Search for a Ridge structure origin with shower broadening and jet quenching

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What is Ridge?

- Ridge structure: base-like structure in the $\Delta \eta$ direction
- Standard picture
  - No Ridge due to hadrons from jet parton
  - Indicating the correlation between jet and other

What makes RIDGE?

- Glasma
- Candidate of Fast thermalization
- Generated by color field instability
- Momentum broadening

Mainly in $\eta$ direction
$\rightarrow$ Large $\Delta \eta$ width

*Does this effect make ridge?*
Model
Jet-Fluid String model

Jet production (PYTHIA) + E-loss (3D Hydro + GLV) + String Form. with Fluid + String Frag.

Explains high $p_T$ signals!

How about RIDGE in JFS?

- Conjecture: Rapidity gap of endpoints makes ridge
- Answer = NO
  - Fluid $p_T$ is too small
  - Thermal Rapidity gap is not large
Momentum Broadening in glasma

Jet-Fluid String model
+ Momentum broadening
Broadening in Glasma

- **Characteristic Features**
  - $Q_{jet} \gg Q_s$ → Random but common field for one jet
  - Color force → Opposite direction for q and qbar
  - Anisotropic: $E_z > E_T$ → Large $\eta$ gap between jet and shower

- **Our implementation**
  - Random Gaussian
  - $\Delta p_z > \Delta p_T$
  - Opposite force for end points

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Results
$\Delta \phi$ correlation with Broadening

- Parameters: 
  $$(\Delta p_z, \Delta p_T) = (10 \text{GeV/c, } 2.5 \text{GeV/c})$$
- No backward peak
- Nearside peak
  larger width, larger yield
\( \Delta \eta - \Delta \phi \) correlation with Broadening

- Long \( \Delta \eta \) correlation
- Small \( \Delta \phi \) width
- Peak / Base ratio: too much
Parameter dependence

- Large $\Delta p_z$ is necessary
- Moderate $\Delta p_T$ for shower hadronization
Summary

- Ridge doesn’t appear in Jet-Fluid String model.
- We implement momentum broadening in the pre-equilibrium stage in the JFS model.
- If we have enough anisotropic momentum broadening, strings from jet and shower partons can make ridge structure.

→ **Momentum broadening in glasma is a possible mechanism to create ridge structure.**

- Future work: More quantitative analysis is needed, because peak height is too large.