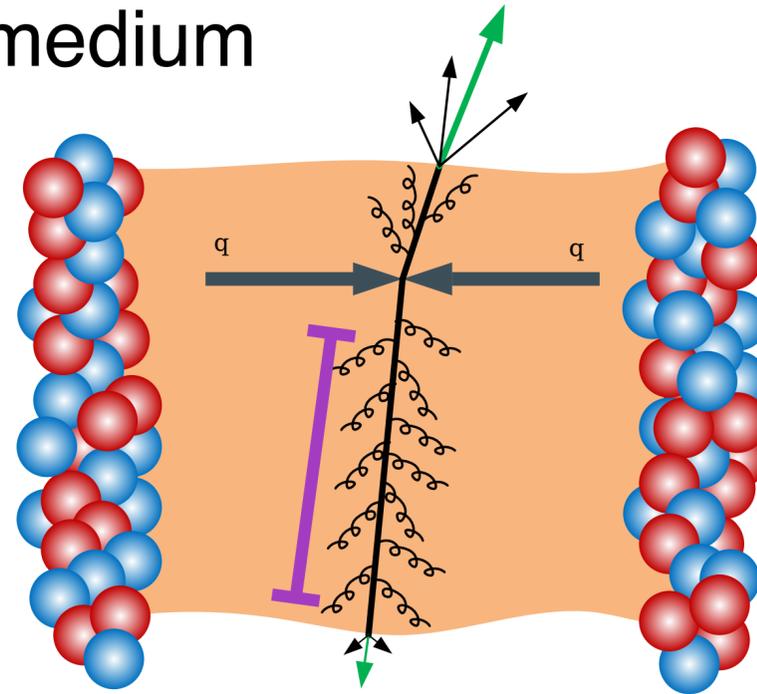
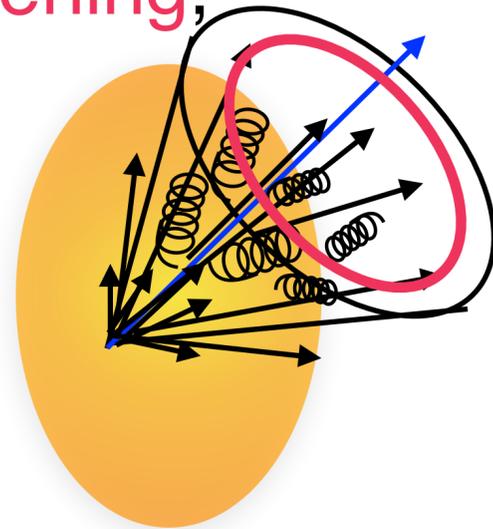
Depends on the **path** traveled in the medium

See next talk by Y. Go

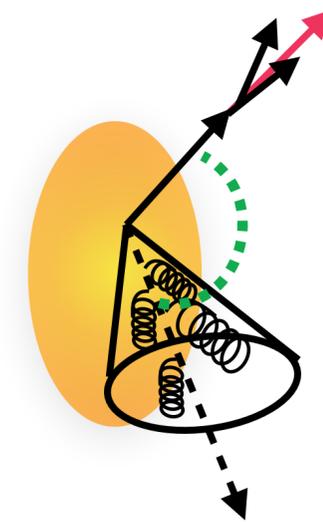
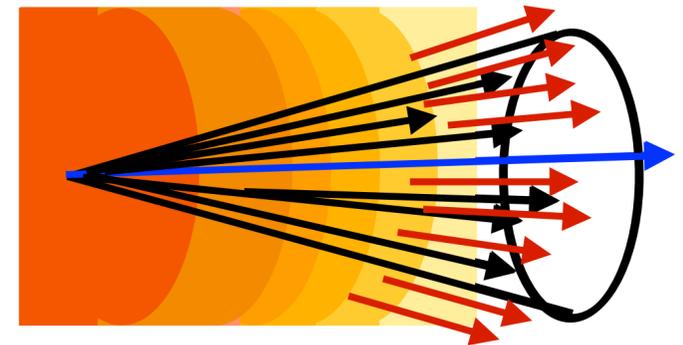
**Medium response**, causing a wake of soft particles

Flavor dependence

Soft gluon emissions cause **momentum broadening**, widening the jet



Molier scattering causes **wide-angle deflection**



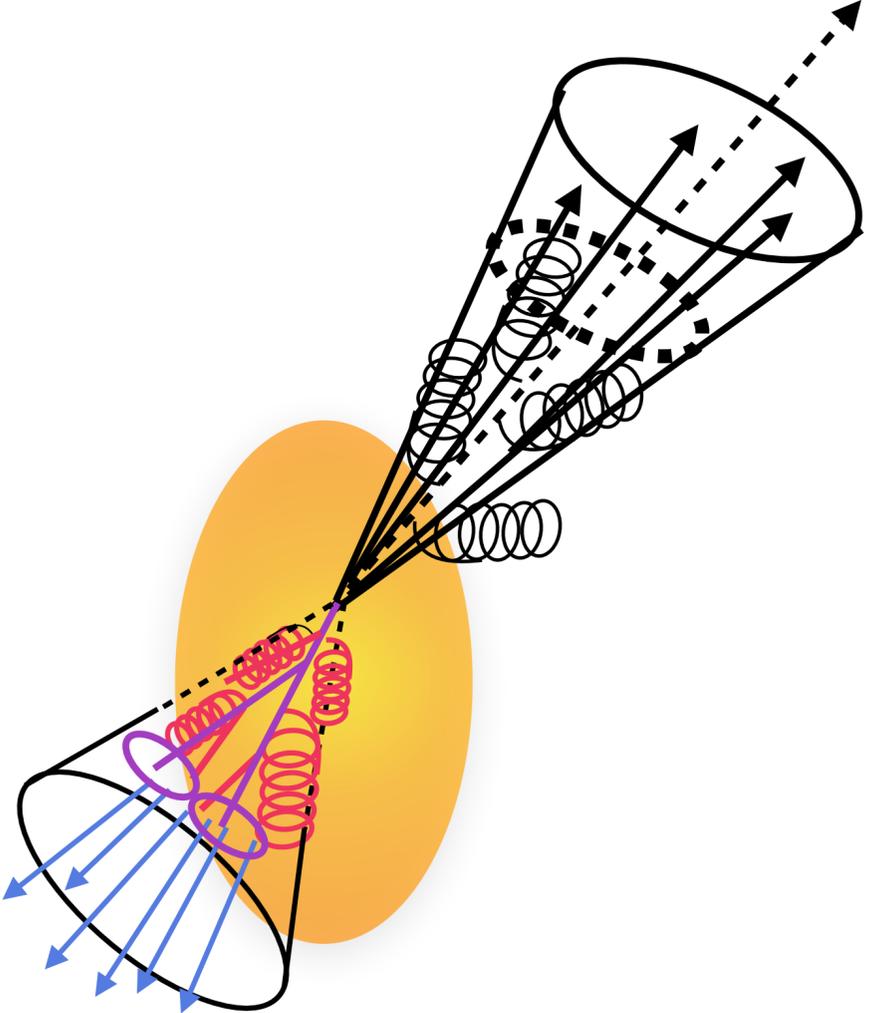
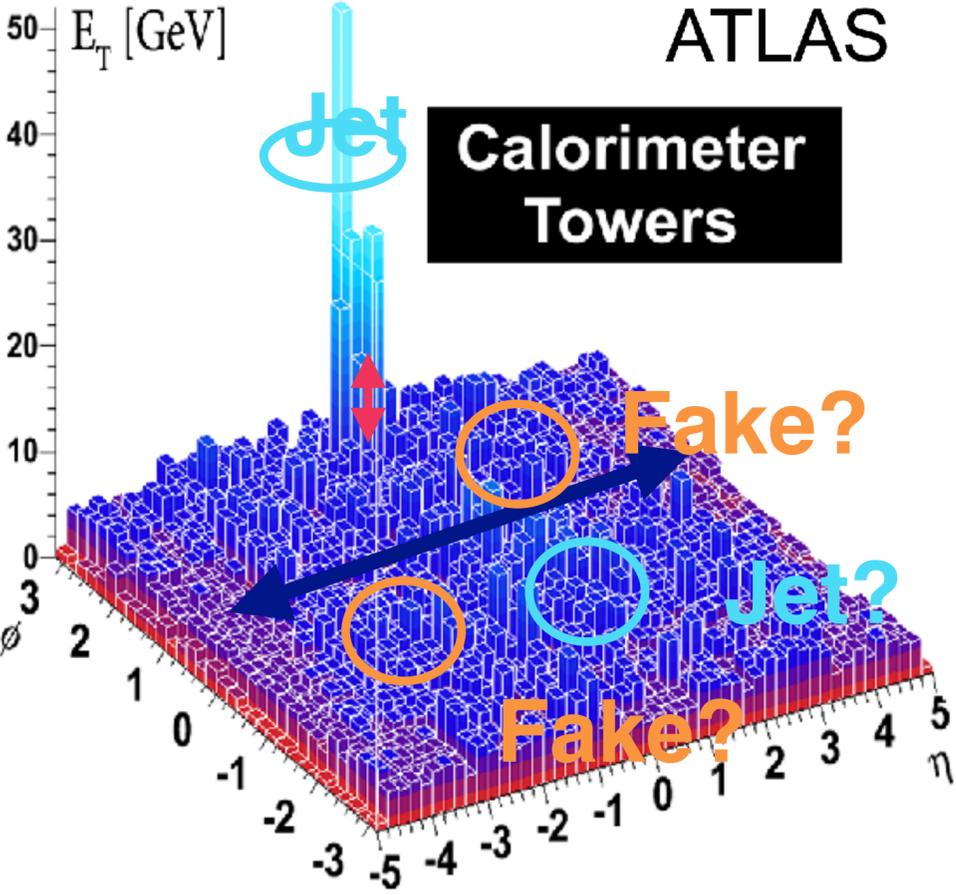
**Goal: craft observables to disentangle effects and extract properties of the QGP**

# Complexity is both a challenge and an advantage

Multi-scale dynamic objects whose complex structure contains QCD information

Challenge to removing the large background due to the UE and define our jet signal

Finding observables sensitive to QGP and calculable in theory



J. Mulligan  
(Mon. 5:00 PM)

**Remember goal: Extracting QGP properties**

# Lessons from pp data and model comparisons

Numerous jet measurements in pp collisions at QM - why should we care?

W. Fan (Wed. 8:50 AM)

N. Zardoshti (Wed. 11:40am)

H. Bossi (Tues. 11:10 AM)

Posters: C. Styliandis, A. Nambrath, J. Ryu, A. Tamis, Y. Song, A. Rai, G. Weeldon, B. Liang-Gilman, E. Yeats, etc.

Hard Probes and Boost 2023

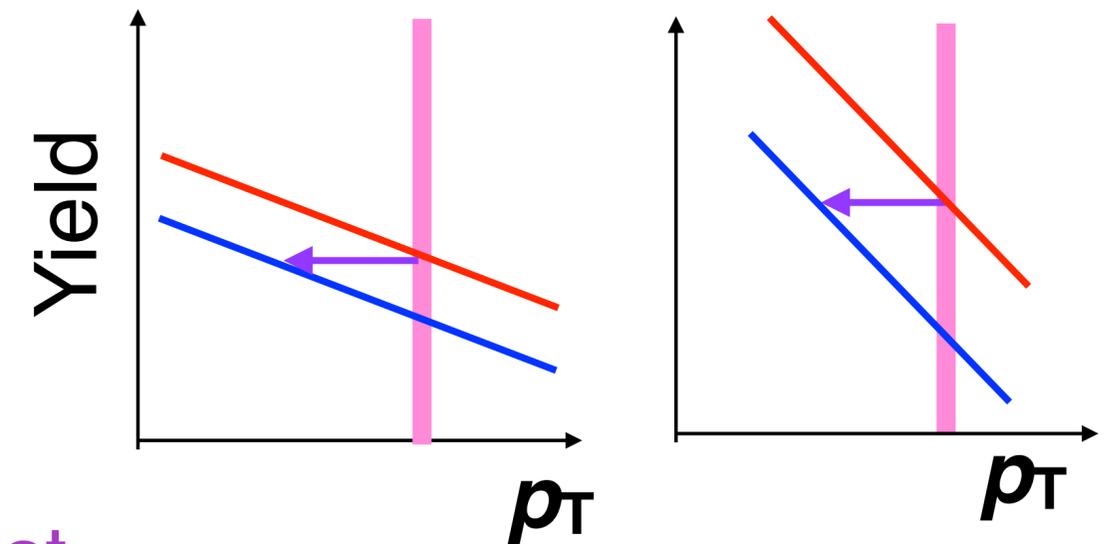
## #1: Important to understand pp baseline

A. Takecs (Wed. 12:40 PM)

## #2: Differences in underlying pp distribution affect interpretation of HI measurements

C. McGinn (Wed. 8:50 AM)

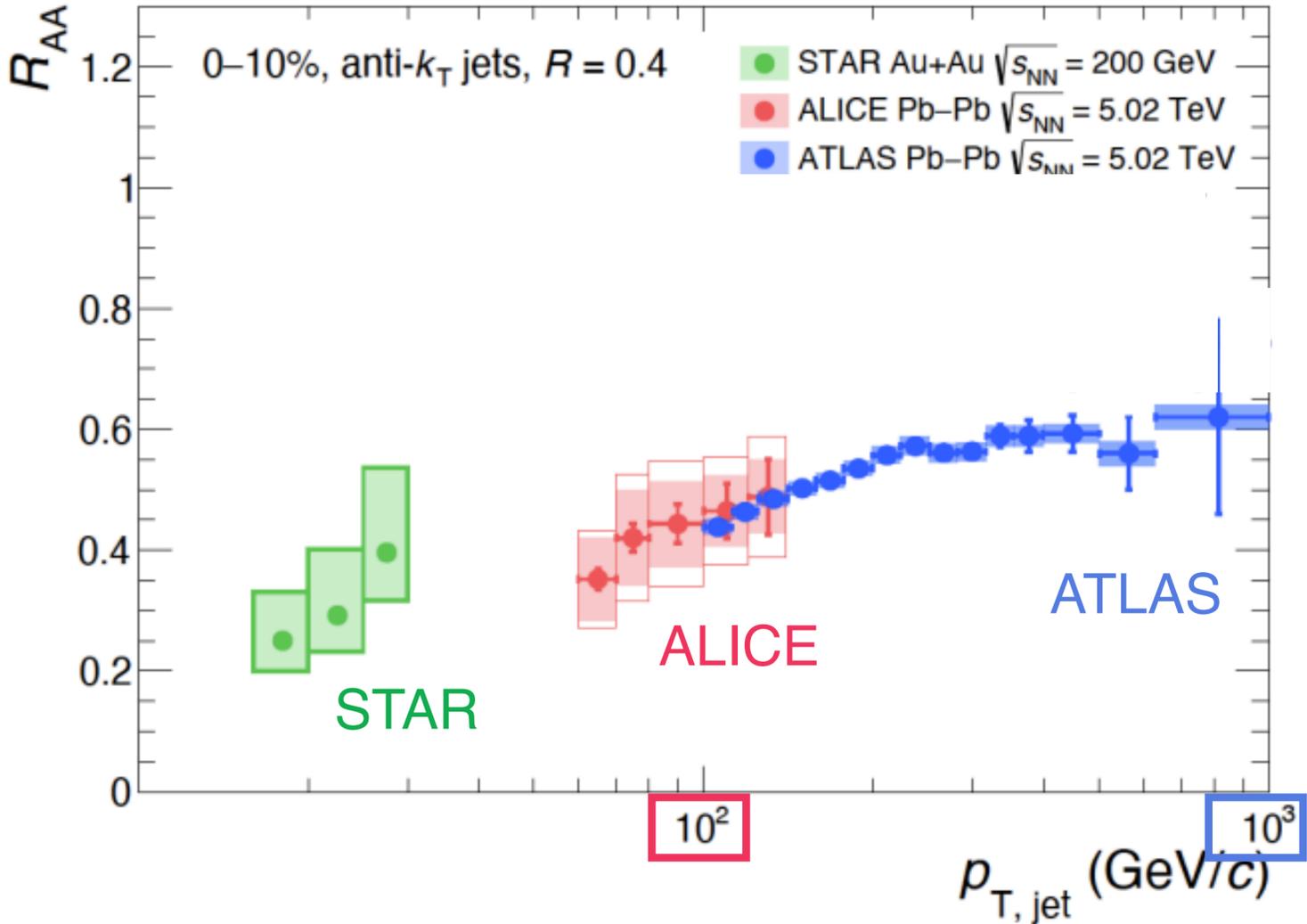
## #3: Develop observables and find ideas in pp collisions that can be applied to HI collisions



# Jets lose energy in the medium

$$R_{AA} = \frac{\text{Pb-Pb } \bigcirc \bigcirc}{\text{scaled } \otimes \text{ pp } \bullet \rightarrow \leftarrow \bullet}$$

Muller, Harris arxiv:2308.05743

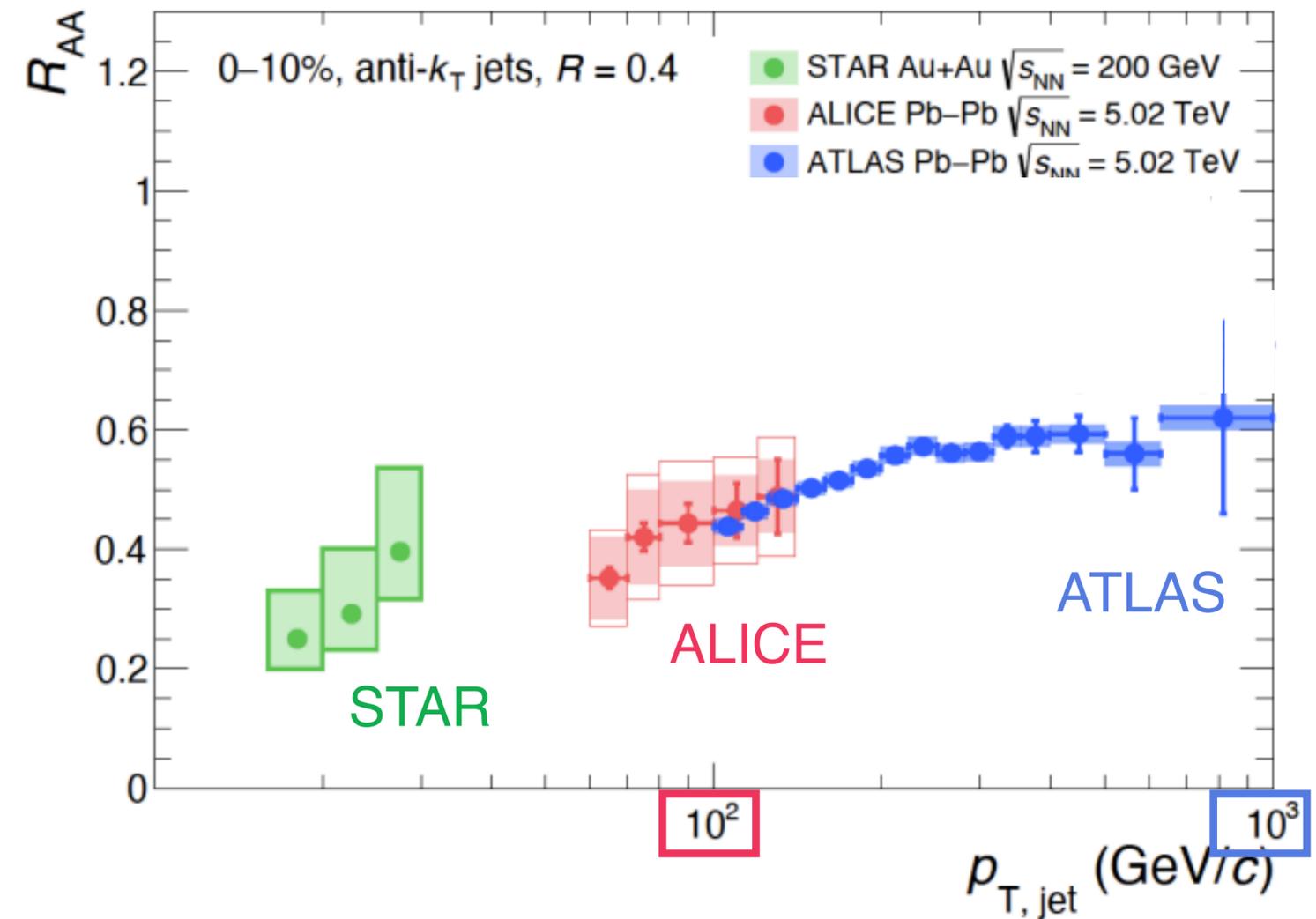
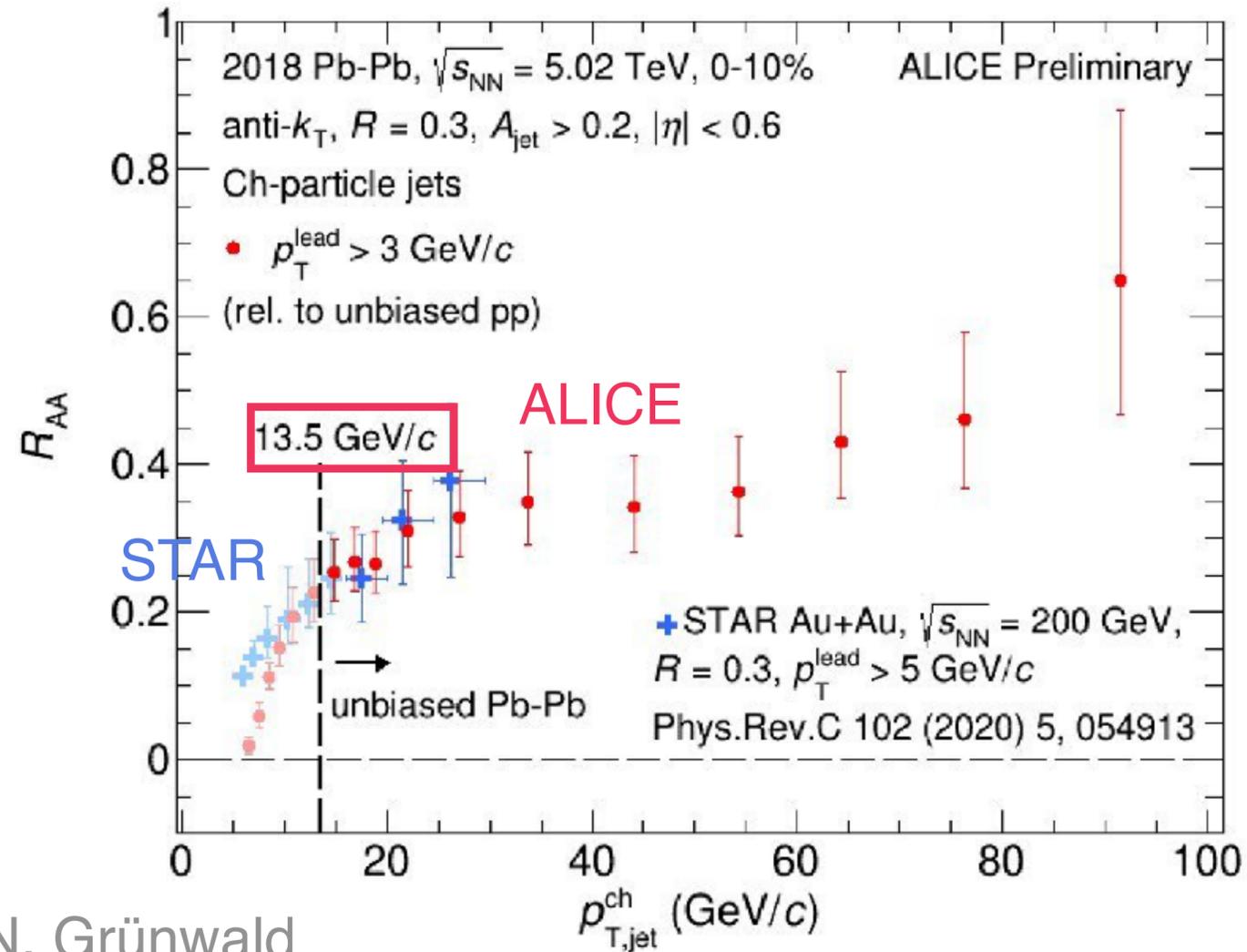


# Jets lose energy in the medium

Innovative technique using mixed events to remove the background at low jet  $p_T$

$$R_{AA} = \frac{\text{Pb-Pb } \bigcirc \bigcirc}{\text{scaled } \otimes \text{ pp } \bullet \rightarrow \leftarrow \bullet}$$

Muller, Harris arxiv:2308.05743



N. Grünwald  
 (Tues. 11:40am)

ALI-PREL-550404

Comparison between RHIC and LHC!

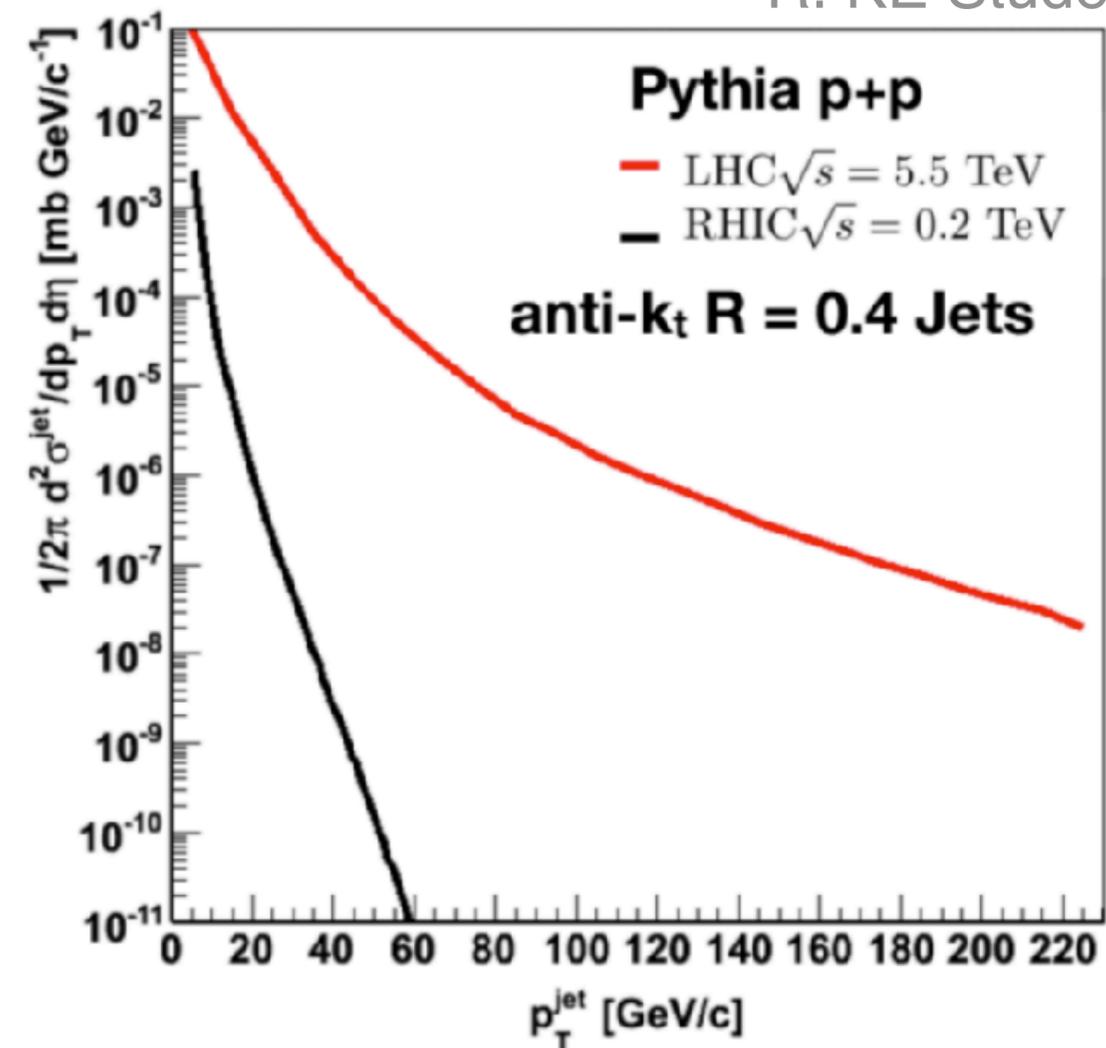
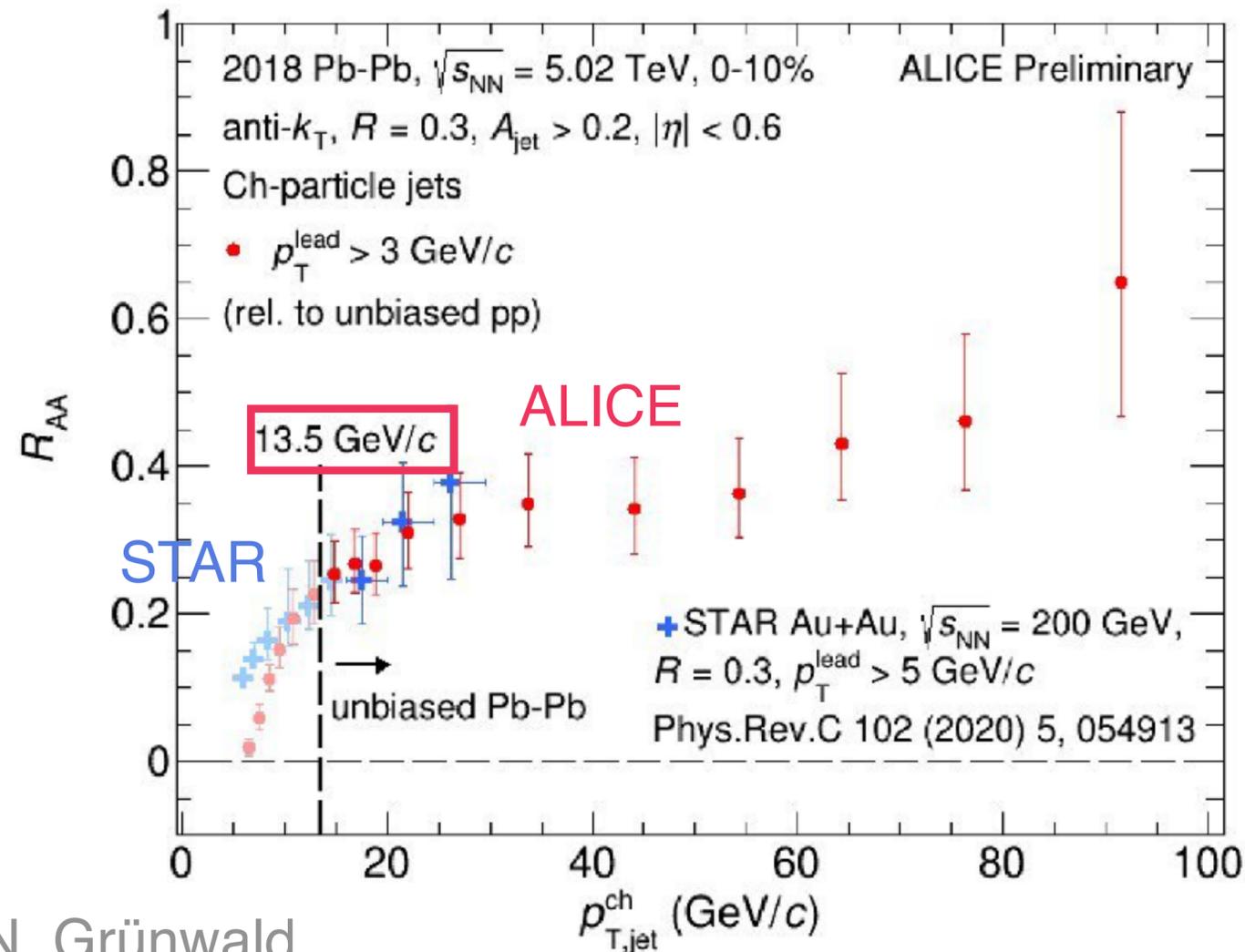
# Aside: RHIC vs LHC

Innovative technique using mixed events to remove the background at low jet  $p_T$

$$R_{AA} = \frac{\text{Pb-Pb } \bigcirc \bigcirc}{\text{scaled } \otimes \text{pp } \bullet \rightarrow \leftarrow \bullet}$$

Caveat: “spectra steepness” plays a role!

R. KE Student Day



N. Grünwald  
 (Tues. 11:40am)

ALI-PREL-550404

**Jet spectra at RHIC are steeper and contain a higher quark fraction at the same  $p_T$**

# Energy loss dependence on parton flavor

Flavor and mass dependence

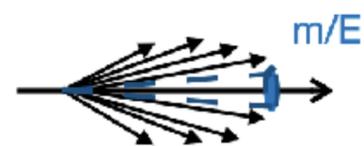
$$E_{\text{loss}}^g > E_{\text{loss}}^q > E_{\text{loss}}^{\text{HQ}}$$

Dead-cone effect

Large parton mass

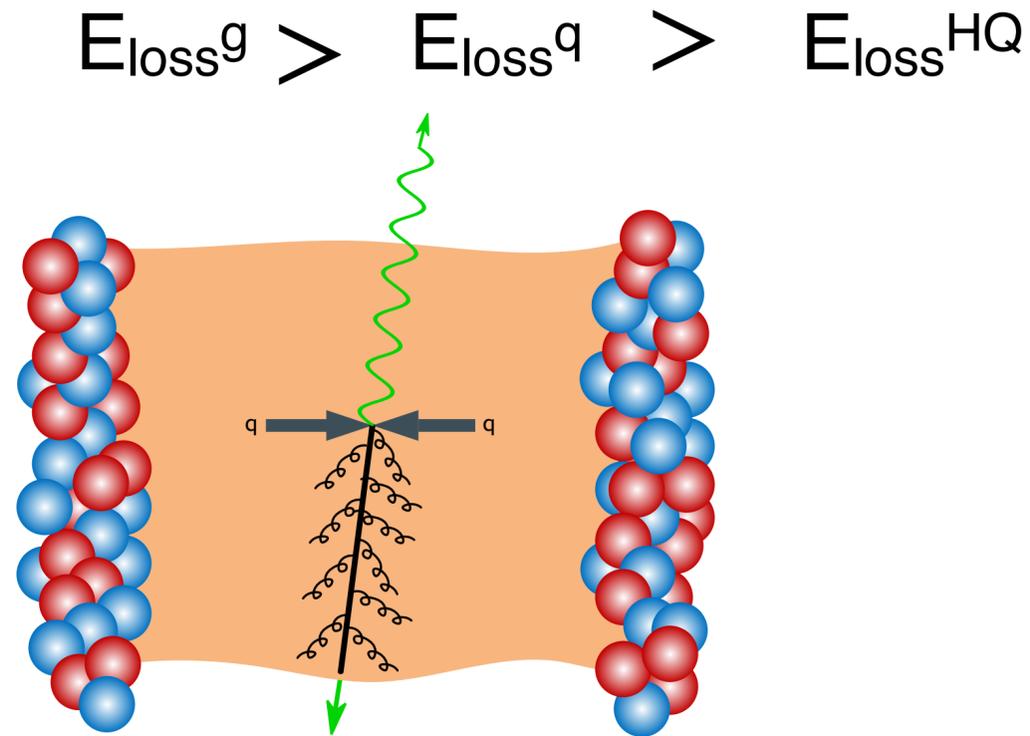


Small parton mass

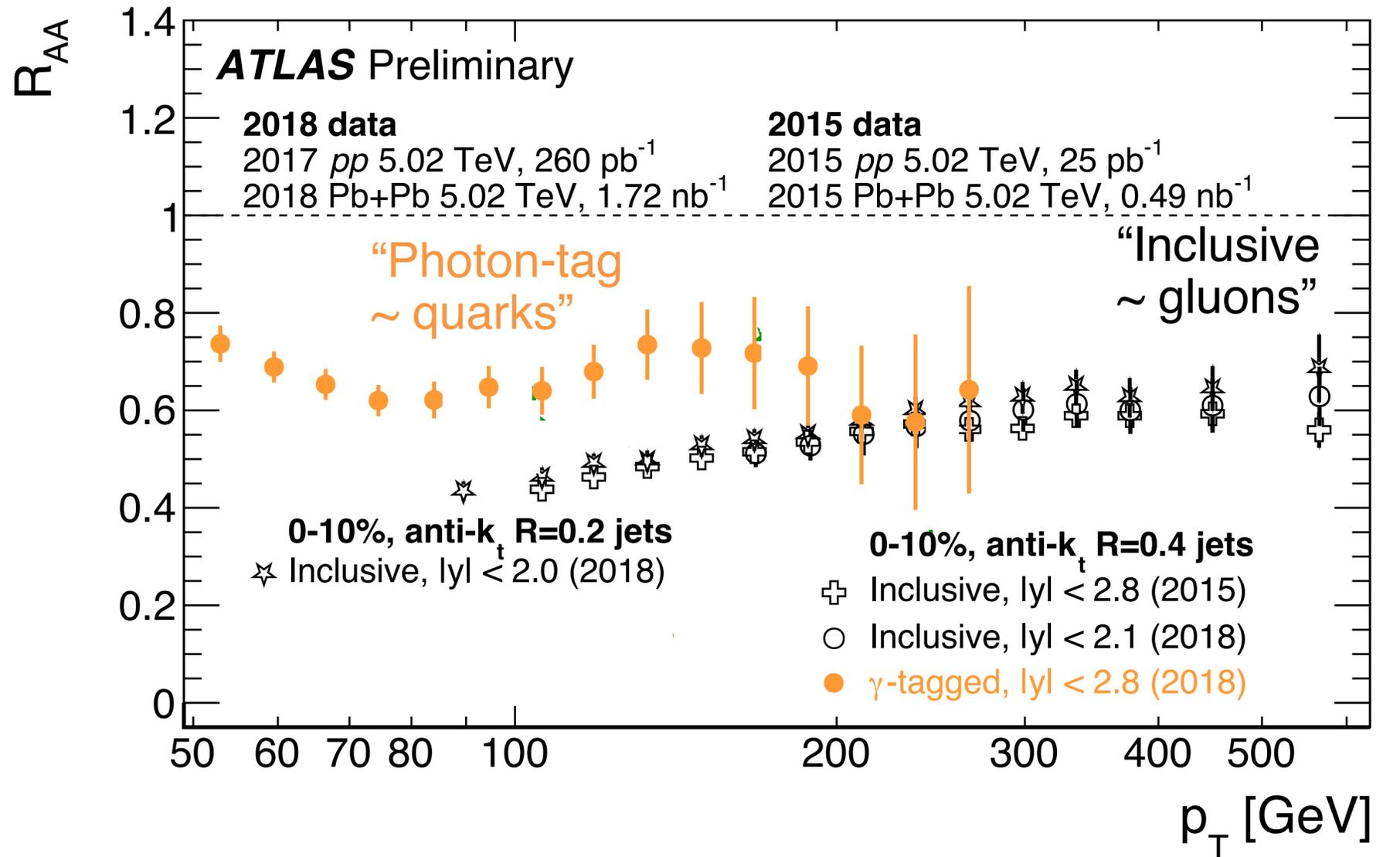


# Energy loss dependence on **parton flavor**

Flavor and mass dependence



Caveat: “spectra steepness” plays a role!



Energy loss depends on color charge

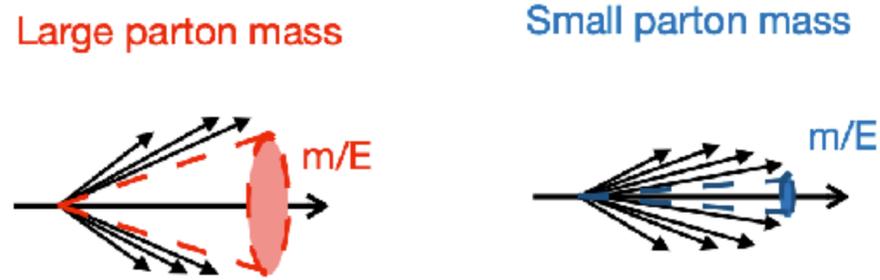
C. McGinn (Wed. 8:50 AM)

# Energy loss dependence on parton flavor

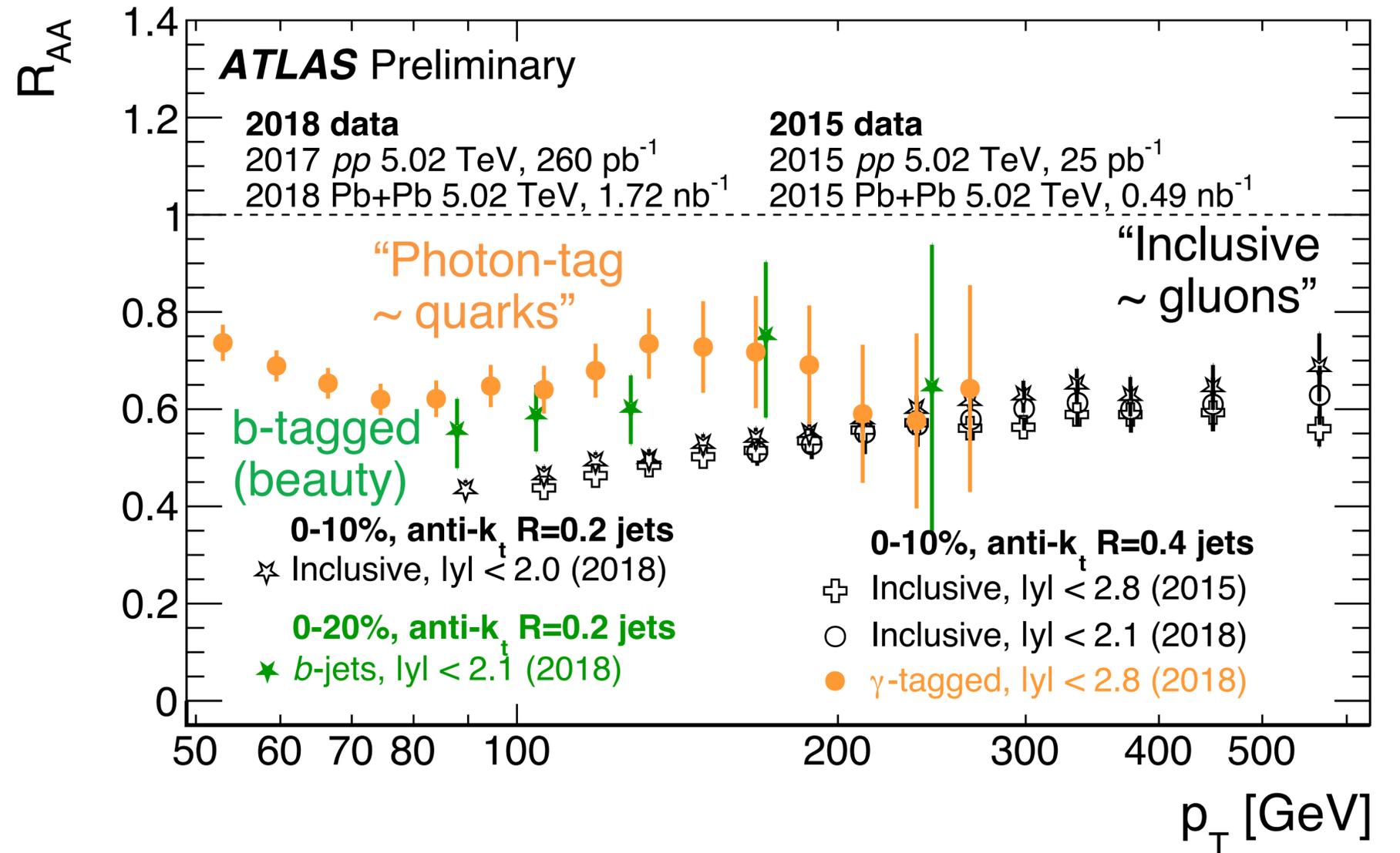
Flavor and mass dependence

$$E_{\text{loss}}^g > E_{\text{loss}}^q > E_{\text{loss}}^{\text{HQ}}$$

Dead-cone effect



Caveat: “spectra steepness” plays a role!



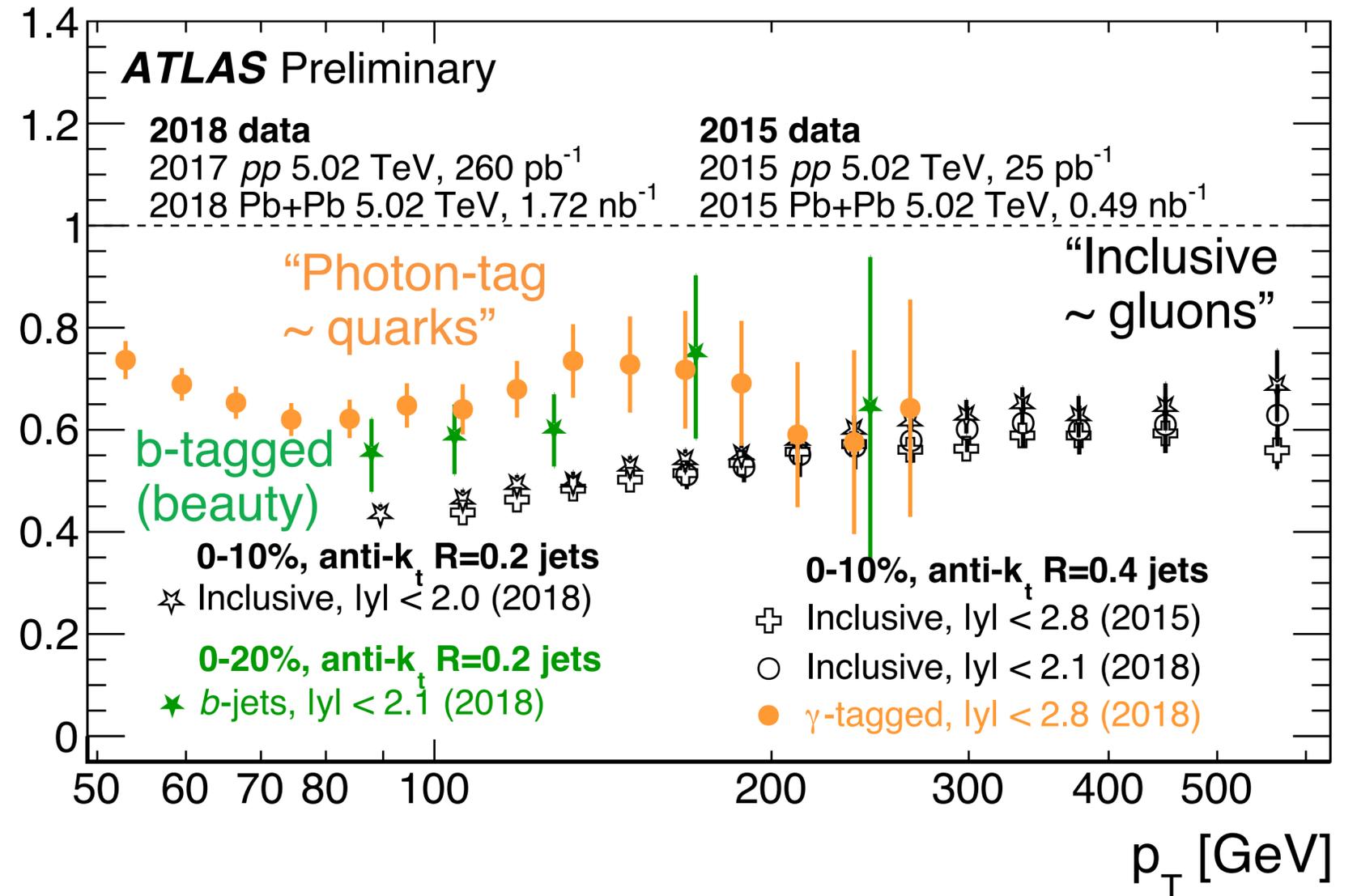
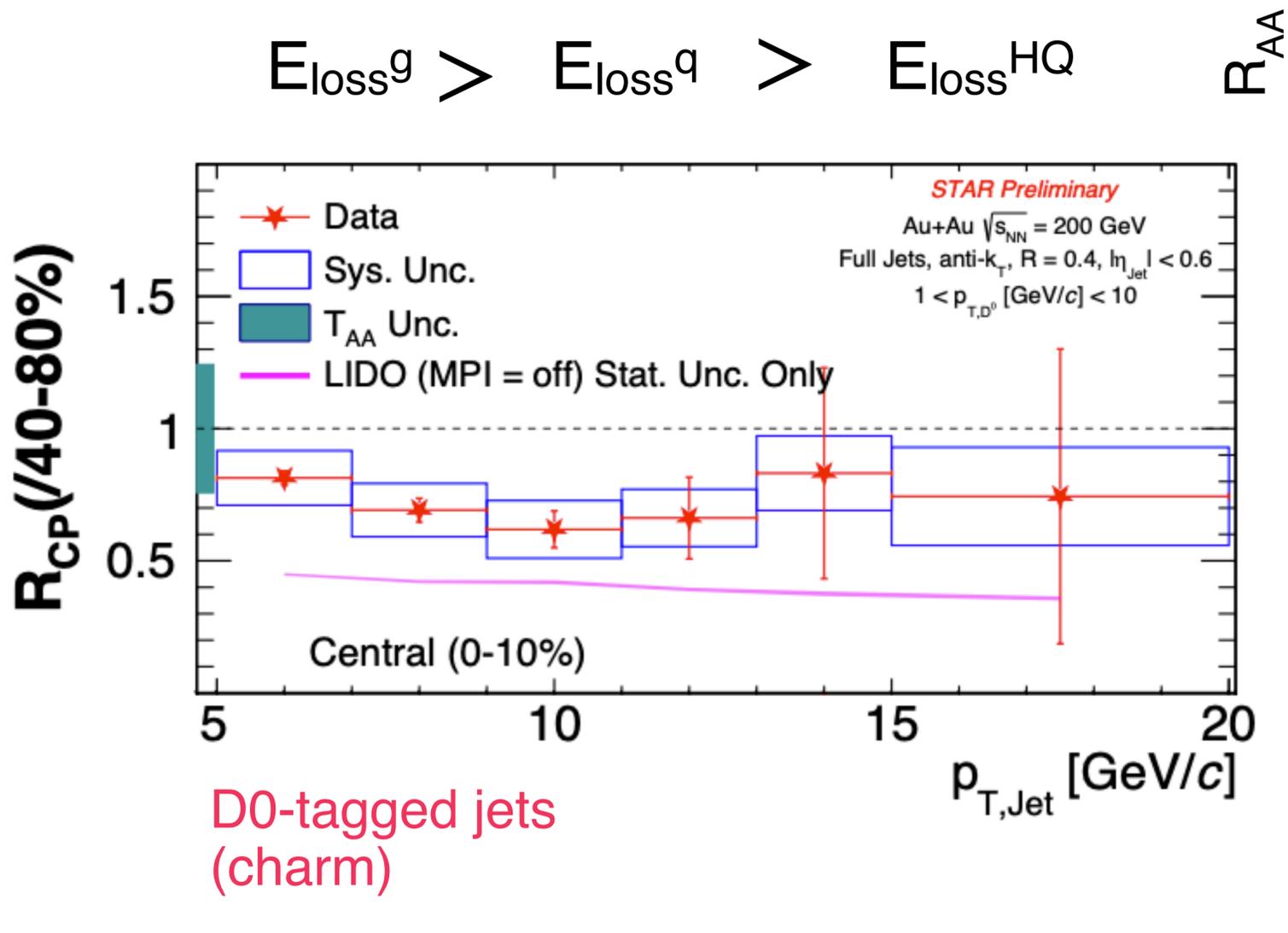
Energy loss depends on color charge (and mass of parton?)

A. Sickles (Tues. 9:30 AM) C. McGinn (Wed. 8:50 AM)

# Energy loss dependence on parton flavor

Flavor and mass dependence

Caveat: “spectra steepness” plays a role!



Y. Su (Tue. 11:20 AM)

D. Roy (Poster)

Energy loss depends on color charge (and mass of parton?)

A. Sickles (Tues. 9:30 AM) C. McGinn (Wed. 8:50 AM)

# Path length dependence of energy loss

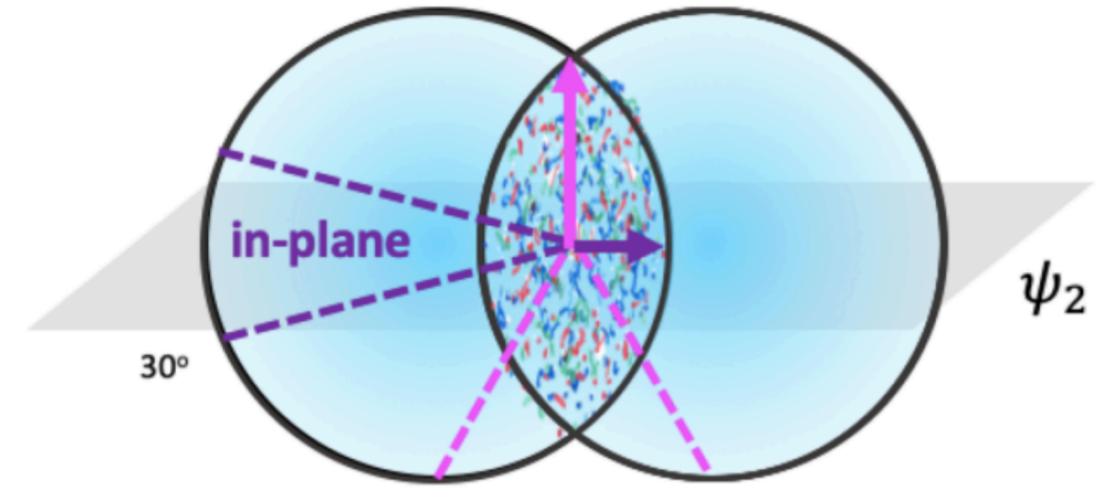
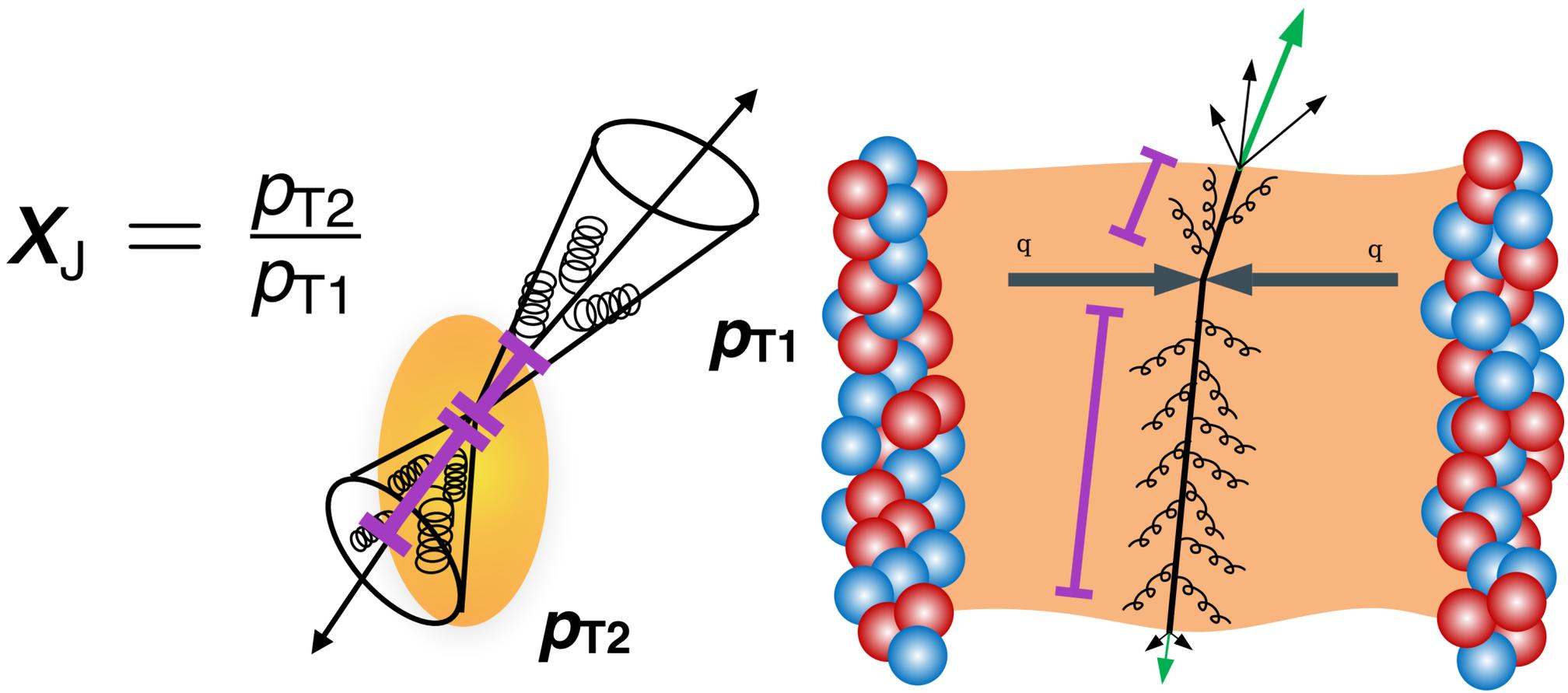


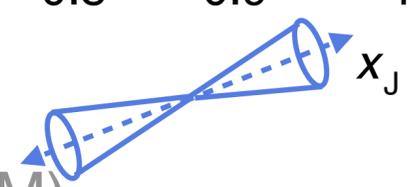
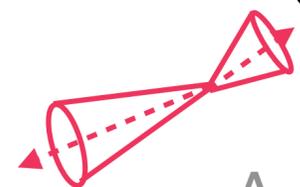
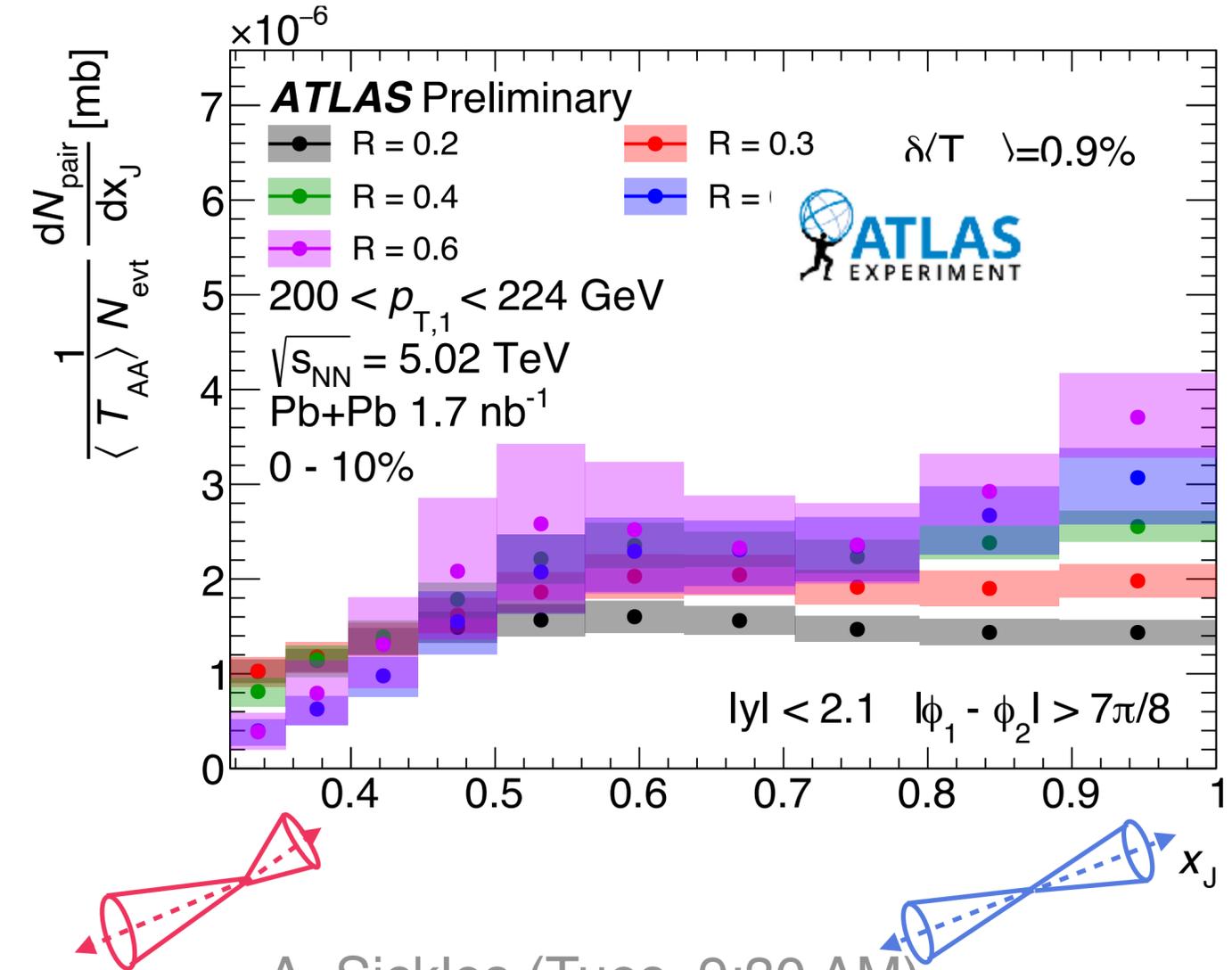
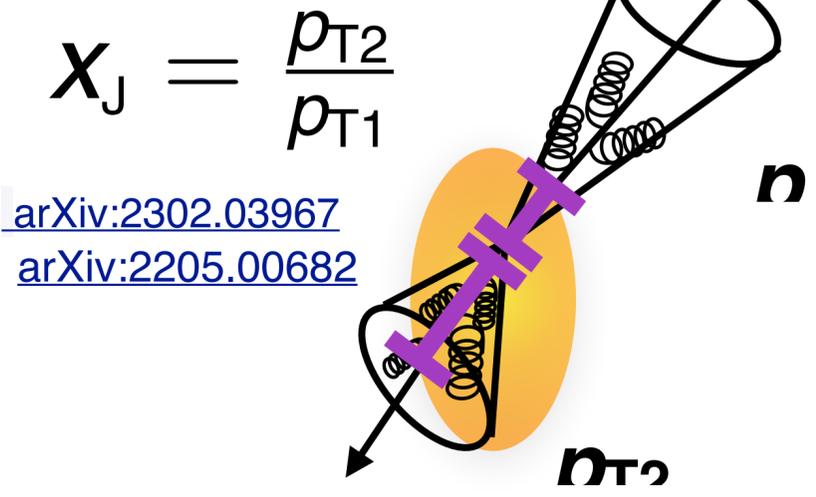
Image credit: Caitie Beattie

Dijet asymmetry: expected **imbalance** due to different paths and fluctuations in jet and energy loss

Event plane dependence: expect **reduced yield out-of-plane**

# Next generation of dijet asymmetry

Extending to larger jet radii

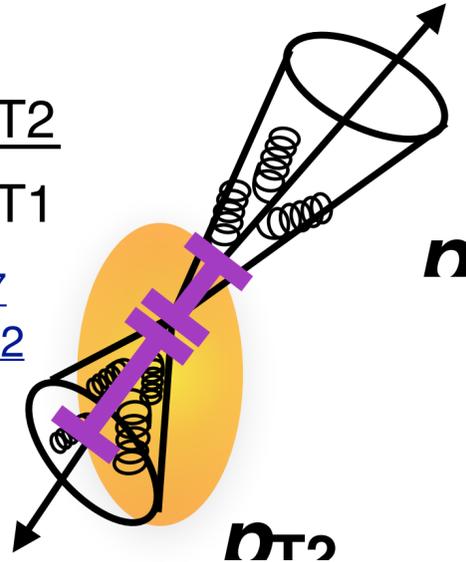


A. Sickles (Tues. 9:30 AM)  
 A. Romero (Poster)

# Next generation of dijet asymmetry

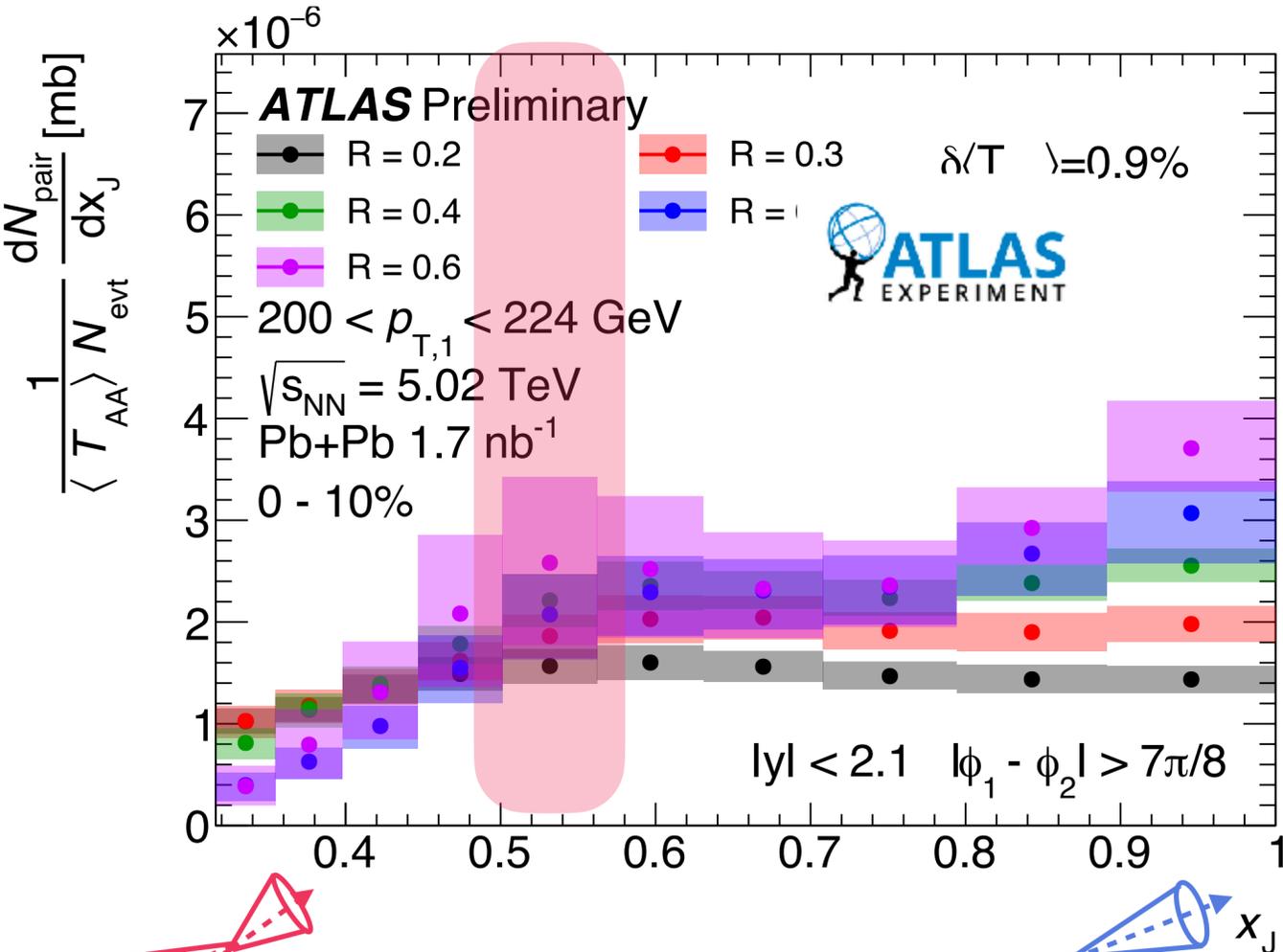
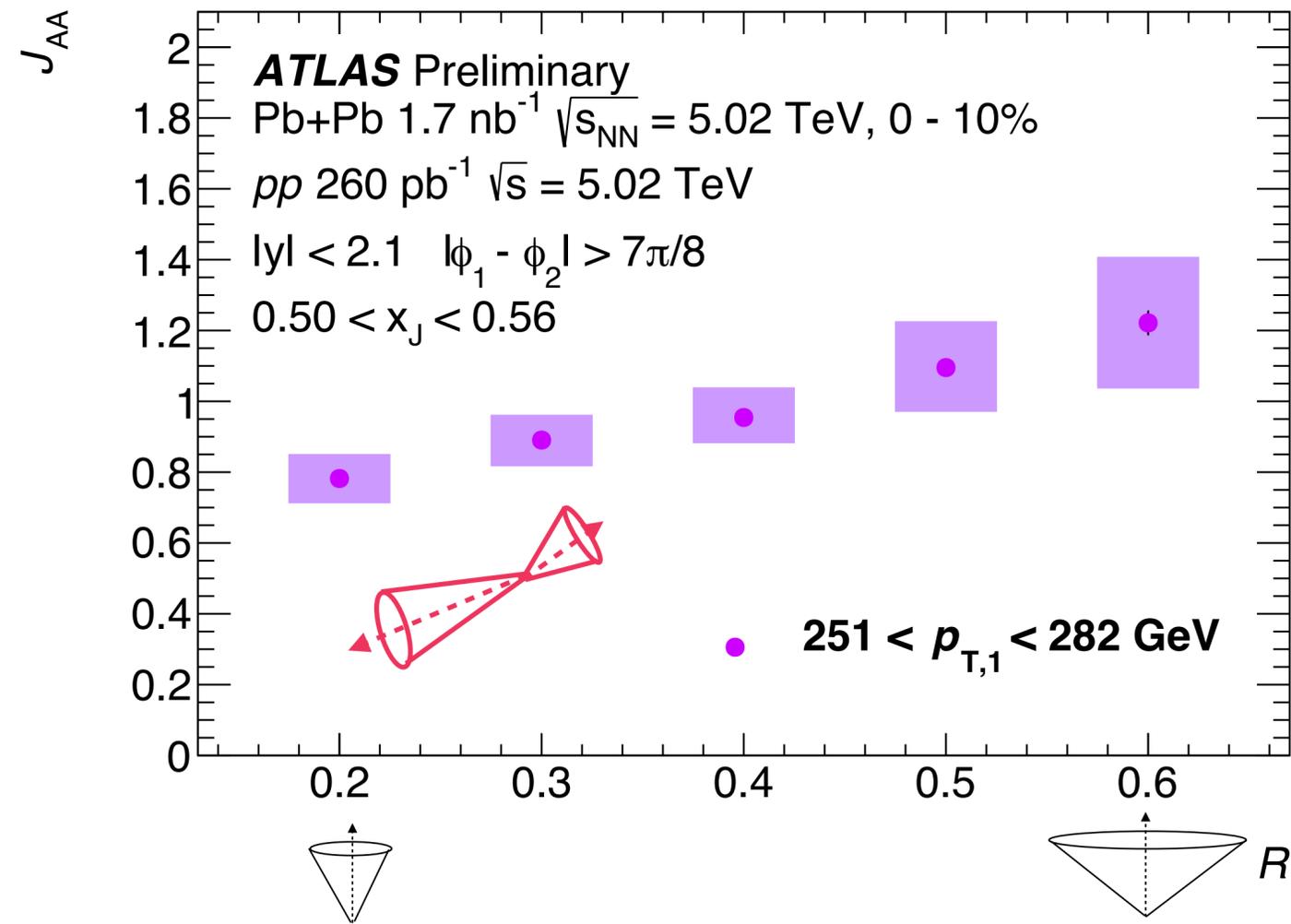
$$x_J = \frac{p_{T2}}{p_{T1}}$$

[arXiv:2302.03967](https://arxiv.org/abs/2302.03967)  
[arXiv:2205.00682](https://arxiv.org/abs/2205.00682)



Extending to larger jet radii

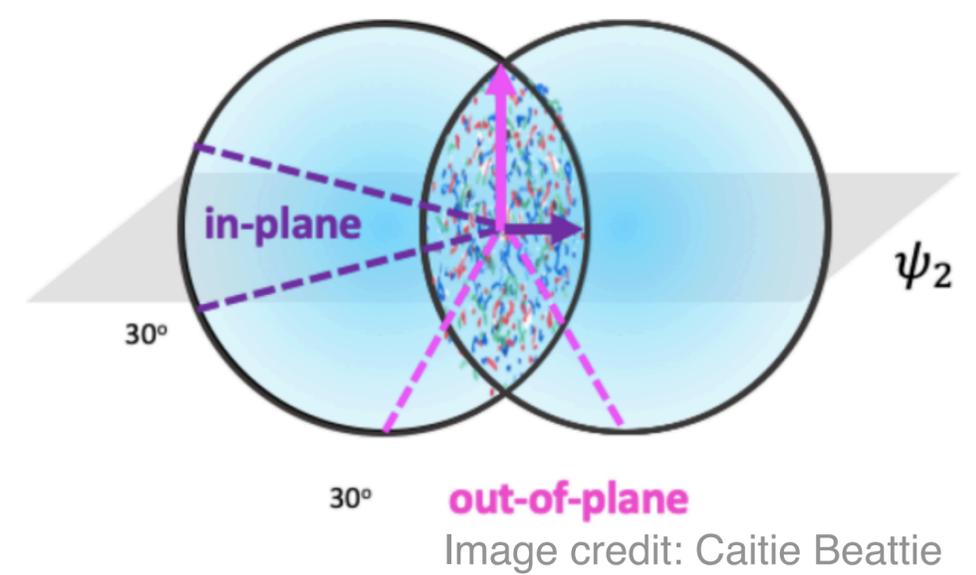
$$J_{AA} = \frac{\text{Pb-Pb}}{\text{scaled } \otimes \text{ pp}}$$



A. Sickles (Tues. 9:30 AM)  
 A. Romero (Poster)

**R-dependence for more asymmetric pairs,  
 more symmetric pairs flat with R**

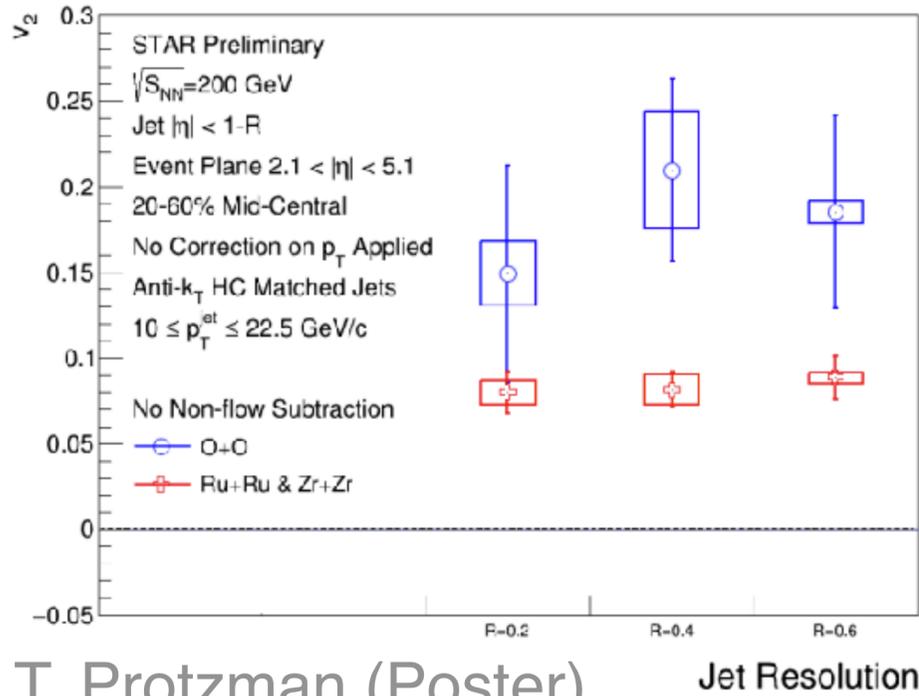
# Event azimuthal anisotropies fixes the path length



System	20-60% Central $\langle N_{part} \rangle$
O+O	10.98
Ru+Ru & Zr+Zr	51.09

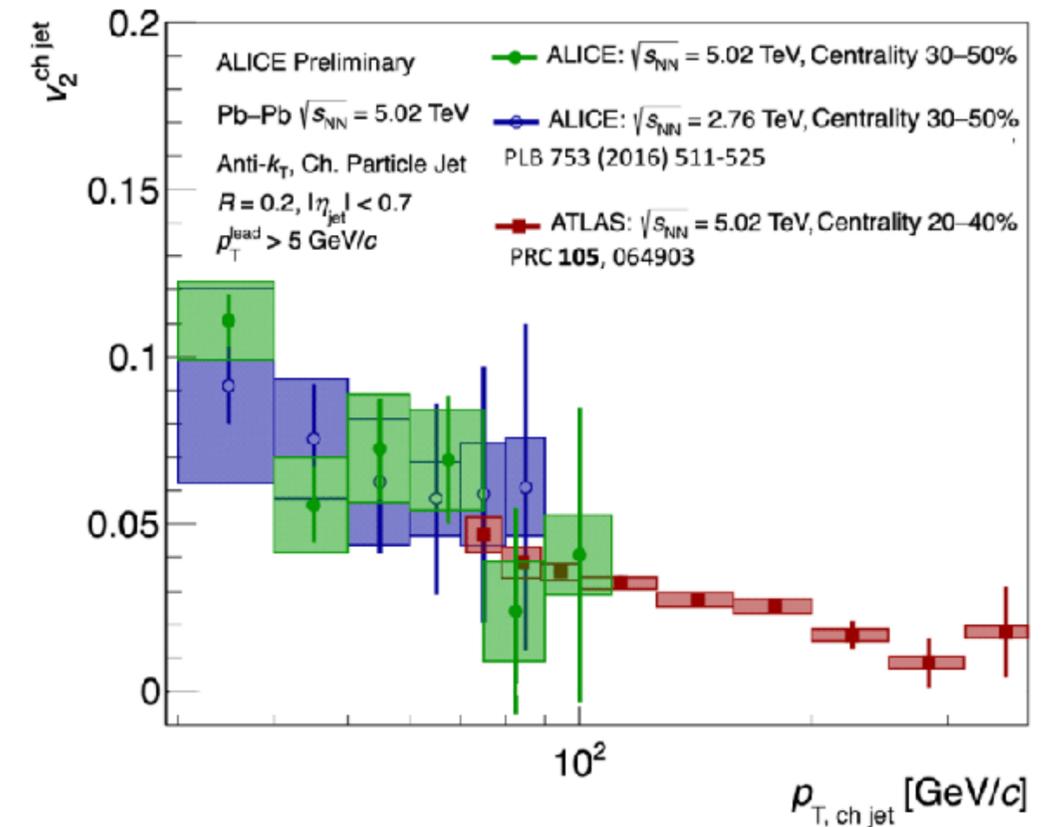
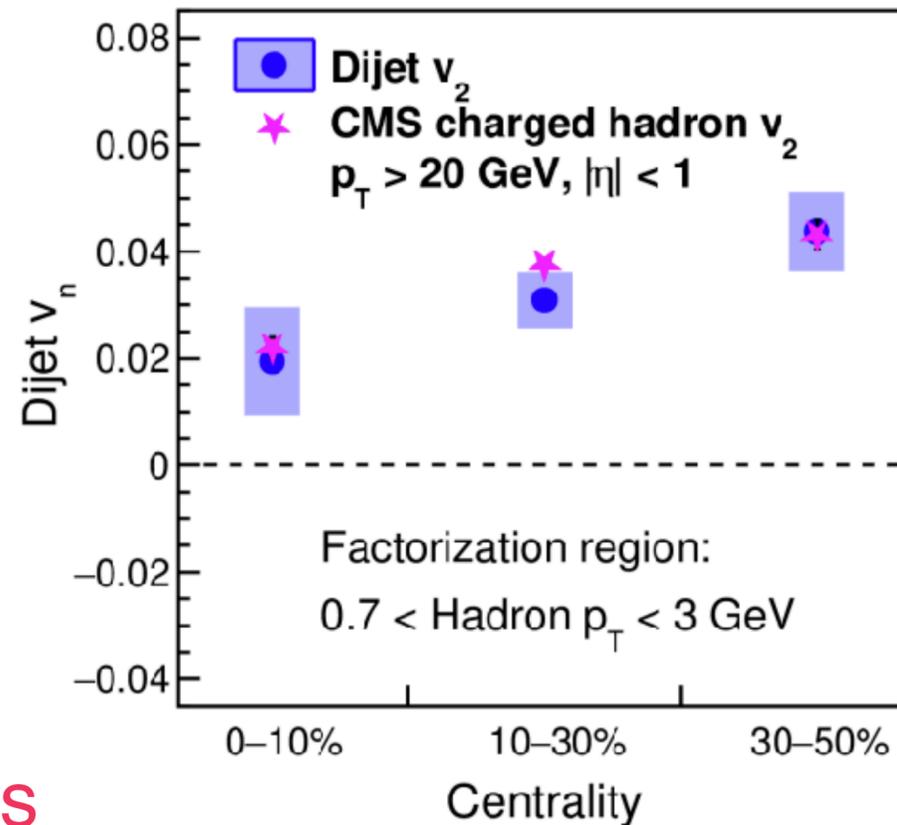
J. Viinikinen (Wed. 11:20 AM)

N. Grünwald (Tues. 11:40am)



T. Protzman (Poster)

Jet  $v_2$  measurement in **isobars** and **O-O** collisions at STAR



ALI-PREL-557234

[ATLAS PRC 105 \(2022\) 064903](#)

**Persistent jet  $v_2$  over large kinematic range at RHIC and LHC**

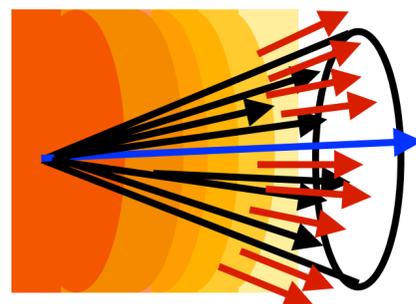
# Substructure modification in the QGP

- Different variables probe a different aspect of jet structure modification

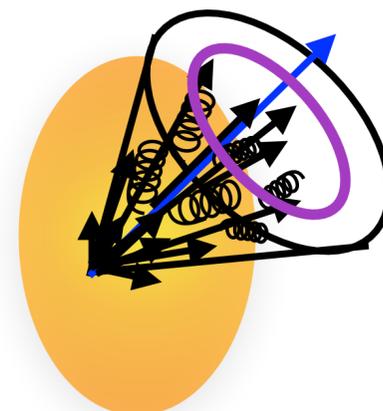
➡ Distribution of charged hadrons

➡ Properties (mass, width)

Medium response



Momentum broadening

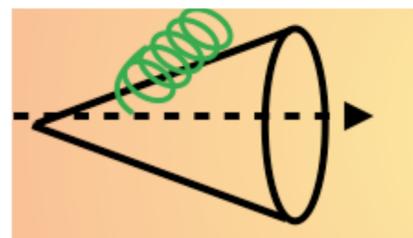


➡ Subjets from hard parton splittings

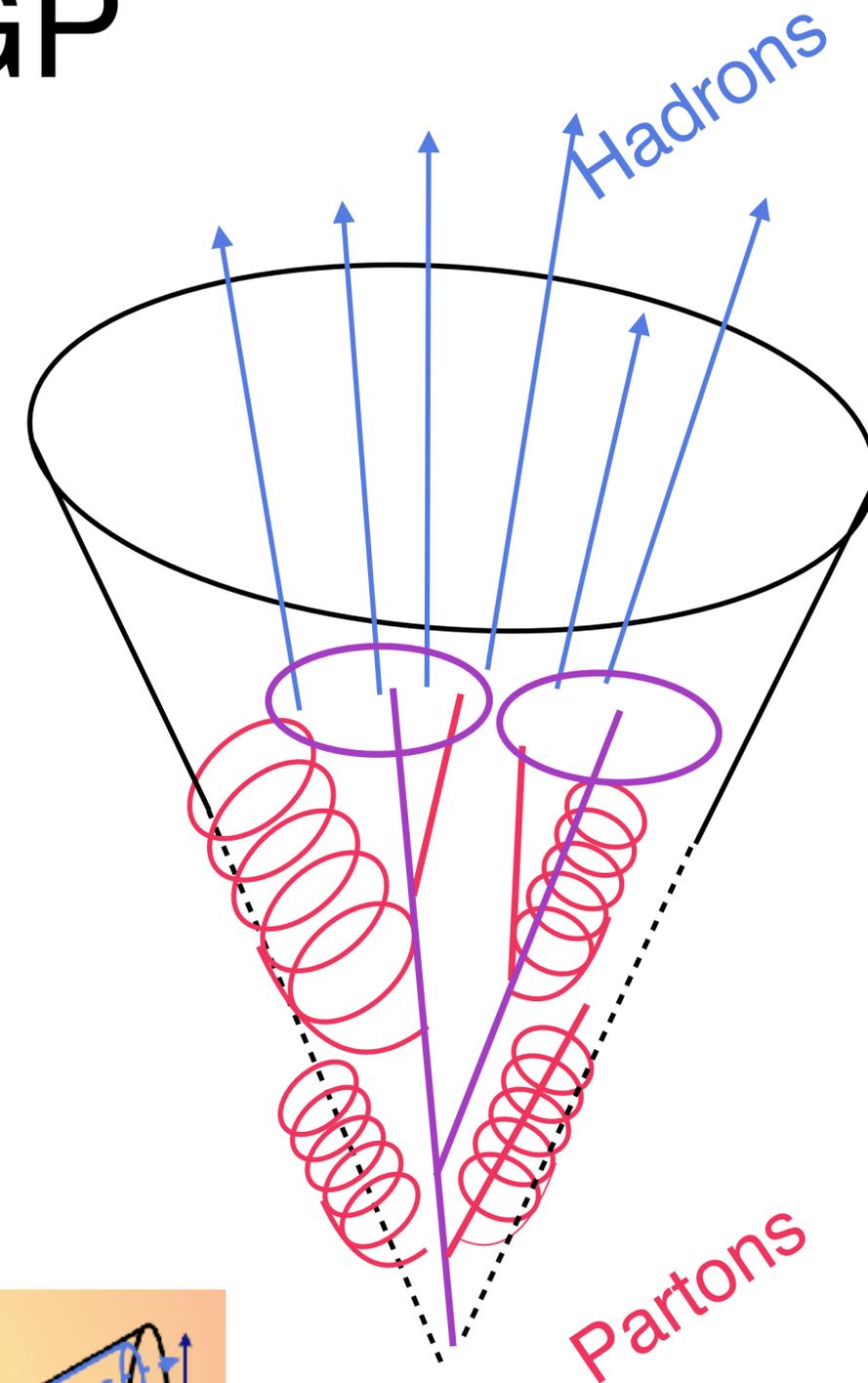
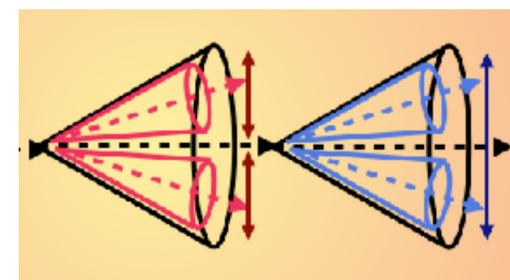
Moilere



Medium-induced splittings

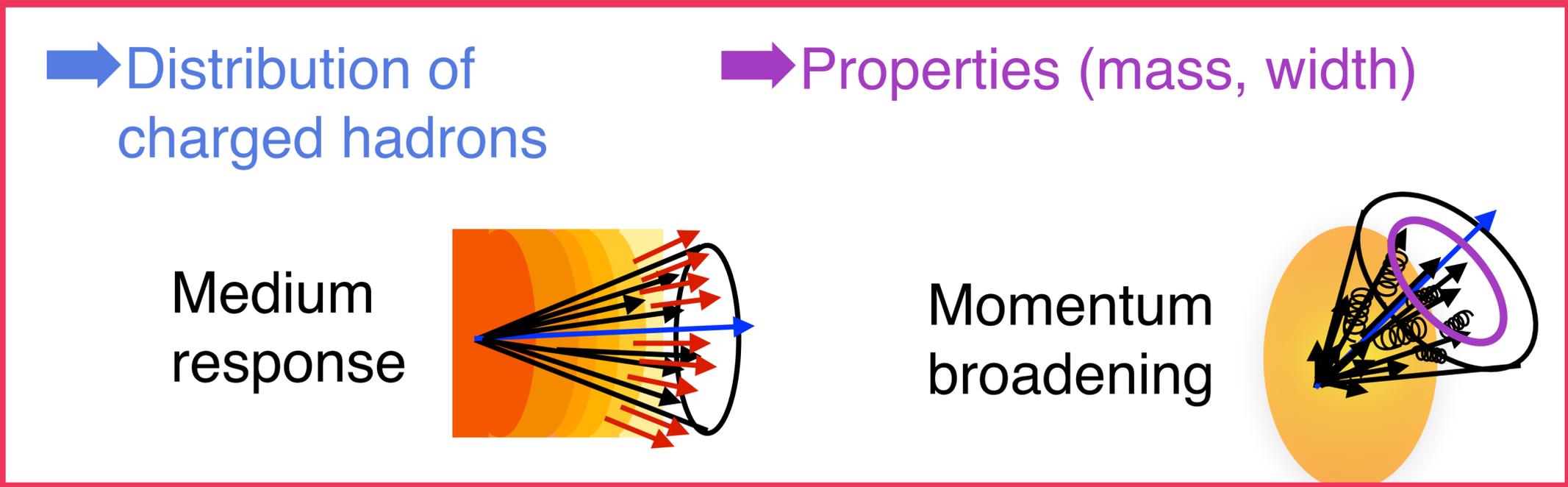


Coherence/ decoherence

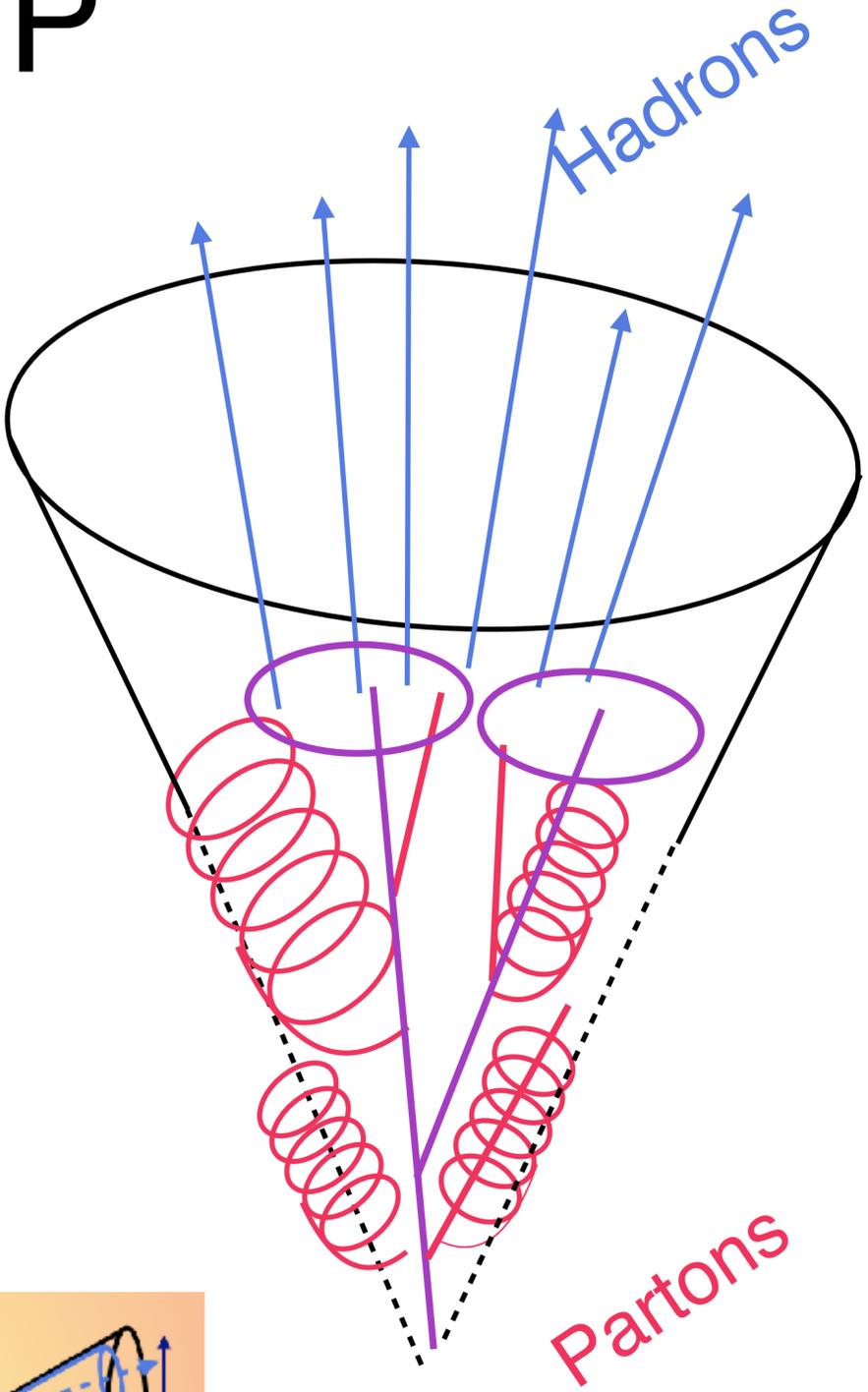
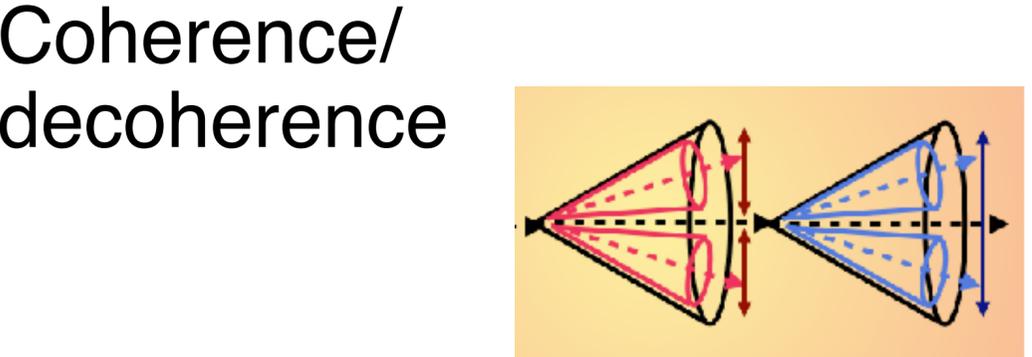
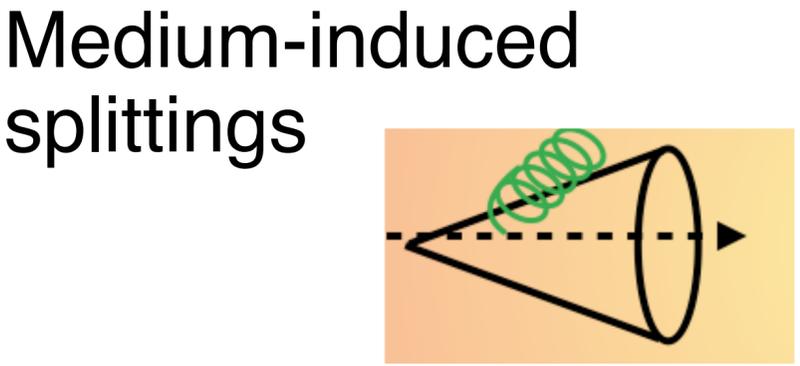
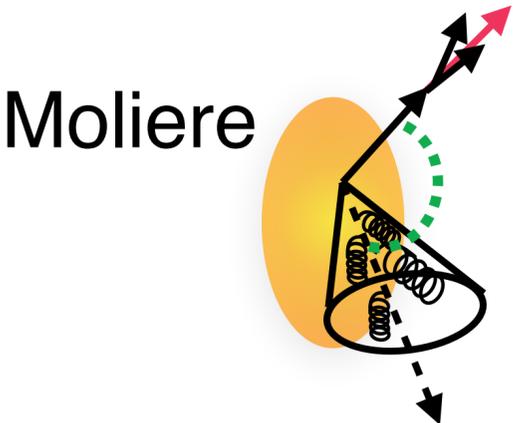


# Substructure modification in the QGP

- Different variables probe a different aspect of jet structure modification



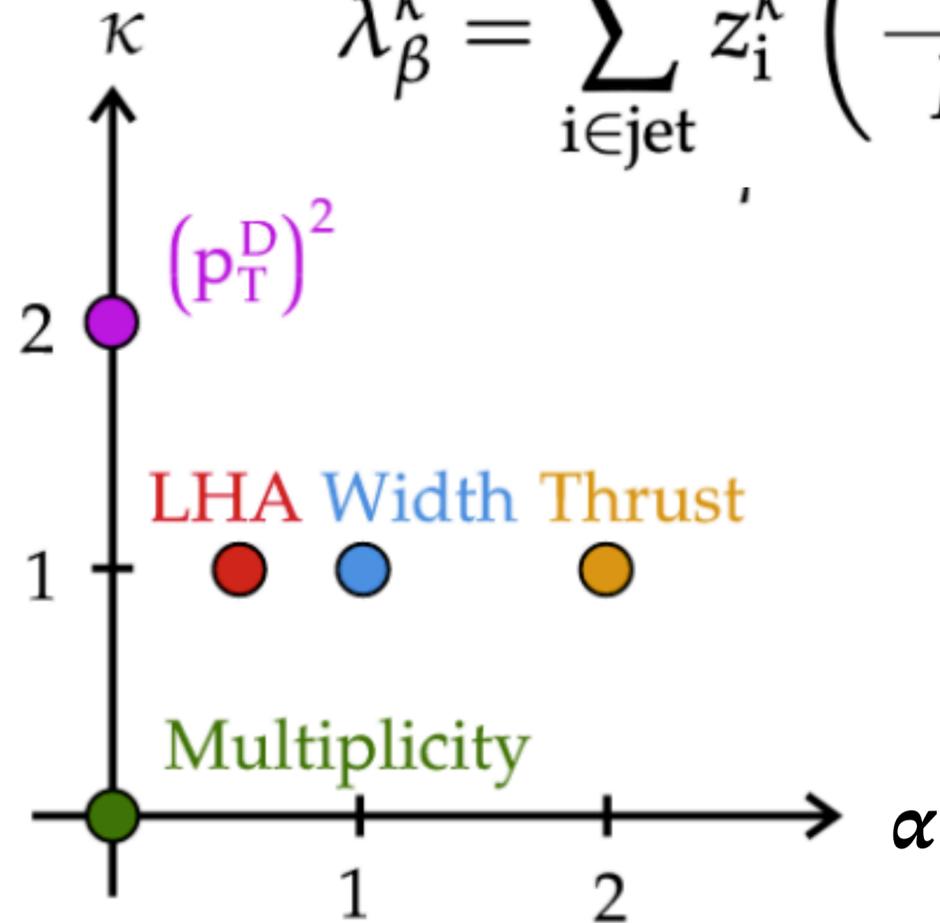
**→ Subjets from hard parton splittings**



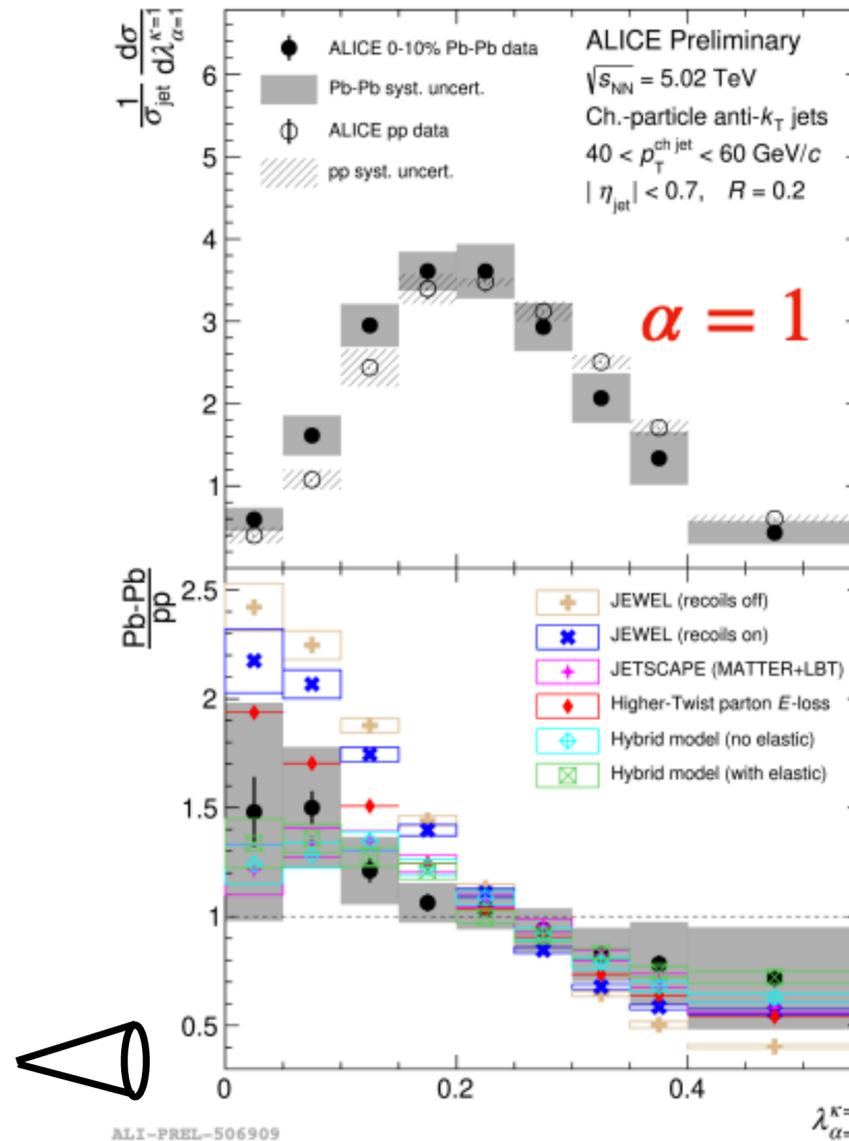
# Generalized angularities: suite of IRC safe jet substructure observables

Exponents vary emphasis of QCD features

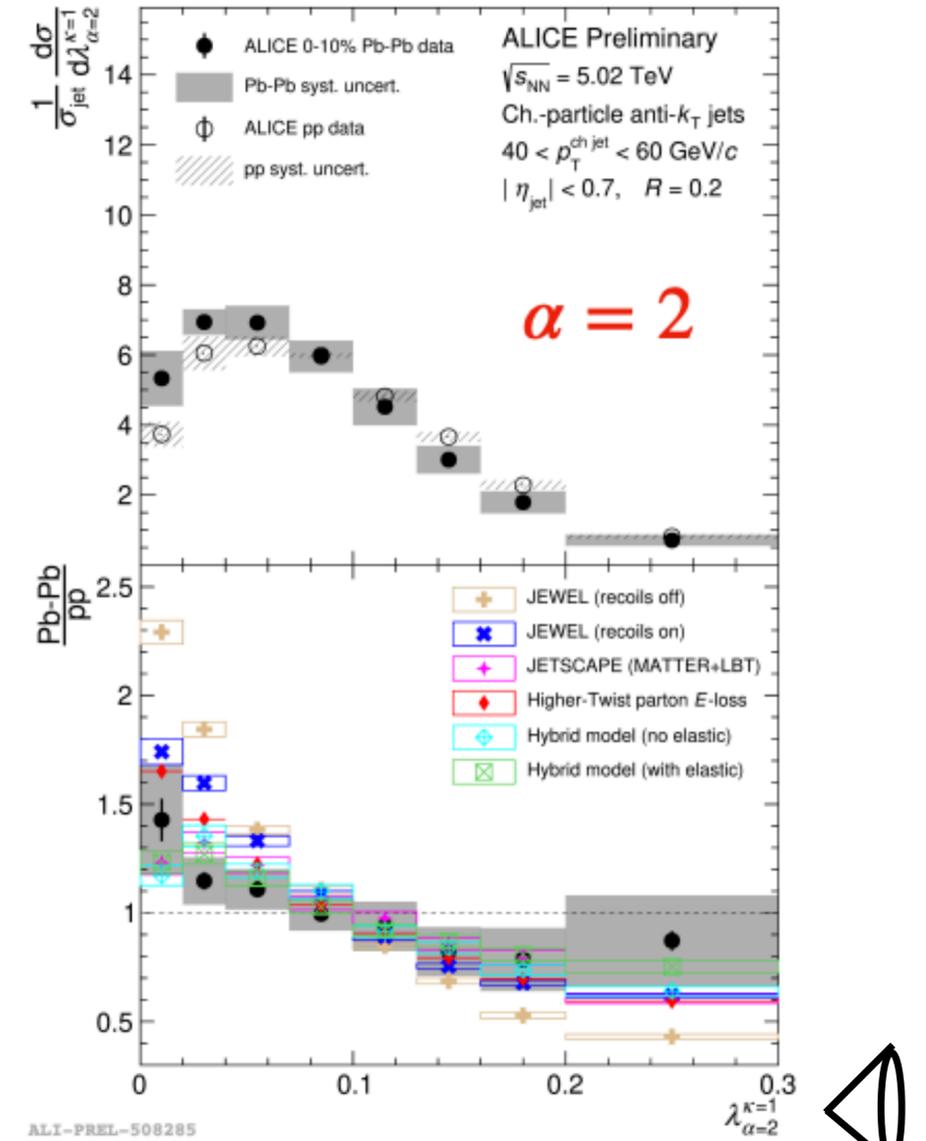
$$\lambda_{\beta}^{\kappa} = \sum_{i \in \text{jet}} z_i^{\kappa} \left( \frac{\Delta R_i}{R} \right)^{\alpha}$$



**Girth**



**Thrust**



ALICE arXiv:2107.11303

H. Bossi (Tues. 11:10 AM)

**Hint that core of the jet is more modified than the large angle distributions**

# First measurement of generalized angularities at RHIC

T. Pani (Wed 12:00 PM)

STAR hard-core selection applied to jet finding, angularities

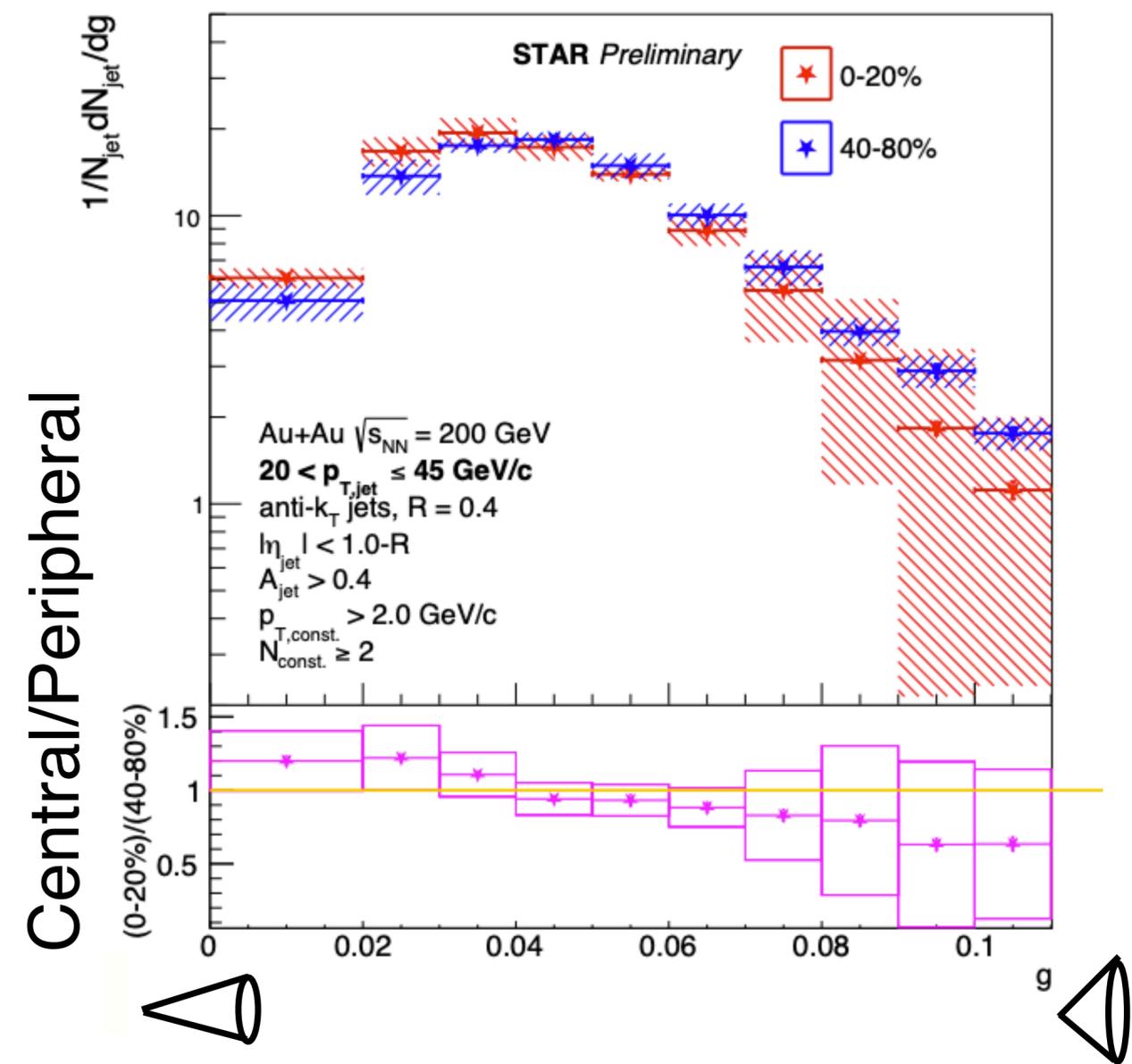
Applies new multidimensional unfolding method, Multifold, to HI collisions for the first time

See the application of the method in pp by STAR!

Y. Song (Poster)

Measured **7D correlation** between observables contains additional information!

J. Mulligan (Mon. 5:00 PM)



**No significant modification observed, work ongoing to reduce systematic uncertainties**

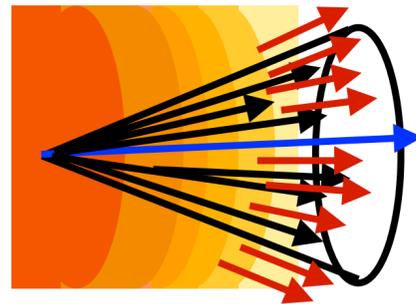
# Substructure modification in the QGP

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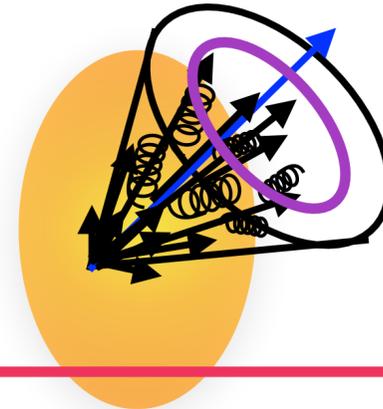
➡ Distribution of charged hadrons

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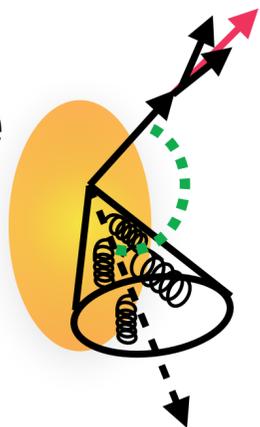


Momentum broadening

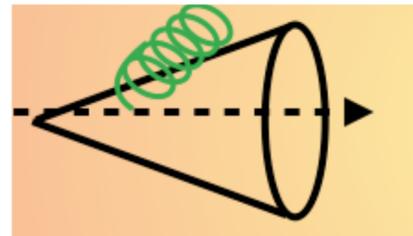


➡ Subjets from hard parton splittings

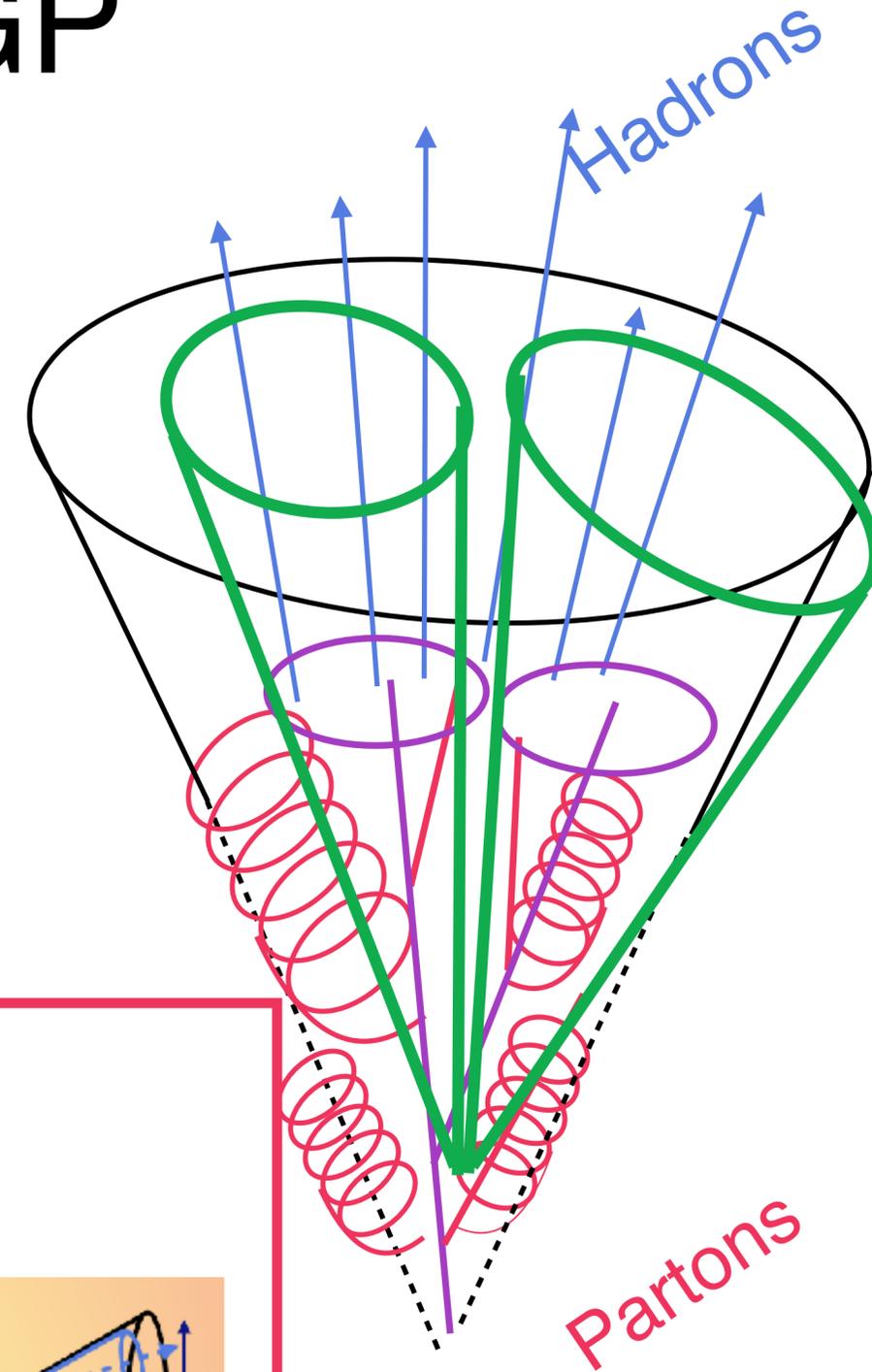
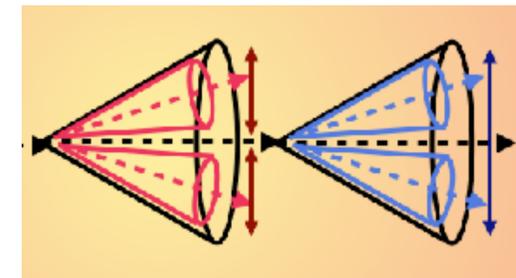
Moliere



Medium-induced splittings



Coherence/ decoherence

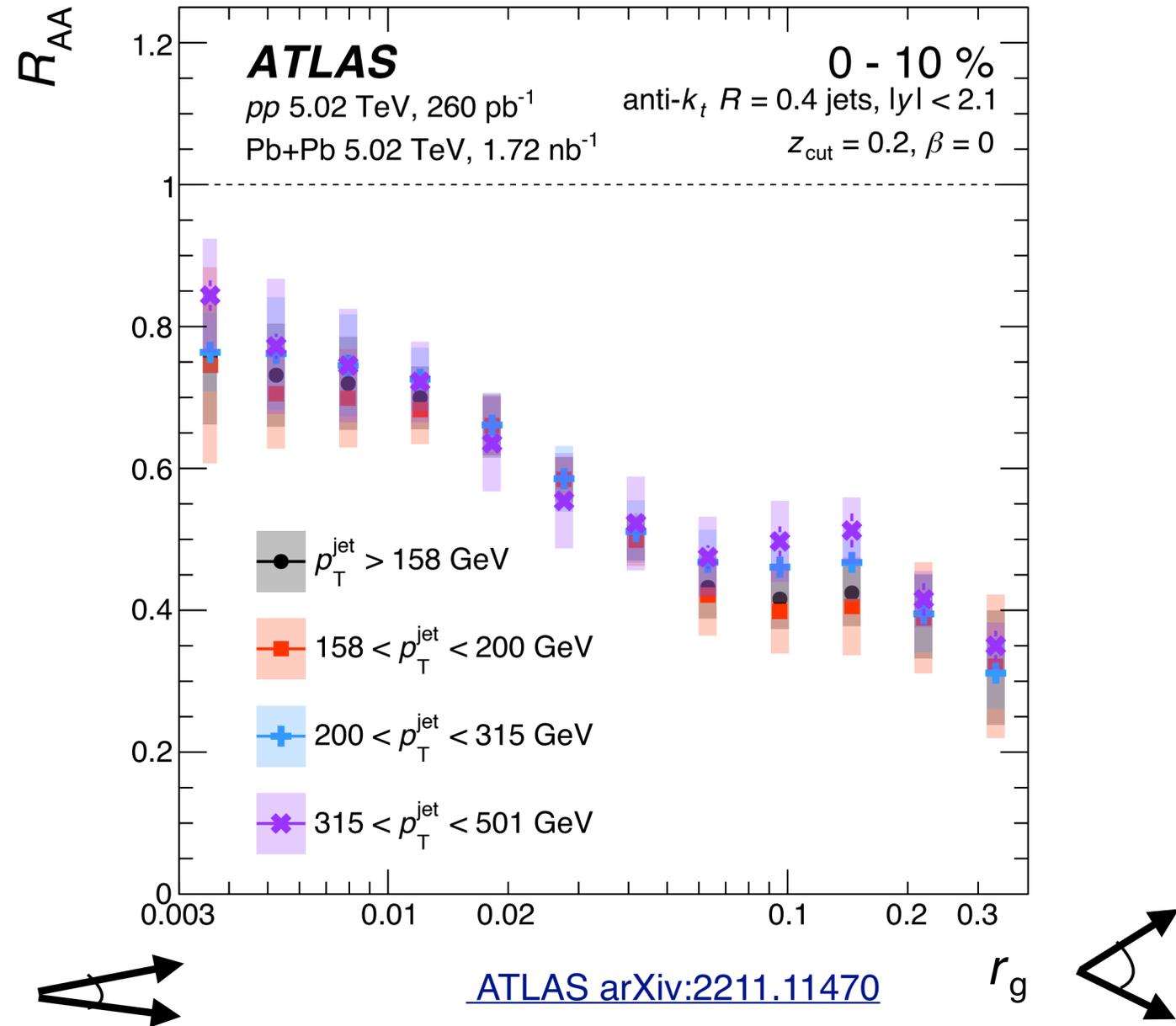


Partons

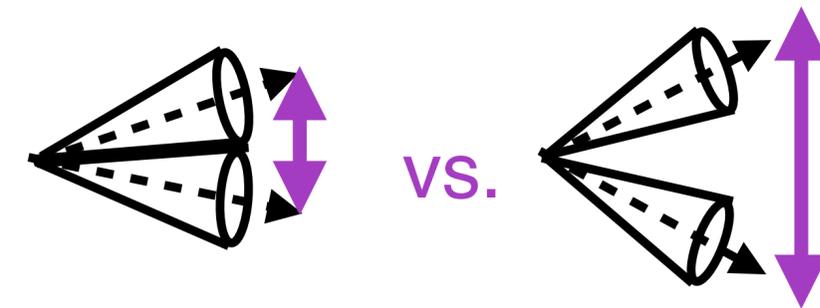
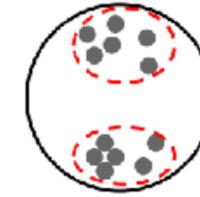
Hadrons

# Splitting angular scale probes color coherence

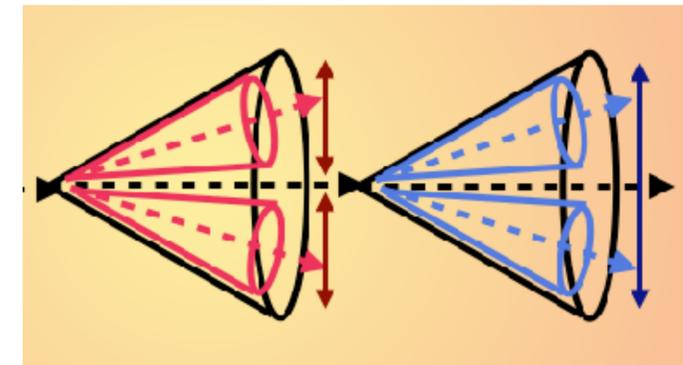
D. Hangal (Wed. 8:30 AM)



Groomed jet



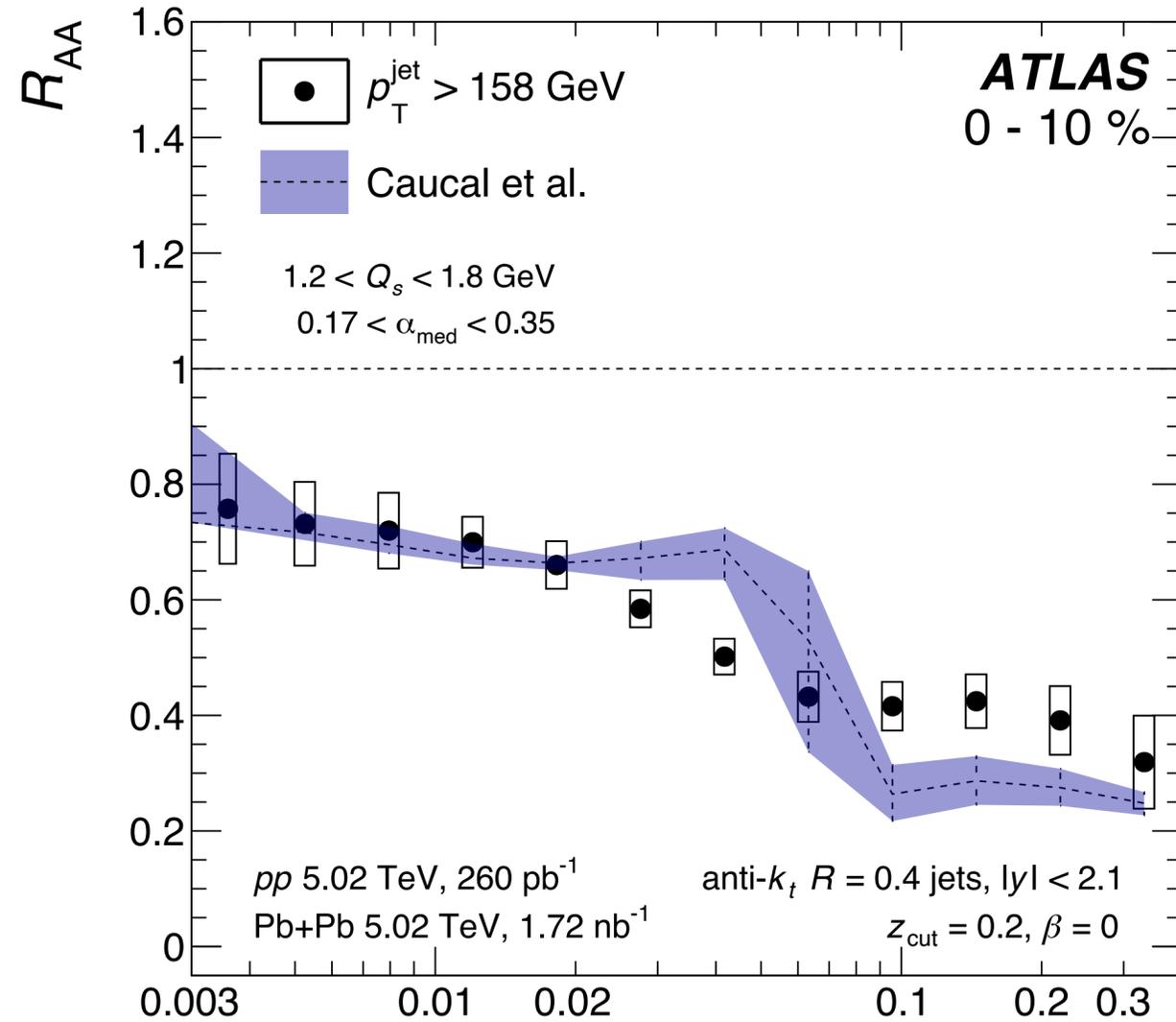
Resolution length of QGP?



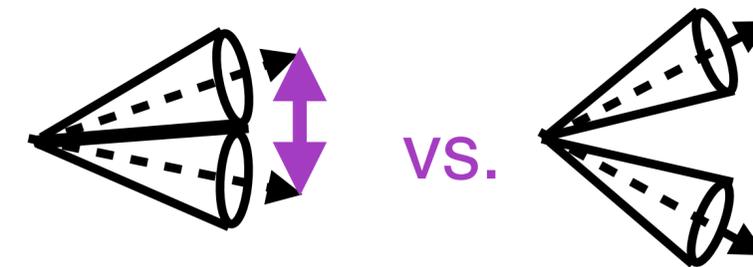
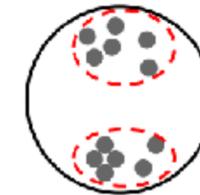
**Narrowing feature observed that is consistent across jet  $p_T$**

# Splitting angular scale probes color coherence

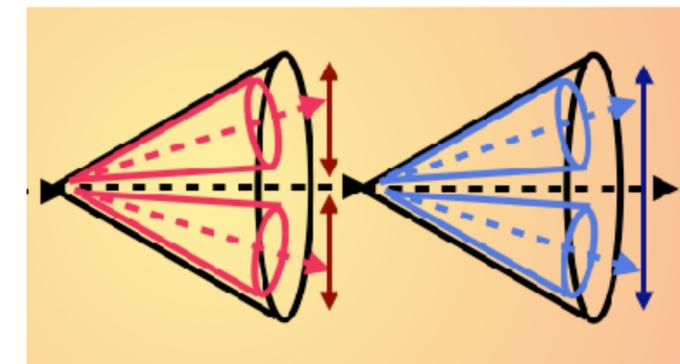
D. Hangal (Wed. 8:30 AM)



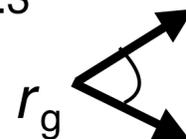
Groomed jet



Resolution length of QGP?



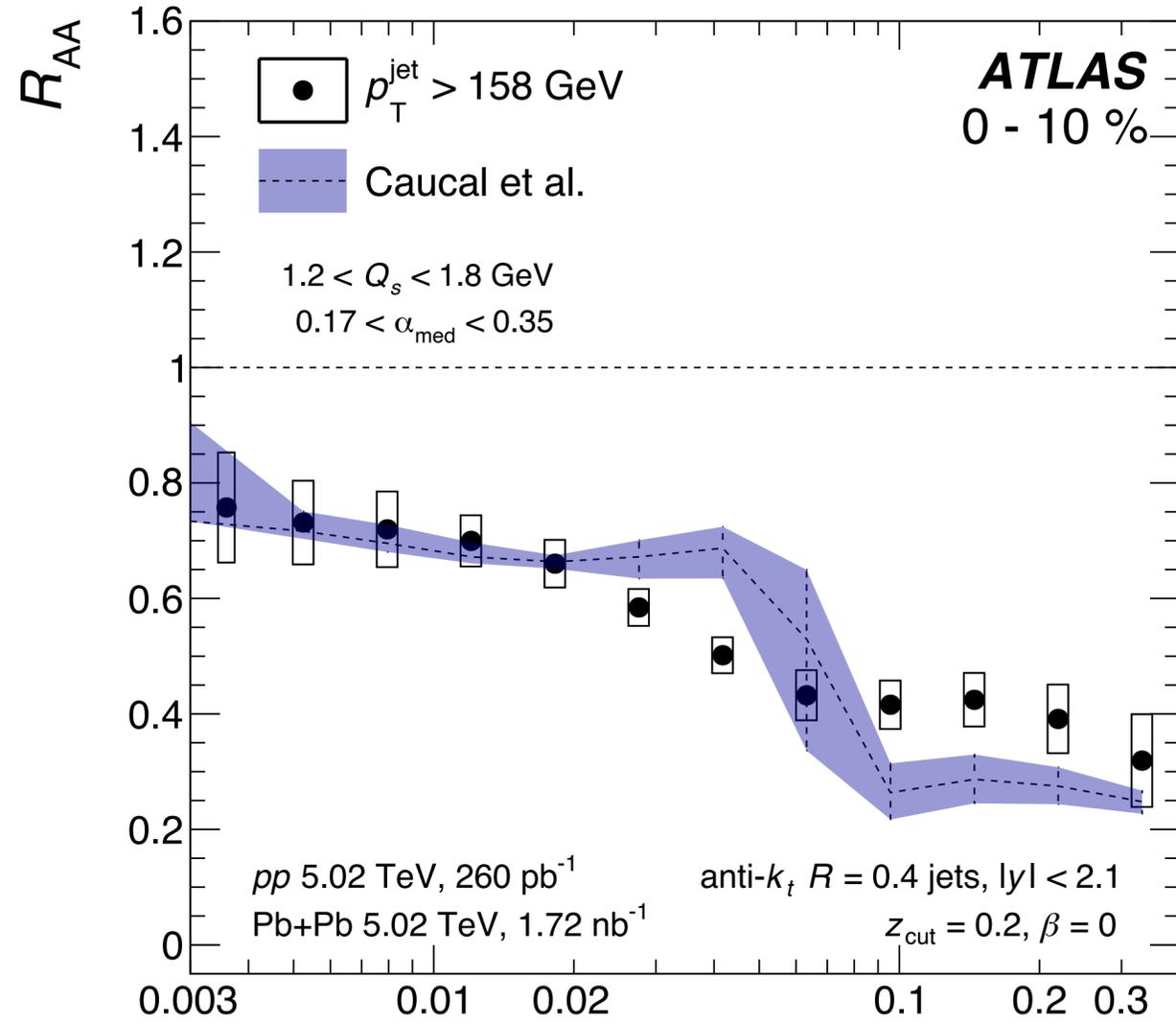
[ATLAS arXiv:2211.11470](https://arxiv.org/abs/2211.11470)



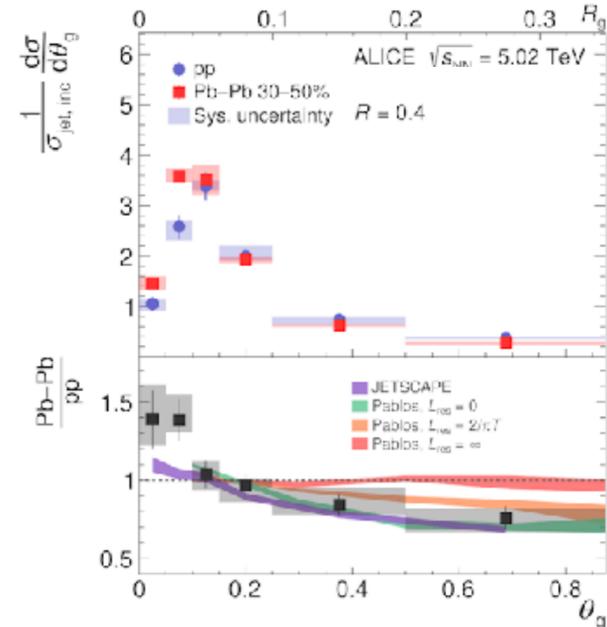
**Narrowing is consistent with color decoherence models  
but is also described by quarks vs. gluons**

# Narrowing picture is persistent

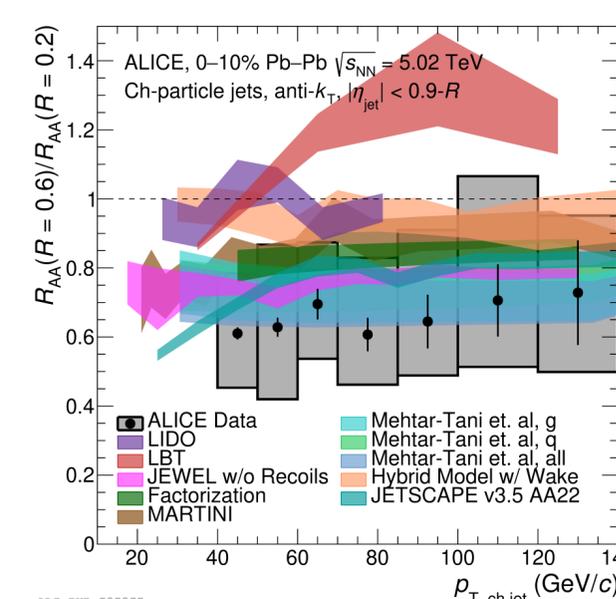
H. Bossi (Tues. 11:10 AM)  
D. Hangal (Wed. 8:30 AM)



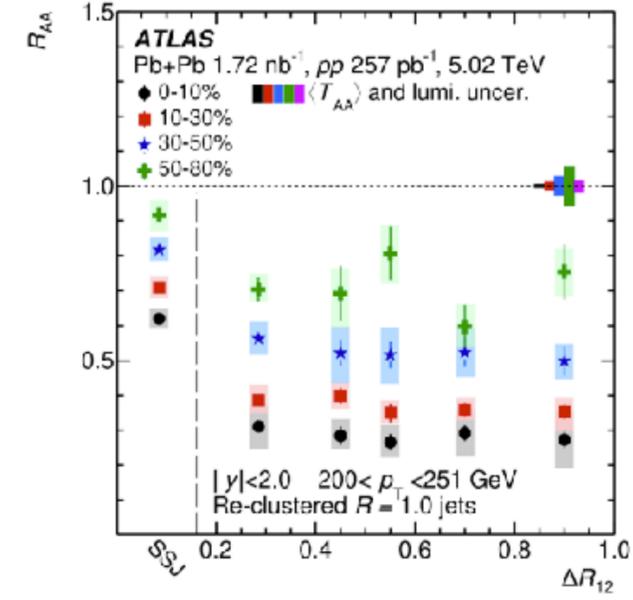
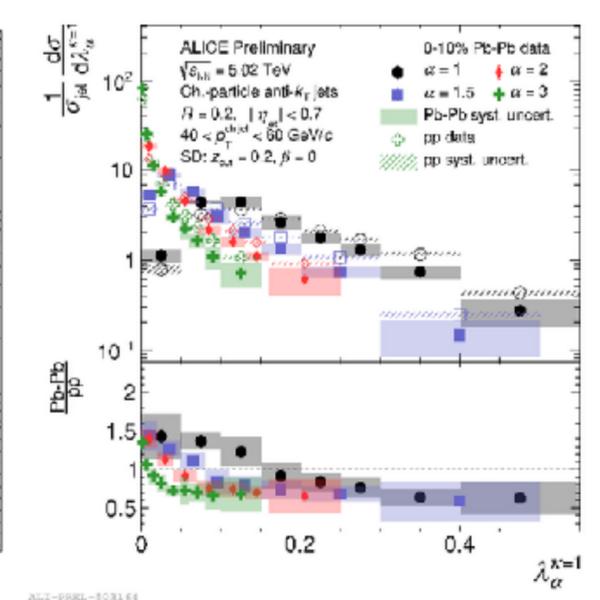
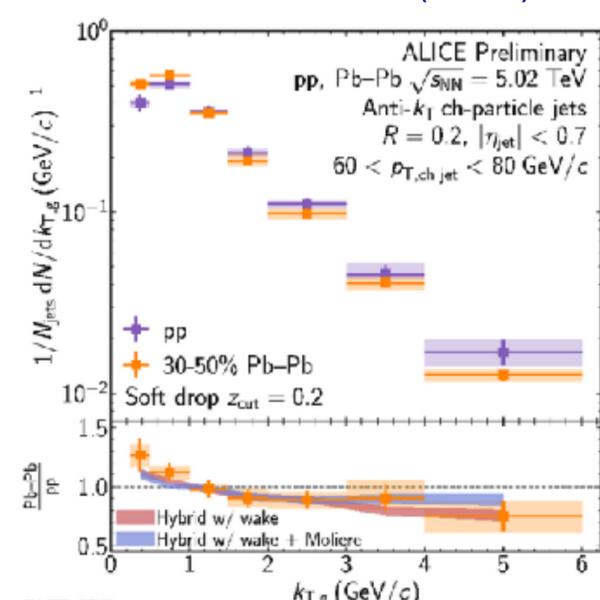
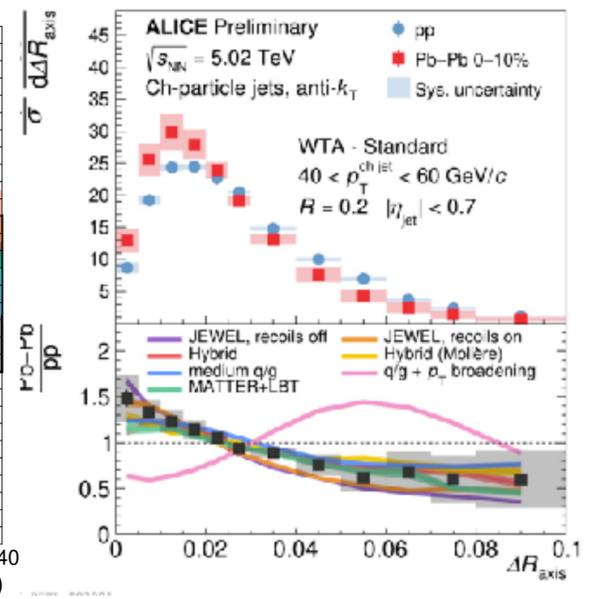
[ATLAS arXiv:2211.11470](#)



[ALICE, PRL 128 \(2022\)](#)



[ALICE arXiv:2303.00592](#)



[ATLAS arXiv:2301.25606](#)

Many substructure measurements at LHC show narrowing in QGP

# Narrowing?

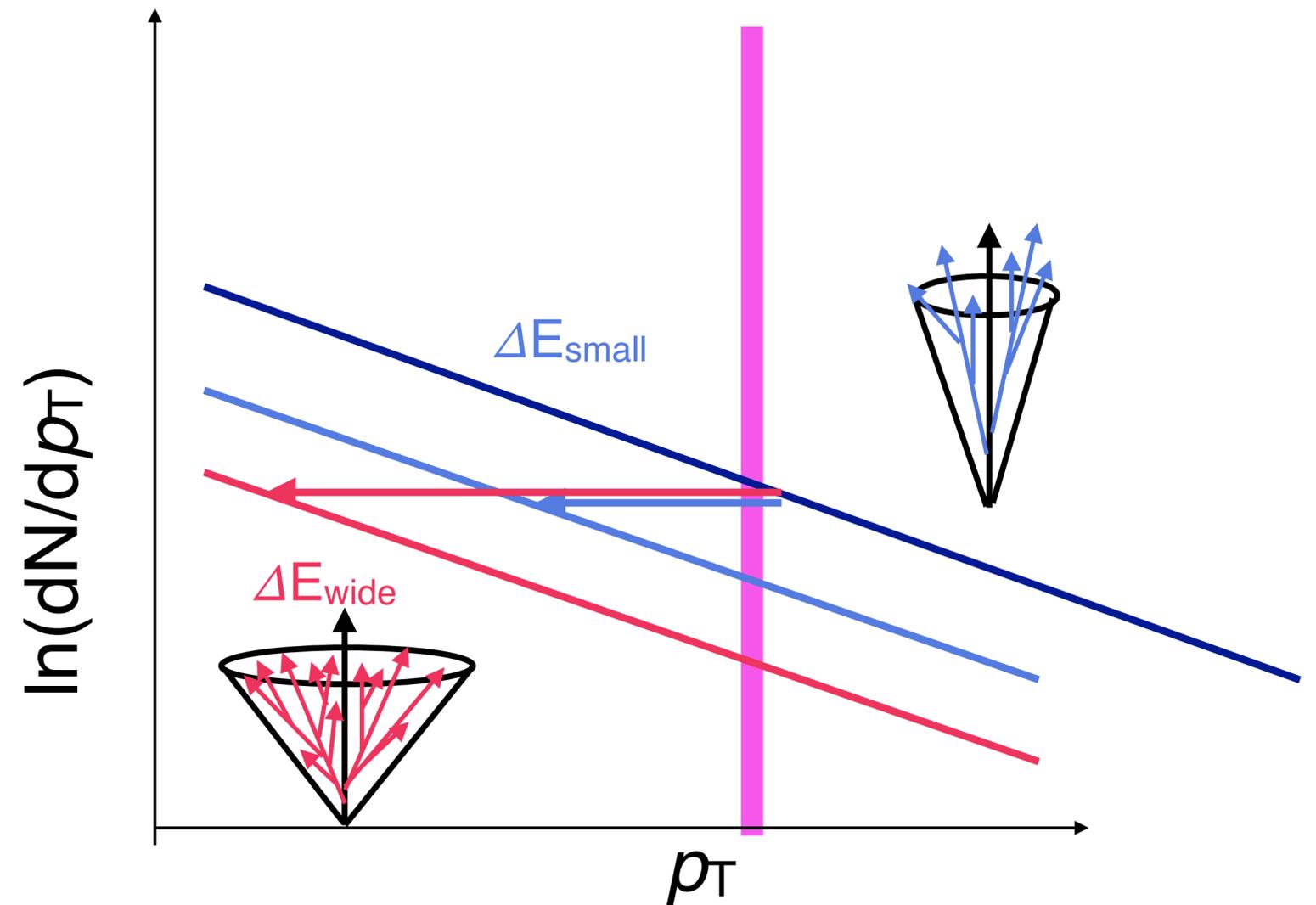
Always measuring less quenched jets that have survived the QGP -> **selection bias**

Comparing modified Pb-Pb vs. unmodified pp jet populations -> **less quenched narrower jets remain**

[Du, Pablos, Tywoniuk, JHEP 21 \(2020\), 206](#)

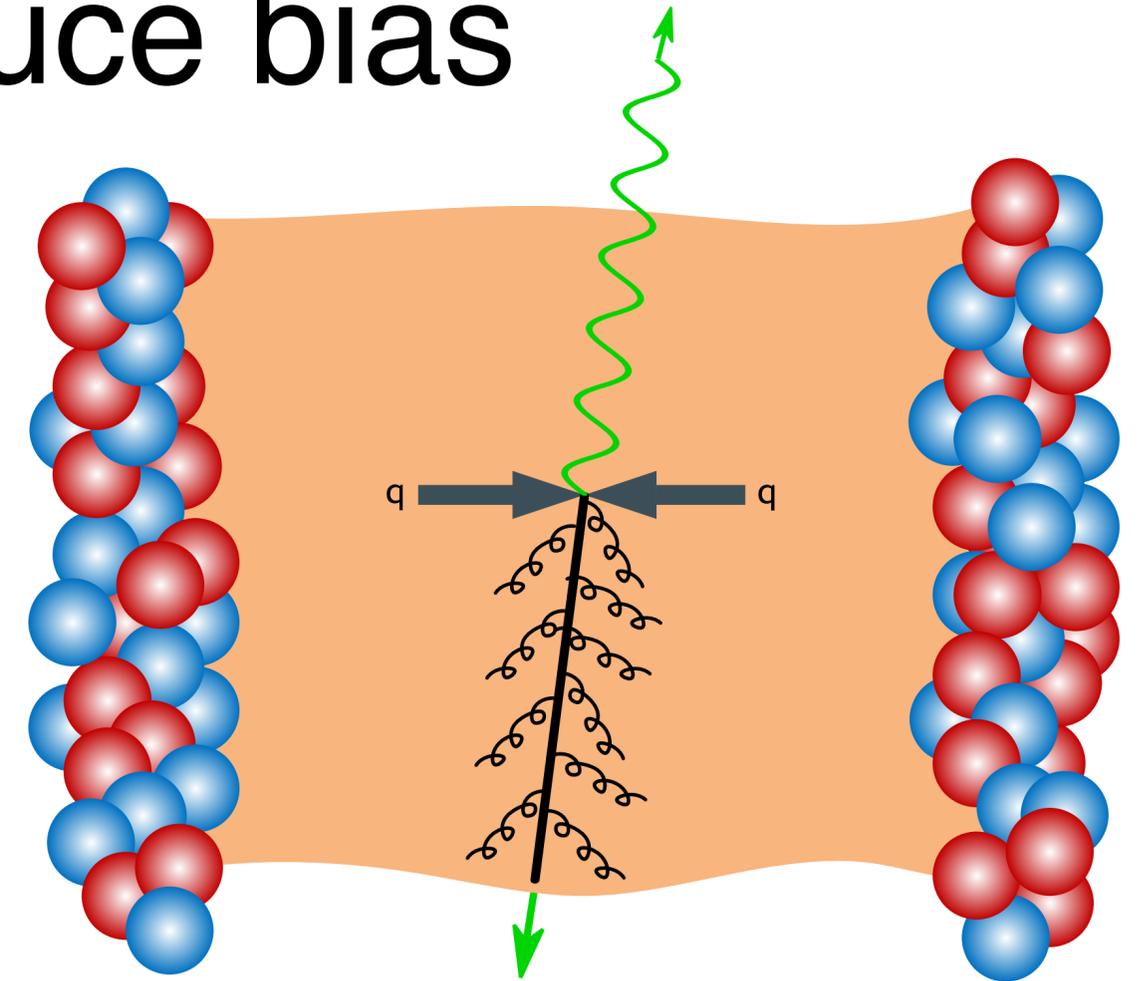
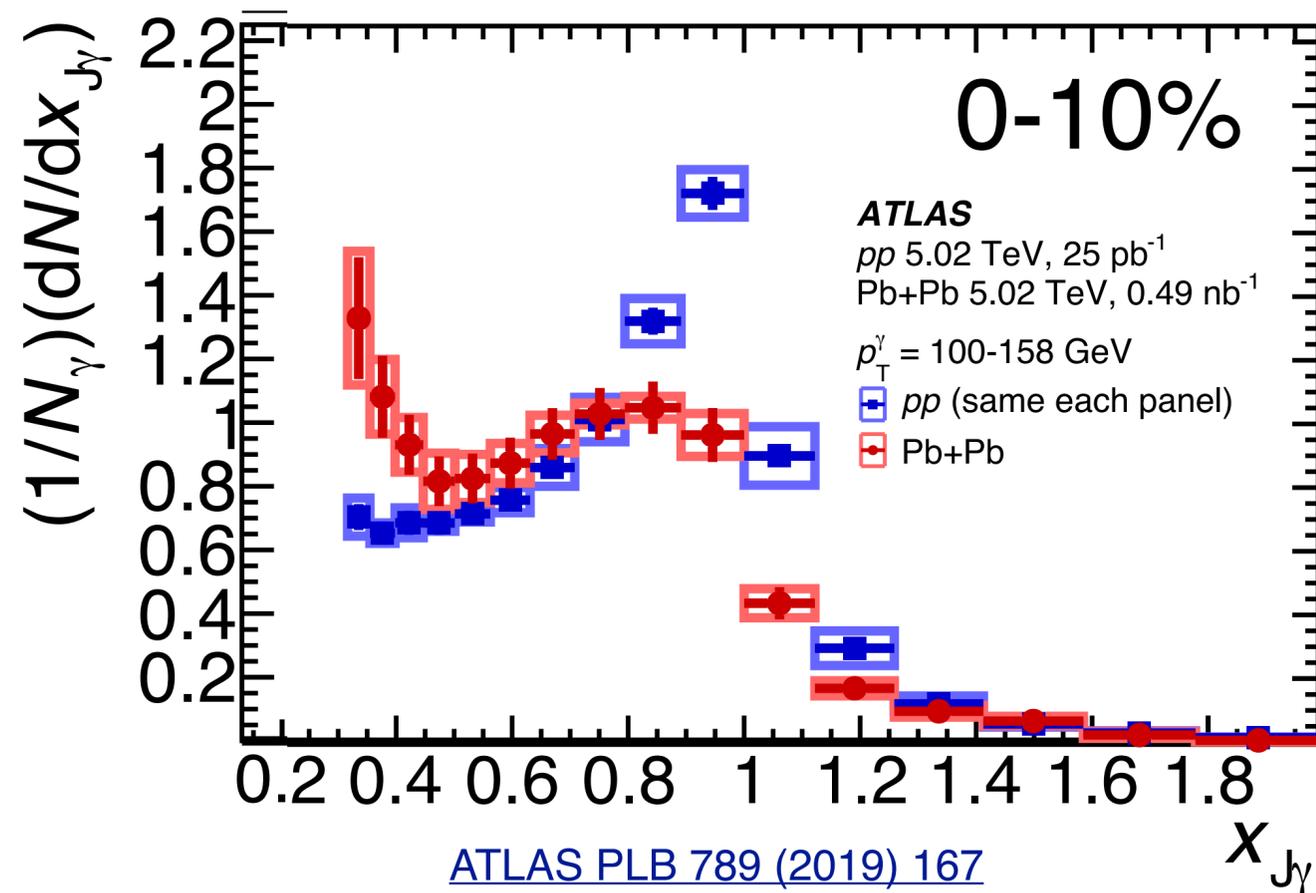
[Brewer, et al PRL \*\*122\*\*, 222301](#)

[Brodsky et al arXiv:2009.03316](#)



# Photon+jet substructure to reduce bias

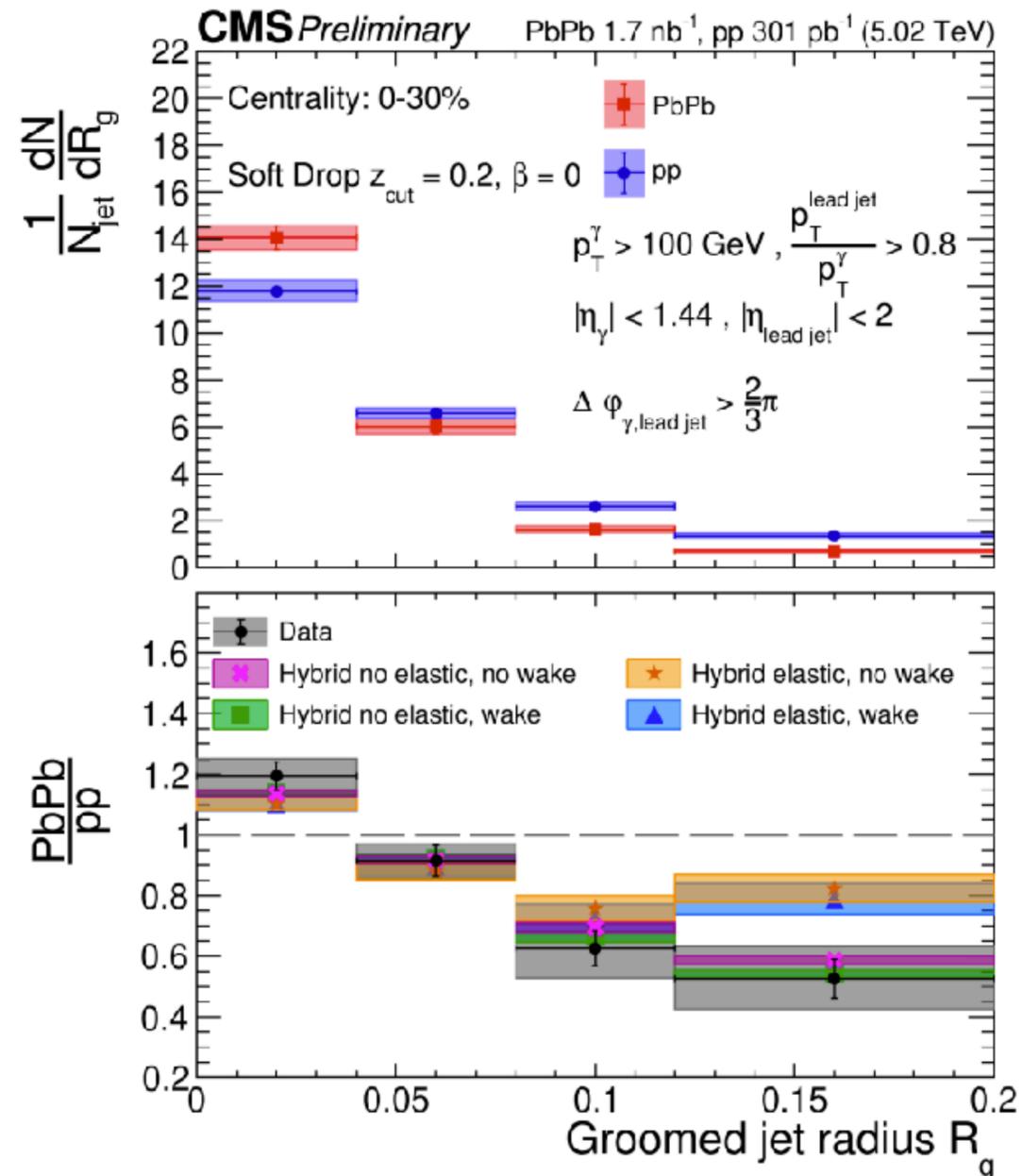
- Photon-jets dominated by quark jets
- Photon tag provides approximate initial momentum of jet (no energy loss)



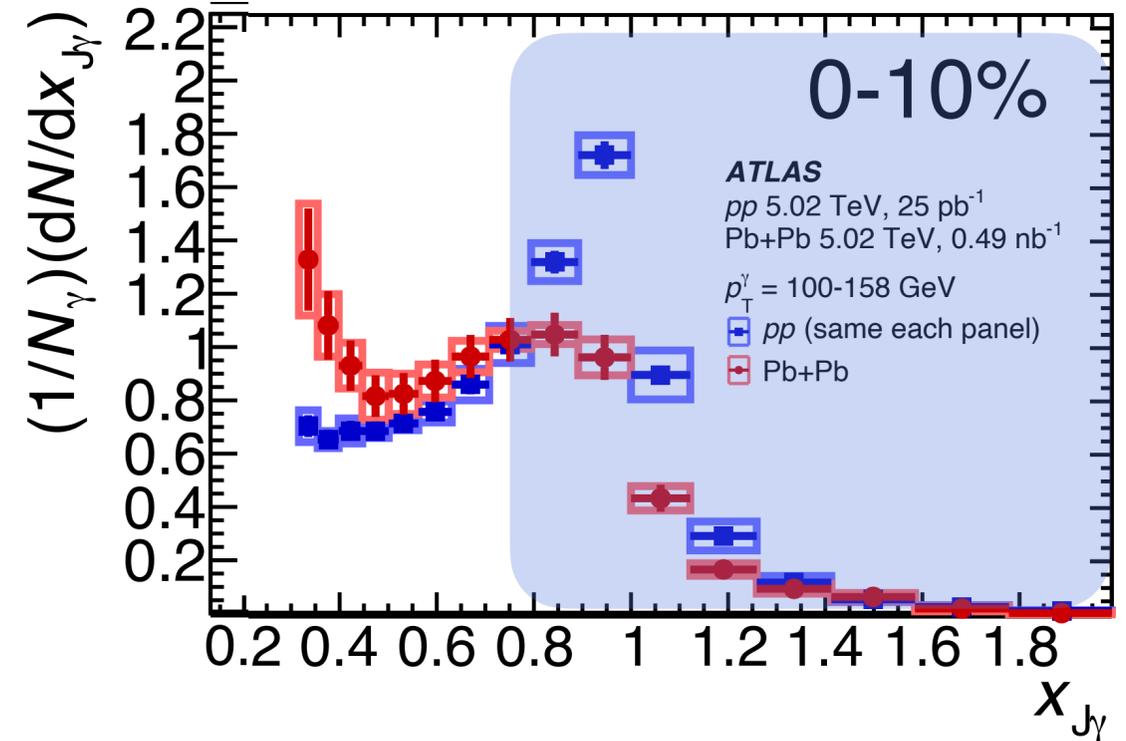
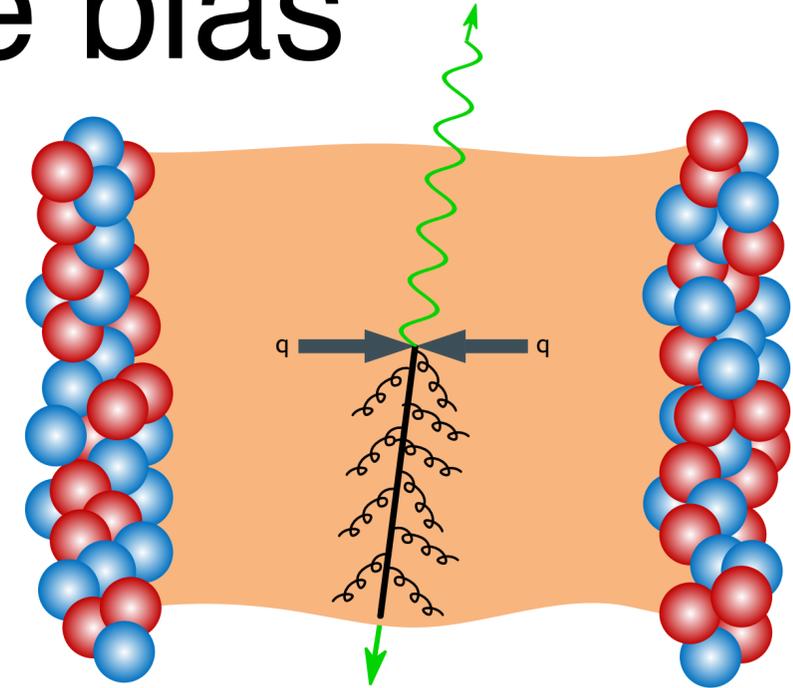
$$x_{J\gamma} = \frac{p_{T,jet}}{p_{T\gamma}}$$

# Photon+jet substructure to reduce bias

Select **balanced** configurations



$$x_{J\gamma} > 0.8$$

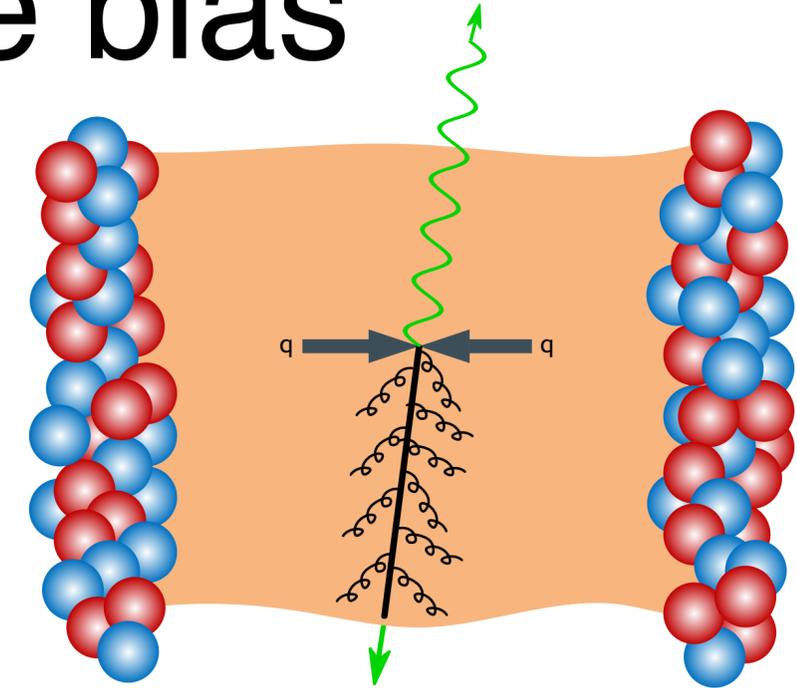


**Less quenched jets: narrowing still observed**

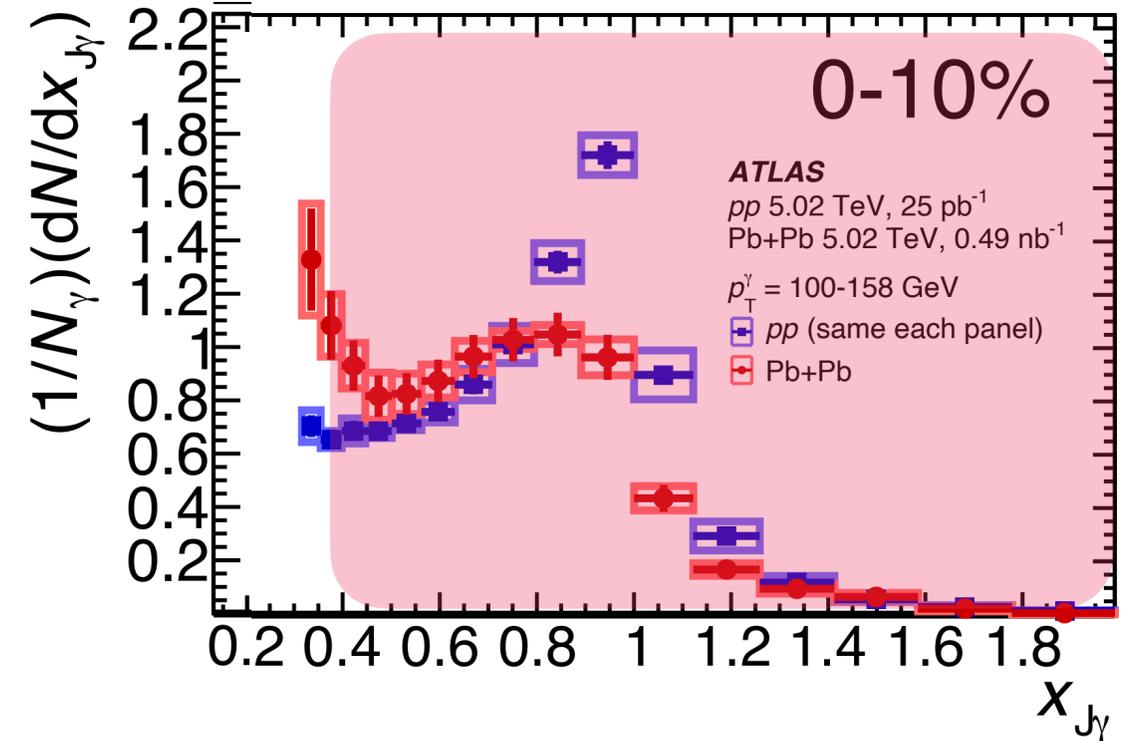
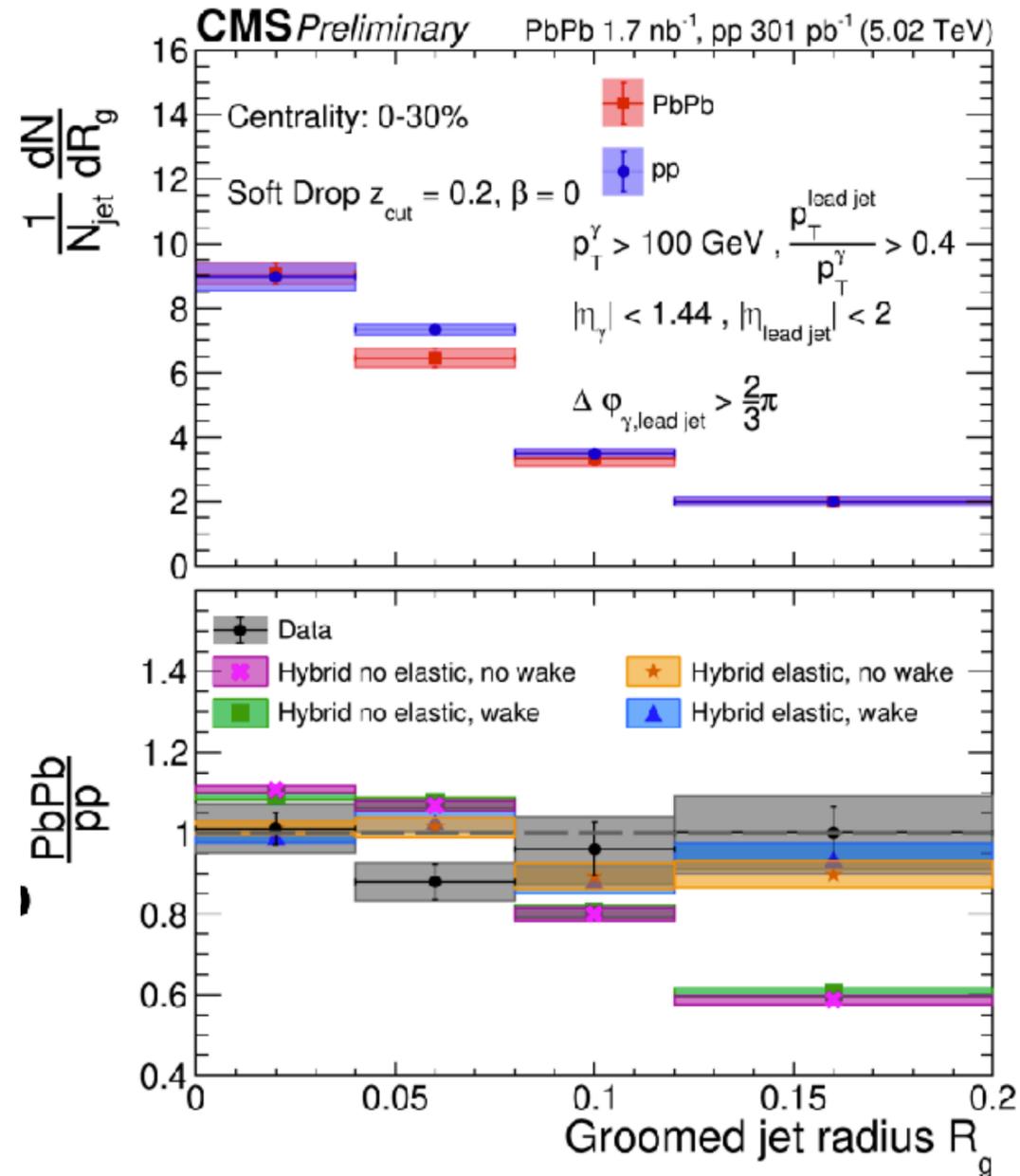
M. Park (Tues. 10:10 AM)

# Photon+jet substructure to reduce bias

Include **unbalanced** configurations



$$x_{J\gamma} > 0.4$$



**More quenched+unquenched jets: no modification**

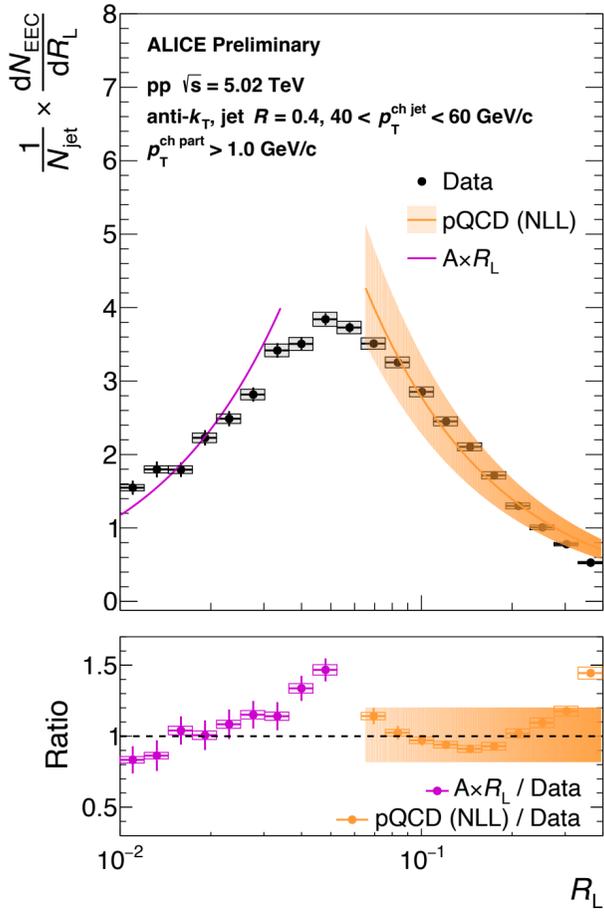
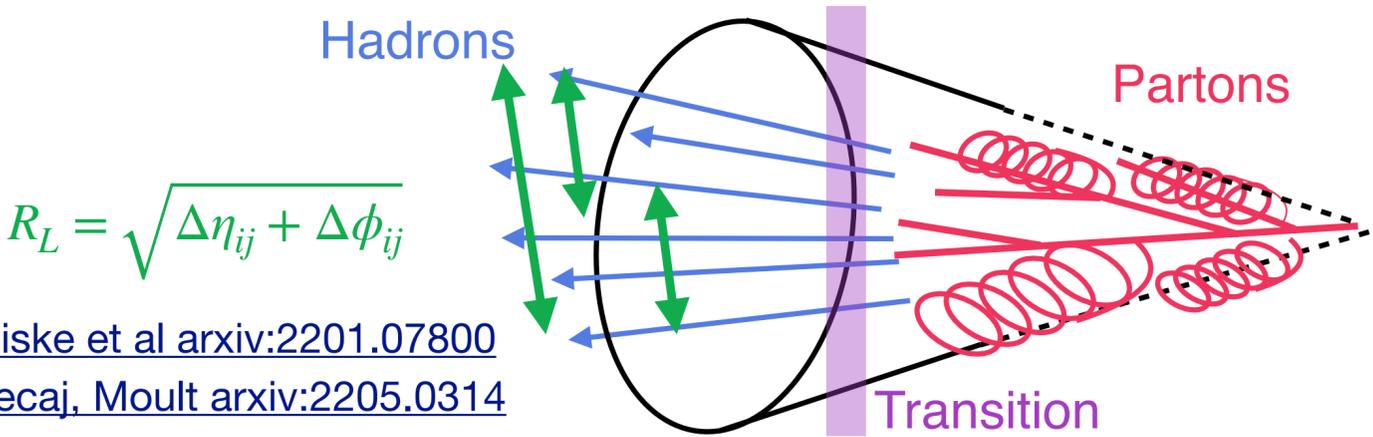
M. Park (Tues. 10:10 AM)

# New observables from pp for exploring the QGP

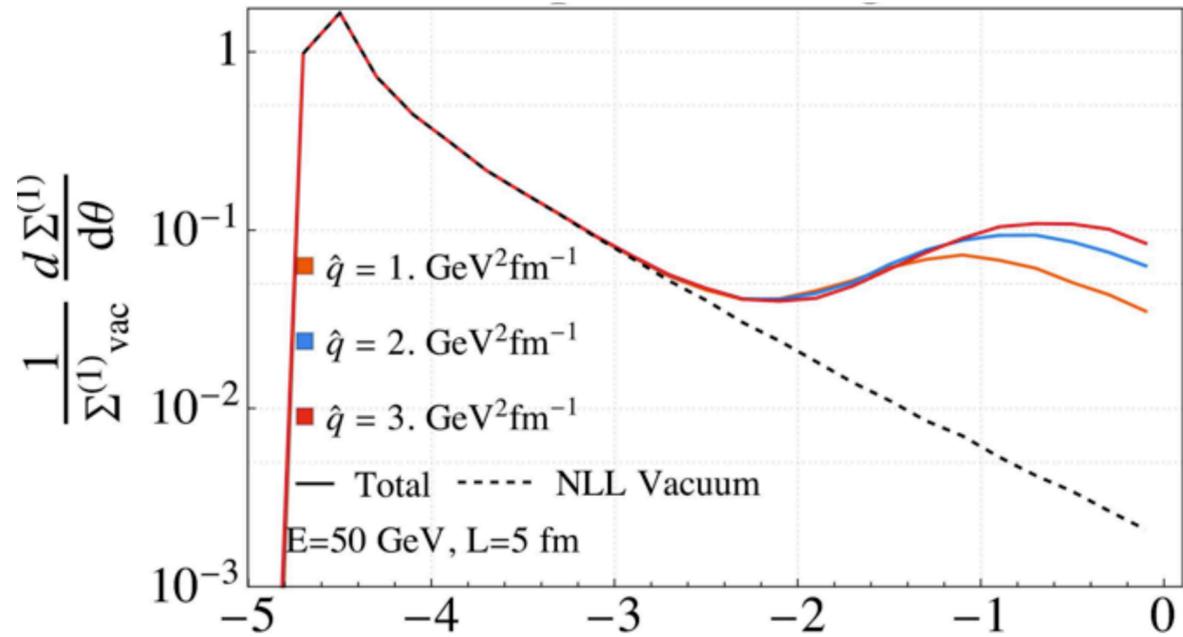
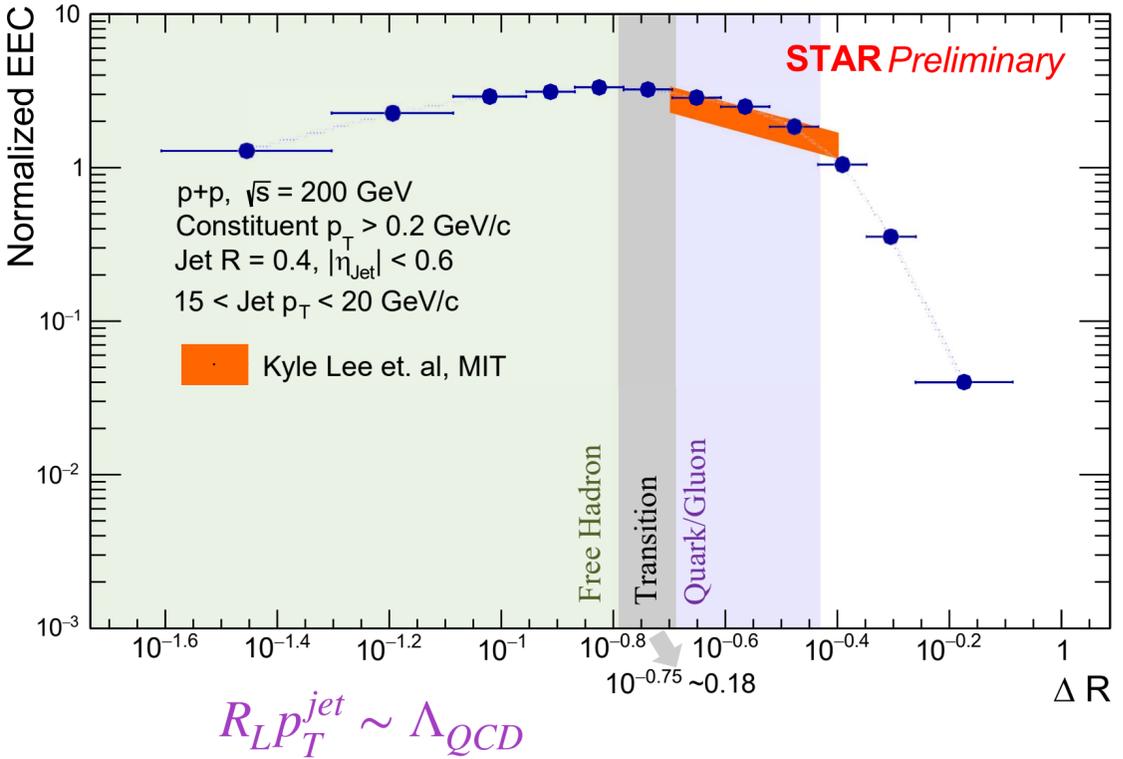
Ex: Energy correlators as a separation of scales

A. Nambrath (poster) B. Liang-Gilman (poster)

W. Fan (Wed. 8:50 AM) A. Rai (Poster)



A. Tamis (Poster)



I. Moults (Tue. 9:10 AM) C. Andres (Wed. 10:10 AM)

Clear distinction between **pQCD** and **npQCD** region at RHIC and LHC

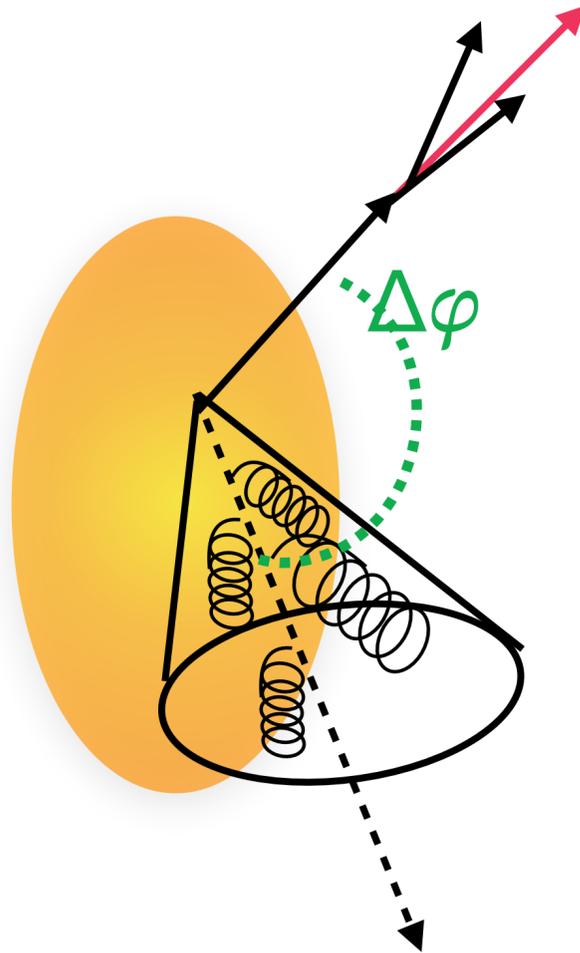
Promising observable for QGP to probe decoherence, HF jet modification, etc.

# Search for quasi-particle structure of QGP

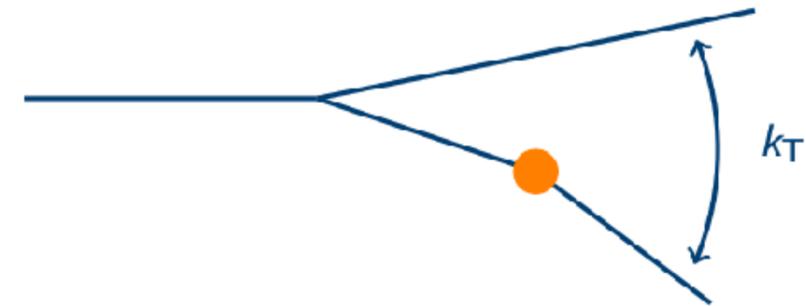
Search for **Moilere scattering** off quasi-particles in the medium

K. Rajagopal (Wed. 9:50 AM)

Jet acoplanarity: look at angle of recoil jet with respect to a trigger hadron (or photon)



Hardest  $k_T$  kicks: looked at groomed  $k_T$  g for a hard kick at high  $k_T$



# Search for quasi-particle structure of QGP

## Jet acoplanarity

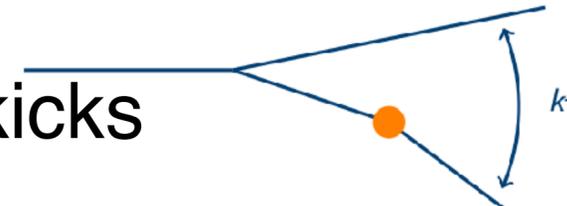


$\Delta\phi$

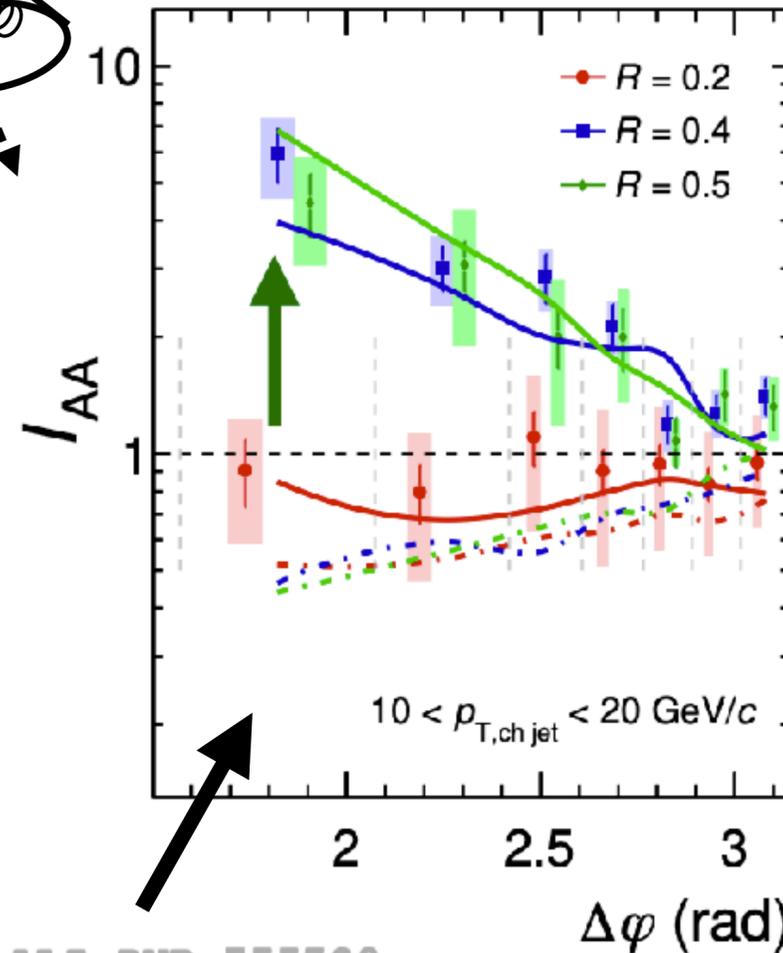
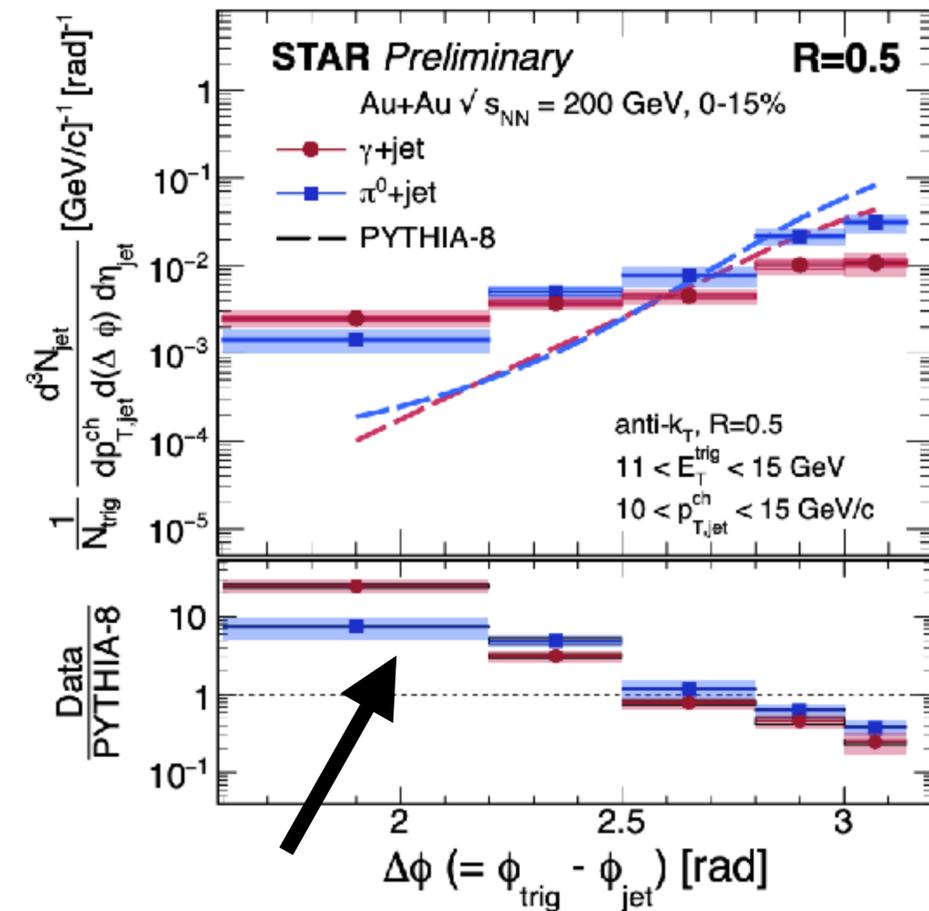
ALICE arxiv:2308.16128  
ALICE arxiv:2308.16131

J. Norman (Wed. 9:50 AM)

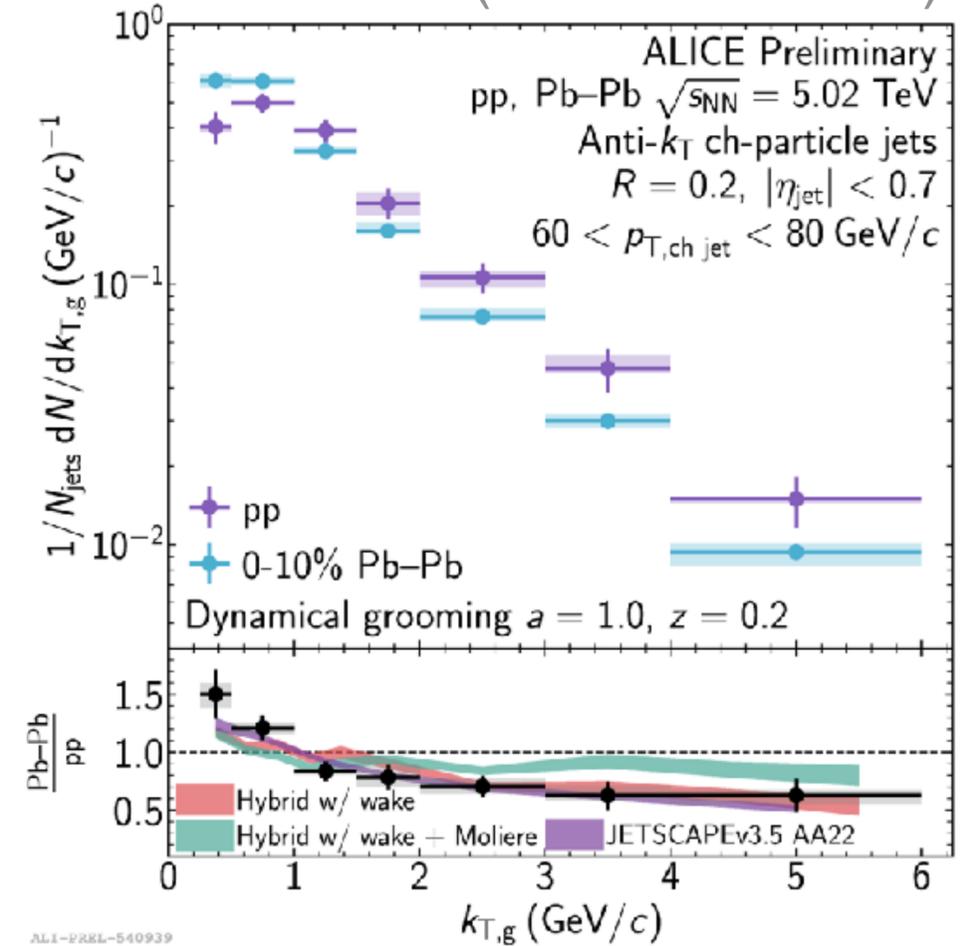
## Hardest $k_T$ kicks



H. Bossi (Tues. 11:10 AM)



ALI-PUB-555709



Signature of jet azimuthal broadening but may be dominated by wake effects

STAR arxiv:2309.00156

STAR arxiv:2309.00145

See next talk by Y. Go

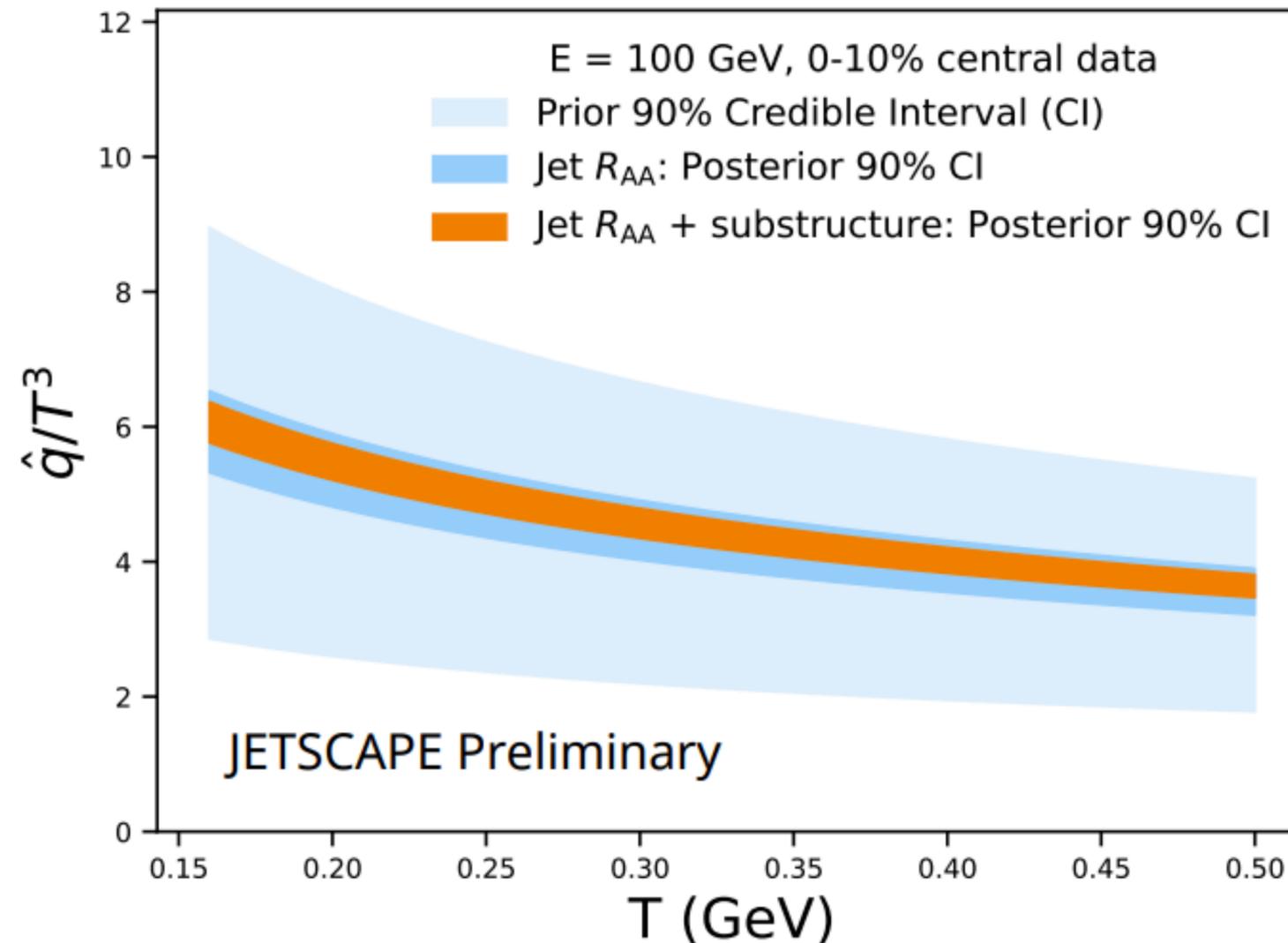
Narrowing observed, no clear evidence but sensitive to differences in models

Future ideas: K. Rajagopal (Wed. 9:50 AM)

# Extracting QGP medium properties from jets

Bayesian analyses of LHC and RHIC data using **jet  $p_T$  and substructure** to extract the QGP jet transport coefficient  $\hat{q}$  using JETSCAPE framework

R. Ehlers (Tue. 3:50 PM)

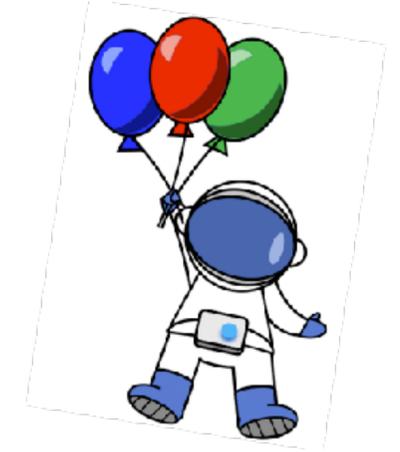


caveat: exploratory study with only 0-10%, simplified error treatment

learning which observables carry complementary information

**Using experimental data to learn about the medium!**

# Looking towards the future with jets



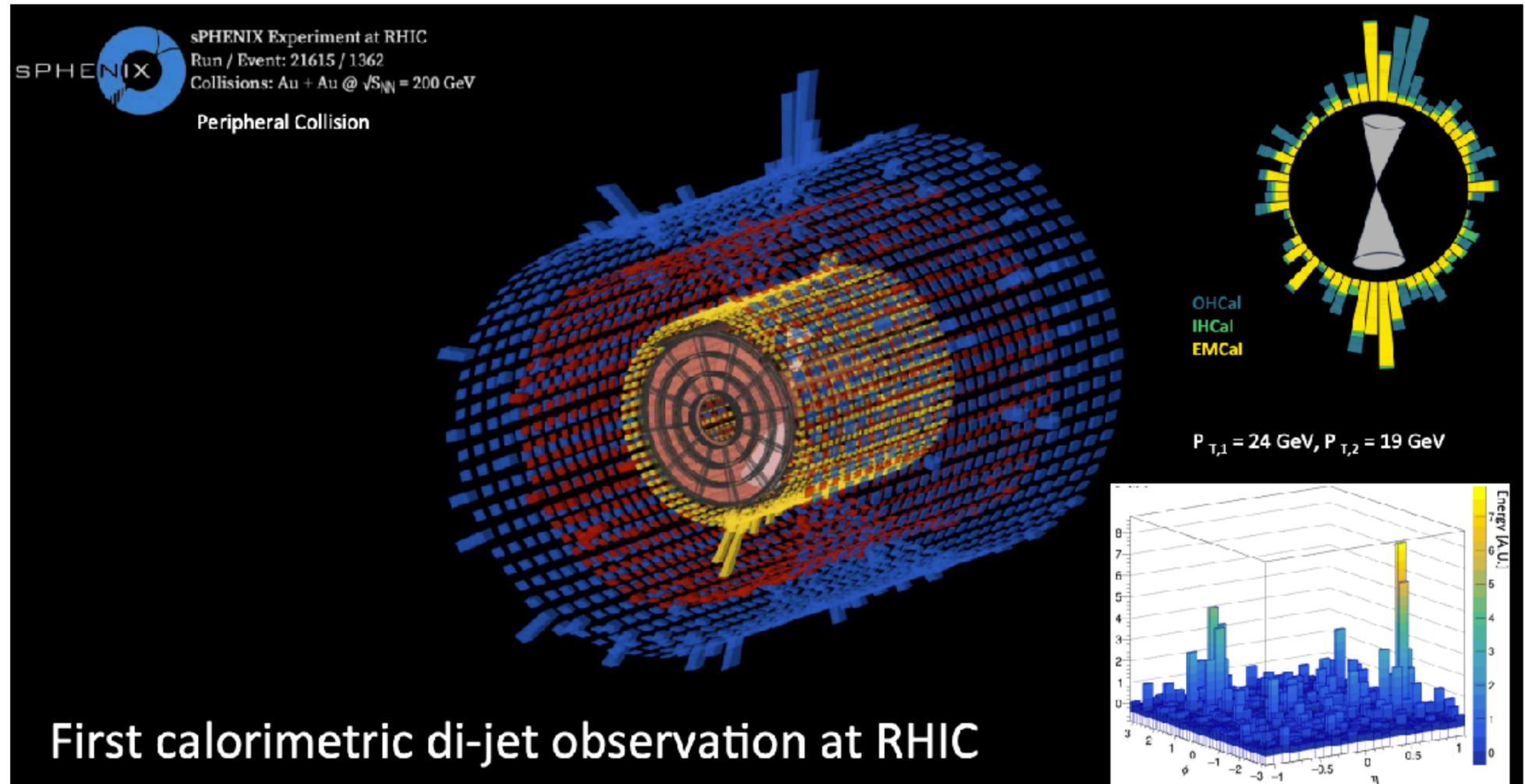
LHC Run 3 HI data coming this fall!

Smaller systems: pp, O+O, etc.

High statistics data at highest energies for precision measurements at very high momentum

Rare probes: photons and HF

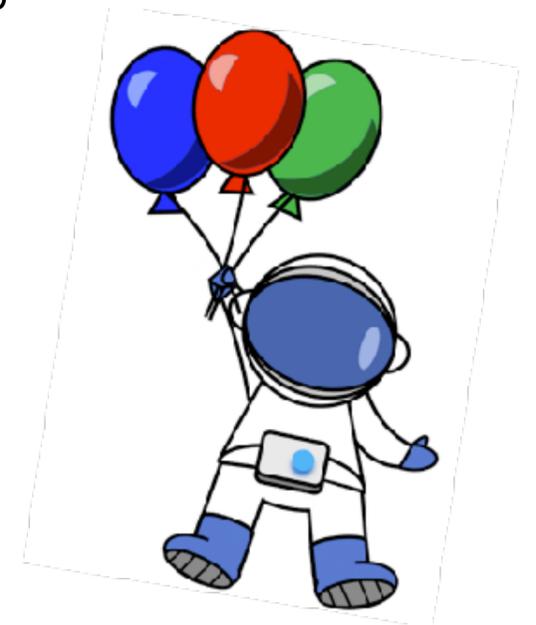
sPHENIX commissioning, pp data-taking next year, Au+Au after  
Continued jet program at STAR



T. Rinn (Tues. 12:00 PM)

# Thank you!

Thank you to Hannah Bossi, Raymond Ehlers, Isaac Mooney, Helen Caines, Fernando Flor, Anne Sickles, Anabel Romero, Nima Zardoshti, Yeonju Go for useful discussions, figures, and/or edits!

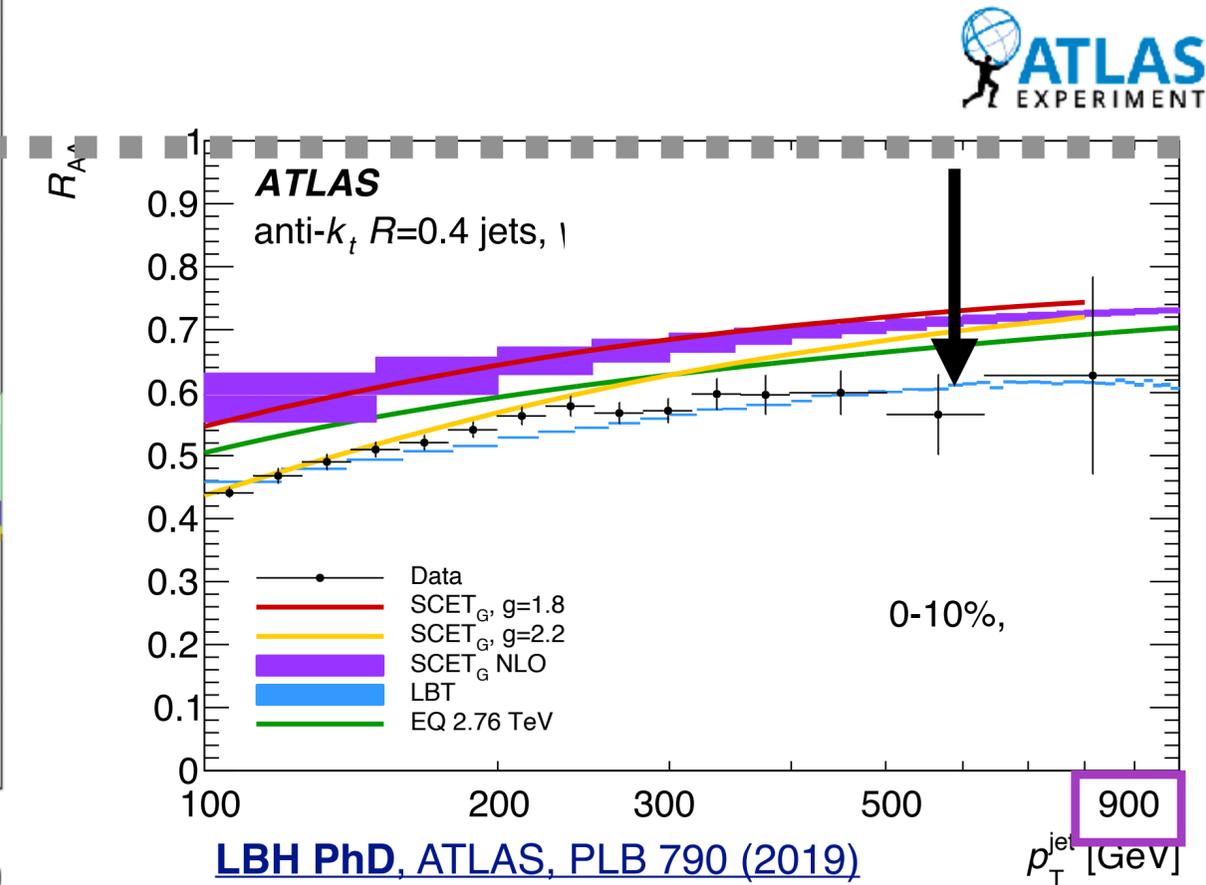
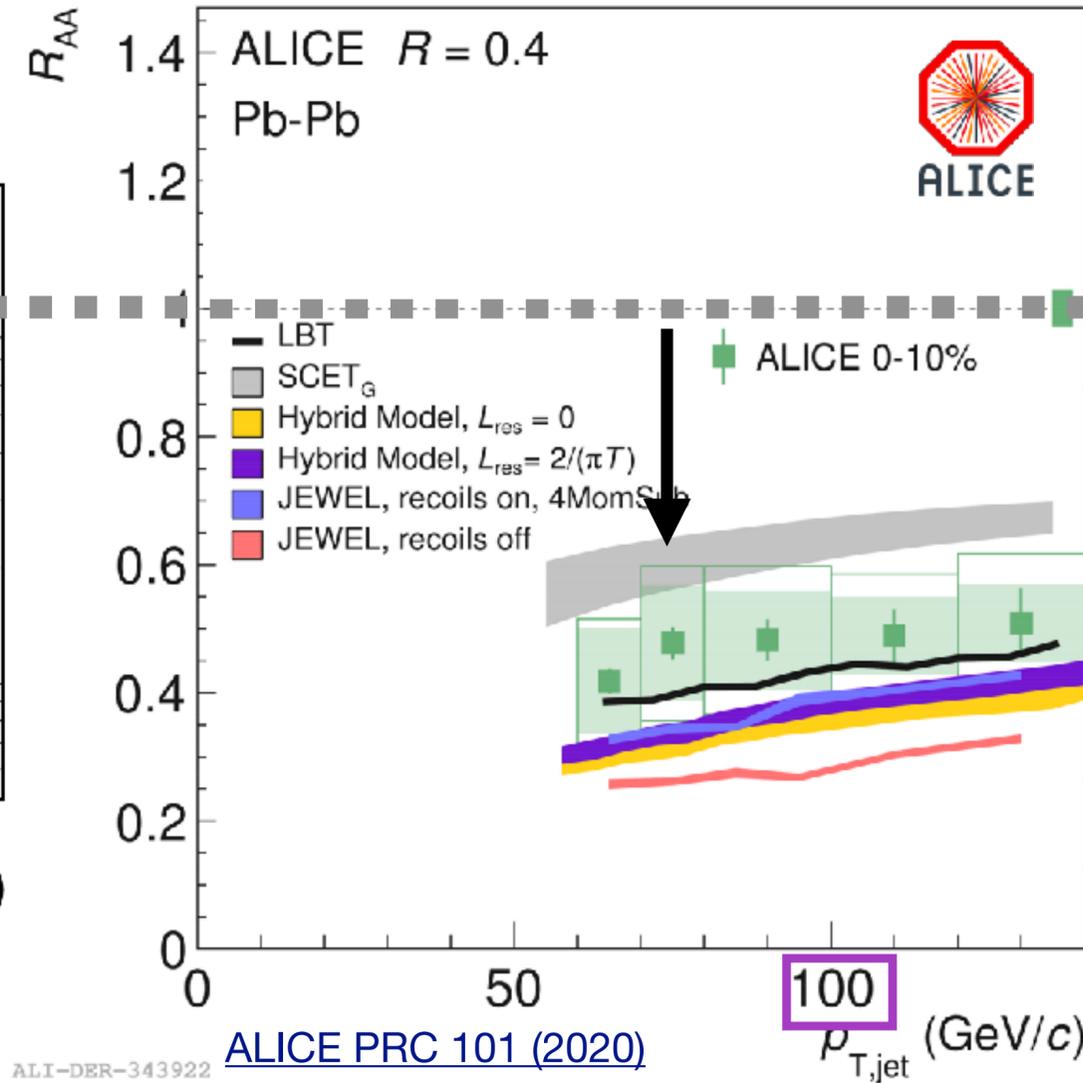
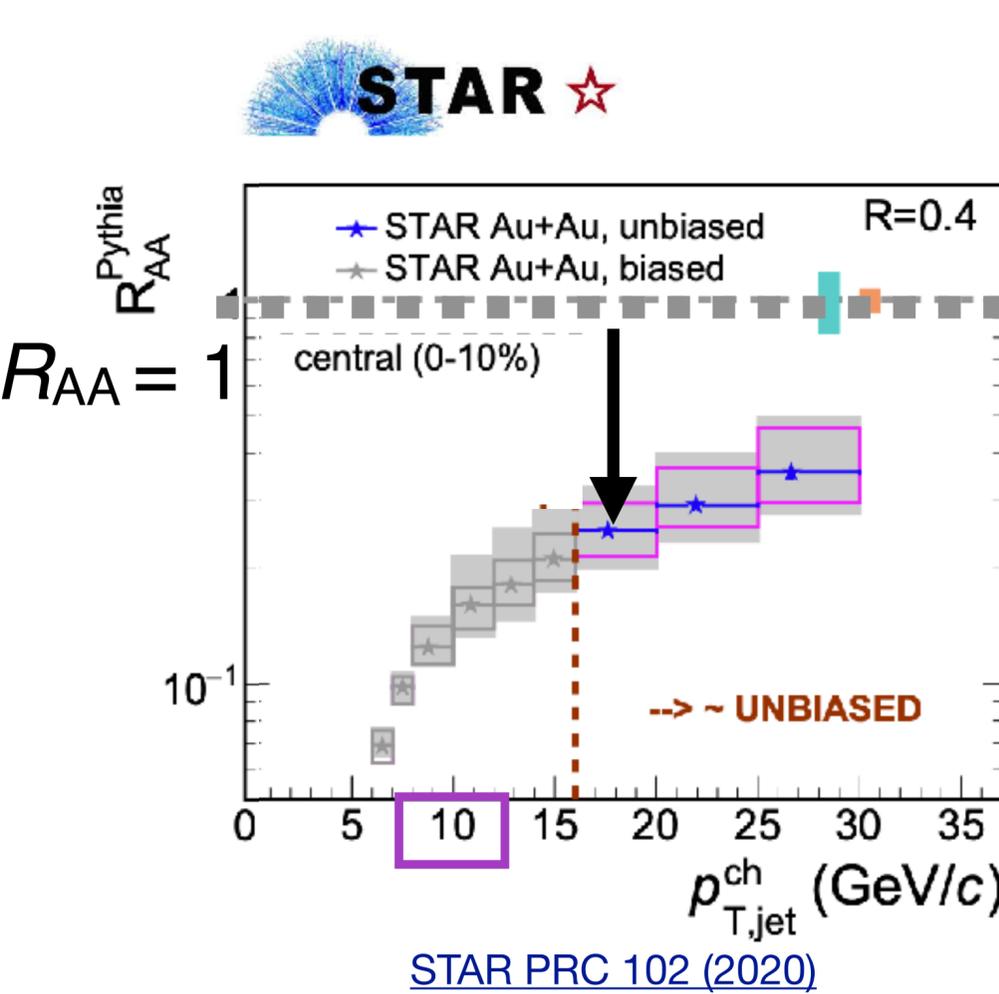


# Backup

# Outlook

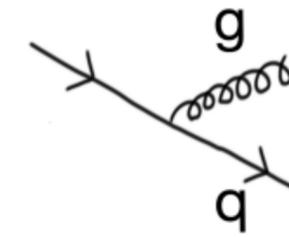
# Jet suppression observed over a large $p_T$ range

$$R_{AA} = \frac{\text{Pb-Pb } \text{⊗}}{\text{scaled } \text{⊗ pp } \text{⊗}}$$



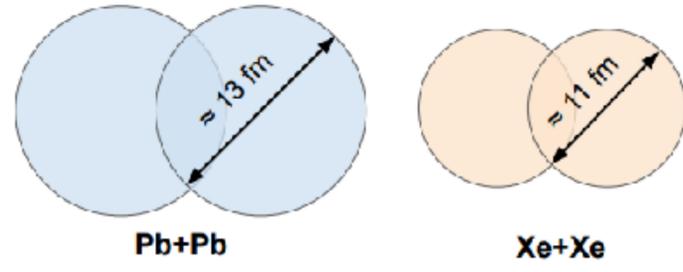
Jet quenching models describe data fairly well but what do we learn?

# Momentum imbalance

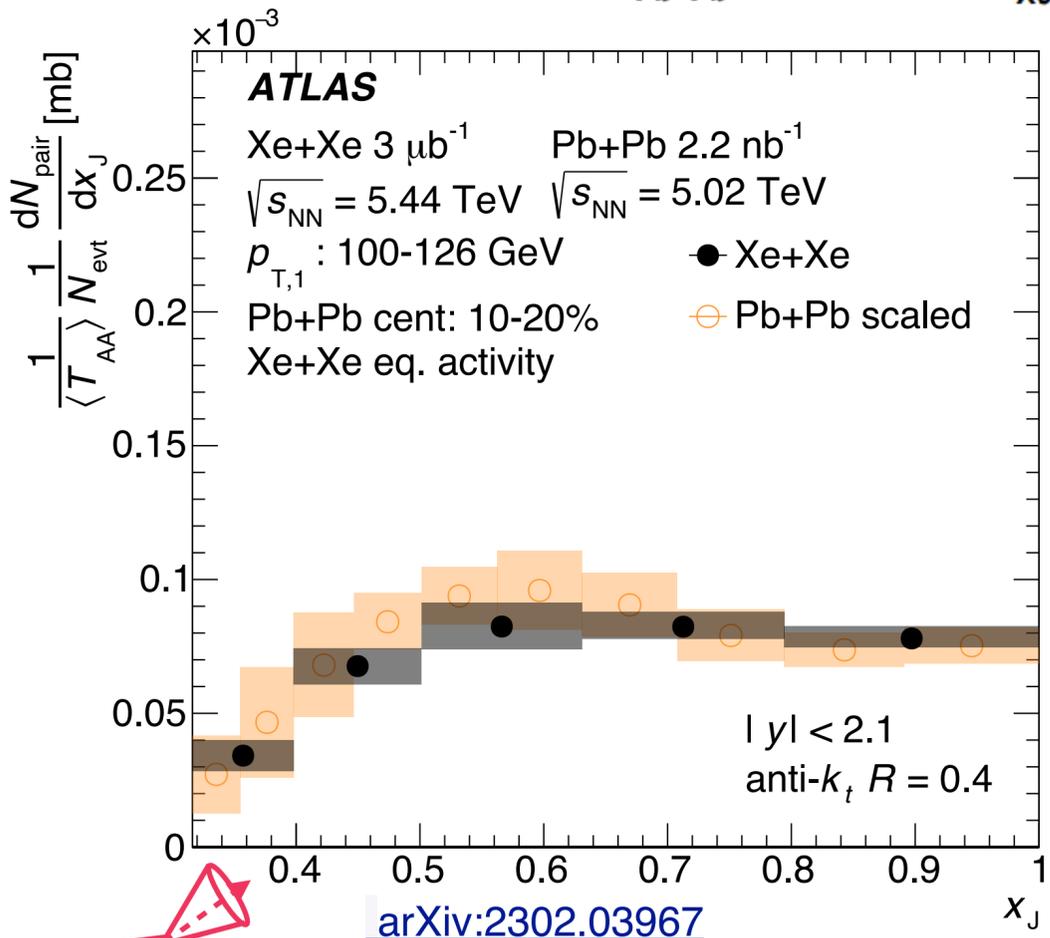


ATLAS-CONF-2023-008

$$x_J = \frac{p_{T2}}{p_{T1}}$$

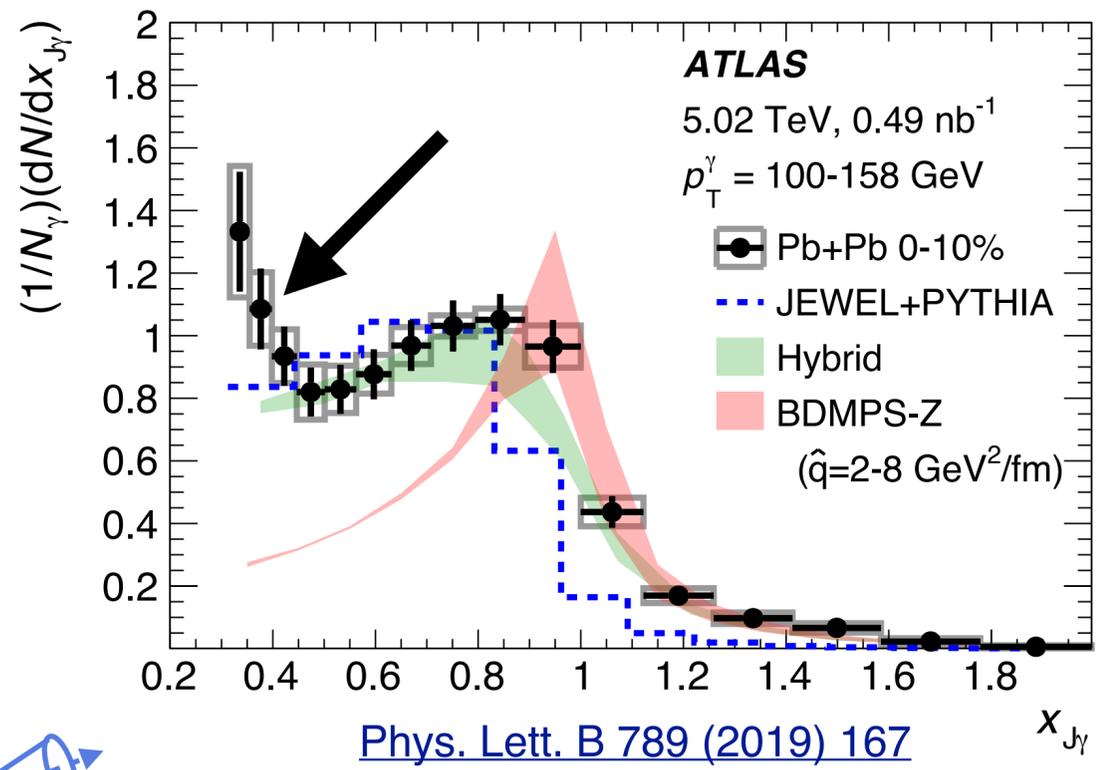


Photon+jet shows increased asymmetry in medium but is the structure from photon+2 jets?

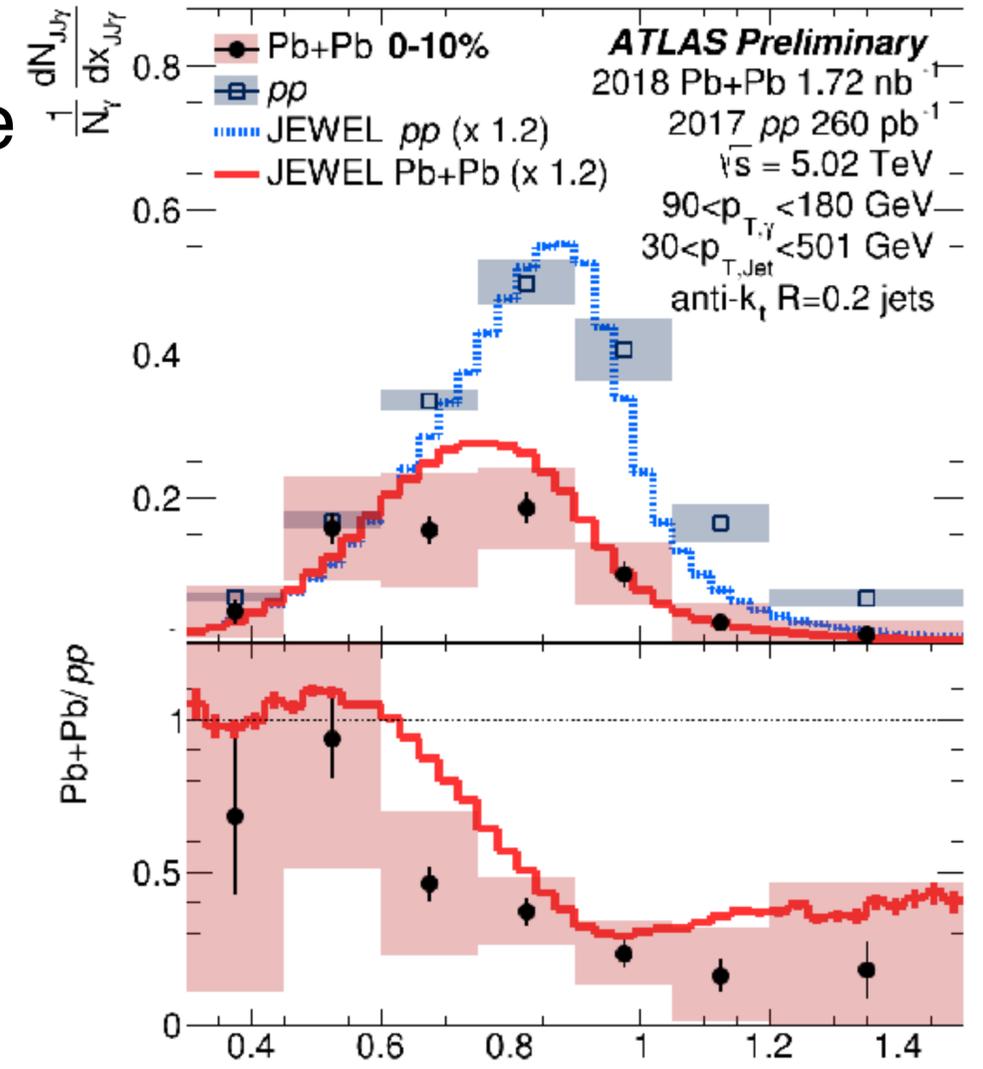


[arXiv:2302.03967](https://arxiv.org/abs/2302.03967)

[arXiv:2205.00682](https://arxiv.org/abs/2205.00682)



[Phys. Lett. B 789 \(2019\) 167](https://arxiv.org/abs/1807.08123)



$$x_{JJ\gamma} = \frac{p_{T1} + p_{T2}}{p_{T\gamma}}$$

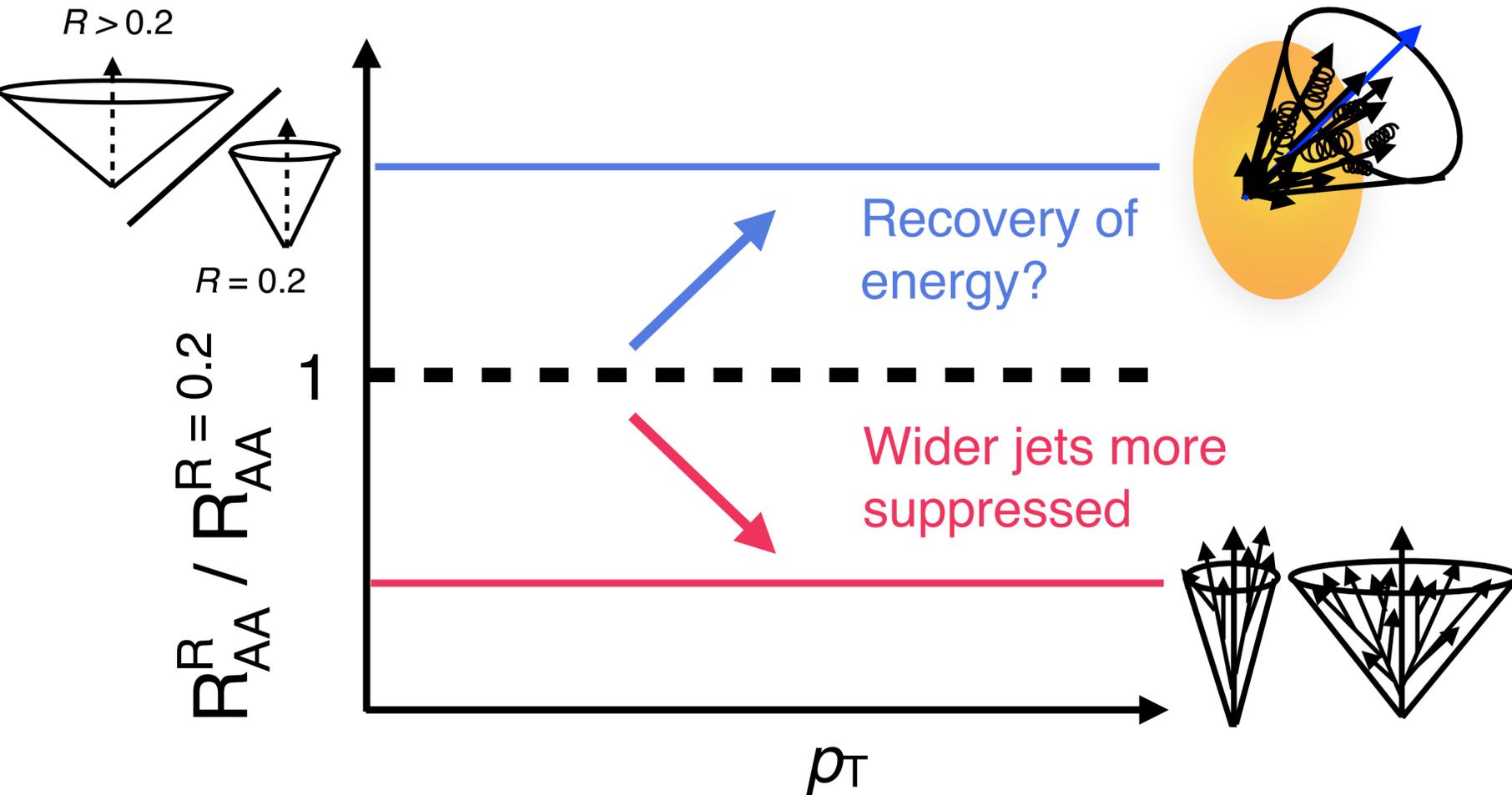
Same asymmetry in Xe+Xe and Pb+Pb at fixed geometry and event activity

Balanced configurations more suppressed  
 Informs interpretation of photon+jet configurations

# Vary jet $R$ to disentangle medium effects

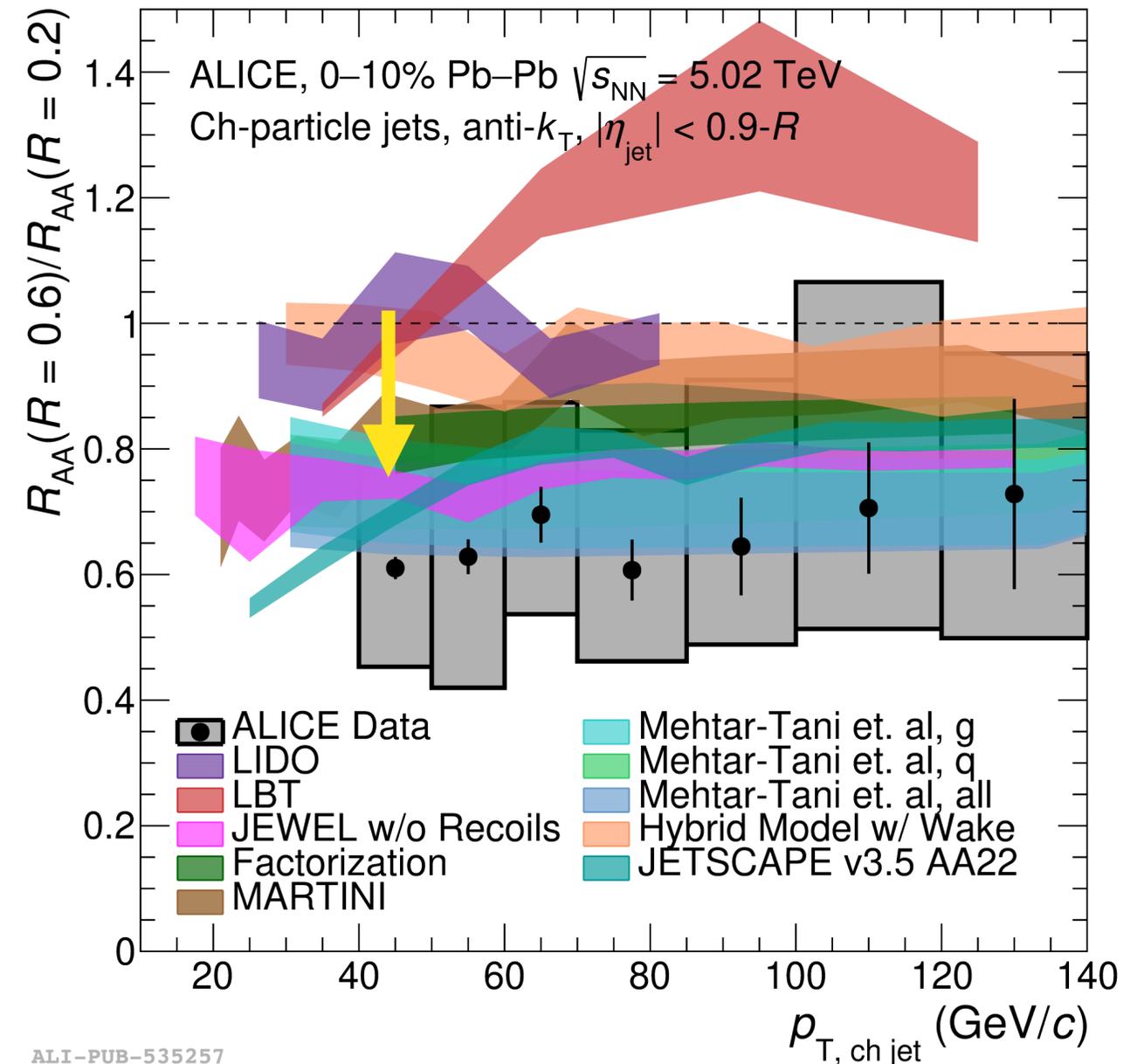
ML-based correction for background [Haake, Loizides PRC 99, 064904 \(2019\)](#)

[ALICE arXiv:2303.00592](#)



Larger jets more suppressed: **jets are narrowed in the QGP**

Discriminating power for models



ALI-PUB-535257

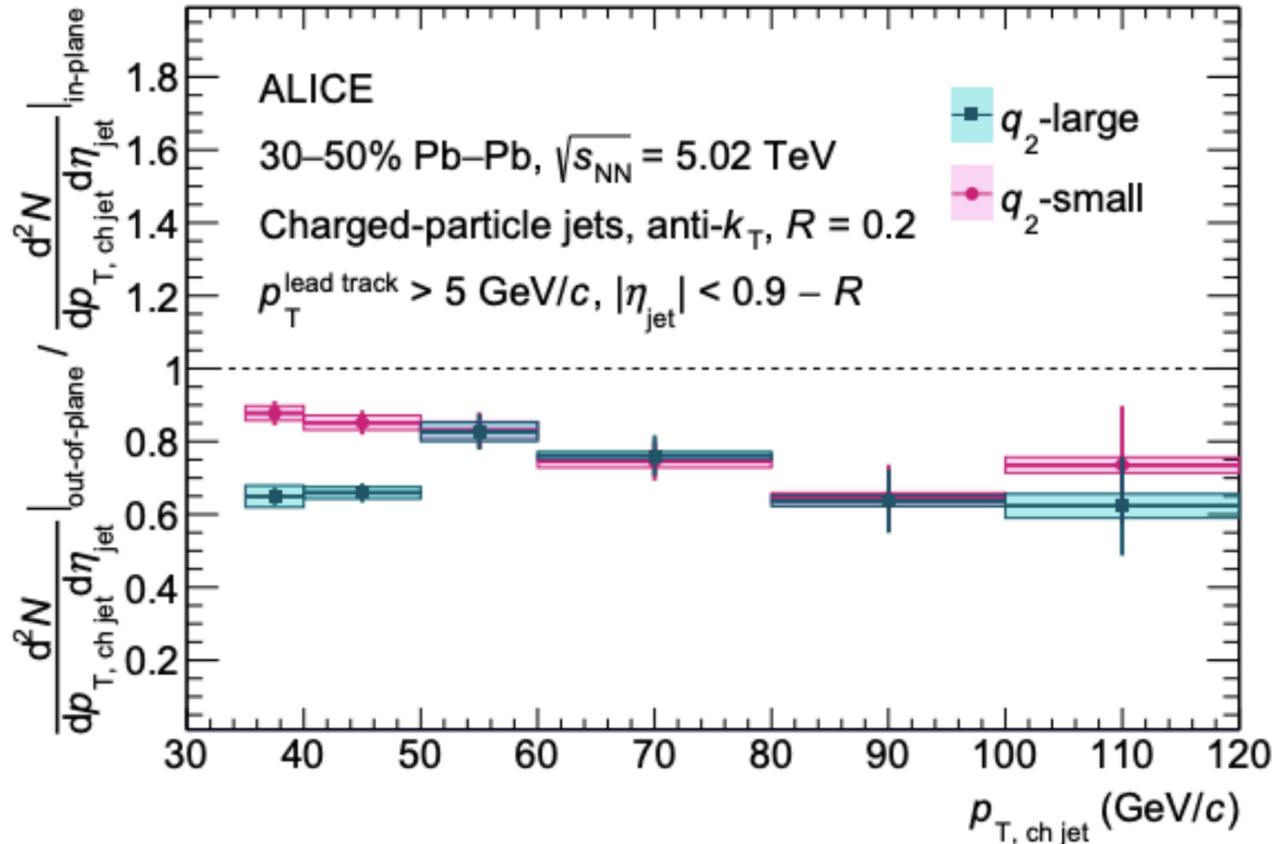
Caveat: tension at low  $p_T$  with **ATLAS result**

[Phys. Lett. B 719 \(2013\) 220-241](#)

# Event-shape engineering in jets

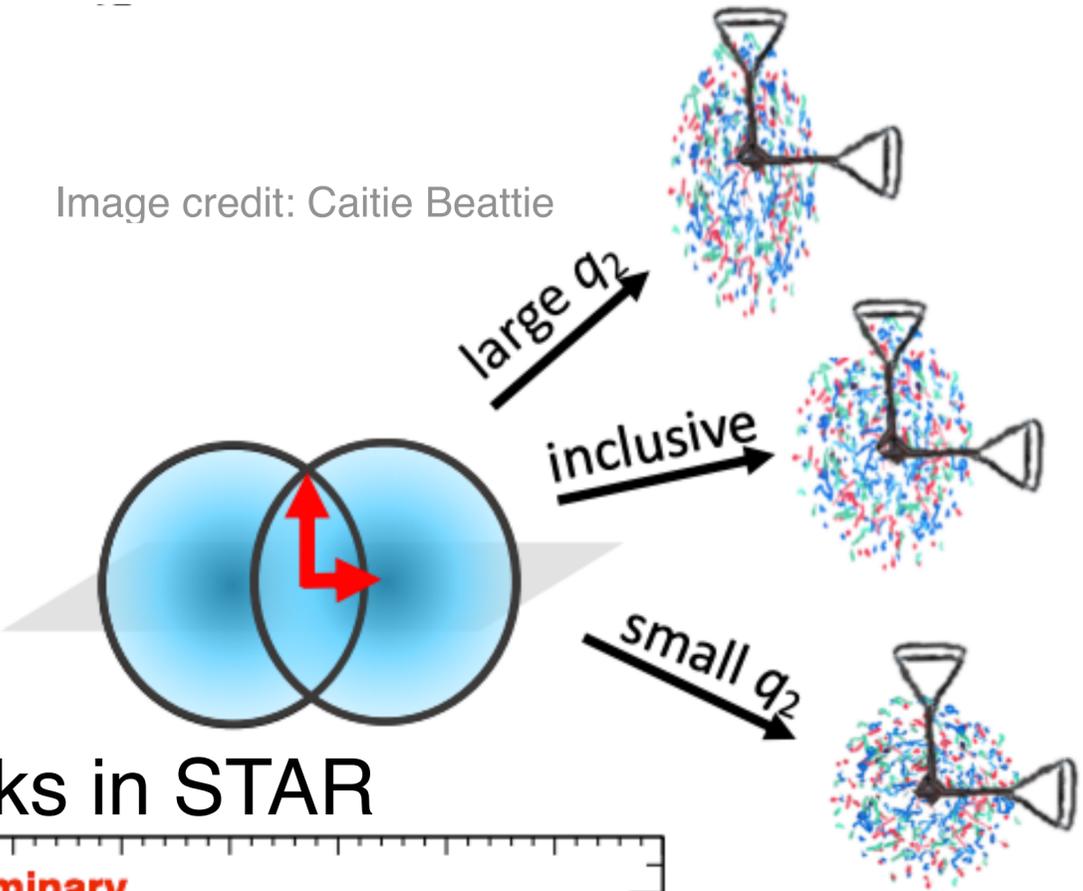
Classify events based on their anisotropy within a centrality class to maximize differences in path lengths

N. Grunwald (Tues. 11:40am)

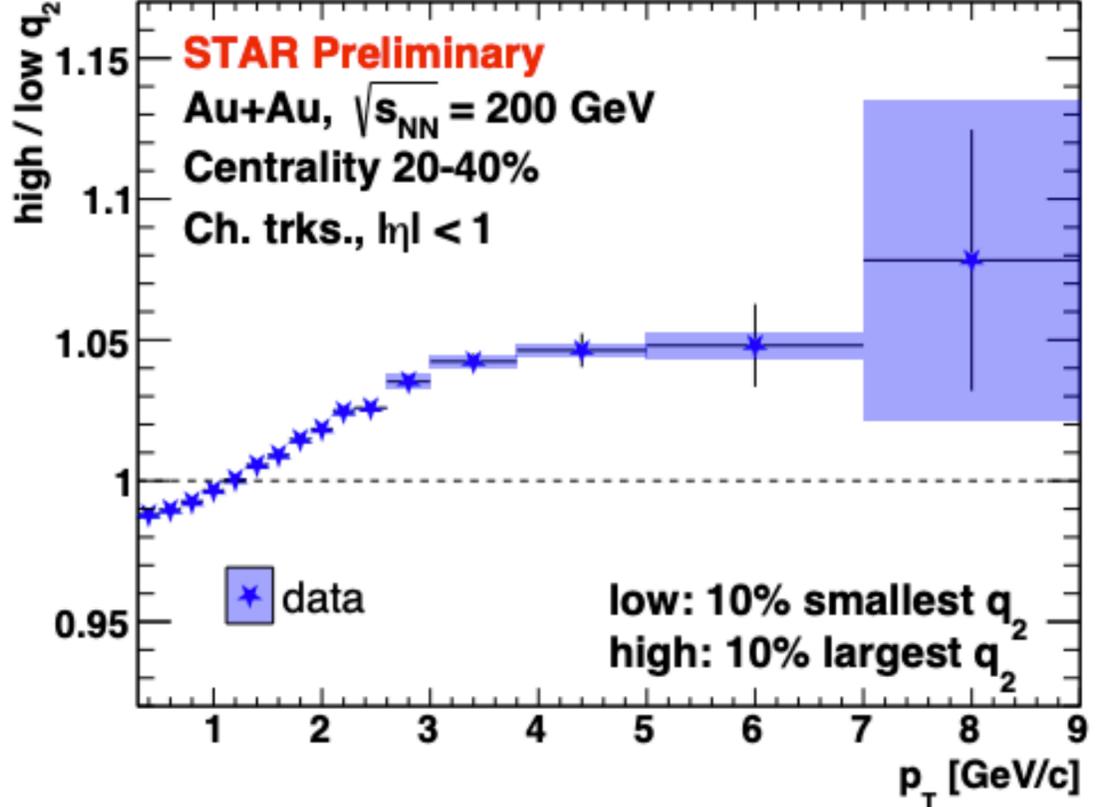


Increase suppression in high  $q_2$  events consistent with path length dependence

Image credit: Caitie Beattie



## ESE applied to tracks in STAR

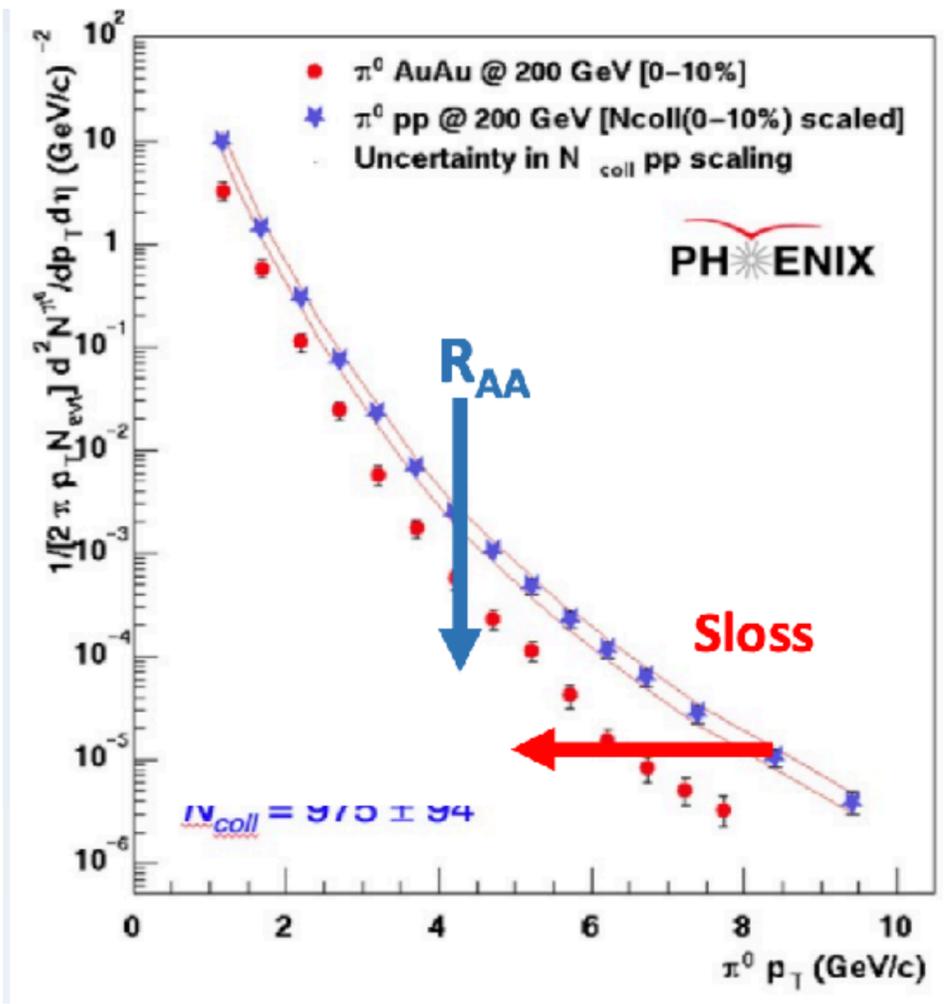
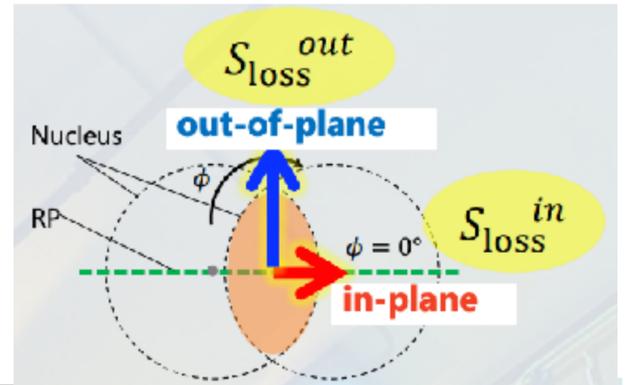


Enhancement of high  $q_2$  consistent with flow effects

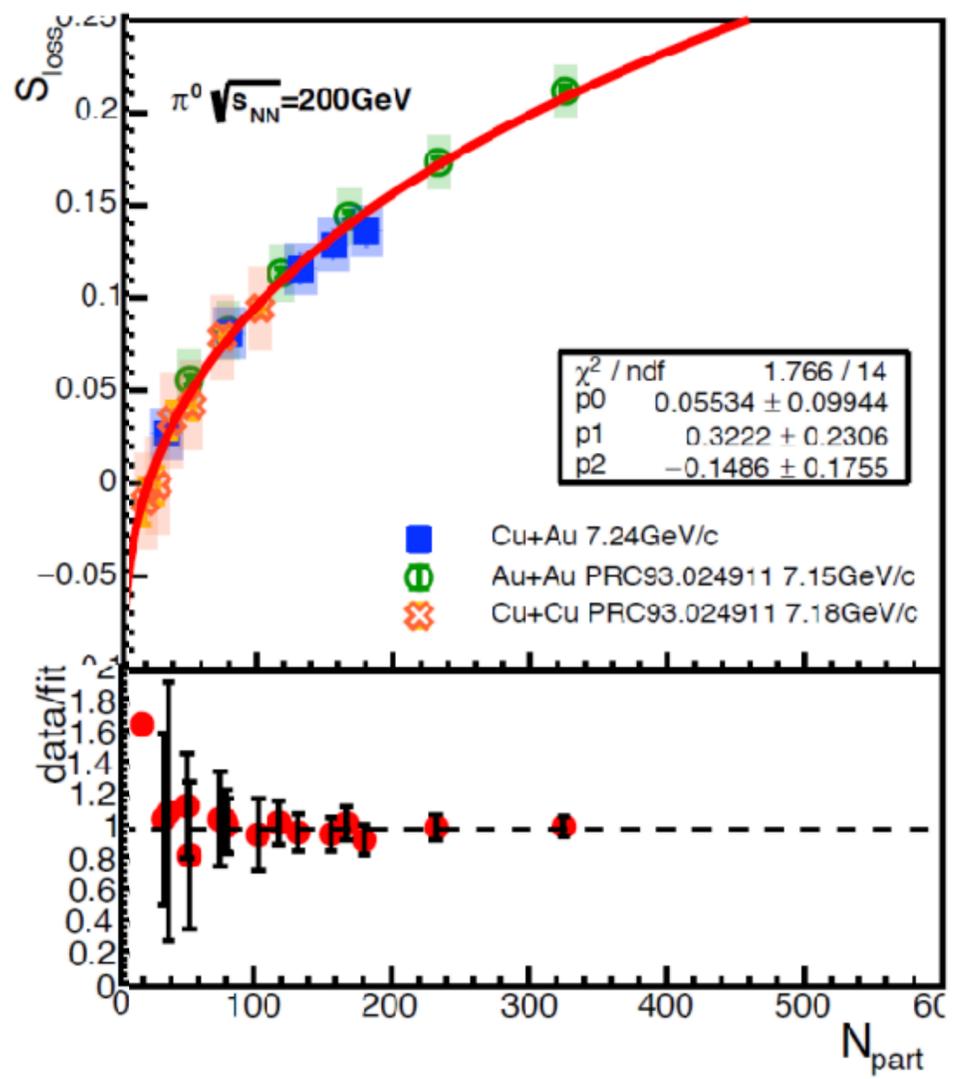
I. Mooney (Poster)

# Systematic study of energy loss in QGP

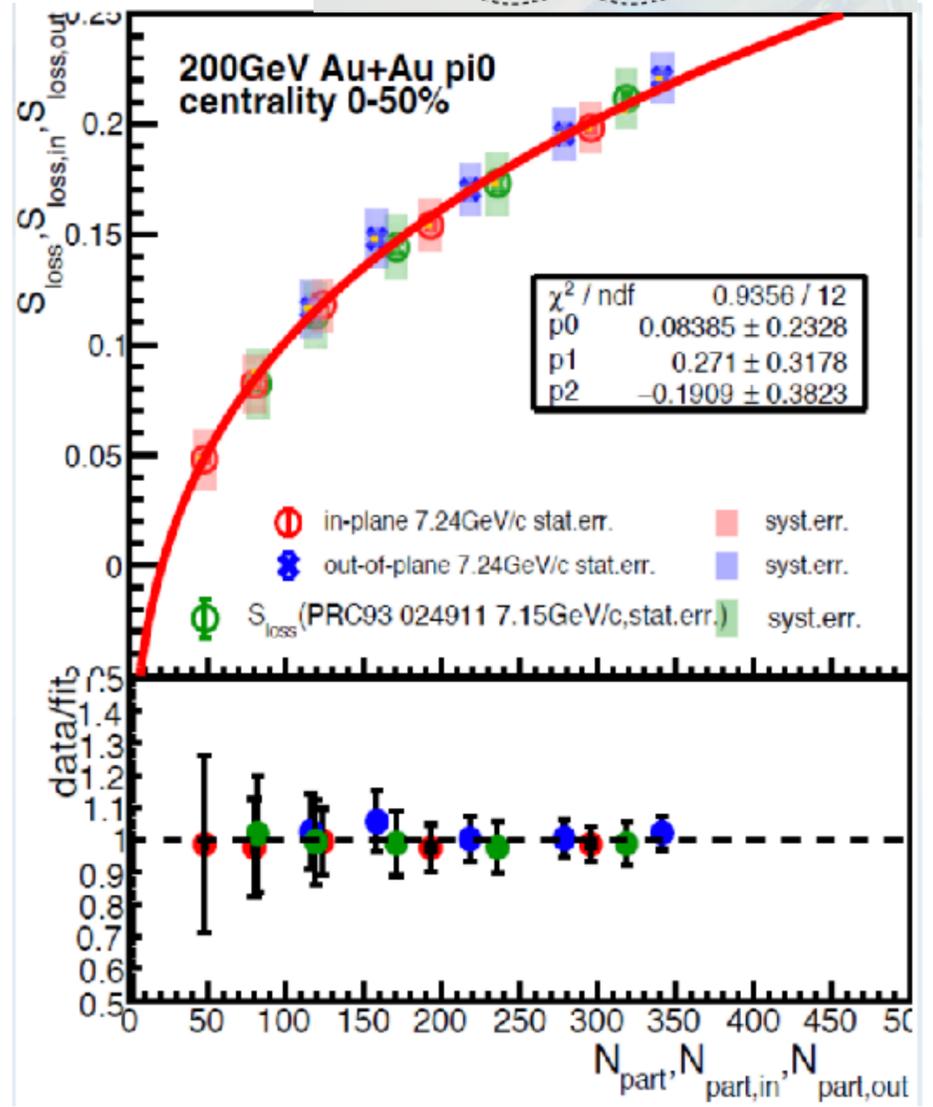
More direct comparison of energy loss from different collision systems



$$S_{loss} = \frac{p_T^{pp}(\text{scaled}) - p_T^{AA}}{p_T^{pp}(\text{scaled})}$$



No significant difference for different collision systems

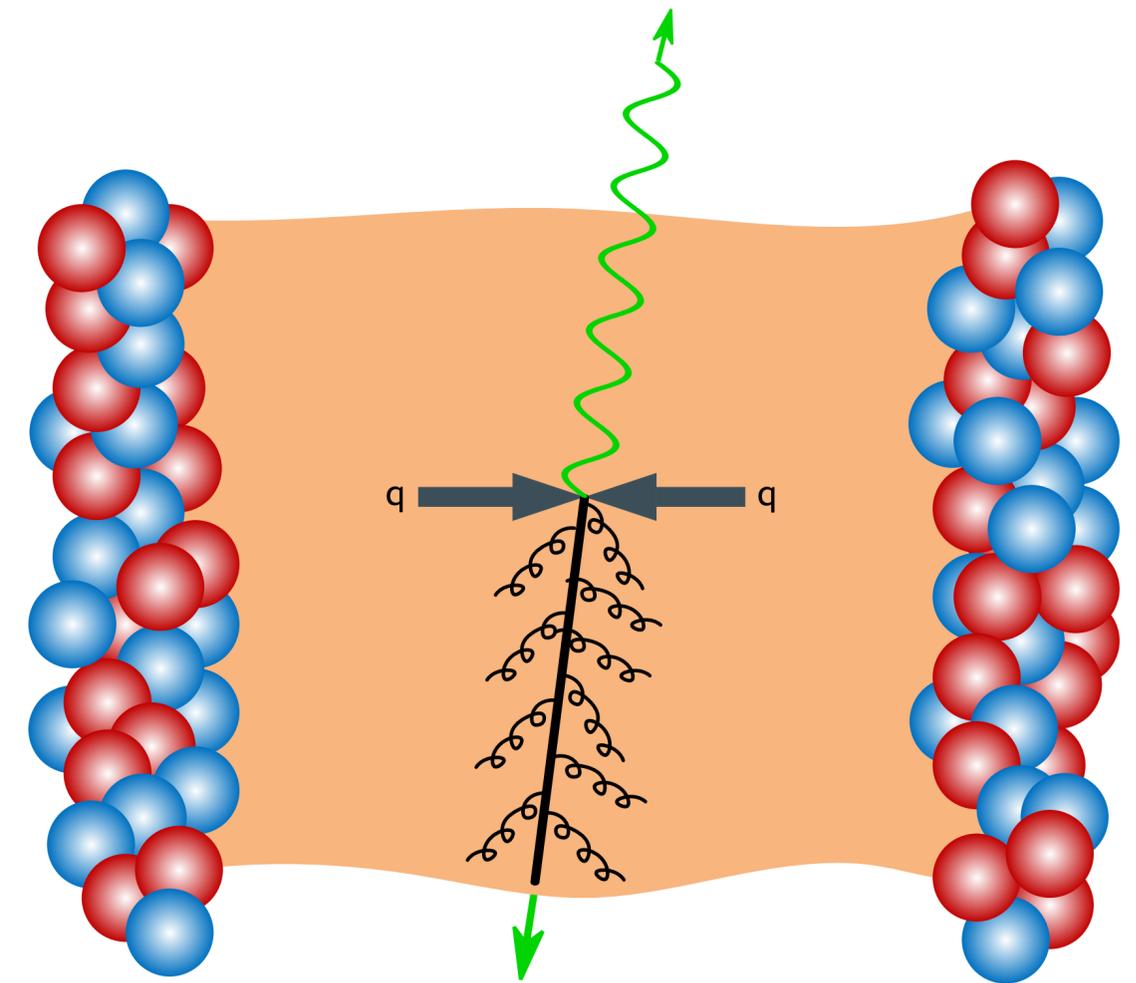
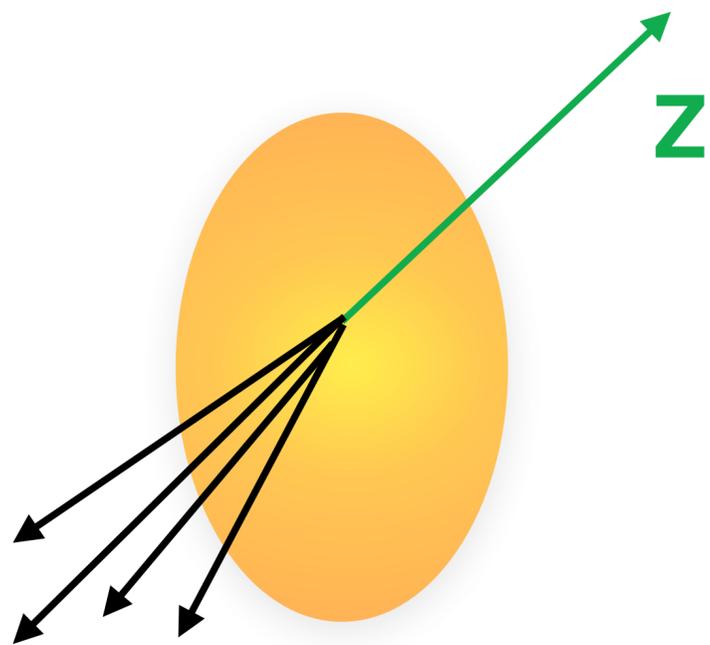


In and out of plane S\_loss follows Npart

T. Hachiya (Poster)

# Boson-tagged jet structure

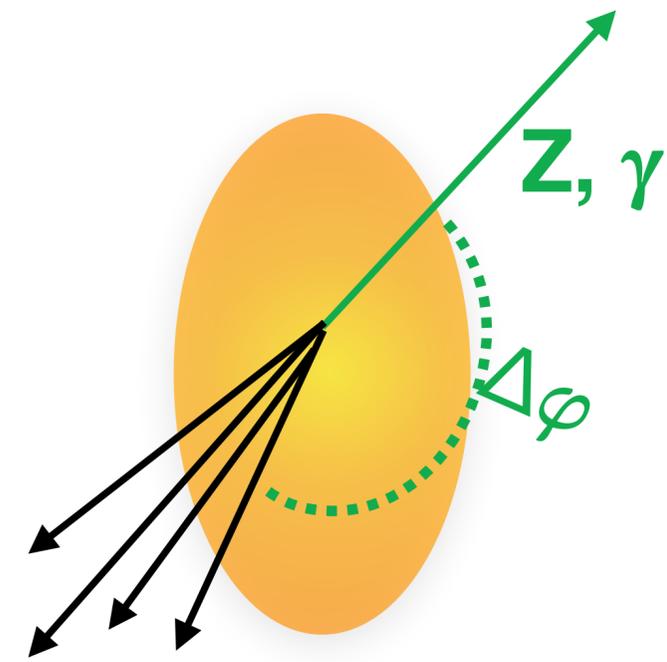
- Boson-jets dominated by quark jets
- Boson tag provides approximate initial momentum of jet (no energy loss)



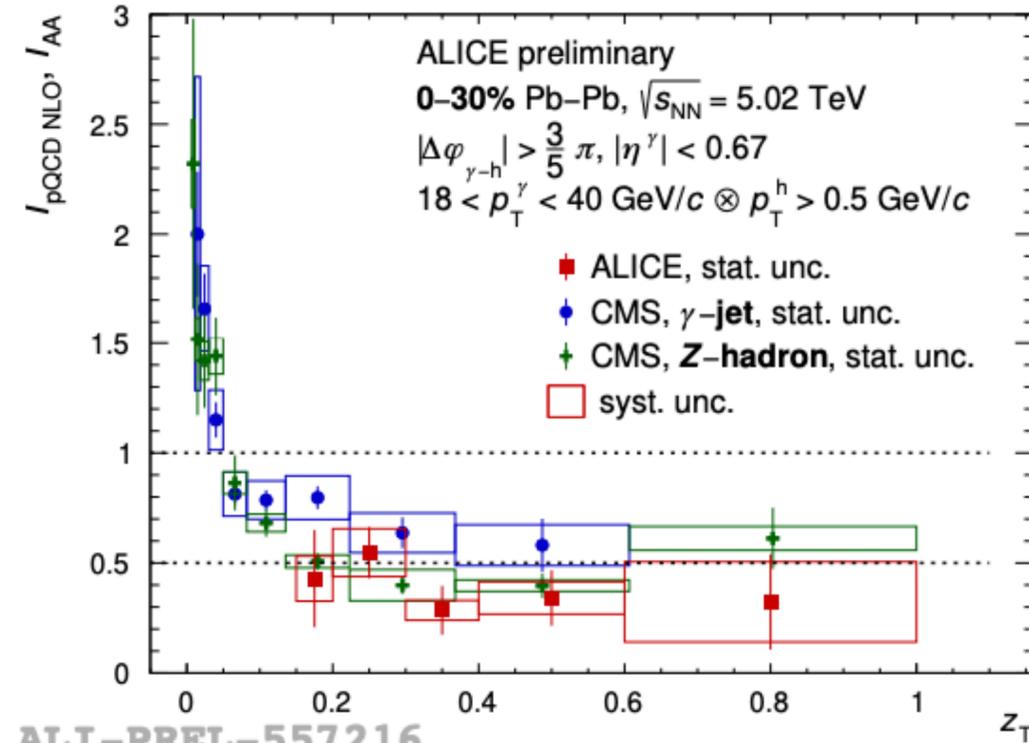
- Z-tag allows access to lower momentum than photons because of less background
- Z/gamma-tagged particles not biased by jet -> possibly access to larger jet quenching effects

# Boson-tagged jet structure

Similar measurements at RHIC and LHC (not apples-to-apples)



LHC, Pb–Pb 5.02 TeV

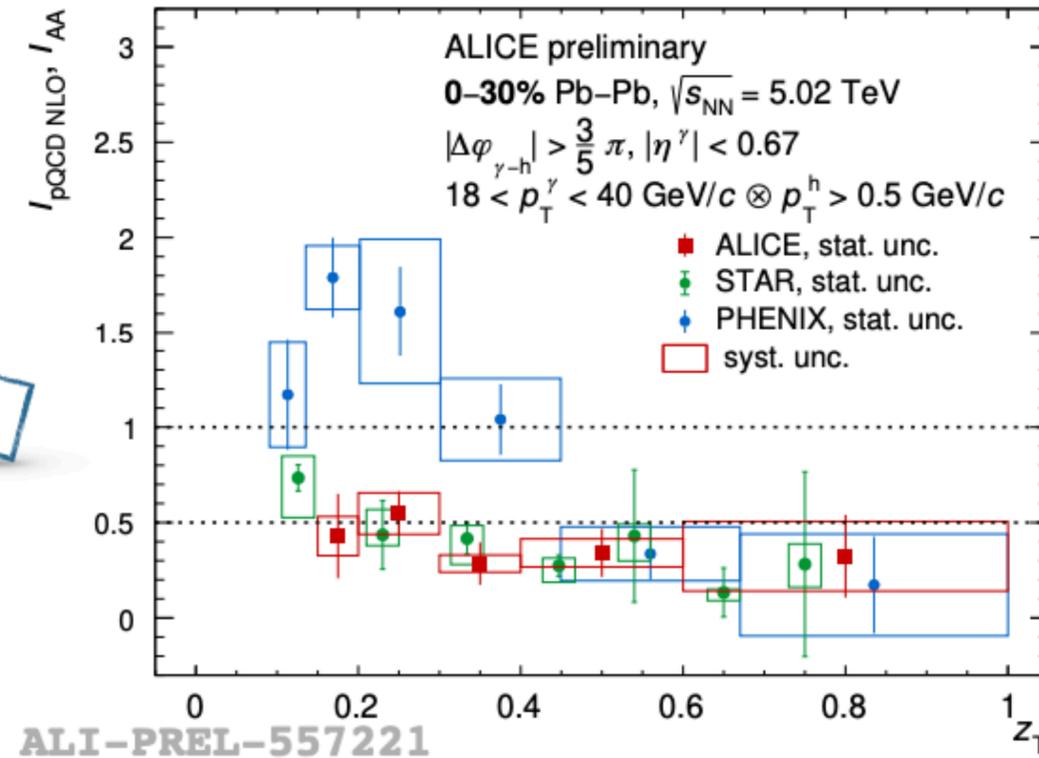


CMS,  $\gamma$ -jet, 0-10% [Phys. Rev. Lett. 121, 242301](#)

CMS, Z-hadron, 0-30% [Phys. Rev. Lett. 128, 122301](#)

- same  $\sqrt{s_{NN}}$  and system
- different selections and measurements

RHIC, Au–Au 200 GeV



STAR:  $\gamma$ -hadron, 0-12% [Phys.Lett.B 760 \(2016\) 689-696](#)

PHENIX:  $\gamma$ -hadron, 0-40% [Phys. Rev. Lett. 111, 032301](#)

- same measurement
- different  $\sqrt{s_{NN}}$ , system and selections

C. Arata (Tues. 4:10 PM)

P. Chou (Tues. 9:50 AM)

[Zhong arXiv:2101.05422](#)

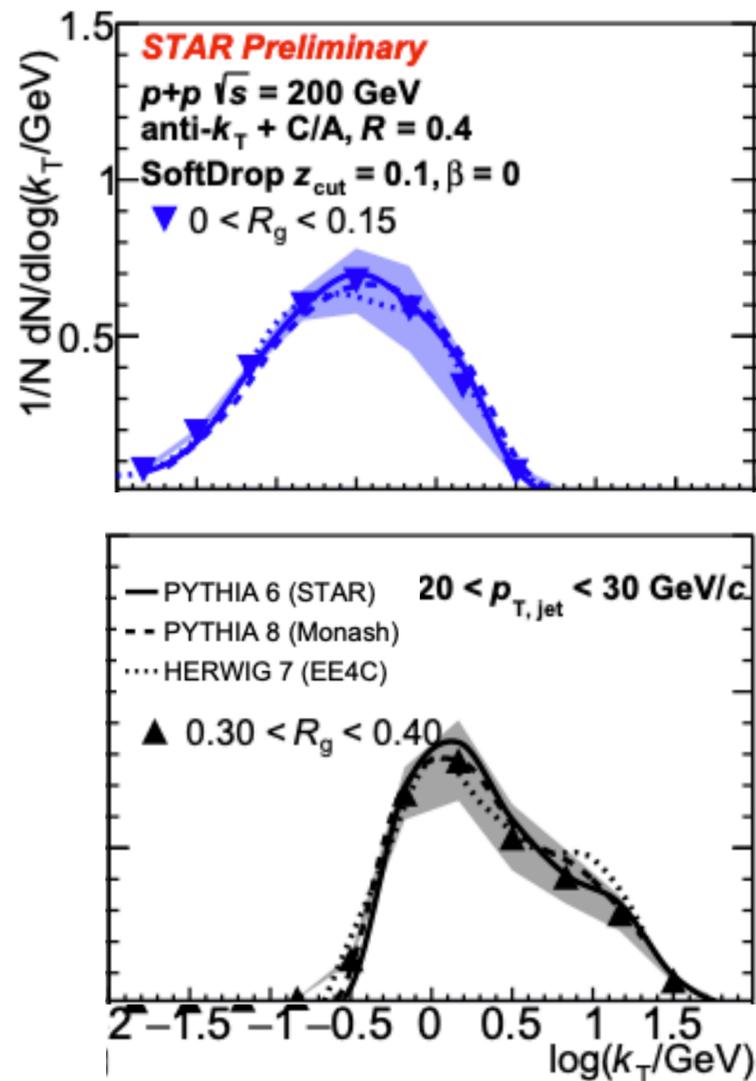
[CMS arXiv:2103.04377](#)

Enhancement at low z, suppression at high z: broadening or medium response?

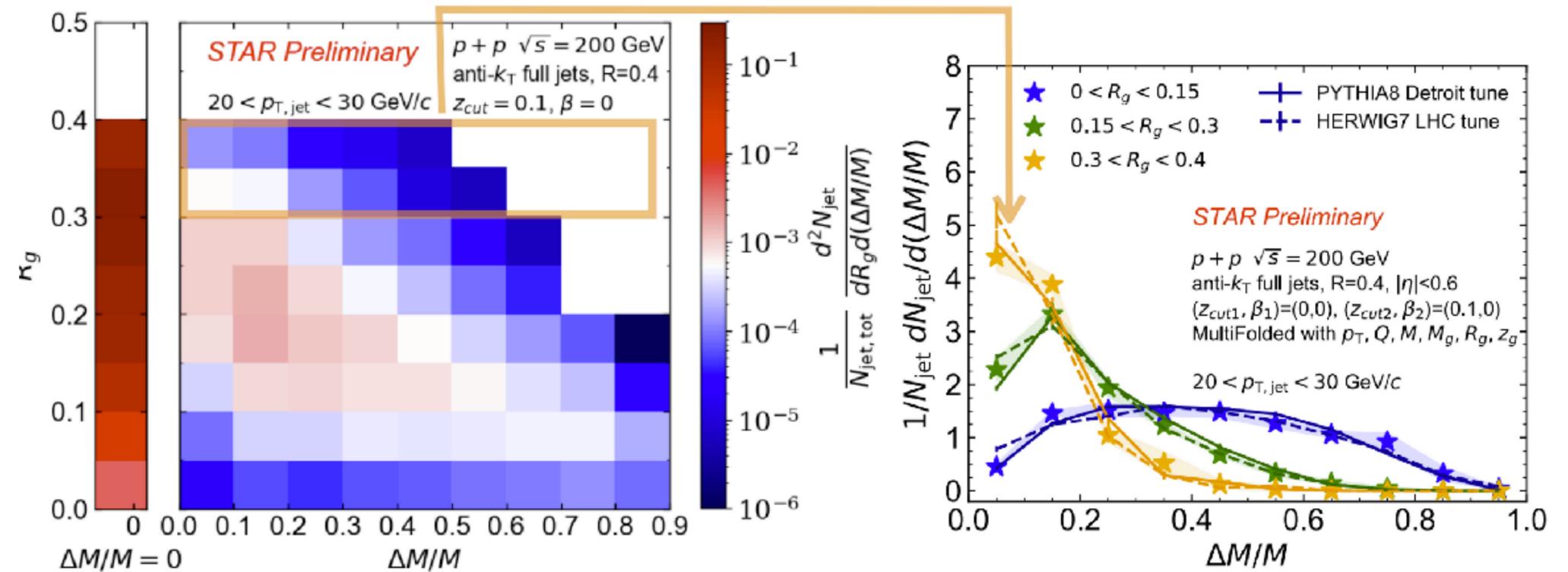
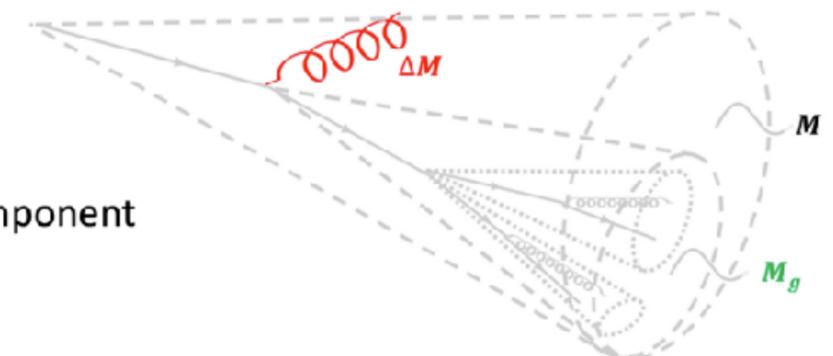
# Multi-dimensional jet substructure

Relate splitting observables through 2D correlations in the Lund plane

With Multifold obtain **6D correlation** between substructure observables measured!



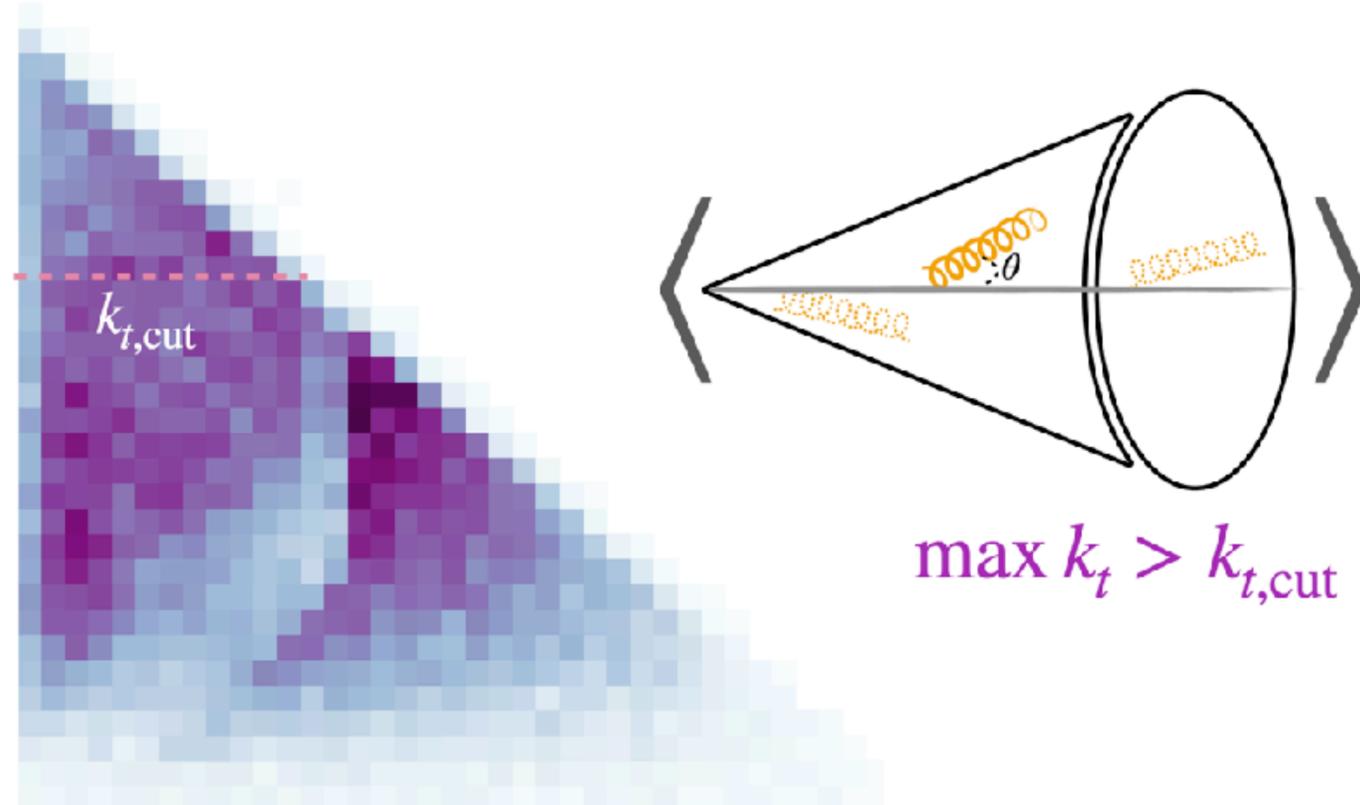
**Collinear Drop:** probes the soft component  
 Chien and Stewart JHEP 2020, 64 (2020).



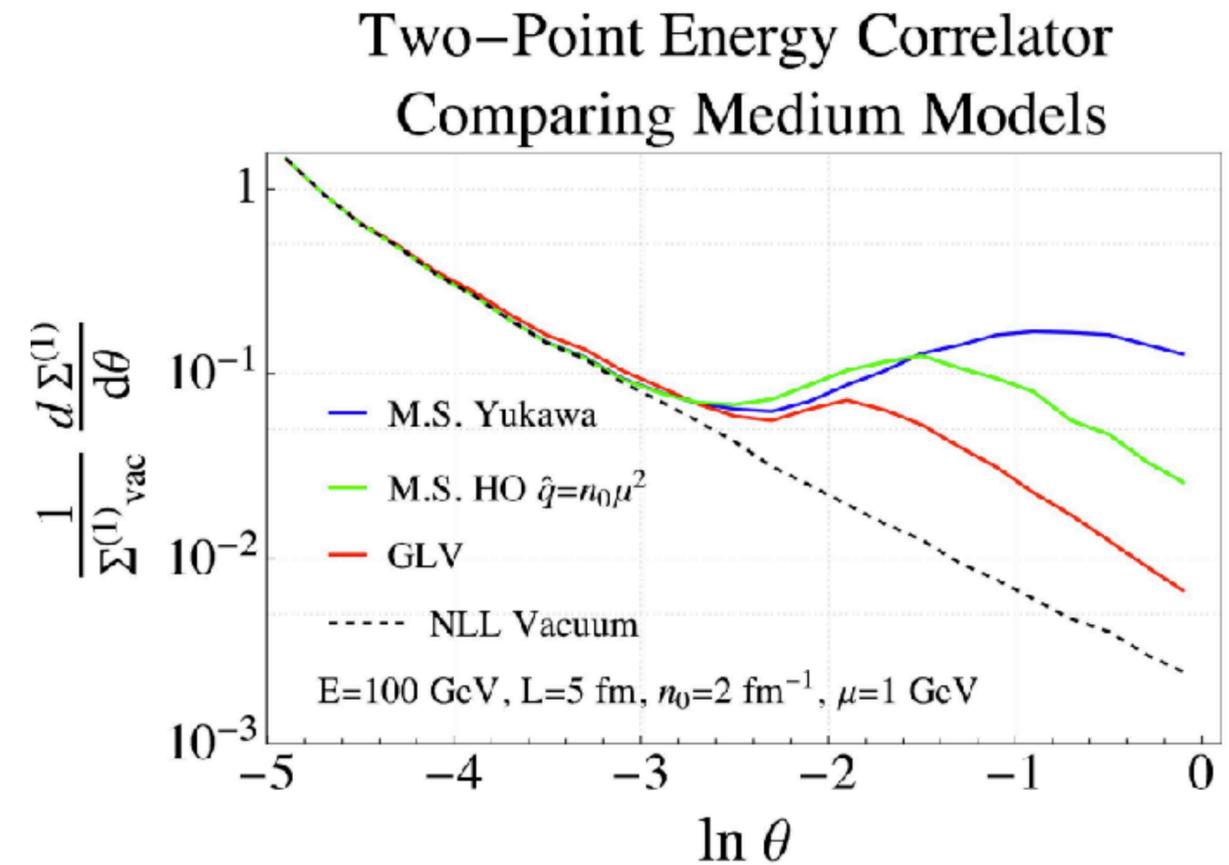
**Connect the npQCD and pQCD parts of the shower**

# Access the resolution length of the medium

[Work in progress with L.Cunquero, J.Holguin, D.Pablos, M.Spousta, A.Takacs and M.Verweij]



High  $k_T$  cut reduces sensitivity to non-perturbative region



EECs provide a better separation of **medium scales**

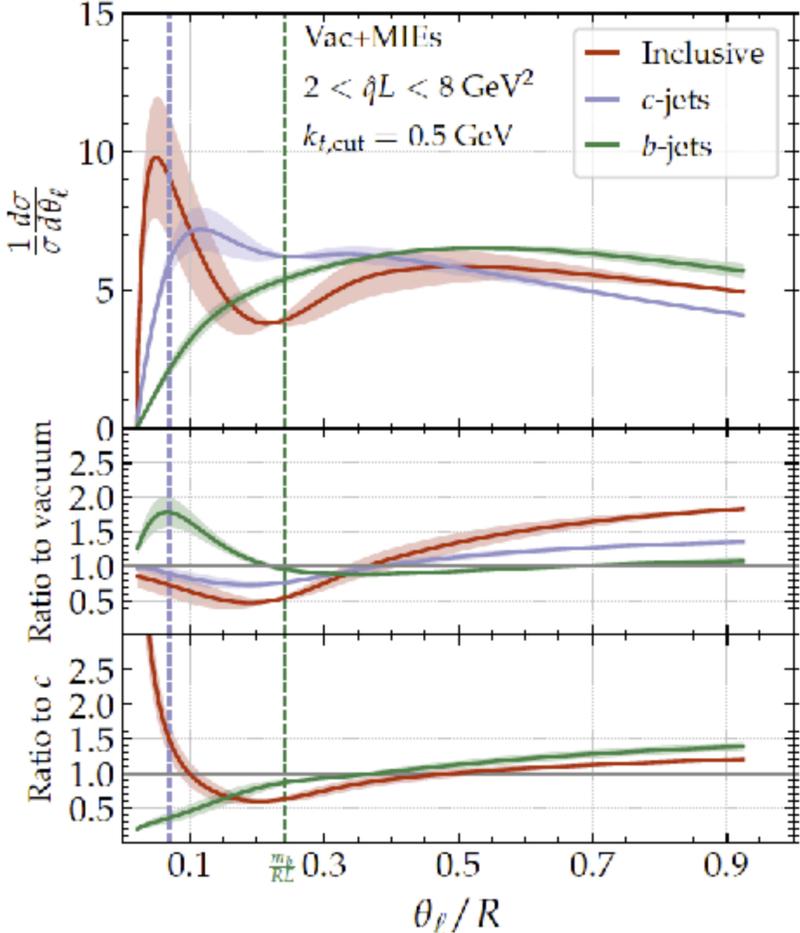
[Anders, Dominguez, Holguin, Marquet, Mout, 2303.03413](#)

[Anders, Dominguez, Elayavalli, Holguin, Marquet, Mout, 2209.11236](#)

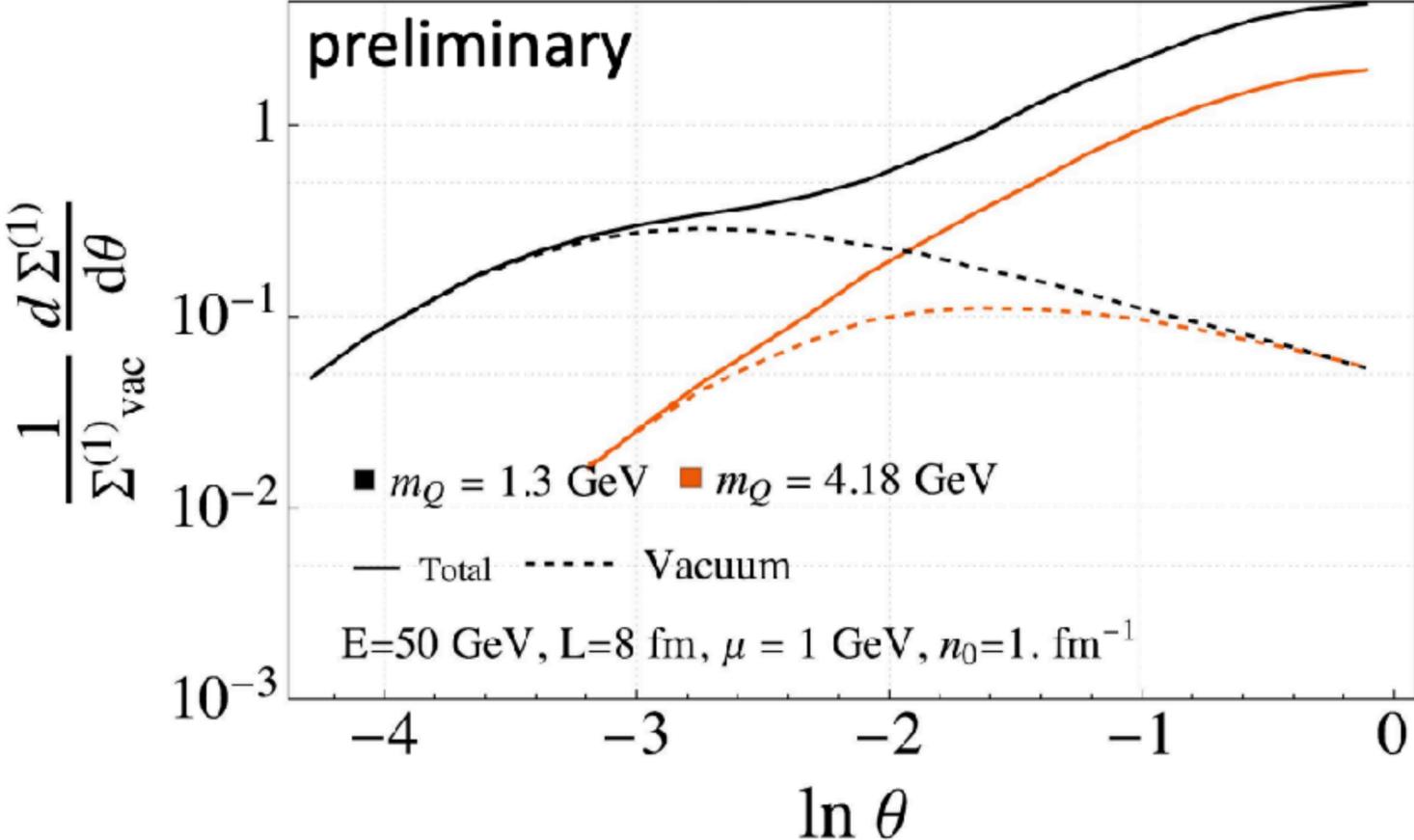
# Direct modifications of dead cone in the QGP

Late- $k_T$  grooming: designed to be naturally sensitive to small-angle radiation

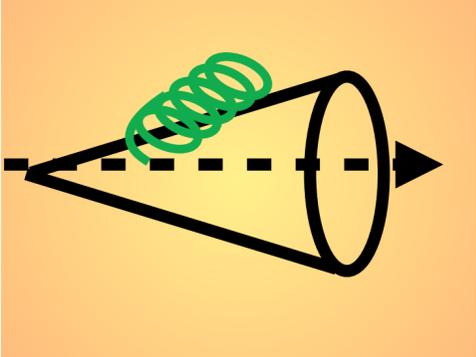
[arXiv:2211.11789](https://arxiv.org/abs/2211.11789)



Two-Point Energy Correlator  
 Comparing Masses



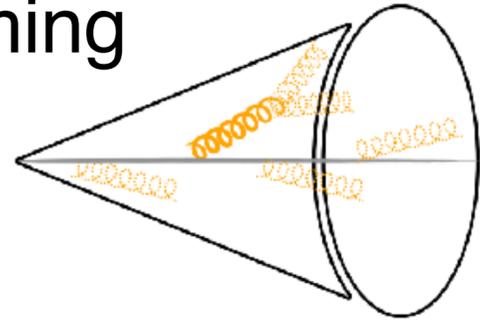
Use empty dead cone to cleanly reveal medium-induced splittings in the Lund plane



EECs sensitive to dead cone and medium modifications to the dead cone

# Subjets access hard parton splittings

Grooming



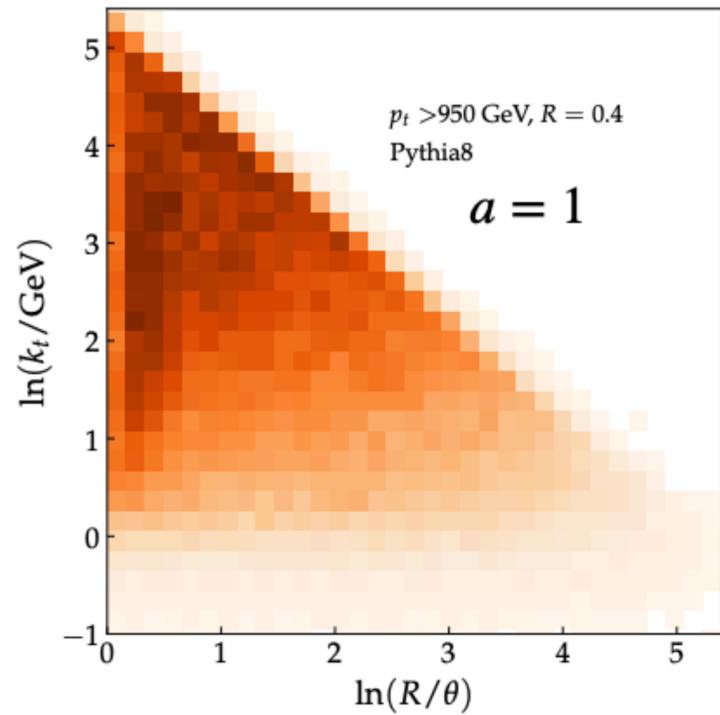
$$\frac{d\sigma}{d\mathcal{O}} = f(E_i, \theta_i) \Theta(\Omega_i - \Omega)$$

phase-space cut

**Dynamical grooming**

[PRD 101 (2020) 3, 034004]

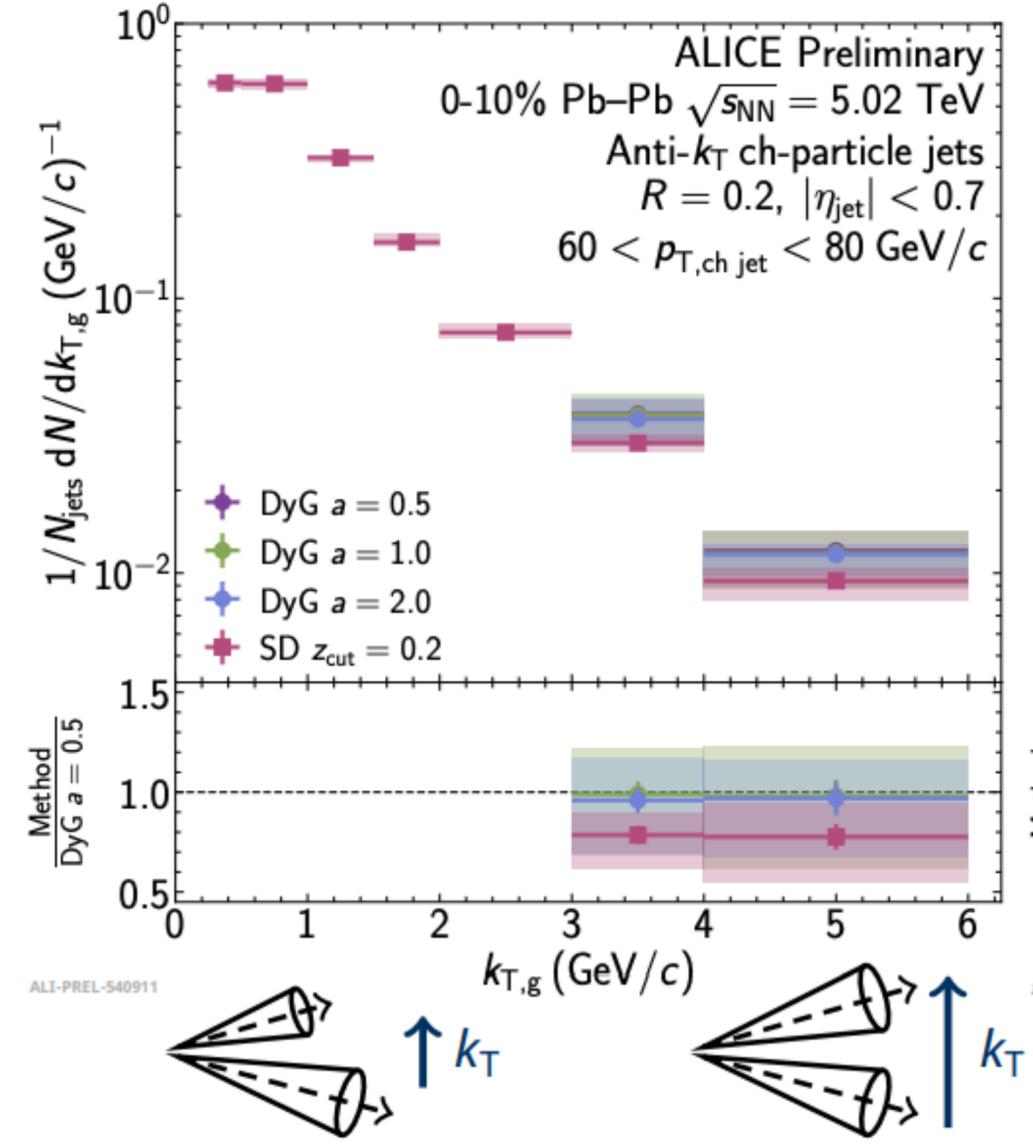
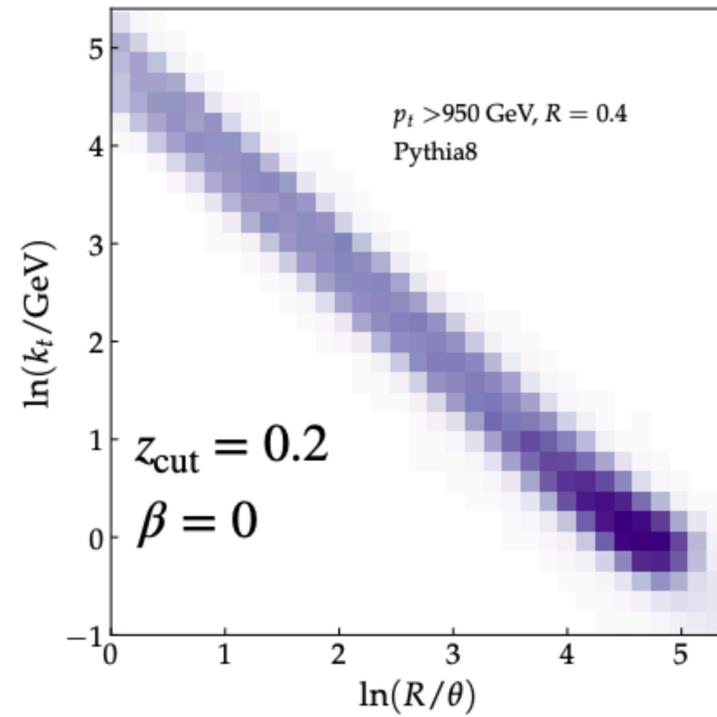
$$\max(z\theta^a)$$



**SoftDrop**

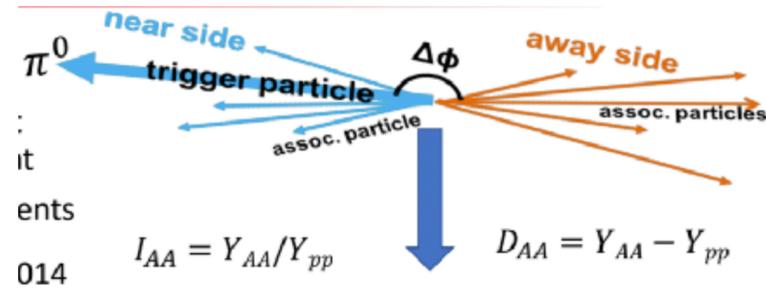
[JHEP 09 (2013) 029, JHEP 05 (2014) 146]

$$\Theta(z > z_{\text{cut}} \theta^\beta)$$

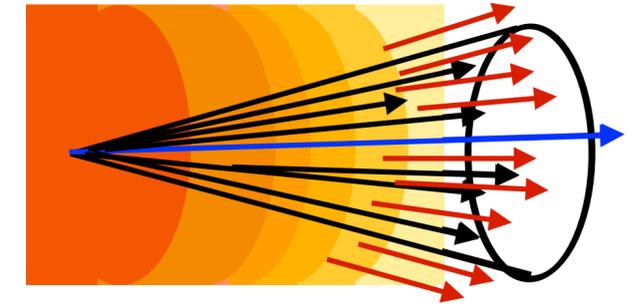


**Comprehensive set of grooming studies in Pb-Pb: grooming methods converge at high  $k_T$**

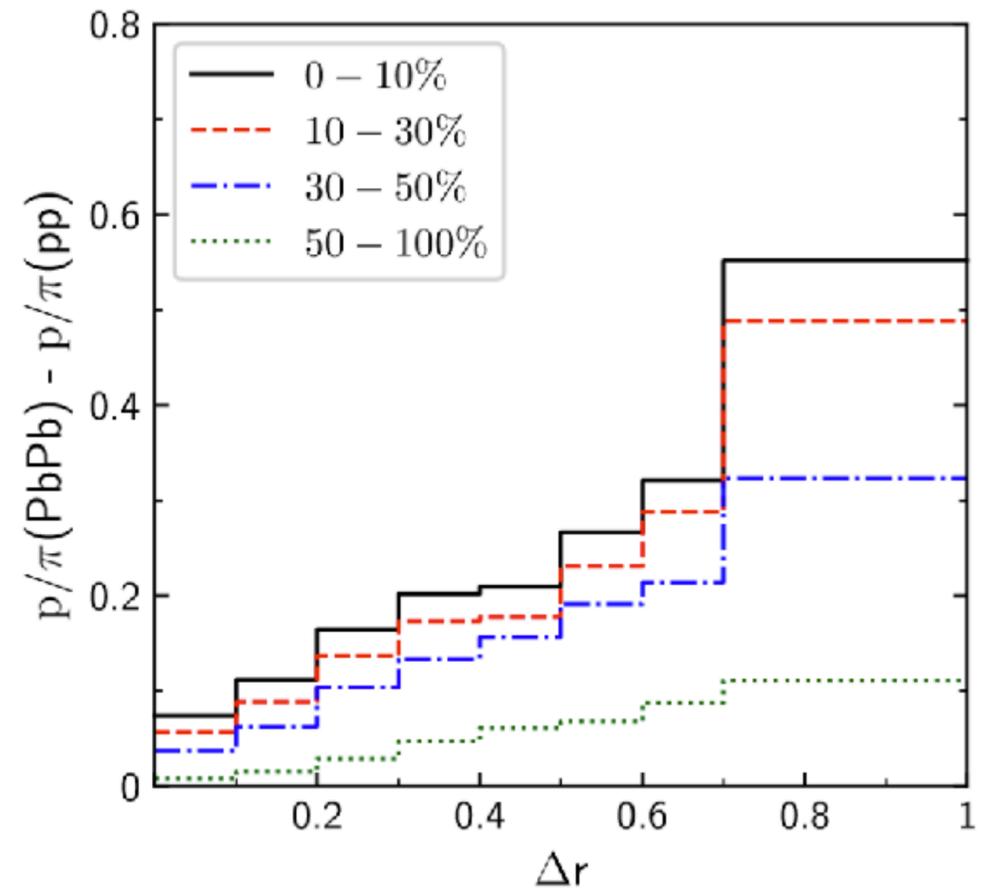
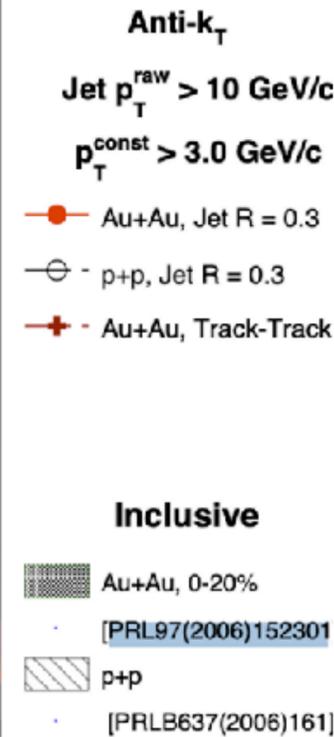
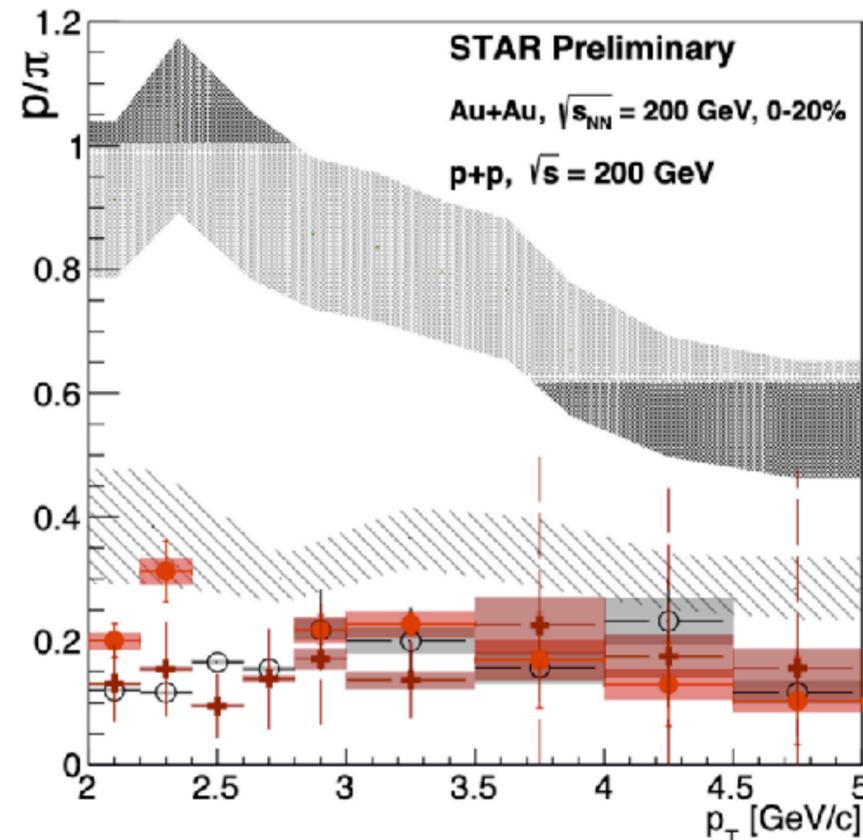
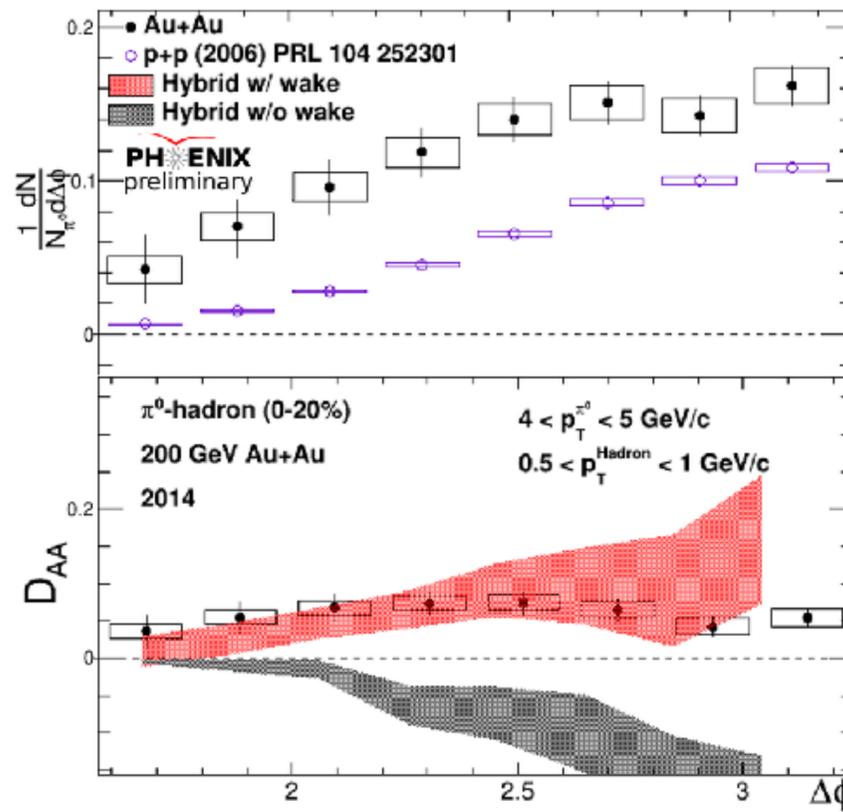
# Searching for the medium response



Models implement medium recoils (weak coupling) or wake (strong coupling)



## Baryon/meson in jets



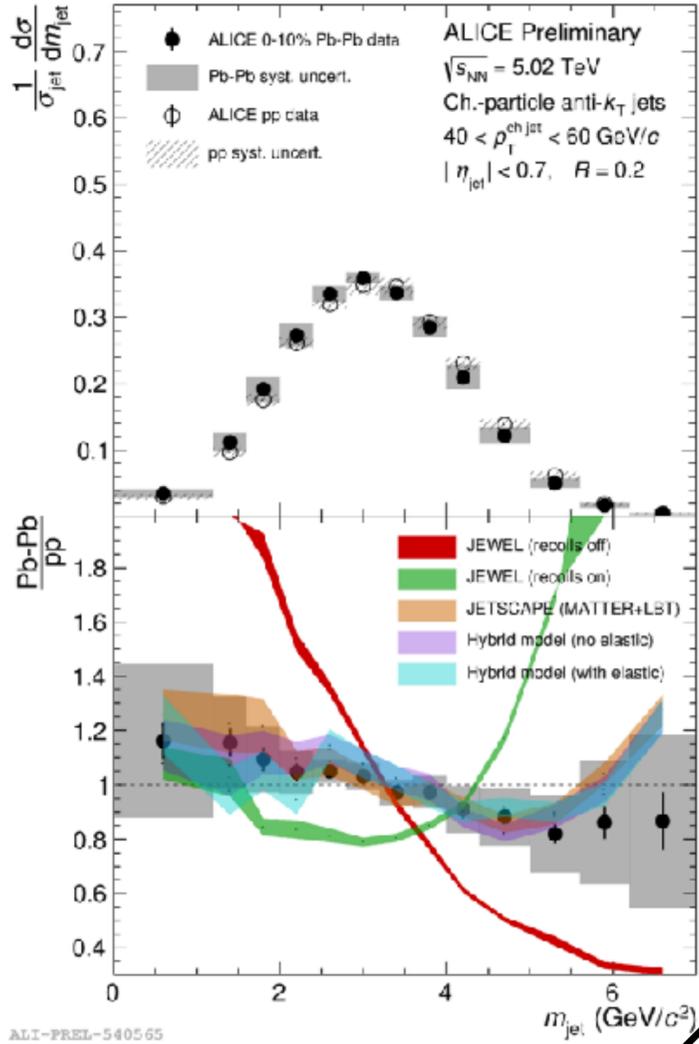
Energy transferred to large angles for every track  $p_T$ ; consistent with medium response

No significant difference from pp: effects outside of the cone?

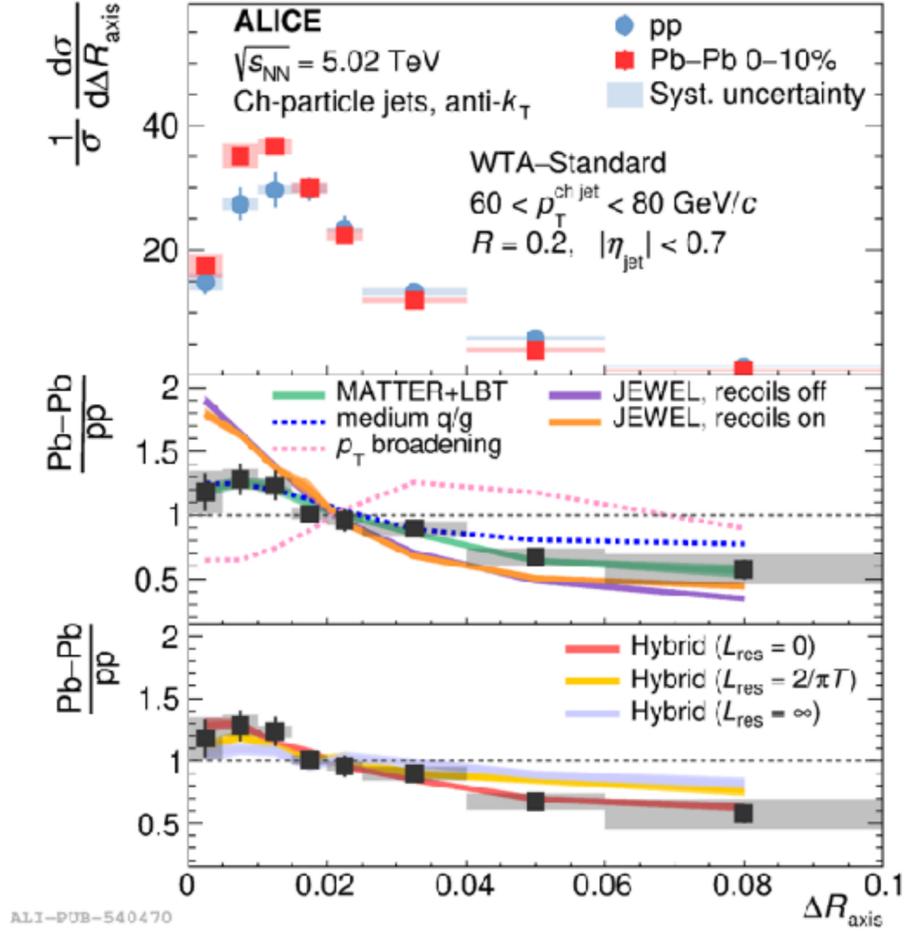
# Complementary jet substructure observables

Jet mass

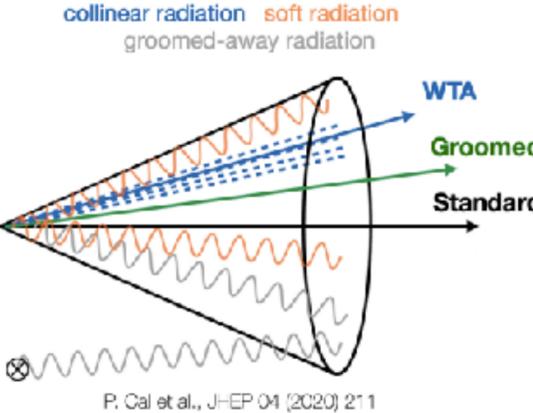
Jet axis differences



mass sensitive to models;  
hint of narrowing

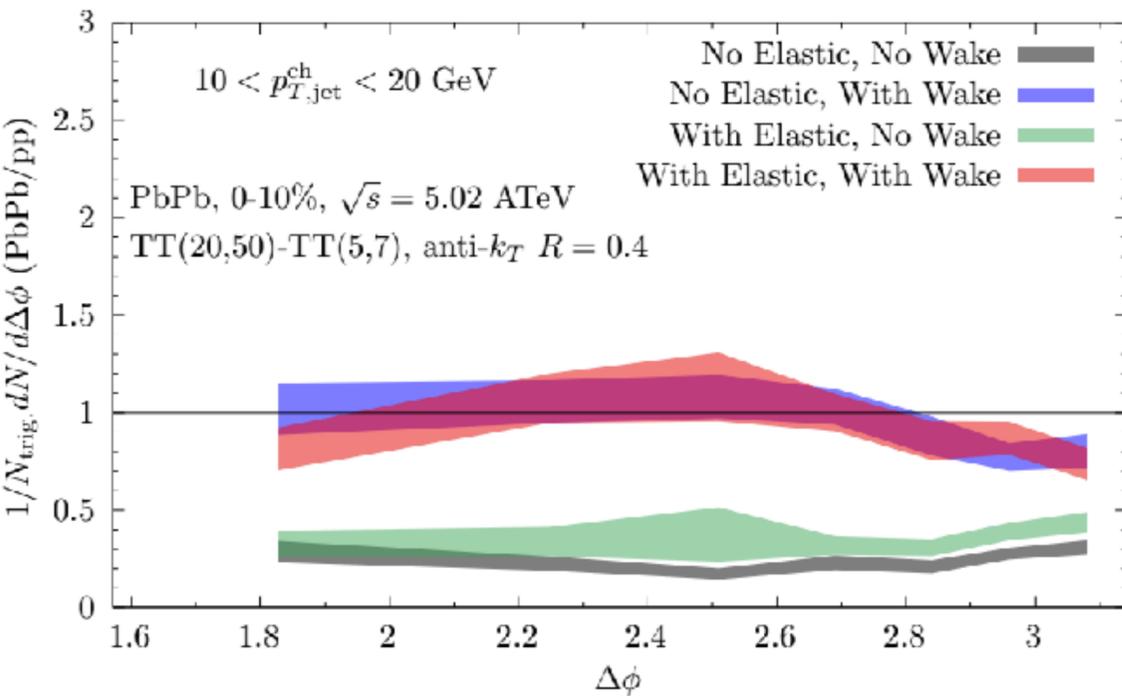


Jet axis shows narrowing that  
is sensitive to decoherence

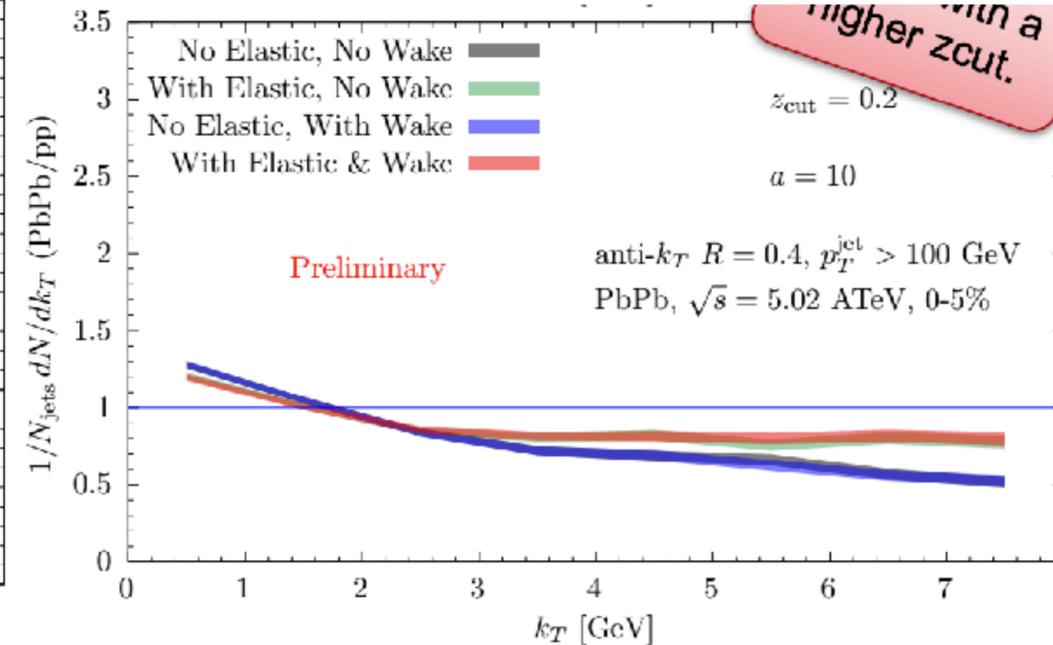


# Theoretical insight: where to find Moilere?

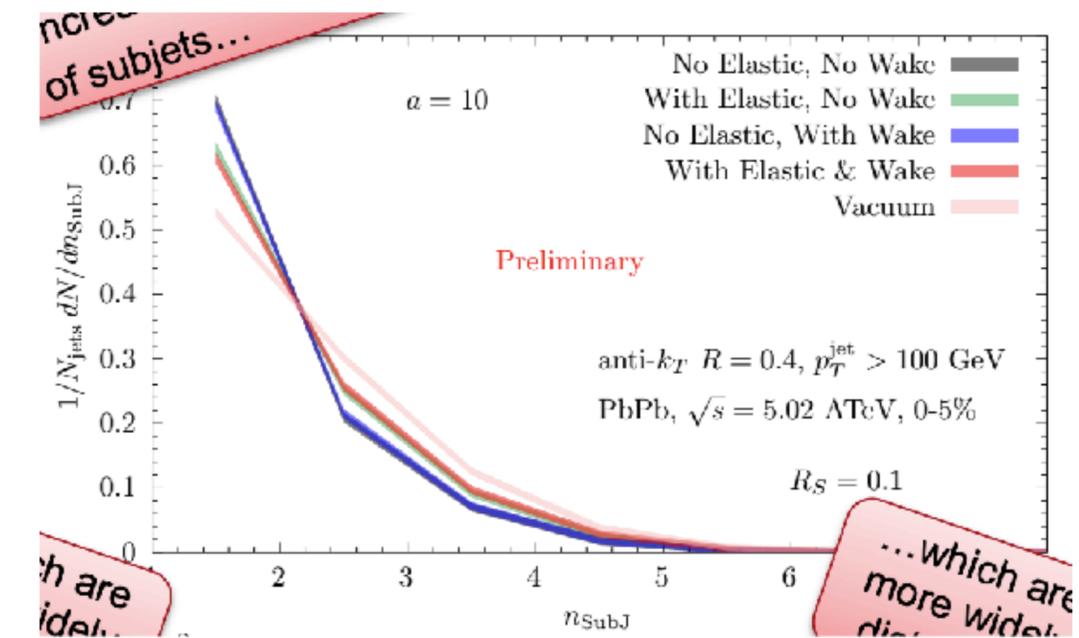
No clear evidence in experimental data yet, hybrid model explores sensitivity of different observables to **Moliere** and **wake** effects K. Rajagopal



Acoplanarity more sensitive to **wake** effects



Hardest  $k_T$  more sensitive to **Moliere** effects



Number of subjects inside a jet very sensitive to Moilere

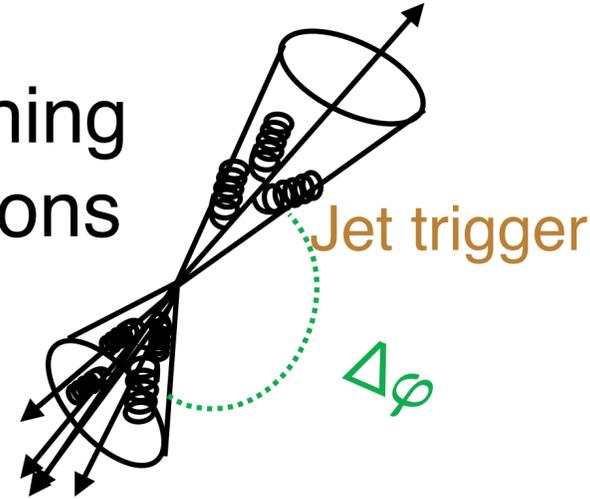
# Searching for jet quenching in small systems

Non-zero jet  $v_2$  at high  $p_T$  in p-Pb

[ALICE arXiv:2212.12609](#)

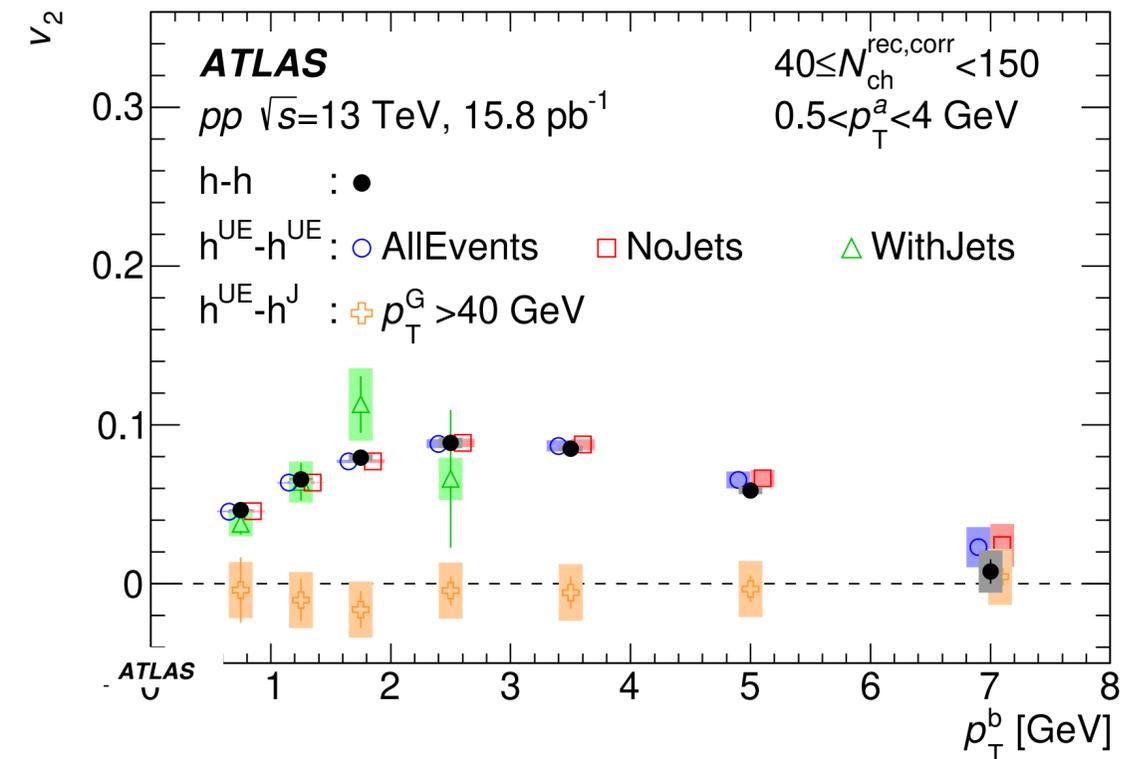
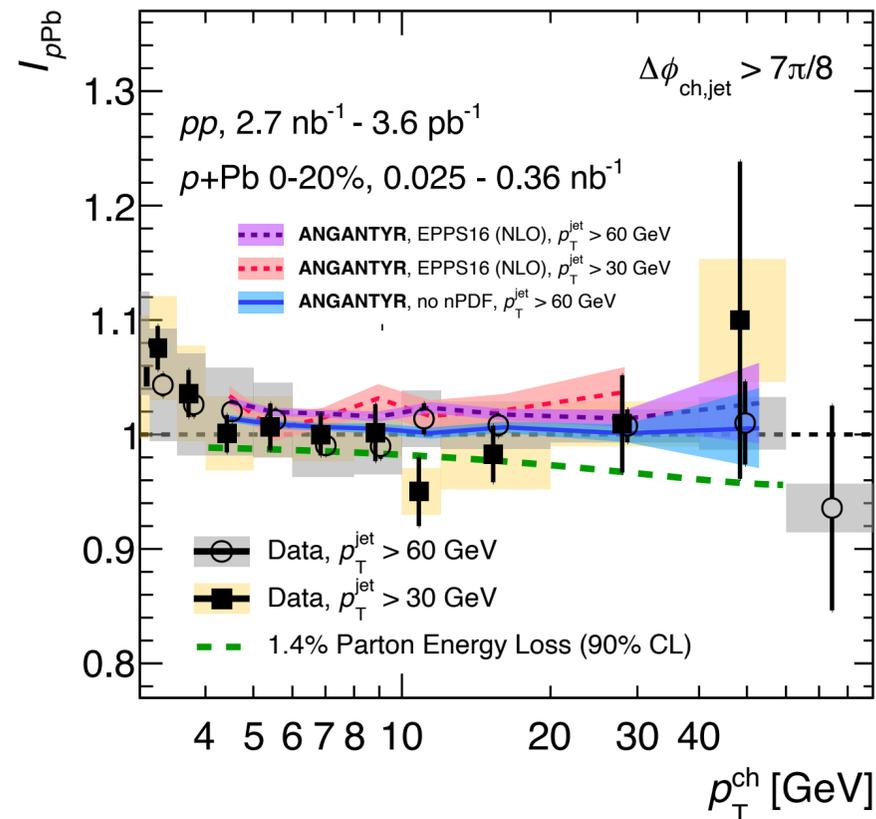
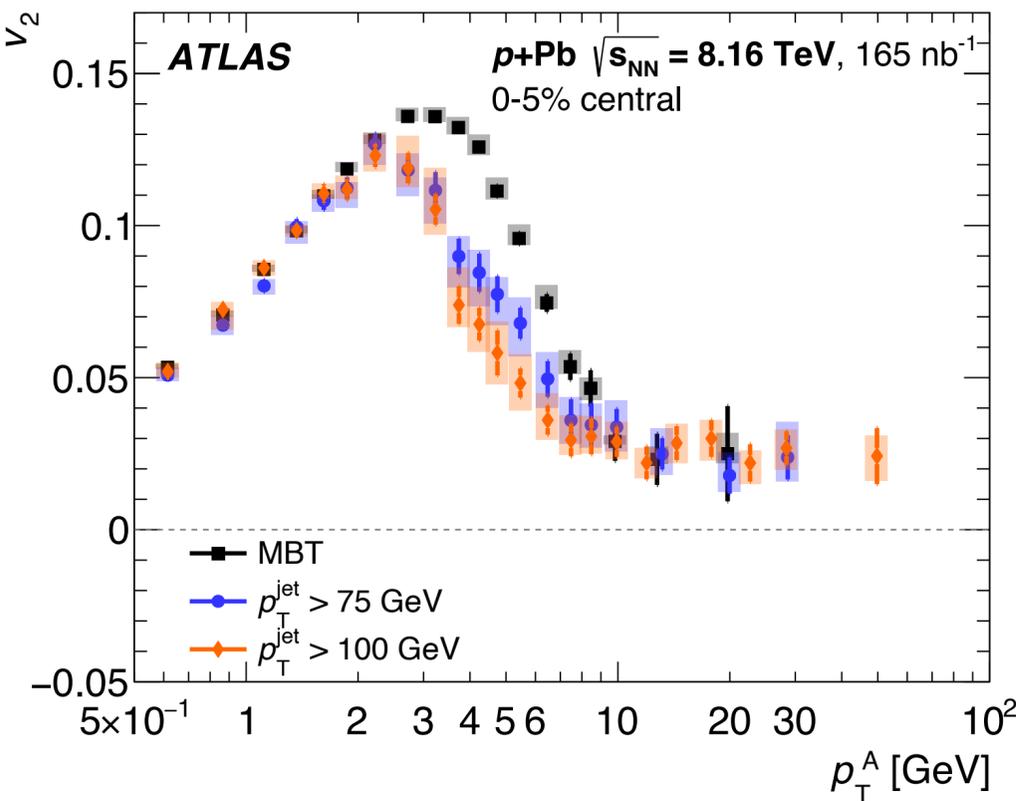
[ATLAS EPJC 80 \(2020\) 73](#)

Search for jet quenching in p-Pb with jet+hadrons



Is hard process decoupled from soft underlying event in pp?

Correlate jet-UE particles



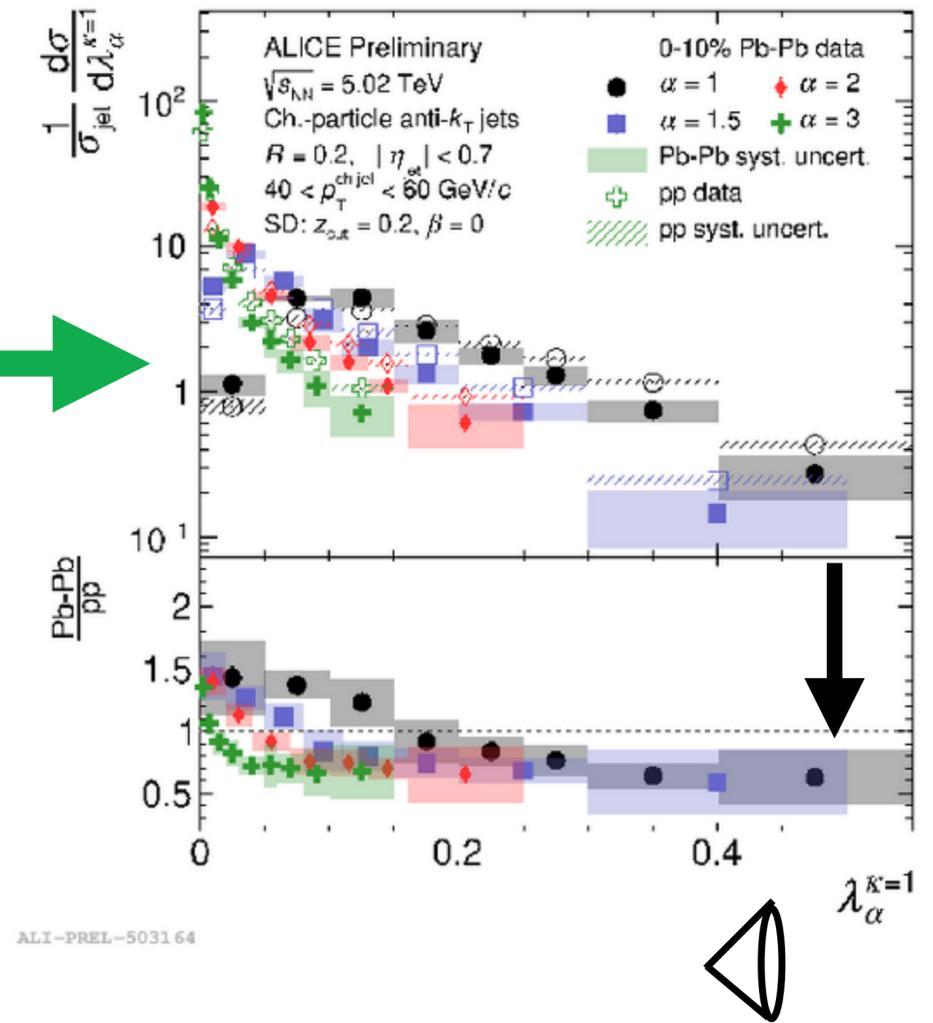
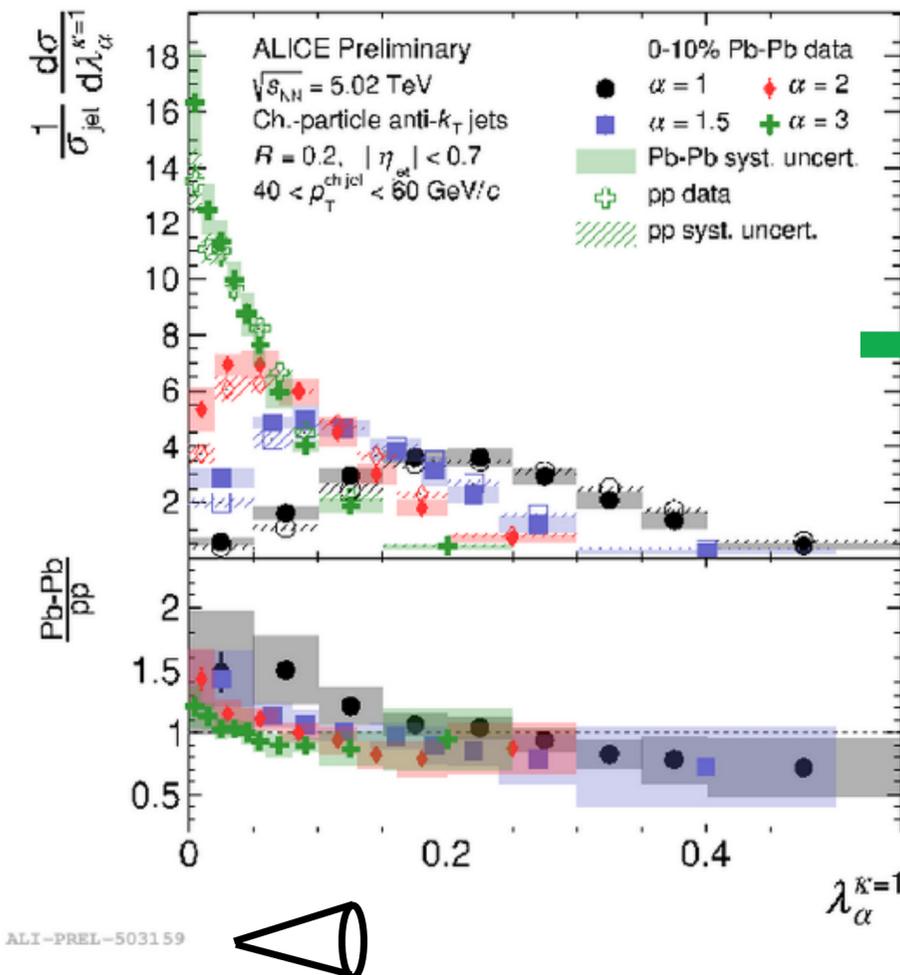
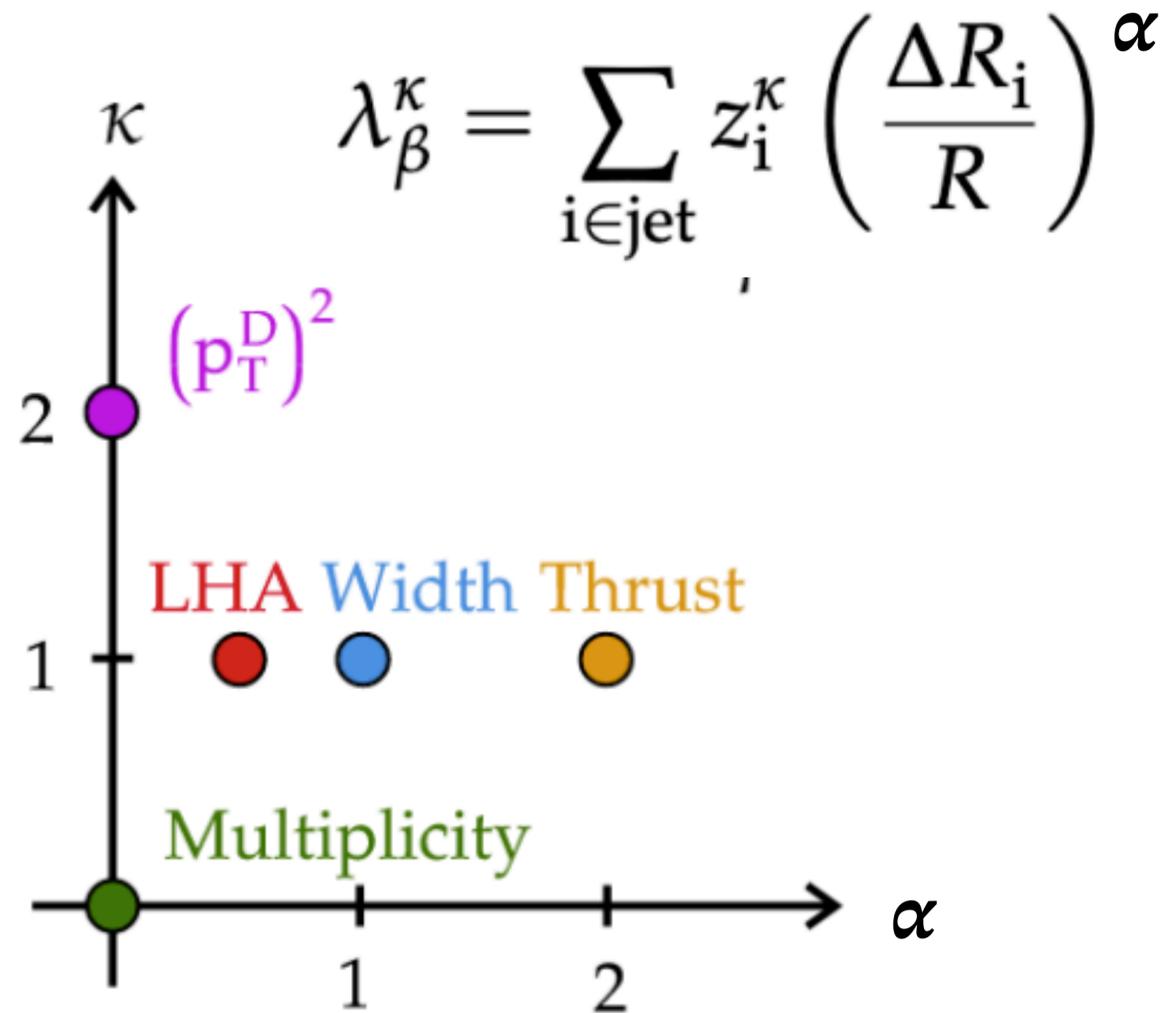
No parton energy loss found, limit set

[ATLAS arXiv:2206.01138](#)

jet-UE  $v_2 \sim 0$ , soft and hard physics decoupled? [ATLAS arXiv:XXXX](#)

# Generalized angularities: suite of IRC safe jet substructure observables

Exponents vary aspects of QCD



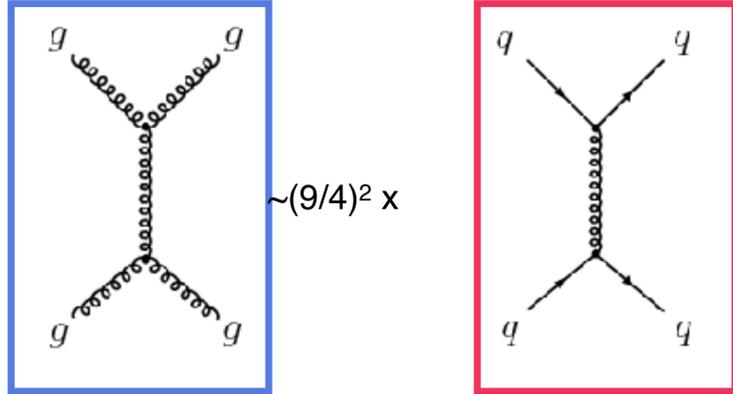
Grooming enhances modification and reveals narrowing features by reducing broadening and recoil effects

[ALICE arXiv:2107.11303](https://arxiv.org/abs/2107.11303)

H. Bossi (Tues. 11:10 AM)

# Heavy-flavor jet structure: ideal QGP probes

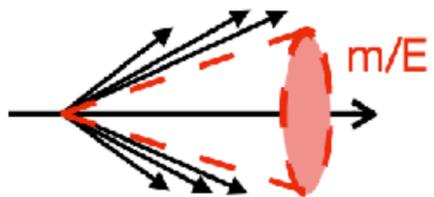
## Flavor dependence



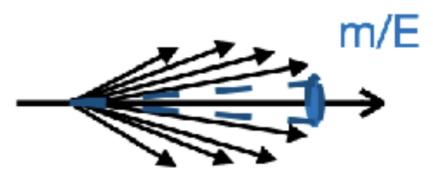
## Mass dependence

(dead cone effect and collisional energy loss)

Large parton mass



Small parton mass



$$E_{\text{loss}}^g > E_{\text{loss}}^q > E_{\text{loss}}^{\text{HQ}}$$

**What happens to the dead cone in the medium?**

**Will HF jets behave like quark jets or will the medium see the dead cone? (Will depend on jet momentum!)**

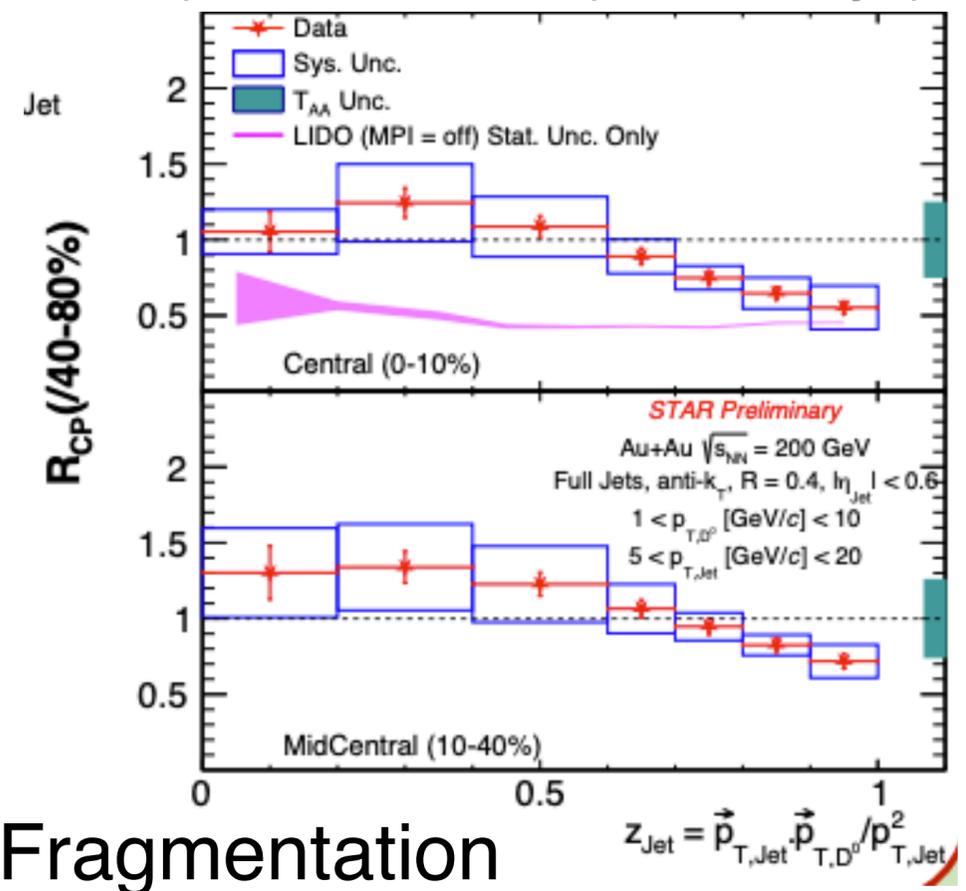
# Heavy-flavor jet structure: ideal QGP probes

What happens to the dead cone in the medium?

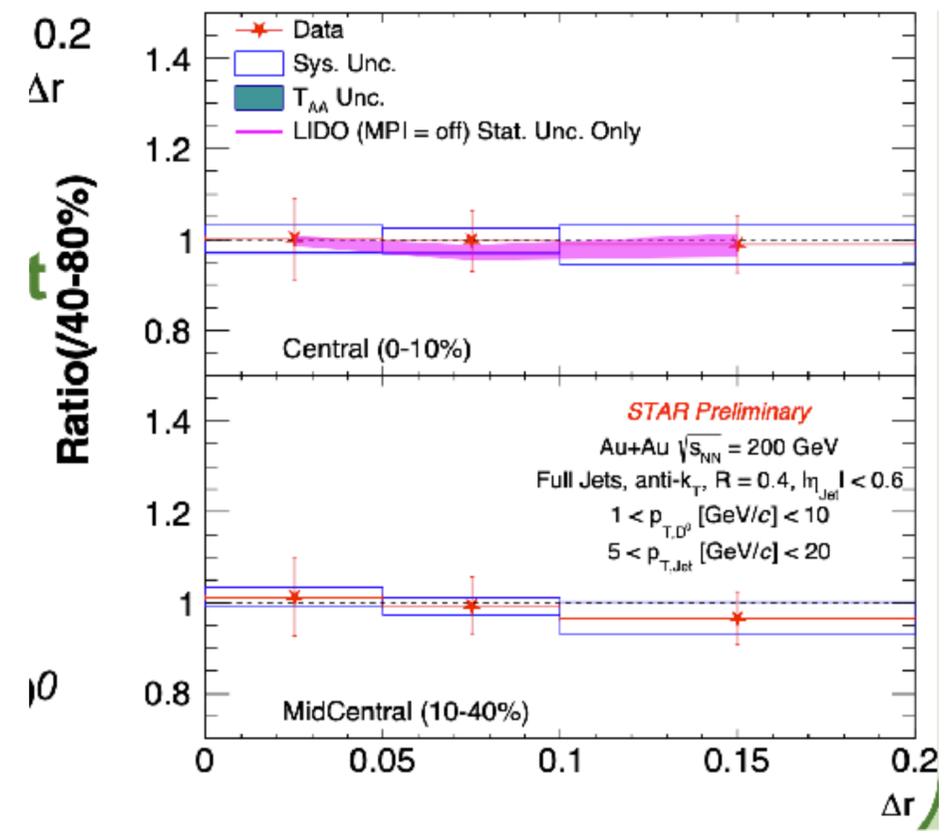
N. Zardoshti (Wed. 11:40am)

Radial profiles

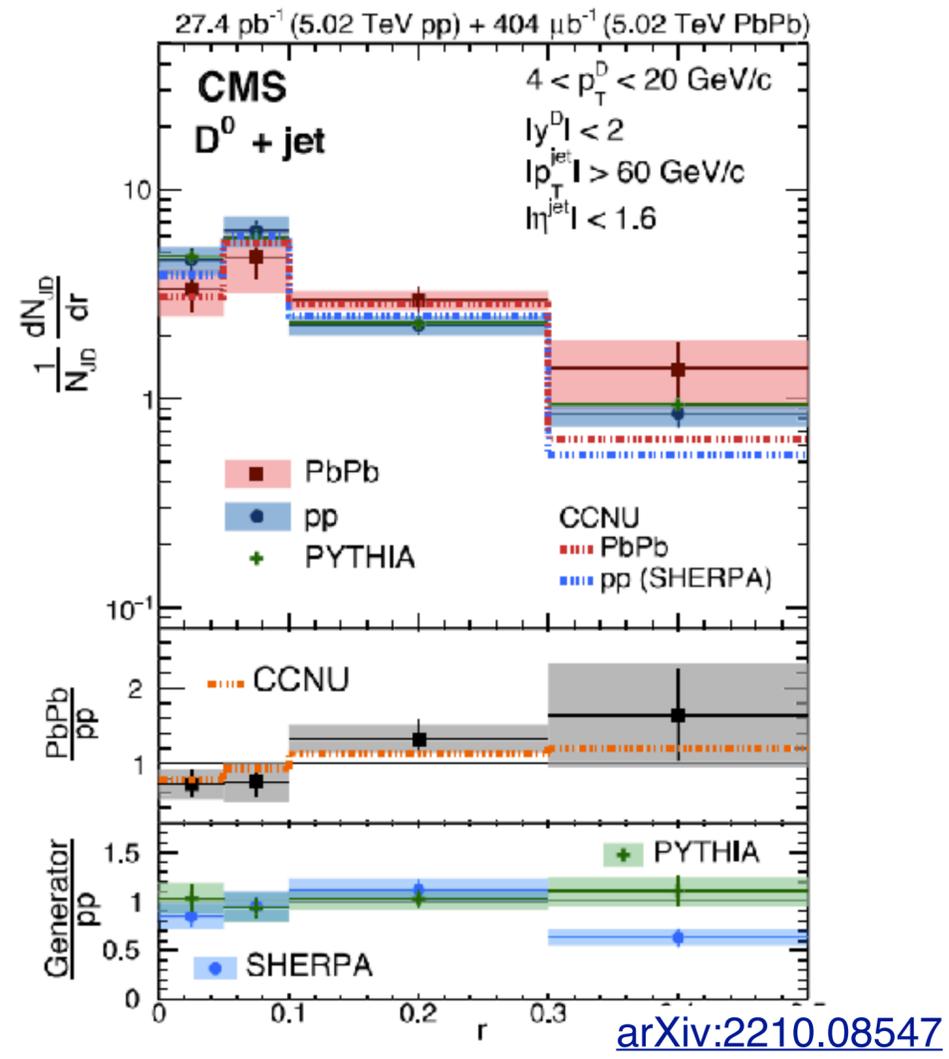
Y. Su (Tue. 11:20 AM) D. Roy (Poster)



Fragmentation functions **Hard fragmented D0 jet yield suppressed**



**D0-jets at STAR and CMS: little to no modification in radial profiles**



[arXiv:2210.08547](https://arxiv.org/abs/2210.08547)