Jet-Soft Correlations in Event-by-Event Hydrodynamic Evolution

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Event-by-Event Jet Evolution

v-USPhydro [2]
2+1D viscous hydrodynamics
T_RENTo initial conditions
Soft particle distributions

+

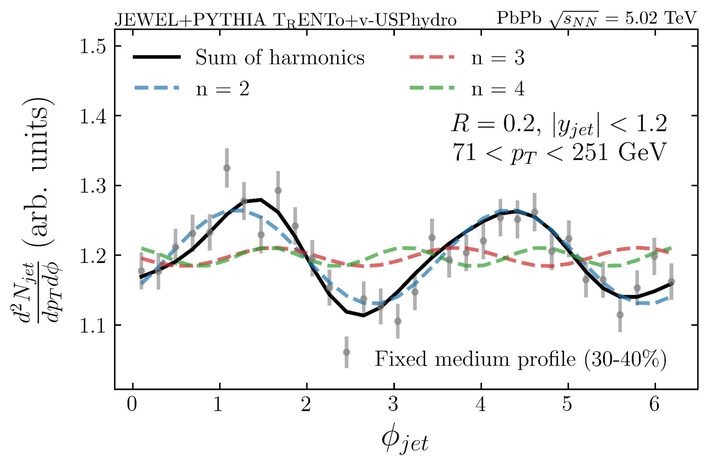
Jet-hydro interface [1]
Local fluid velocity
Realistic choice of initial dijet vertex
MC limits appropriate for EbE

+

JEWEL [3]
MC parton shower evolution
with medium interaction

Motivation

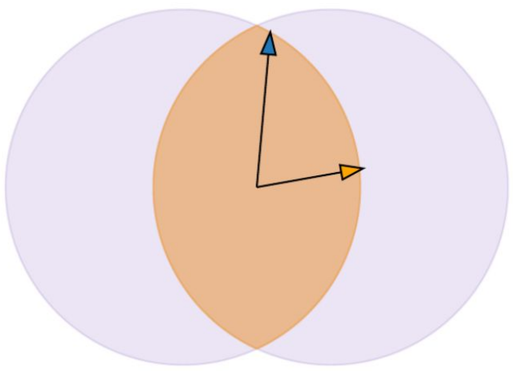
- Improvement upon JEWEL simple medium
- Better description of **jet quenching**
- **Event-by-event fluctuations** needed to describe hard sector anisotropies [4]
- Insight into **medium response** and **background subtraction**



Simulation Details

- New calculations with **JEWEL 2.4.0** (ISR medium interaction) + **EPPS21 PDFs**
- Oversampling of hydro profiles ⇒ jet azimuthal distribution per medium
- JEWEL simulations **without recoils**

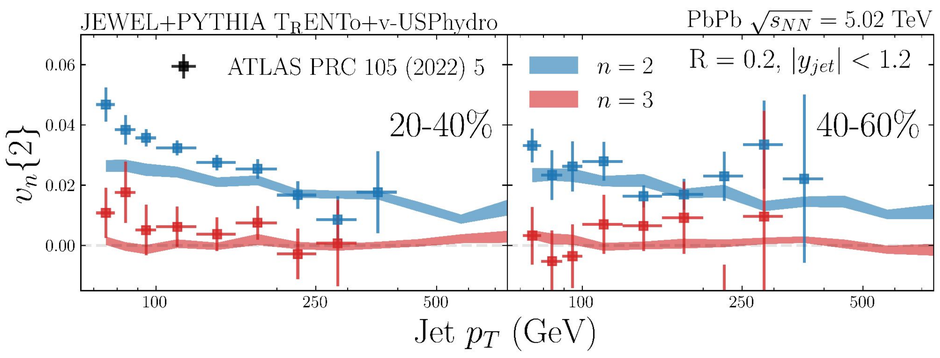
Jet Anisotropic Flow



Longer path ⇒ more energy loss
Smaller path ⇒ less energy loss

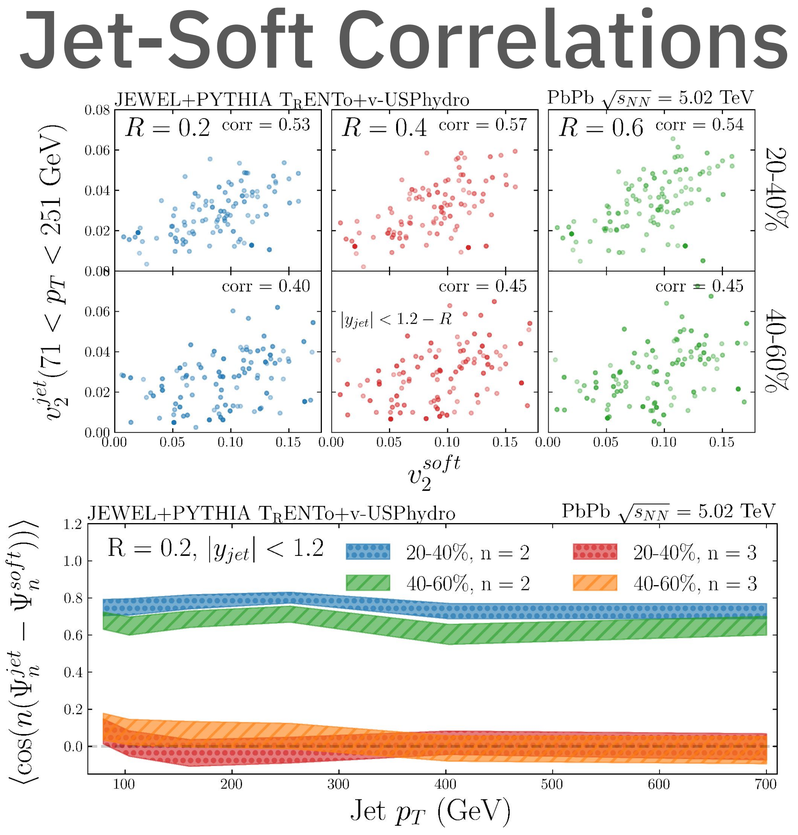
$\mathcal{E}_n$ + path-length dependent energy-loss
=
jet anisotropies

$$v_n\{2\}(p_T) = \frac{\langle v_n^{soft} v_n^{jet}(p_T) \cos(n(\Psi_n^{soft} - \Psi_n^{jet}(p_T)))\rangle}{\sqrt{\langle \left(v_n^{soft}\right)^2 \rangle}} \qquad \langle \ldots \rangle \doteq \frac{\sum_i M_i R_{AA}(p_T)_i (\ldots)}{\sum_i M_i R_{AA}(p_T)_i}$$



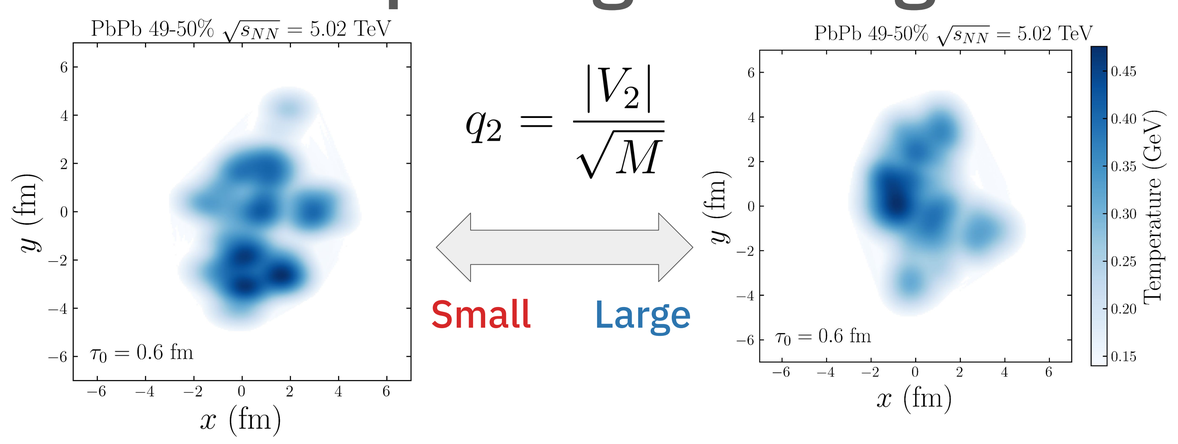
- Does not describe p_T dependence
- Suppressed triangular flow

Jet-Soft Correlations

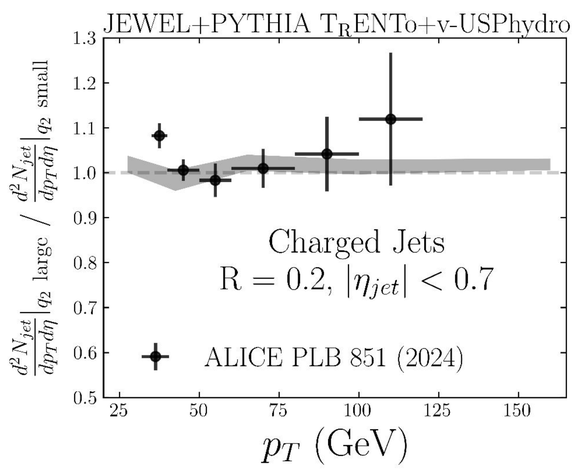


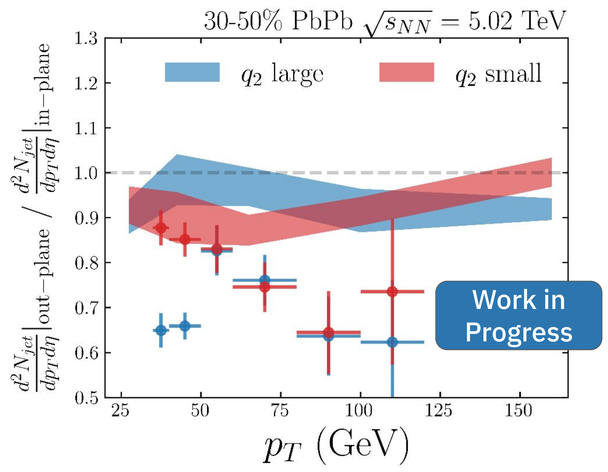
- High variance in **event-by-event** anisotropies
- Centrality and jet resolution R dependence [1]
- **Symmetry plane misalignment ⇒ Missing effect?**
- Higher decorrelation than hard hadrons [4]

Event-Shape Engineering



- Promising tool for hard probes observables [5]
- Select collisions within the same centrality class
- **Elliptical** vs. **isotropic**: media with 30% **largest**/**smallest** reduced second harmonic flow vector





- ϕ-integrated jet spectrum does not depend on medium shape
- Large discrepancy for highly elliptical collisions

Summary and Outlook

- **Jet-soft correlations** used to better understand **jet evolution**
- Indication of missing effect in implemented **jet-hydro dialogue**
- First exploration of **ESE + JEWEL**
- Baseline for future research on **medium response**

References

[1] L. Barreto et al., arxiv:2208.02061
[2] J. Noronha-Hostler et al., Phys. Rev. C 90, 034907 (2014)
[3] K. Zapp et al., JHEP 03, 080 (2013)
[4] J. Noronha-Hostler et al., Phys. Rev. Lett. 116, 252301 (2016)
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