

Exploring hadronization through jet substructure selections on r_c

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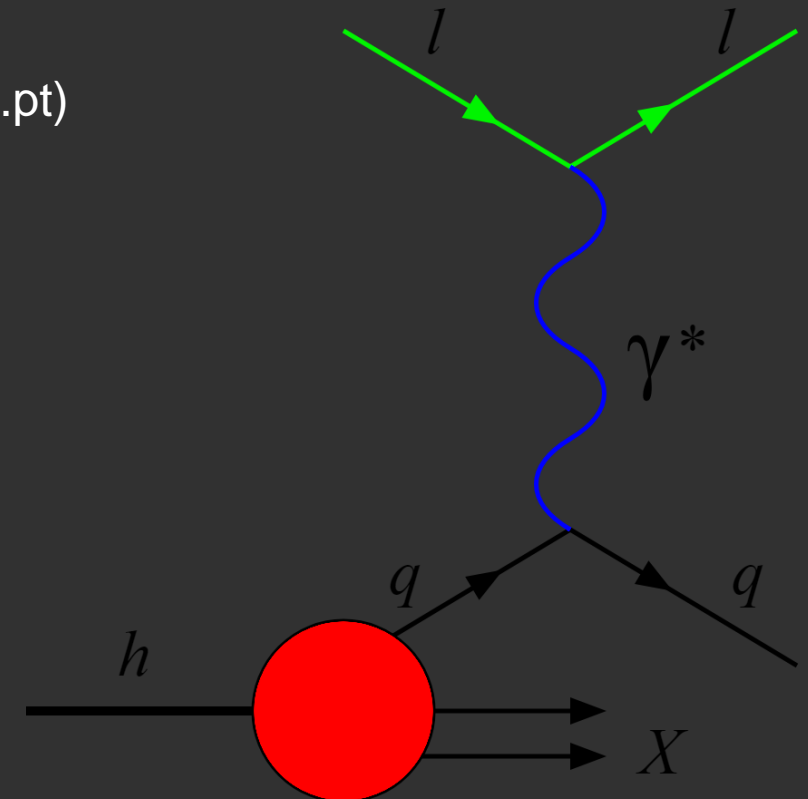
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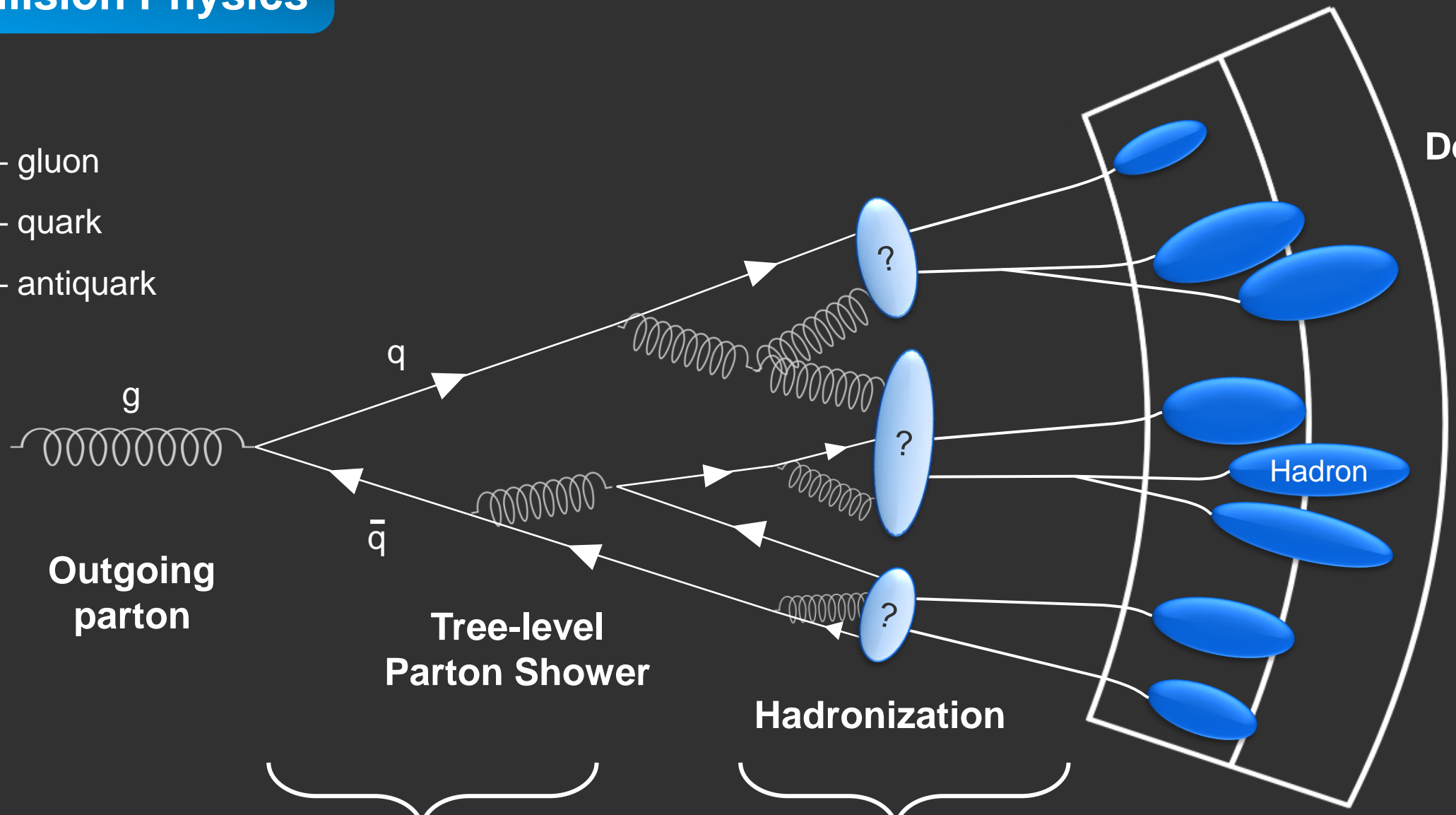


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Collision Physics

g – gluon
 q – quark
 \bar{q} – antiquark



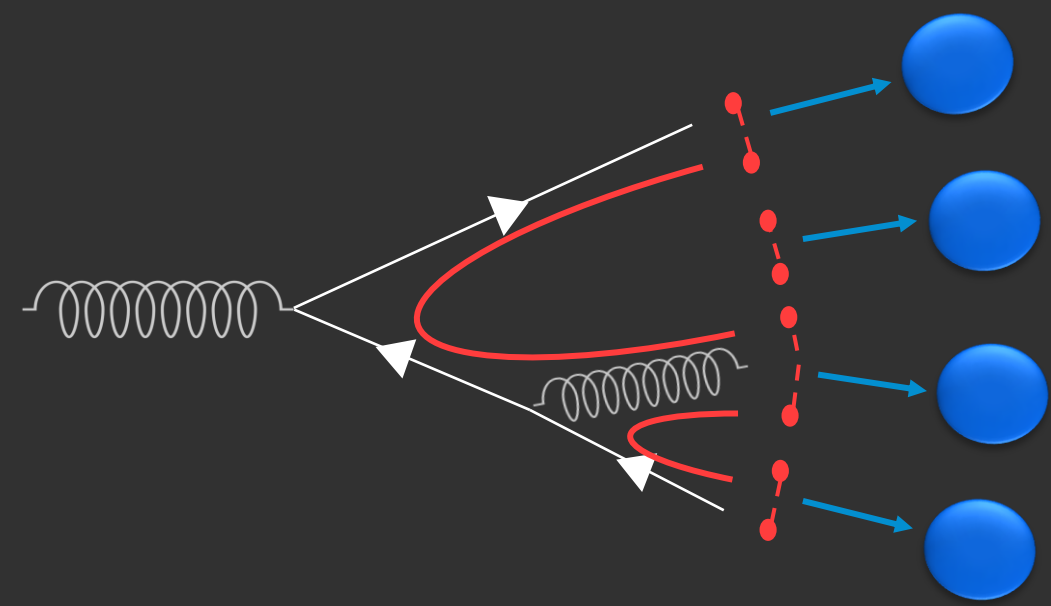
Perturbative QCD

Non-perturbative QCD

Hadronization Models

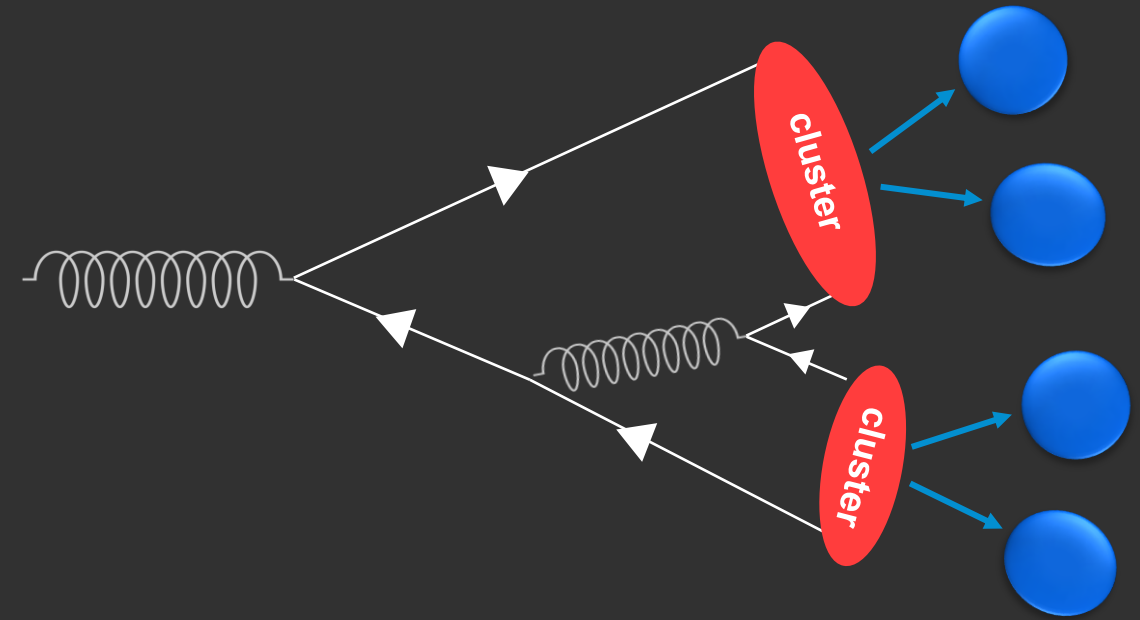
Lund String (Pythia, Jetset)

[B. Andersson, G. Gustafson, and B. Soderberg, Z. Phys.C 20, 317 (1983)]



Cluster Fragmentation (Herwig, Sherpa)

[D. Amati and G. Veneziano, Phys. Lett. B 83, 87 (1979)]

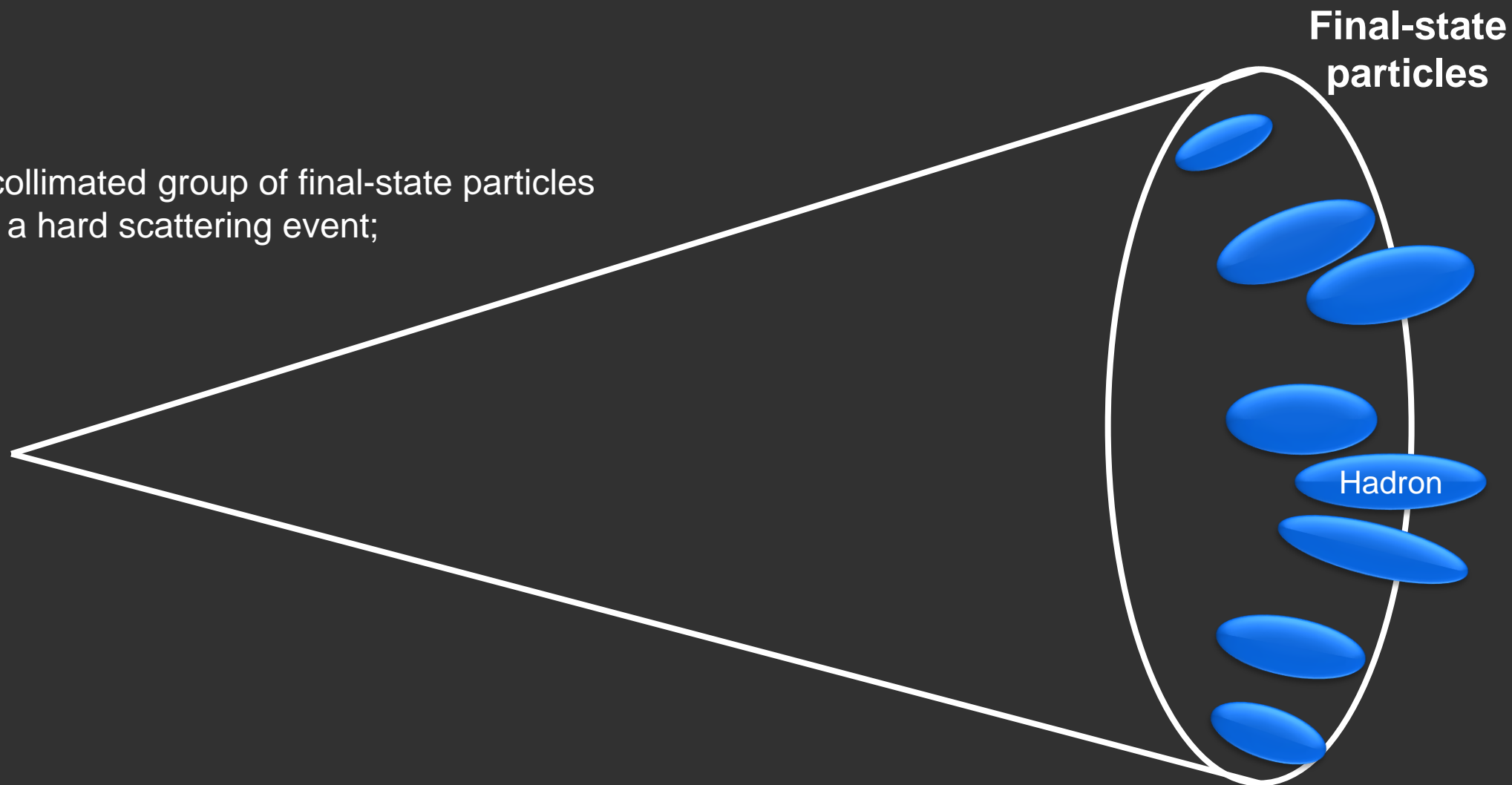


Jets



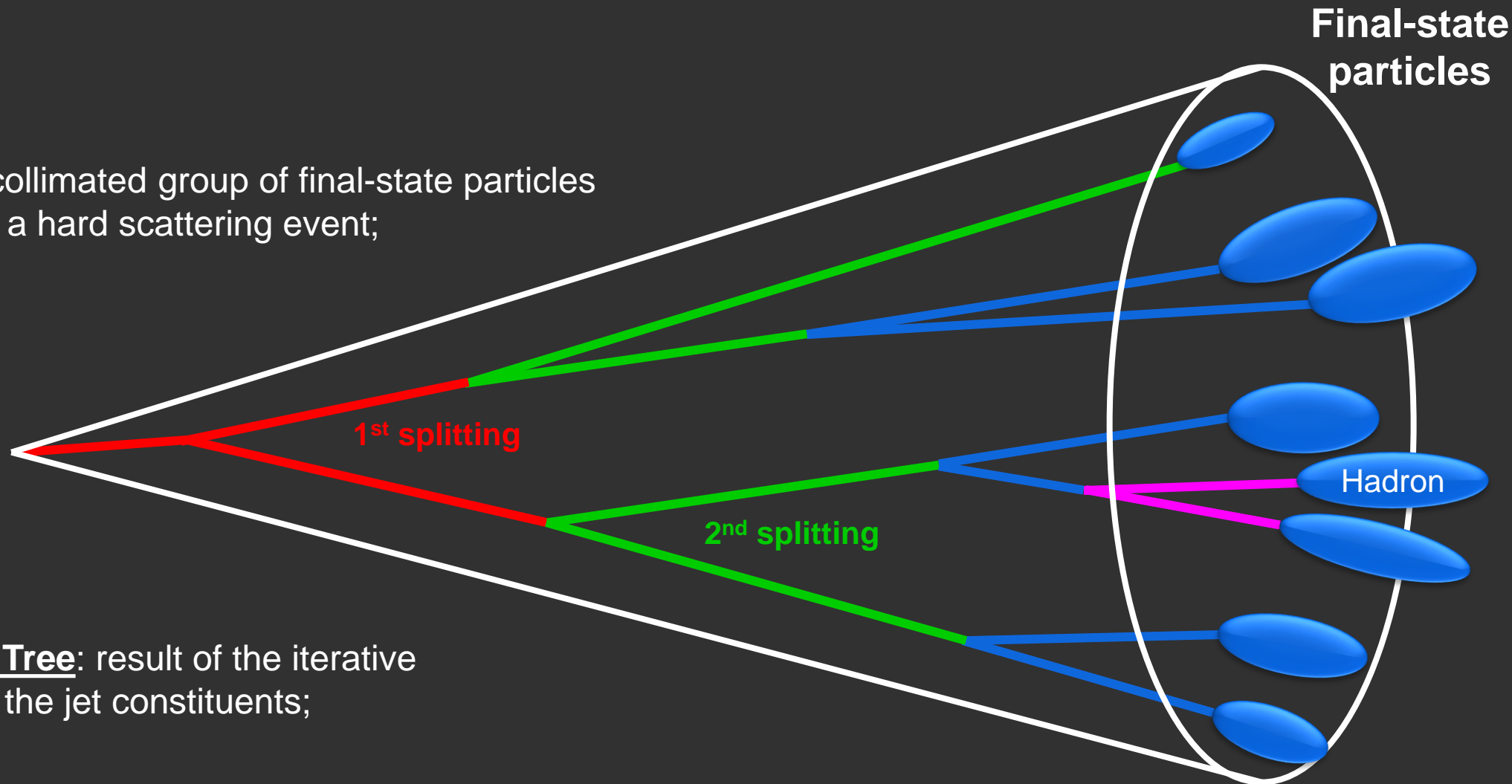
Jets

Jet: highly-collimated group of final-state particles produced in a hard scattering event;



Jets

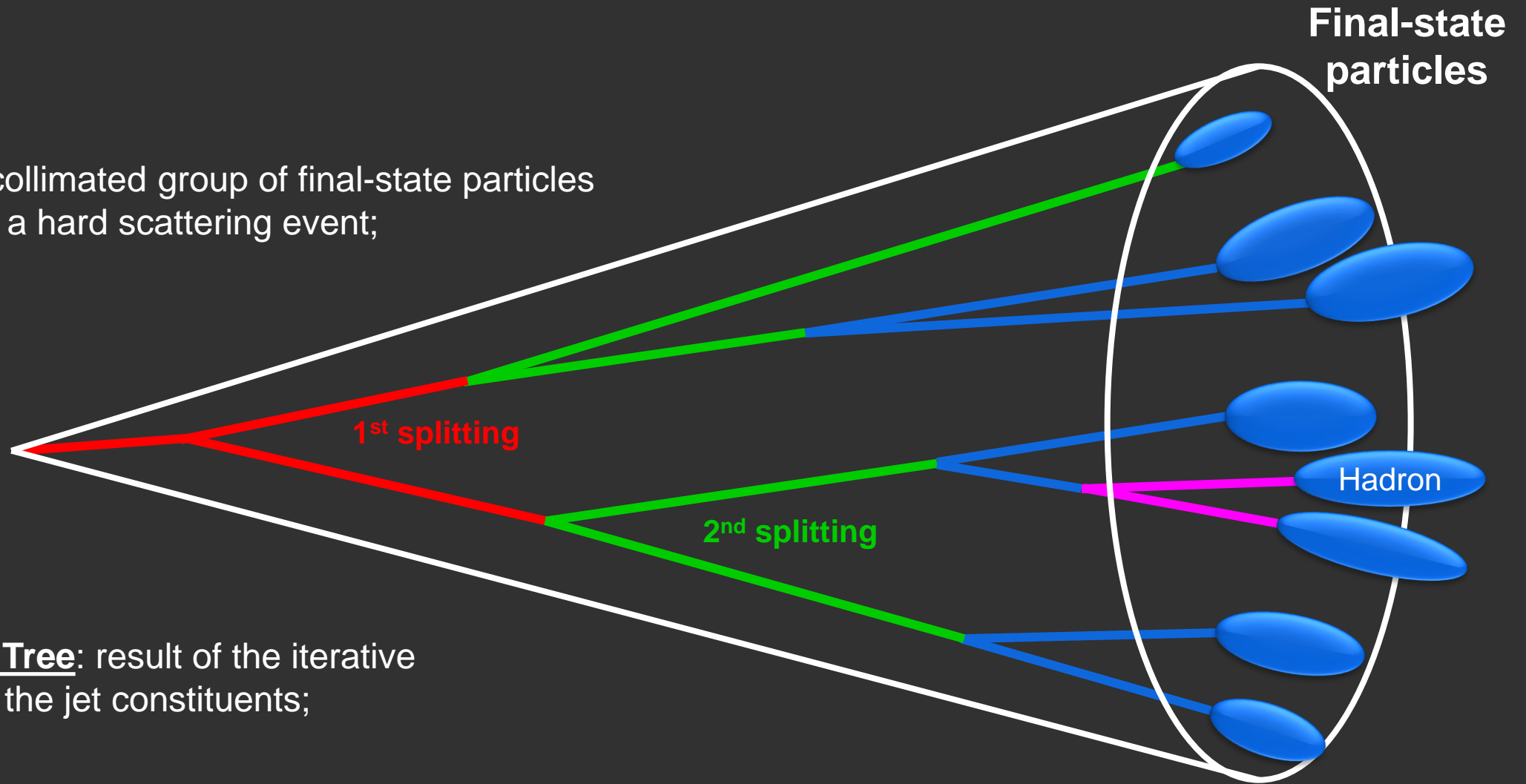
Jet: highly-collimated group of final-state particles produced in a hard scattering event;



Clustering Tree: result of the iterative grouping of the jet constituents;

Jets

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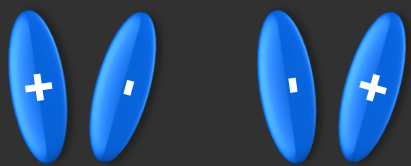


Clustering Tree: result of the iterative grouping of the jet constituents;

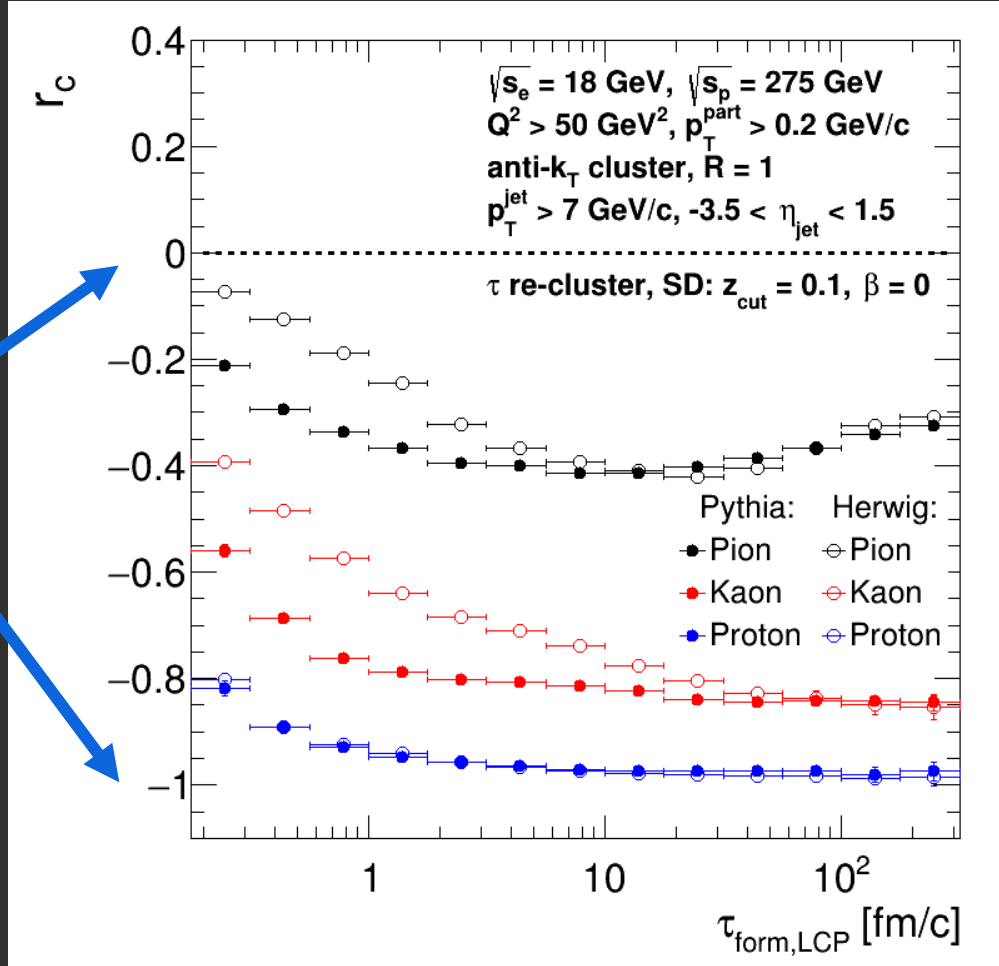
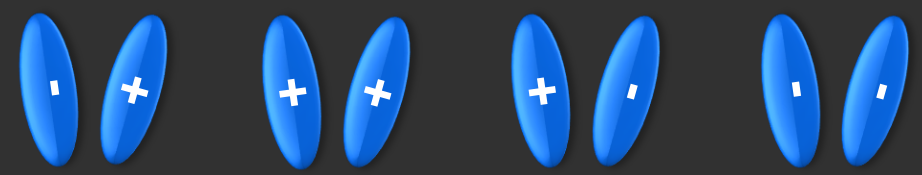
- **Objective:** find substructure observables with increased sensitivity to hadronization effects!

Charge Ratio with Selections

0% same-sign, 100% opposite-sign jets



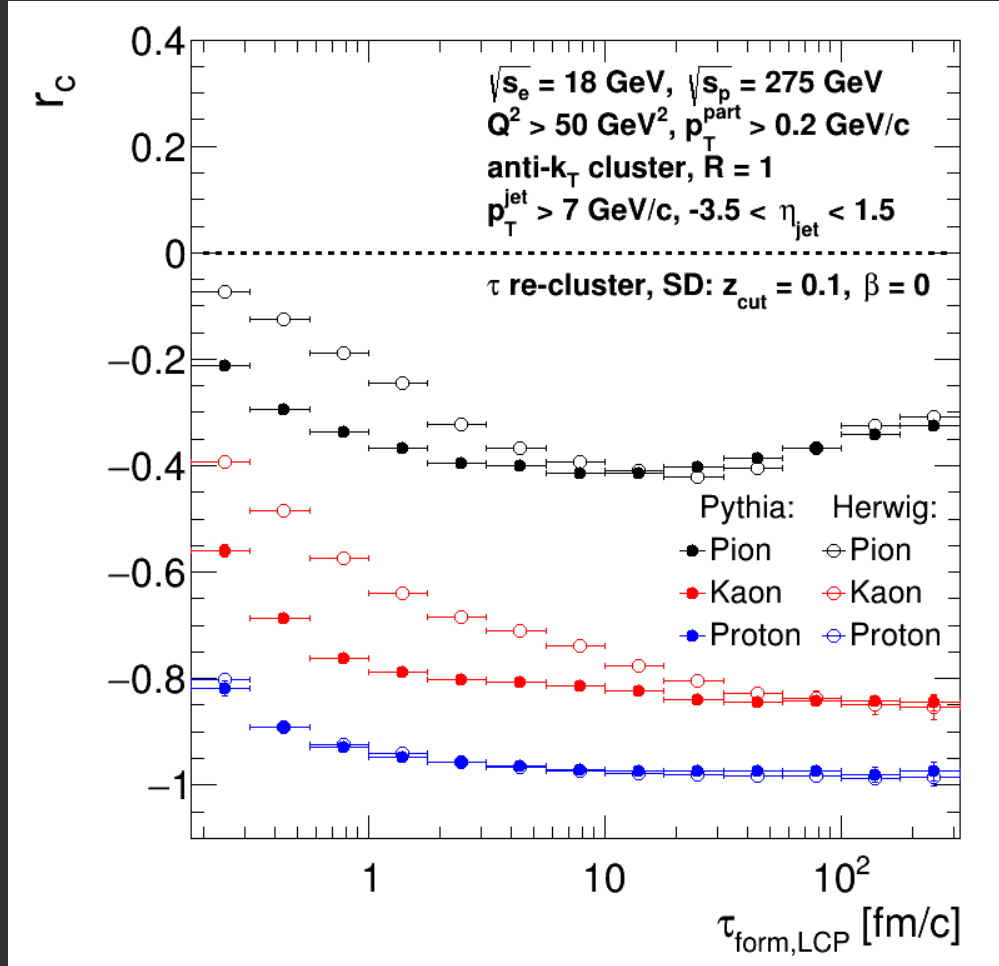
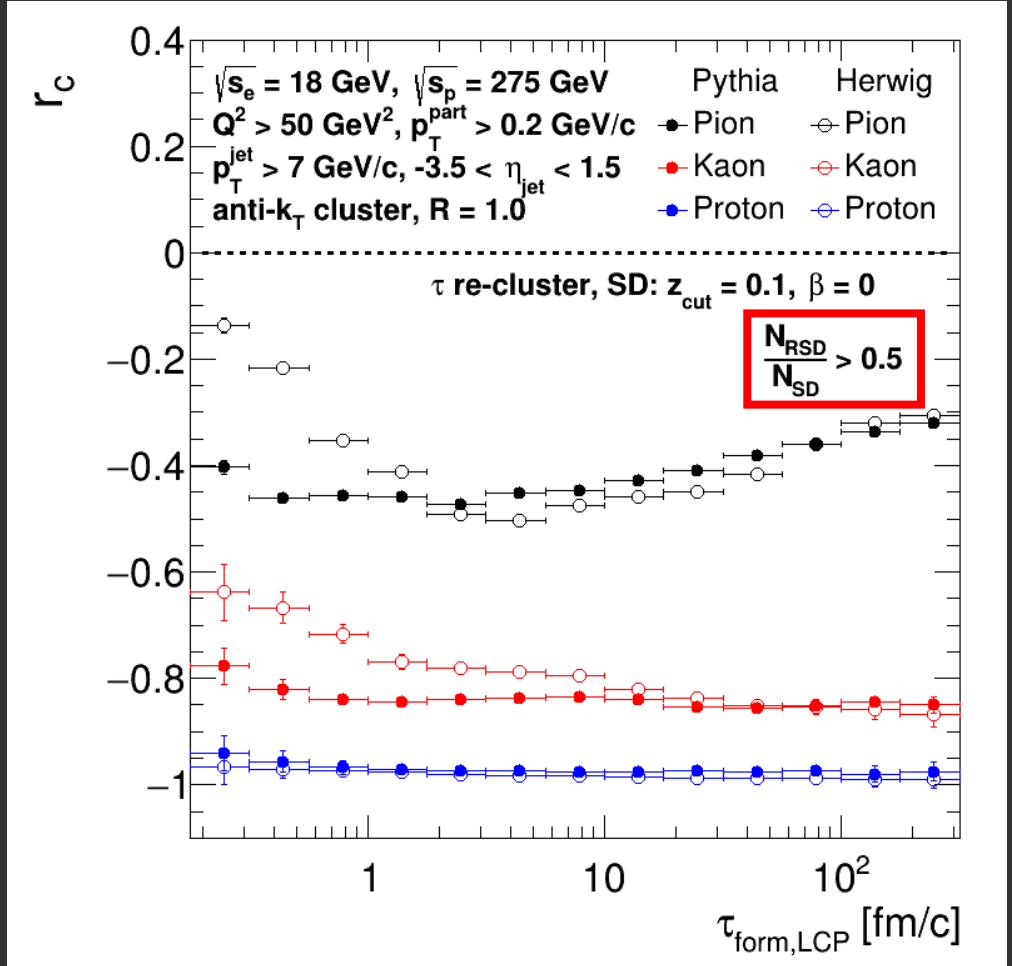
50% same-sign, 50% opposite-sign jets



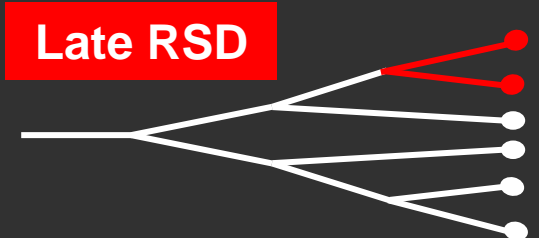
[Similar to study in Y.-T. Chien et al, arXiv:2109.15318]

Inclusive Plot

Charge Ratio with Selections



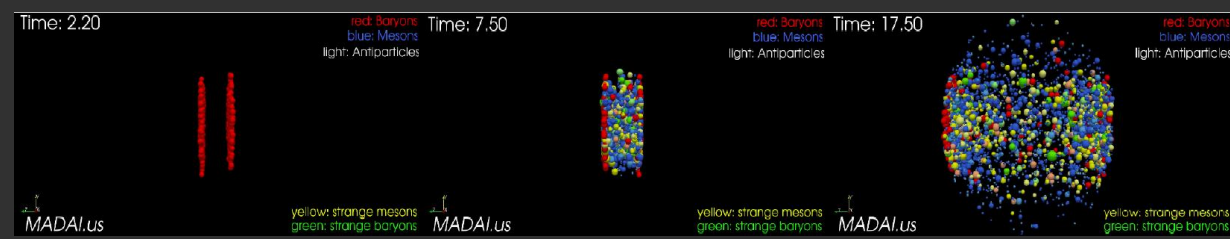
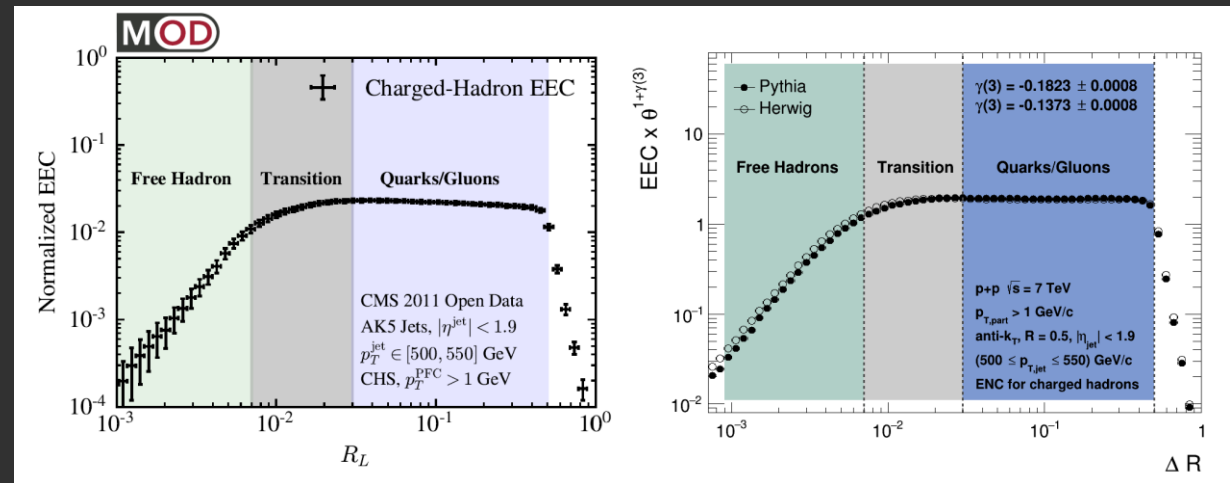
[Similar to study in Y.-T. Chien et al, arXiv:2109.15318]



Inclusive Plot

Future Work

- Exploring new jet substructure observables such as energy-energy correlators;
- Studying jet-medium interactions introduced by the quark-gluon plasma produced in heavy-ion collisions;
- Part of PhD in Vanderbilt University at Nashville, Tennessee, more focused on experiment at RHIC.



Thank you for your attention!

Questions?

Aknowledgements



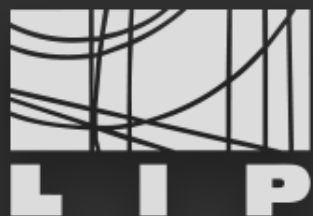
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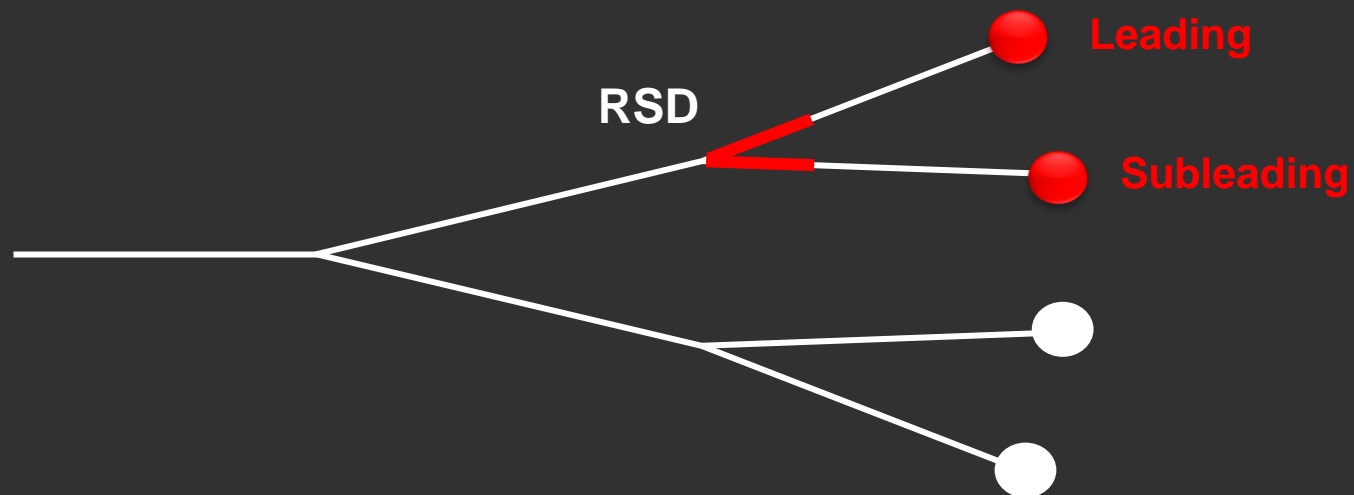
Backup Slides



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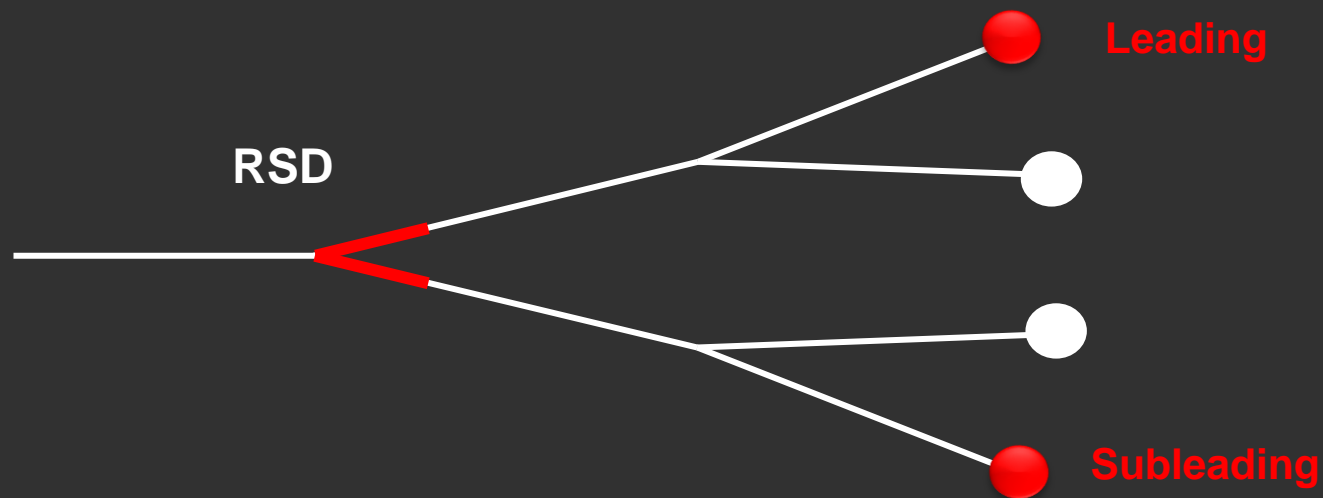
Resolved SoftDrop Splitting – RSD



- The **RSD** is the SoftDrop splitting in the clustering tree where the leading charged particles get separated into 2 different subsets;

- **Top** clustering tree:

- $N_{SD} = 2$
- $N_{RSD} = 2$
- RSD depth = $N_{RSD}/N_{SD} = 2/2$



- **Bottom** clustering tree:

- $N_{SD} = 2$
- $N_{RSD} = 1$
- RSD depth = $N_{RSD}/N_{SD} = 1/2$