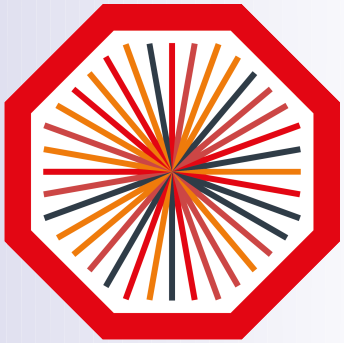
Patrick Steffanic

Measuring Jets with the EMCal Detector in the ALICE Experiment



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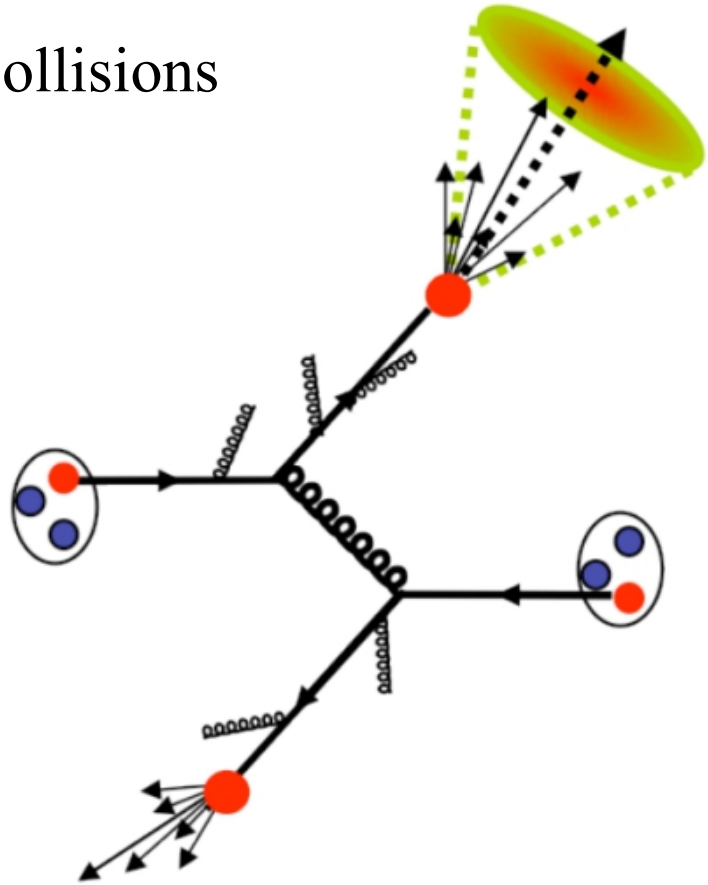
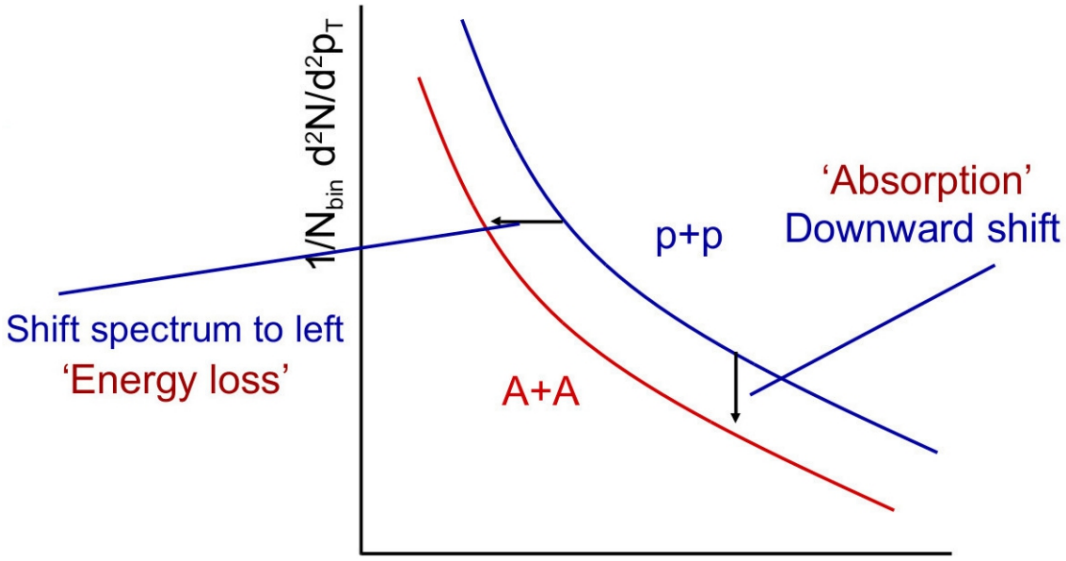
What are Jets?

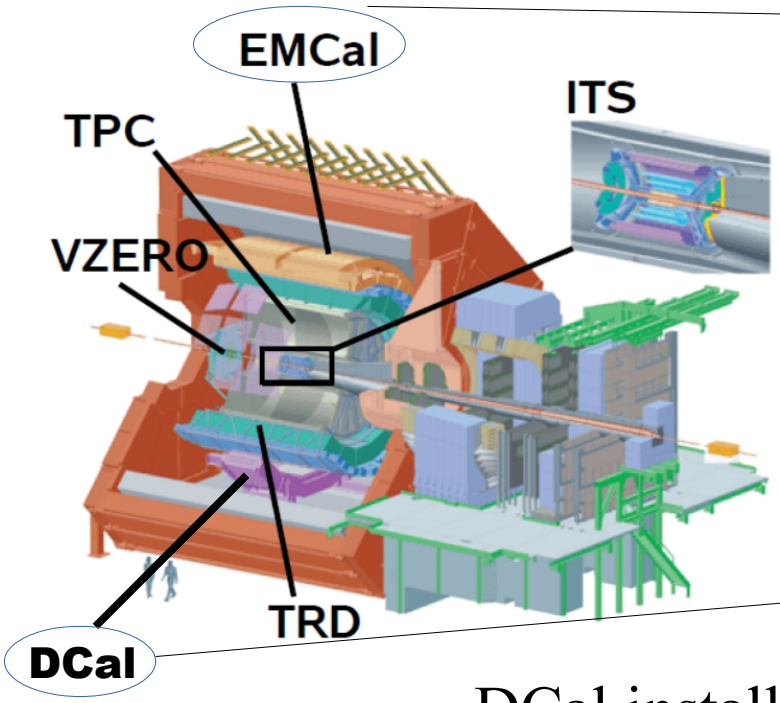
- Partons interact with medium in PbPb collisions
- Radiation of quarks and gluons
- Hadronization into spray of particles
- Jet quenching

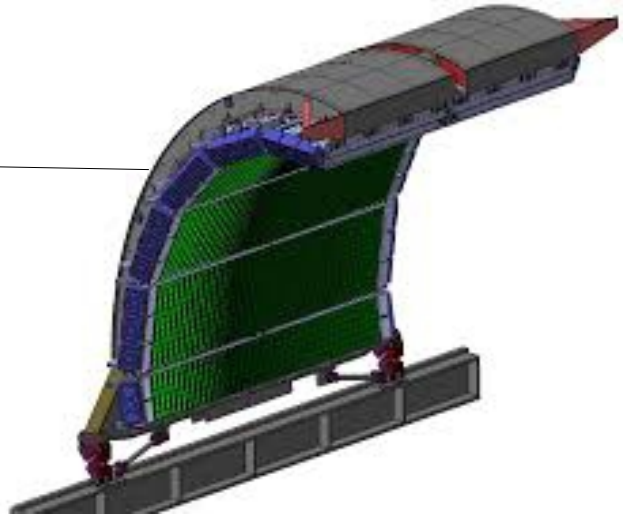


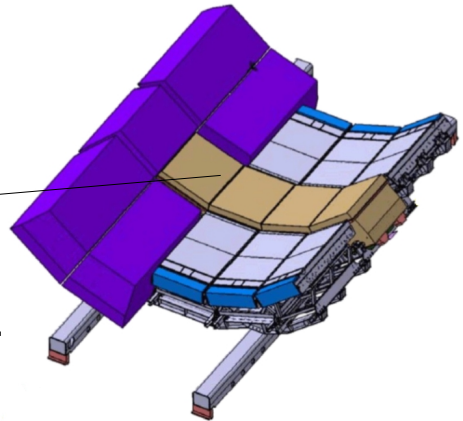


EMCal/DCal in ALICE

- Pb-Scintillator sampling calorimeter
- Optimized for jet studies and jet triggering
- Allows for study of charged+neutral jet constituents
- DCal provides di-jet acceptance



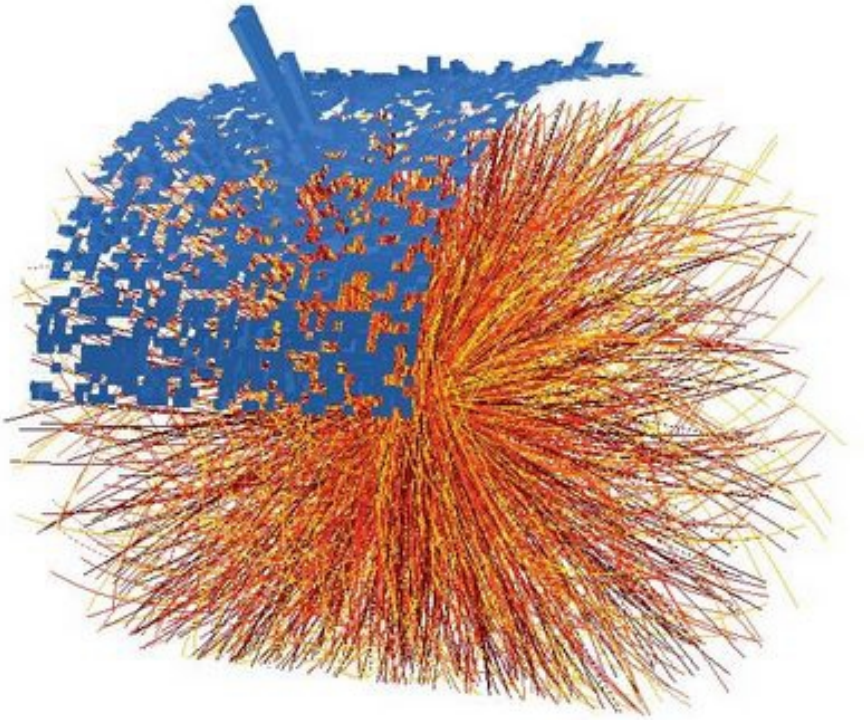


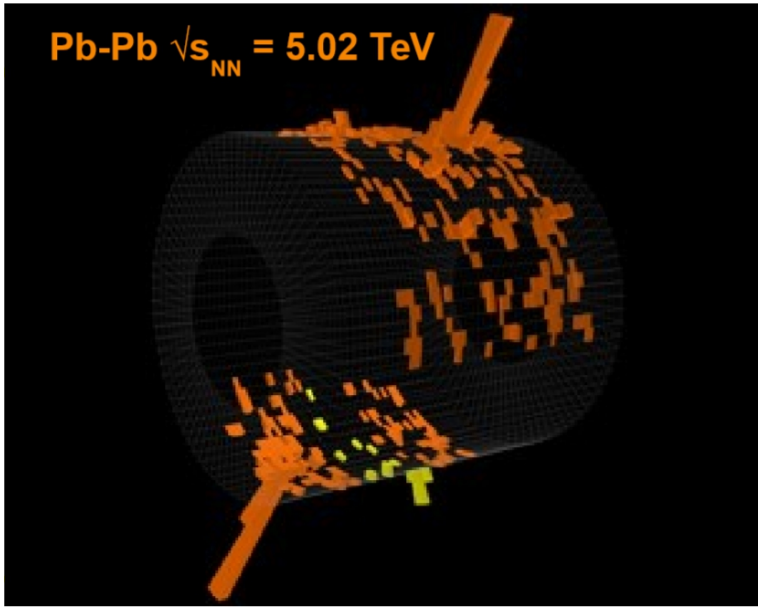


DCal installed fall 2014

Jet Reconstruction

- Charged particle tracks from TPC and ITS
- Energy clusters from EMCal/DCal



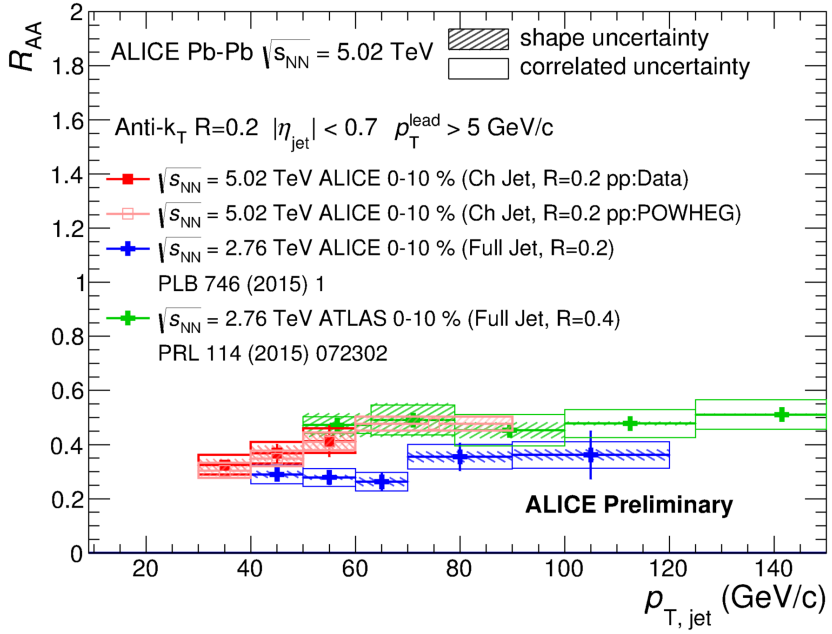


- kT or anti-kT
  - Sequential clustering algorithm
  - IR/Collinear-safe
  - Implemented in FastJet
  - Computationally quick

Nuclear Modification Factor

- Comparison of charged jets to full jets at resolution parameter R=0.2 (ATLAS data at R=0.4)
- R_{AA} < 1 => Suppression
- Note: Centre-of-mass energy difference
- Evidence of jet quenching

0-10% Central



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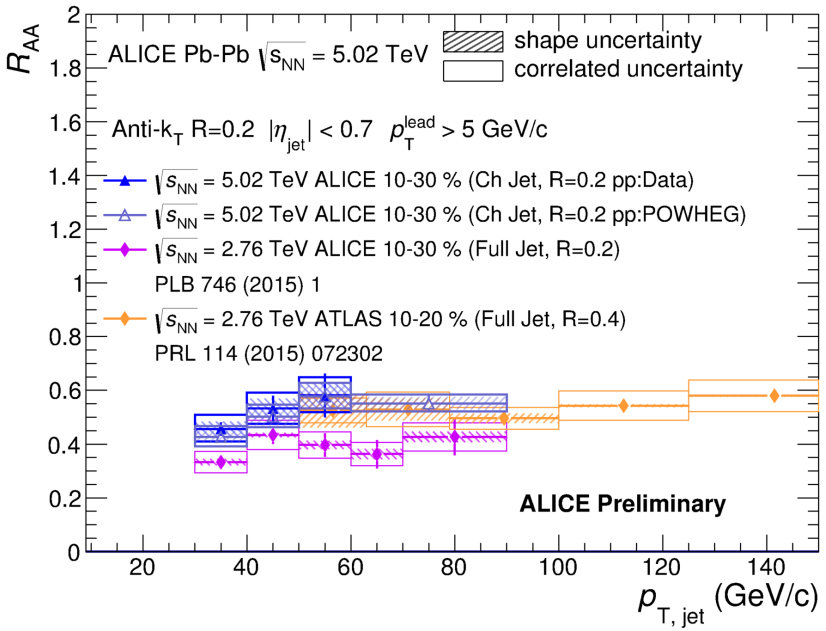
10-30% Central



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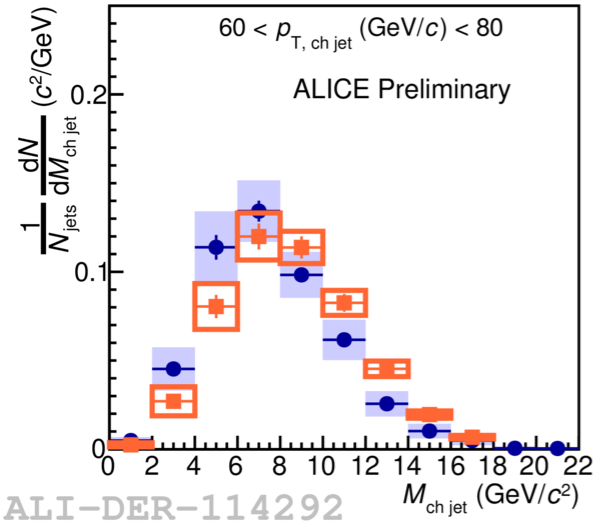
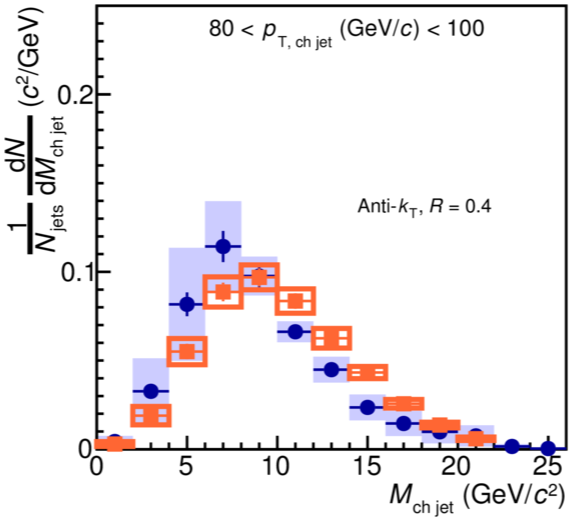
Recently presented at Hard Probes 2016

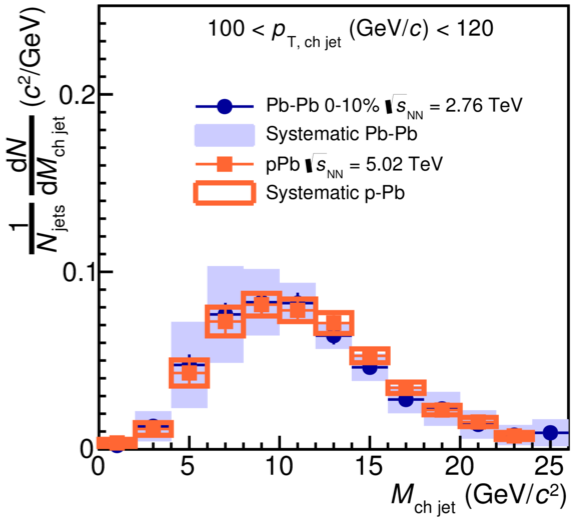
Jet Mass

- Soft constituents away from jet axis give larger mass
- Hard constituents close to jet axis give smaller mass
- Jet mass measurements in Pb-Pb at sqrt(s)=2.76 TeV and p-Pb at sqrt(s)=5.02 TeV collisions
- Pb-Pb collisions: shift towards lower mass jets w.r.t p-Pb

$$M = \sqrt{p^2 - p_T^2 - p_z^2} \qquad p = \sum_{i=1}^{n} p_{T_i} \cosh \eta_i \qquad p = \sum_{i=1}^{n} p_{T_i} \sinh \eta_i$$







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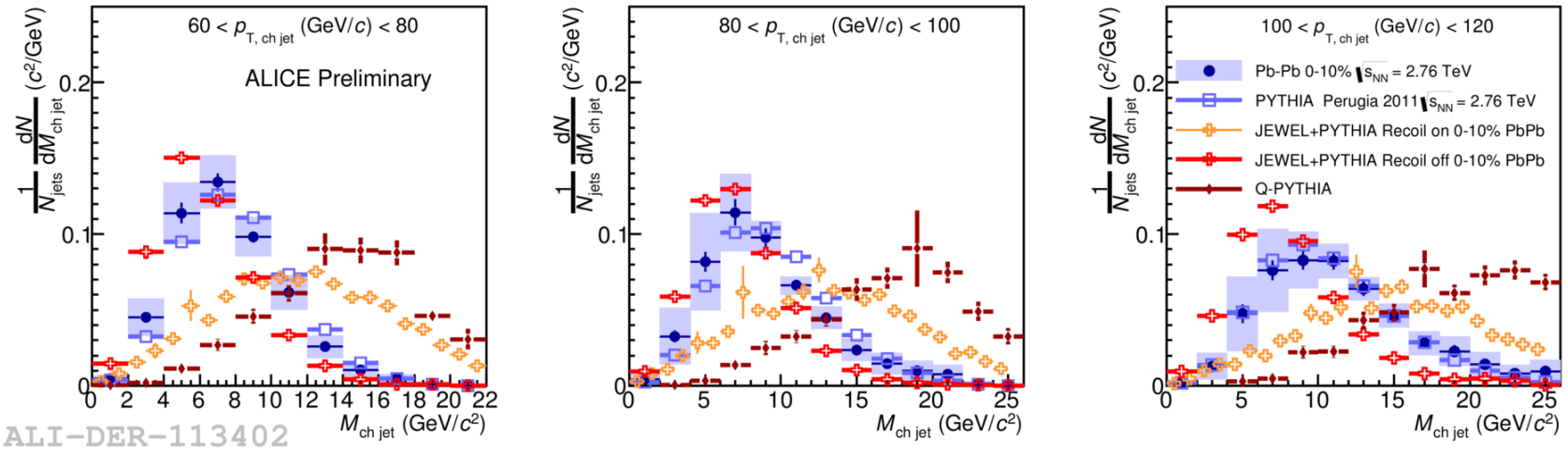
Recently presented at Hard Probes 2016

Model Comparison

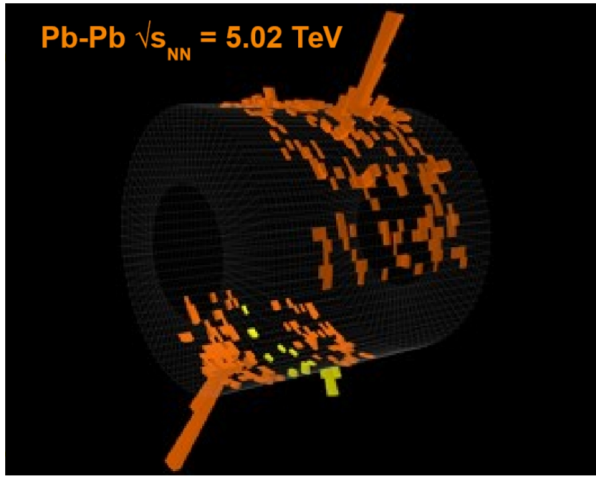
- Comparison to models
- Quenching models don't quite describe the data
- Jet mass measurements can help constrain models
- Full jet measurements in ALICE in the future



Recently presented at Hard Probes 2016

Summary

- Jets provide a hard probe into medium-induced effects
- EMCal/DCal optimized for jet studies
- **Future:**
  - Full jet mass measurements→larger energy scale, better comparison to theory
  - Barrel tracking and EMCal+DCal→di-jet studies
  - More full jet measurements of “common” observables



ALICE

CAL POLY
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Thanks for listening!