Jet analysis on a hybrid transport model in Heavy Ion Collisions

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A linearized-Boltzmann-Langevin Transport Model (Lido)

- Interactions are divided into large-q scattering and small-q diffusion.

\[
\frac{df}{dt} = \mathcal{D}[f] + \mathcal{C}[1 + \mathcal{C}^2[f] + \mathcal{C}^3[f]]
\]

\[
\mathcal{D} : \frac{\Delta \tilde{p}}{\Delta t} = -\eta \tilde{p} + \xi(t), \left(\xi(t) + \xi(t')\right) = \delta(t - t') \left(\hat{p}_L \hat{q}_L + \hat{p}_T \hat{q}_T\right)
\]

- Monte-Carlo implementation of the Landau-Pomeranchuk-Migdal (LPM) effect [1].

Comparison of splitting rate with Theory in a Static Medium

Left: Splitting rate as functions of daughter parton’s energy in an infinite static medium. Mother parton has an energy of 1 (\(T = 0.5 GeV, \alpha_s = 0.1\))

Right: Path-length dependence of the emission rate compared with theory. Mother quark has an energy of 16GeV.

Inclusive Jet Observables for PbPb 2.76TeV and PbPb 5.02TeV


Conclusion and Outlook

- Our model is capable of describing many inclusive jet observables with a single set of parameters (and was previously calibrated on open heavy flavor observables).
- Next steps: using event-by-event hydro and add hadronization; perform Bayesian analysis to get a better inference on the transport coefficients; understand the correlation between medium space-time evolution and jet substructure.

Reference:

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