Thursday discussion session

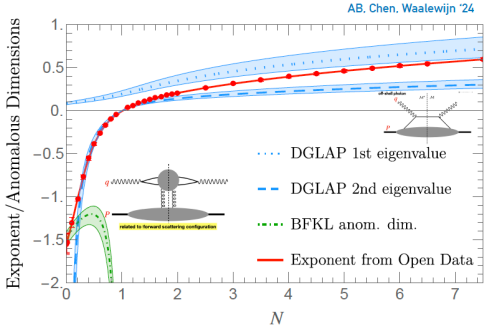
Peter J.

Probing the early stages with jets
July 13-17, 2026

APPLICATION: ANALYTIC CONTINUATION IN N

AB, Chen, Waalewijn '24

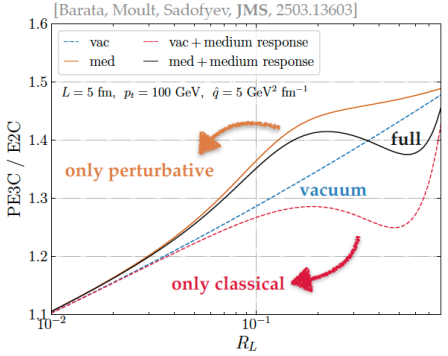
- Fit CMS Open data to power law.
- Compare to both DGLAP eigenvalues (no quark/gluon mixing).
- Interestingly, approaches BFKL for $N \to 0$.



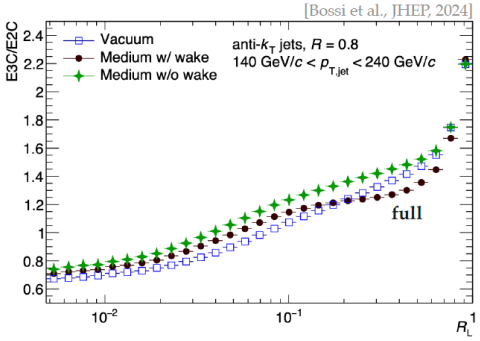
Full PE3C

Fix $\mathbf{N = 3}$. What happens if we add a classical/uncorrelated energy flow to the **PE3C**?

[Barata, Moult, Sadofyev, **JMS**, 2503.13603]



[Bossi et al., JHEP, 2024]



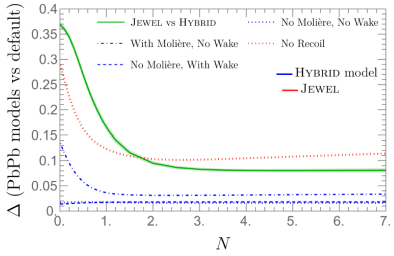
In **qualitative** agreement with, e.g., the Hybrid model.

Δ FOR PROJECTED CORRELATORS: DIFFERENTIATING PBPB MODELS

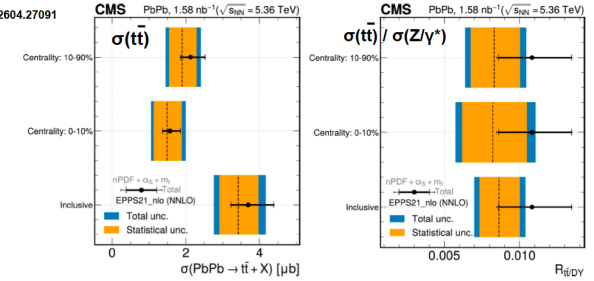
Alipour-fard, AB, Kudinoor, Thaler, Waalewijn; in progress

- $N < 1$ correlators show the most sensitivity to different jet quenching models.

See Balbeer's talk !



Production Control: Results vs Centrality for PbPb at 5.36 TeV

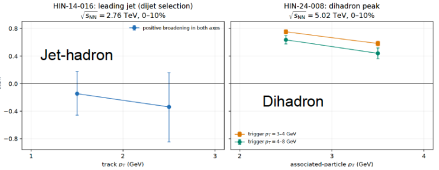


- First centrality differential measurement of the $t\bar{t}$ cross section in PbPb!
- No significant centrality dependence is observed within the current uncertainties

Direction Control: Asymmetry between Δη and Δφ Width

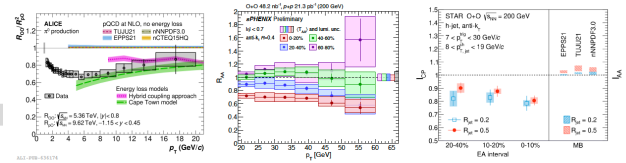
$$A_{\text{beam}}(p_T) = \frac{\Delta\sigma_\eta^2 - \Delta\sigma_\phi^2}{\Delta\sigma_\eta^2 + \Delta\sigma_\phi^2} \qquad \Delta\sigma_i^2 \equiv \sigma_{i,\text{PbPb}}^2 - \sigma_{i,pp}^2, \qquad i \in \{\eta, \phi\},$$

Minimal anisotropic-glasma expectation: $A_{\text{beam}} > 0$



→ Jet-hadron and dihadron correlations give different pictures
However, the result is sensitive to trigger and surface bias, reco jet axis (or hadron) axis response, diffusion wake and medium response, hydro flow subtraction etc.

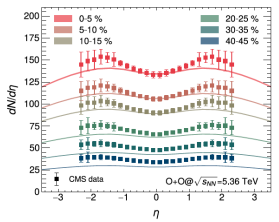
Conclusion



- **Consistent picture at RHIC and LHC: light ions data indicates quenching**
- **New directions with existing data: substructure, system-size scans**
- **More exciting opportunities w/ future runs at the LHC!**
  - **We should be carefully exploring options in Run 4**

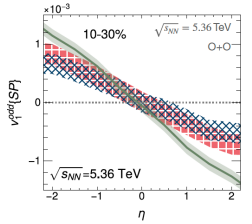
What would the people in this room like to see (now and future) from experiment?

SOME SOFT RESULTS IN SMALL SYSTEMS



Minimal IC tuning. Shape of $dN_{ch}/d\eta$ given by IP-Sat

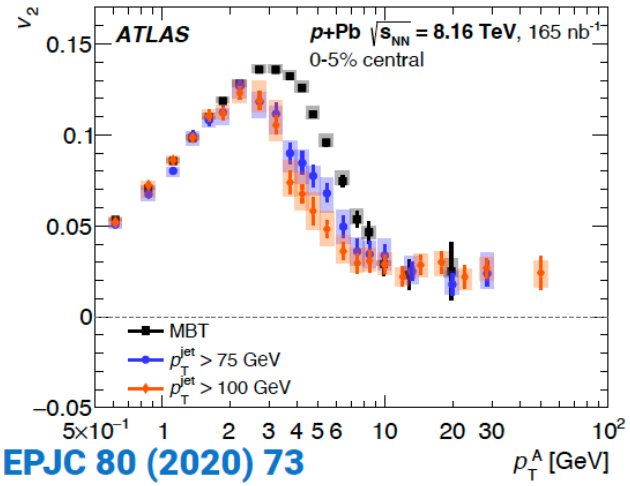
[GM, Zhu, 2608.XXXX]



IC-information tunes the sensitive longitudinal structures, and describes data quantitatively

An abiding puzzle

High-p_T v_2 in pPb



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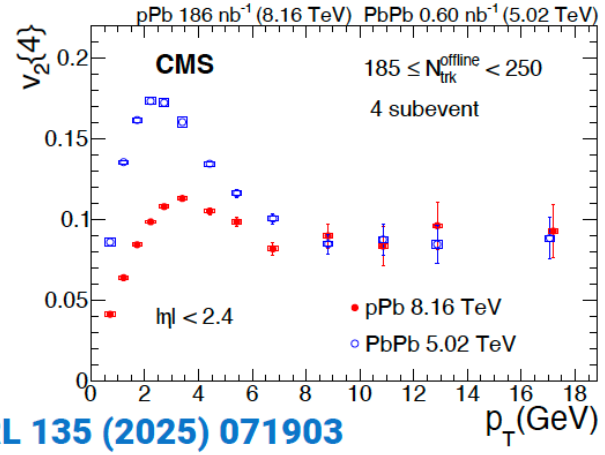

PRL 135 (2025) 071903

- CMS and ATLAS both see a high-p_T v_2 in pPb
- High-p_T v_2 in PbPb was explained by models with path-length dependent energy loss
  - But no jet energy loss in pPb is detected
  - Open question: do we understand the origins of high-p_T v_2?

Massachusetts Institute of Technology Christopher McGinn 8

Experimental results are solid: v_2 persists to arbitrarily high p_T in p+Pb
But jet quenching effects are negligible in other channels

Is this a window into the initial state or glasma? Should be getting more attention

Selected other questions (a small subset)

EECs and early stages: how can EECs be applied to discriminate early stage/glasma effects on jet structure? How clearly interpretable?

EECs and QGP: what are the advantages to EECs vs other techniques for measuring/interpretating wake and Moliere scattering?

Ankita: analytic continuation of EEC correlation order N. How to think about this intuitively, and how to interpret?

Yen –jie: Isolate early stage effects using W->t+tbar: how well understood at present in terms of kinematic range, statistical precision, etc.? What theory calculations needed to clarify physics impact?

Luna: reanalysis of LEP data is a landmark in vacuum QCD studies. How can it illuminate many-body QCD (low x and QGP)?'

Choice of collision system: how can systematic variation of collision system (p+Pb, O+O,…,_Pb+Pb) illuminate early-time dynamics?

- Chris McG: crucial discussion for planning LHC Run 4/5