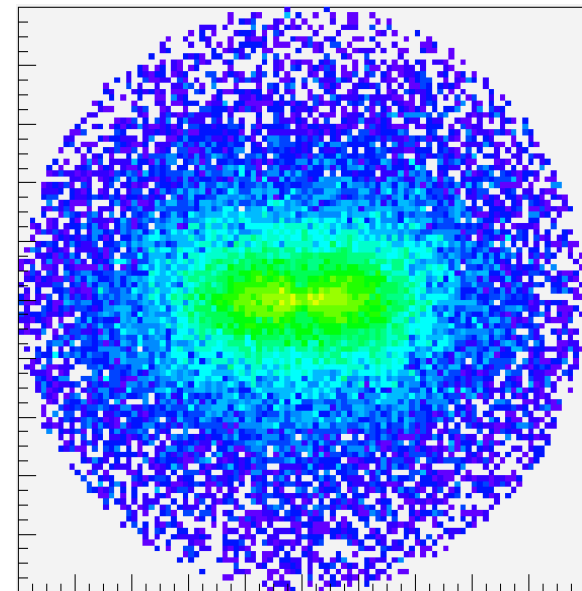


Azimuthal Structure of Intra-Jet Radiation in pp and PbPb

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AIM Session
ALICE Physics Week

Frascati
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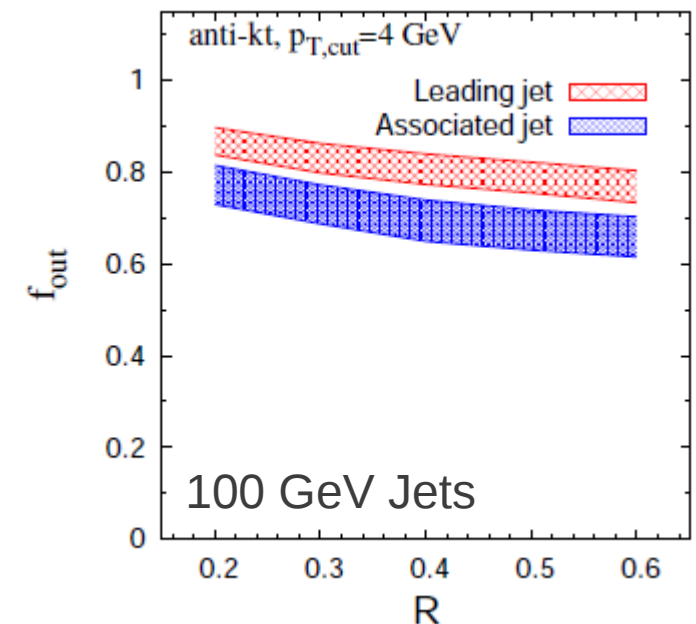
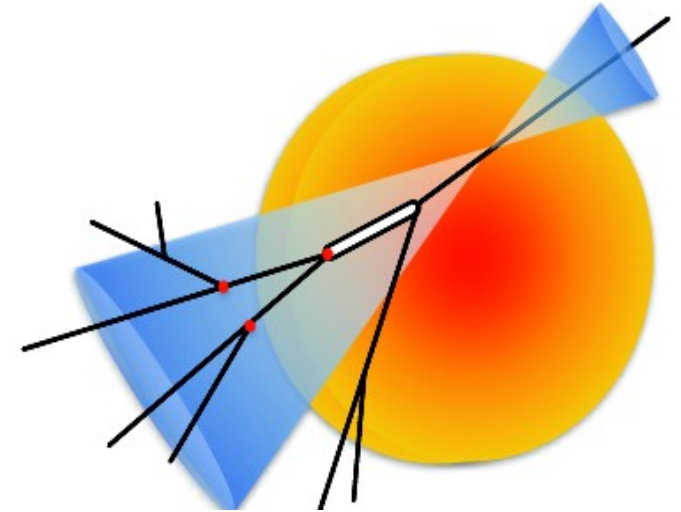
Motivation

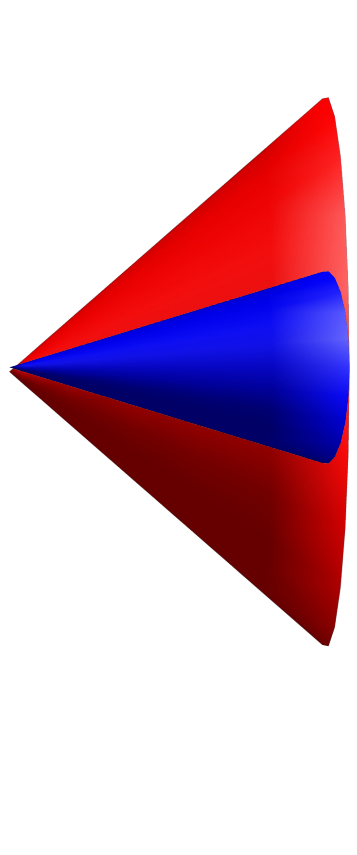
- High- p_{T} jets in heavy ion collisions at the LHC
 - Strong di-jet **energy imbalance**
 - Energy **radiated outside jet cone** (low p_{T})
 - Remnant jet shows **unmodified fragmentation**
- How can we learn more about the physics of in-medium energy loss ?
 - So far jet structure has been studied using event averaged single particle distributions
 - **Investigate particle correlations within jet-cone**

Why is this (potentially) interesting ?

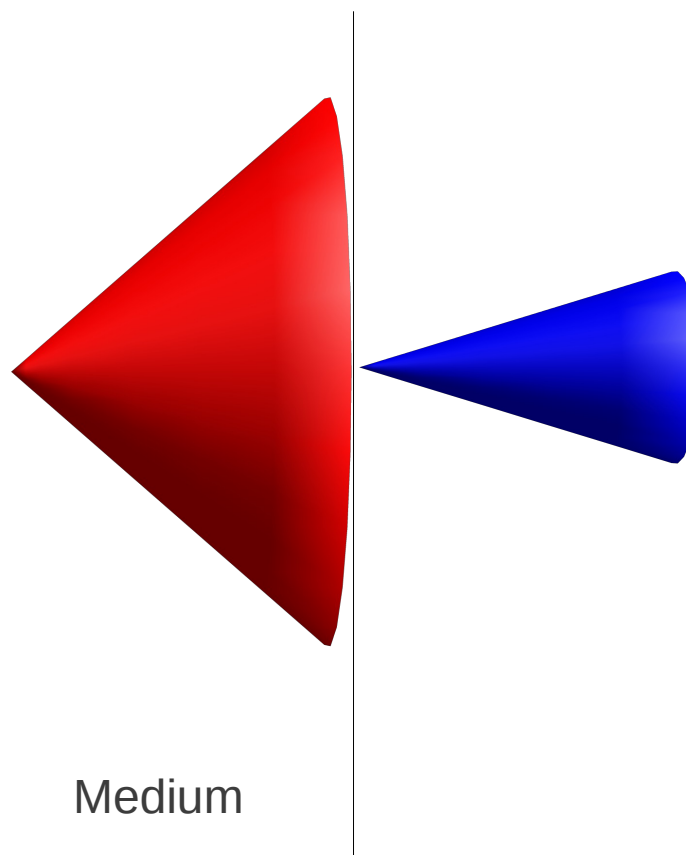
Jorge Casalderrey-Solana, et al. arXiv:1111.0310v1 [hep-ph]

- Large fraction of jet fragmentation happens outside the medium.
- Effect of the medium
 - Lowers the energy of the original parton
 - Additional low p_T radiation inside the medium
- Low p_T radiation and parton shower in vacuum are not correlated.
- In pp: low p_T partons branch off higher p_T partons from earlier splittings.





Modified parton shower



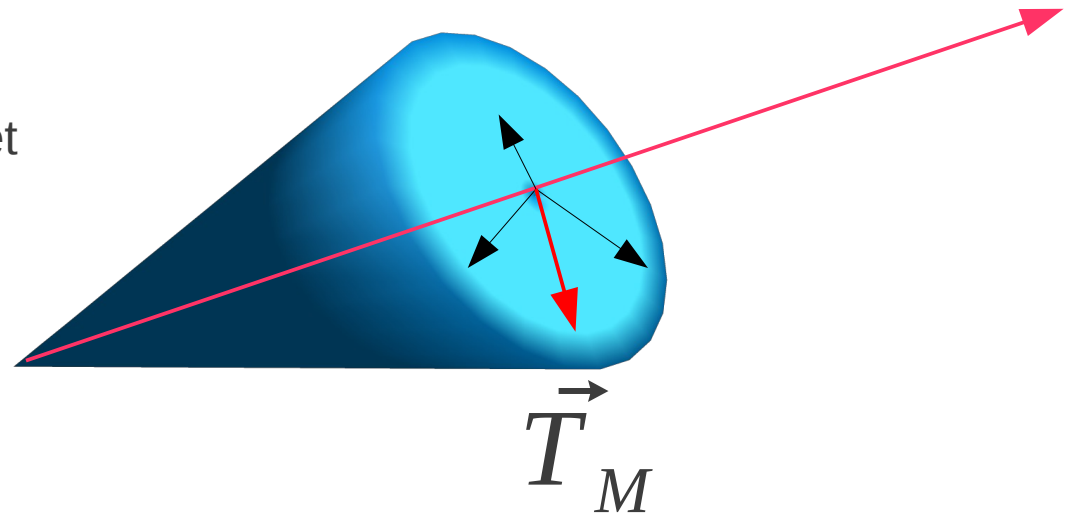
Medium

“hard shower” outside medium

How to associate particles with “hard” splittings ? (pseudo) **Thrust Major Axis**

Project particles into plane perpendicular to jet axis and construct sphericity matrix:

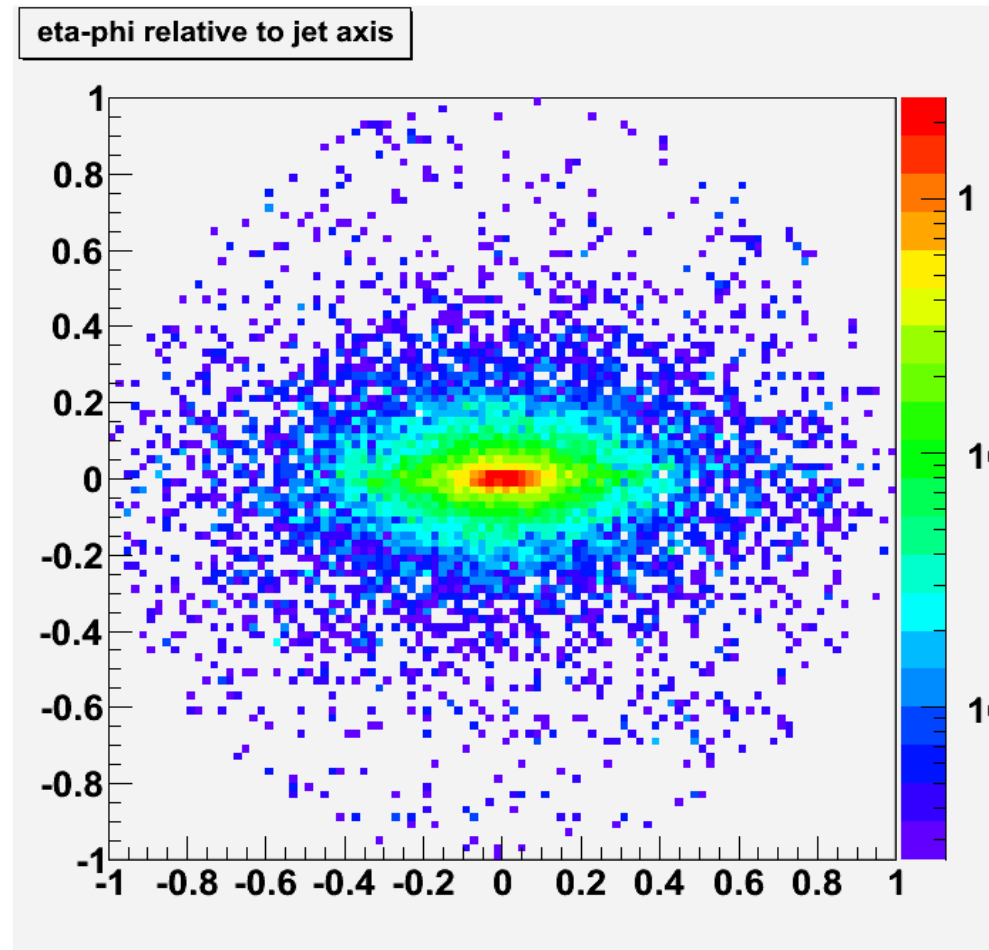
$$S^{\alpha\beta} = \frac{\sum_i p_i^\alpha p_i^\beta}{\sum_i p_i^2}$$



The thrust major axis is the eigenvector corresponding to the largest eigenvalue.

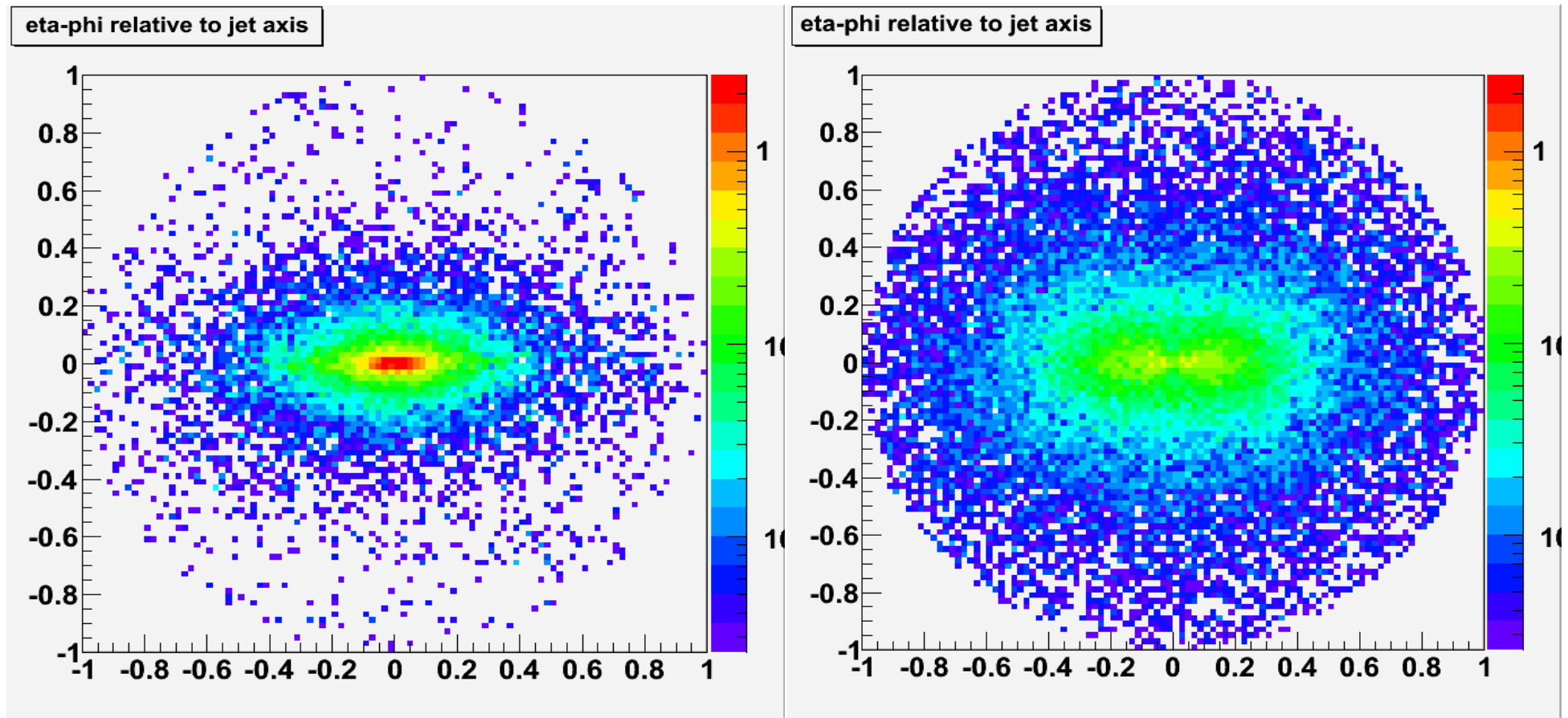
Particle distribution relative to TM in pp

100 GeV

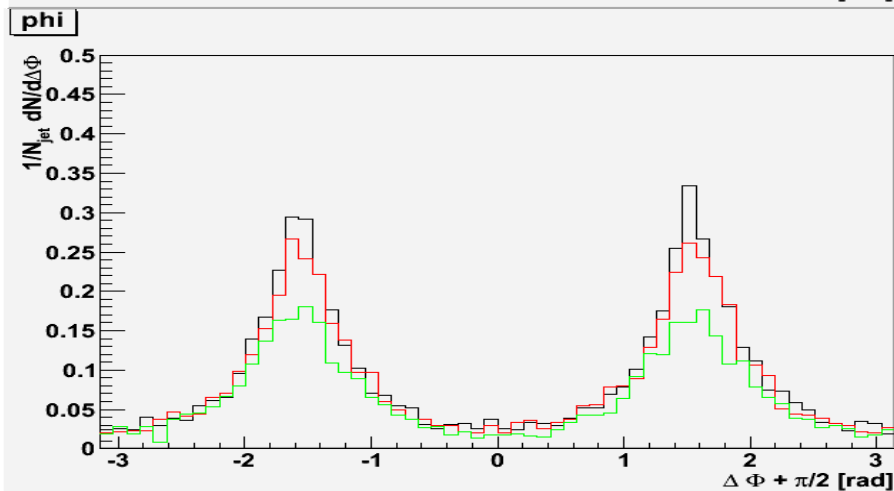
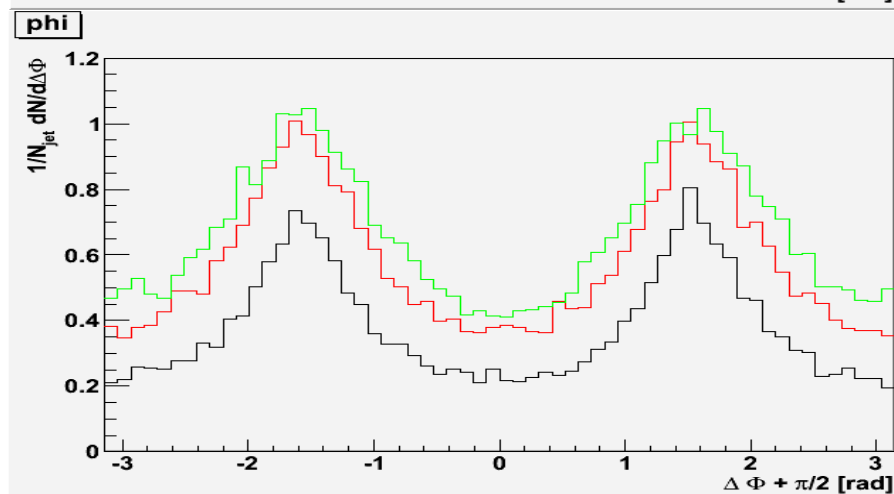
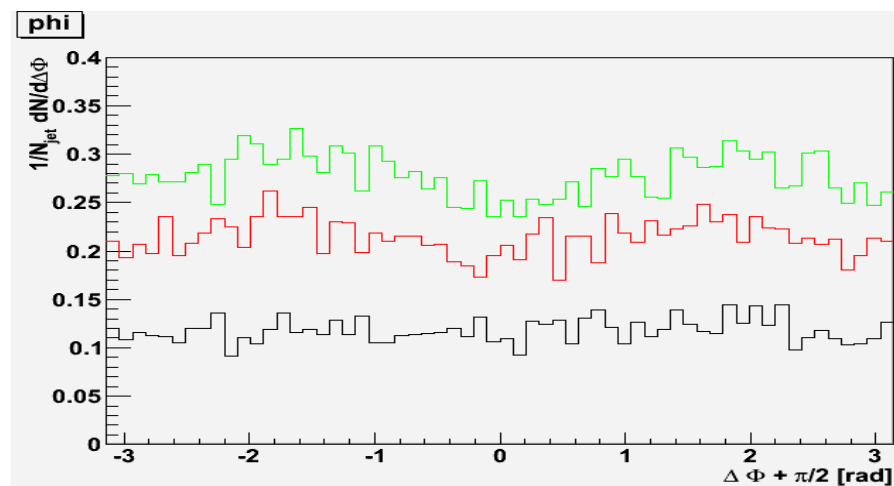
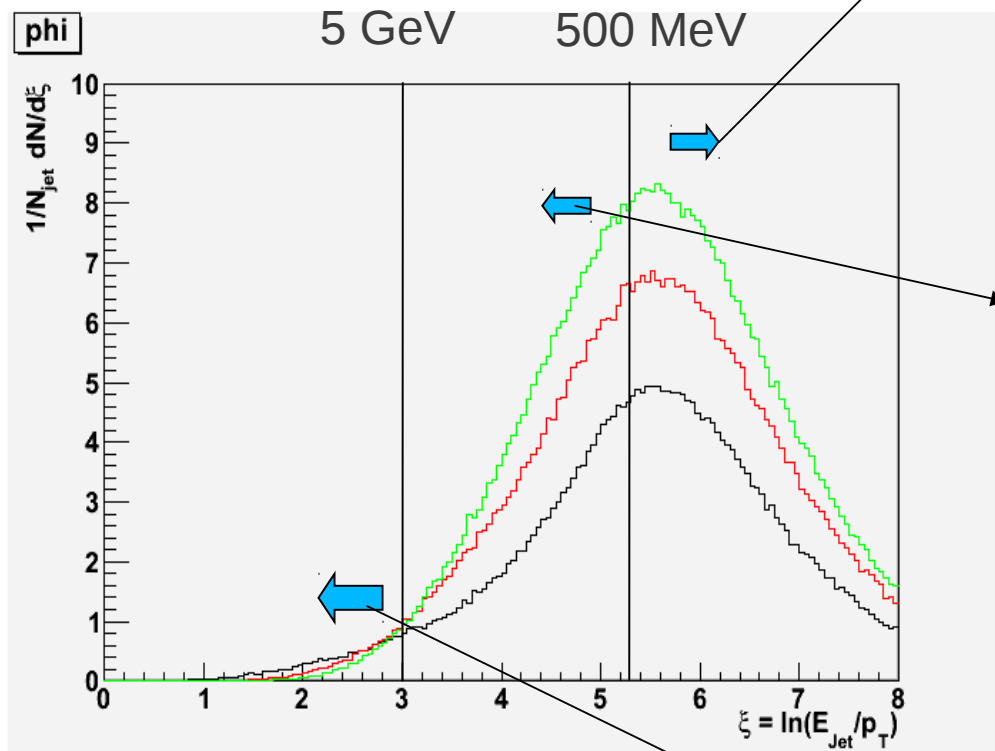


Modified Fragmentation via enhanced splittings (QPythia)

100 GeV



Enhancement of correlated low p_T particles



Pros and Cons

Pros

- Low p_T radiation correlated with TM axis in principle easier to discern from the flat background.
- Azimuthal direction in jet not biased by the jet reconstruction

Cons

- Thrust axis biased by particles from the underlying event
 - Use only high p_T particles to determine the TM axis
 - Use the two leading particles within the jet cone
 - Use two nearby leading particles in the event and do 3-particle correlations.
- Very low S/B at distances from the jet axis where the radiation goes
 - needs high statistics and good control of the systematics