Electron ID with EMCal 2x2 Gaing

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Software tools

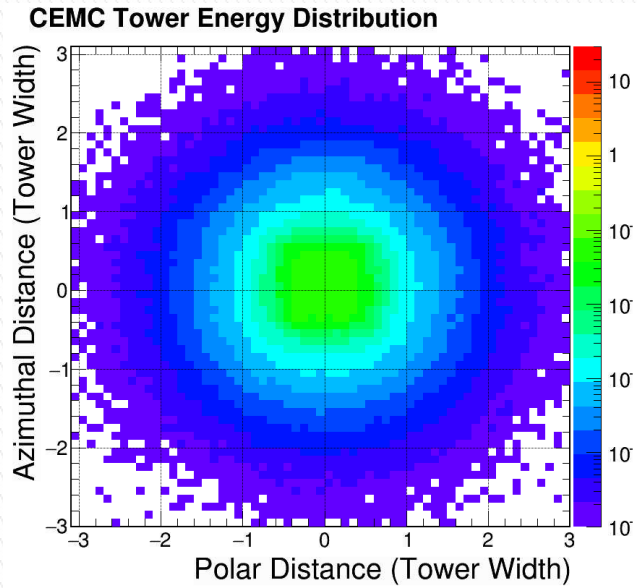
- Simulation data set
  Pre-CDR sPHENIX-Geant4 production of 5M single particle shower embedded in Hijing, including detailed 2D-projective SPACAL description
- Software: in analysis repository
  - https://github.com/sPHENIX-Collaboration/analysis/tree/master/EMCal-analysis
  - Fun4All analysis module to build condensed DST objects
    → pico-DST file of emcal focused analysis
- New tool to produce ganged readout in pico-DST file, prior to the likelihood analysis
- Comparison plots in these slides

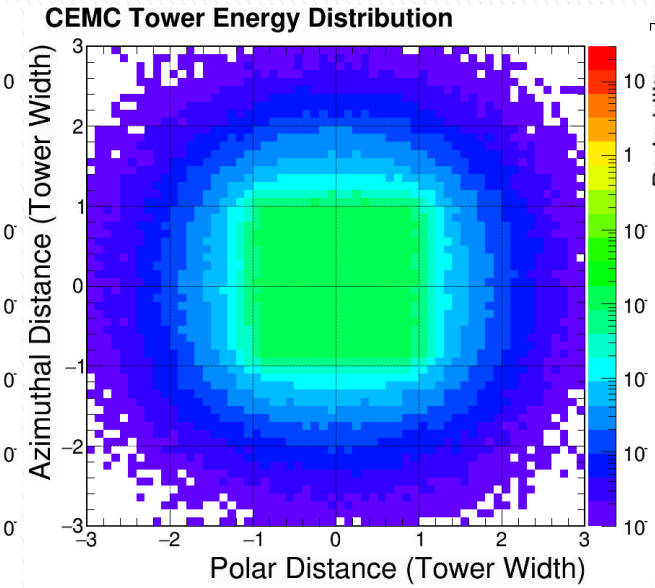
EM-Shower shape as observed in readout

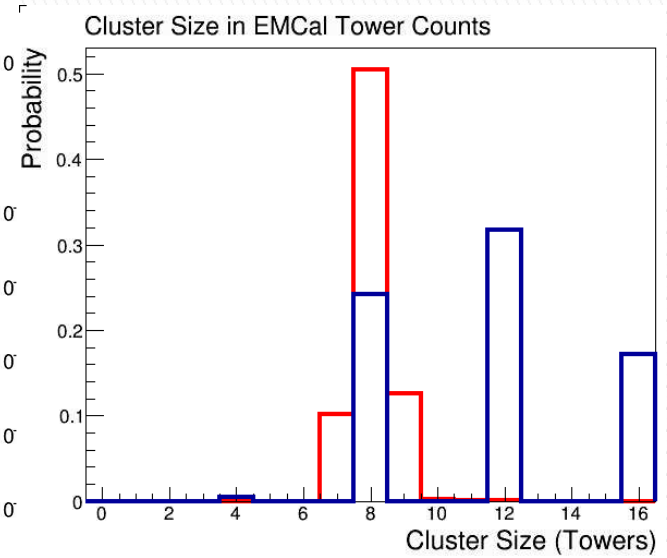
8 GeV e- shower in 2D proj. SPACAL around eta = 0

Larger spread of shower core requires larger cluster to contain, which pickup higher portion of hadronic shower and higher event background

— Default
— 2x2 Ganging







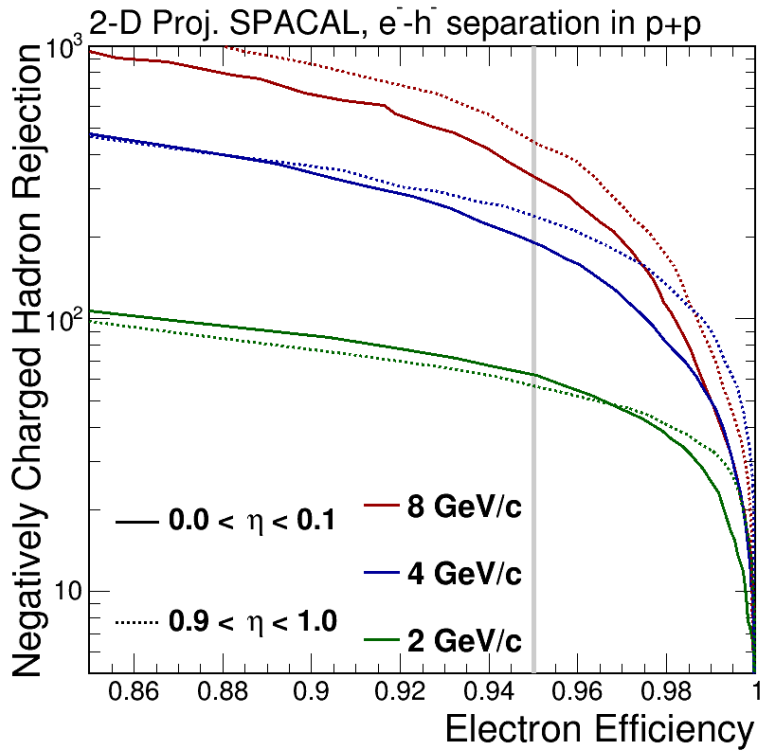
One readout per tower

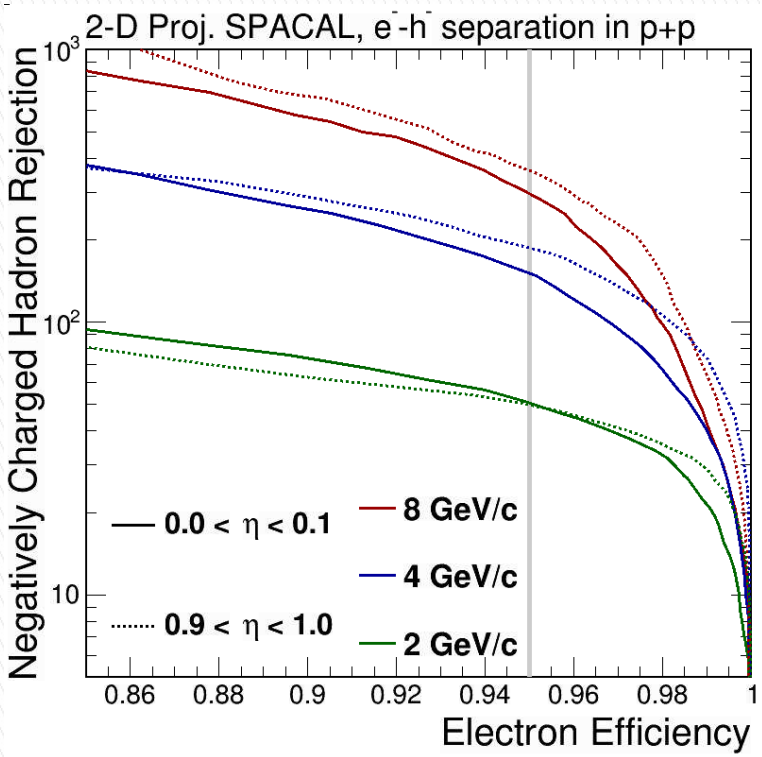
One readout per 2x2 tower

Cluster size comparison

Single Particle Summary: h-

Single negatively charged particle 2/4/8 GeV shower in 2D proj. SPACAL





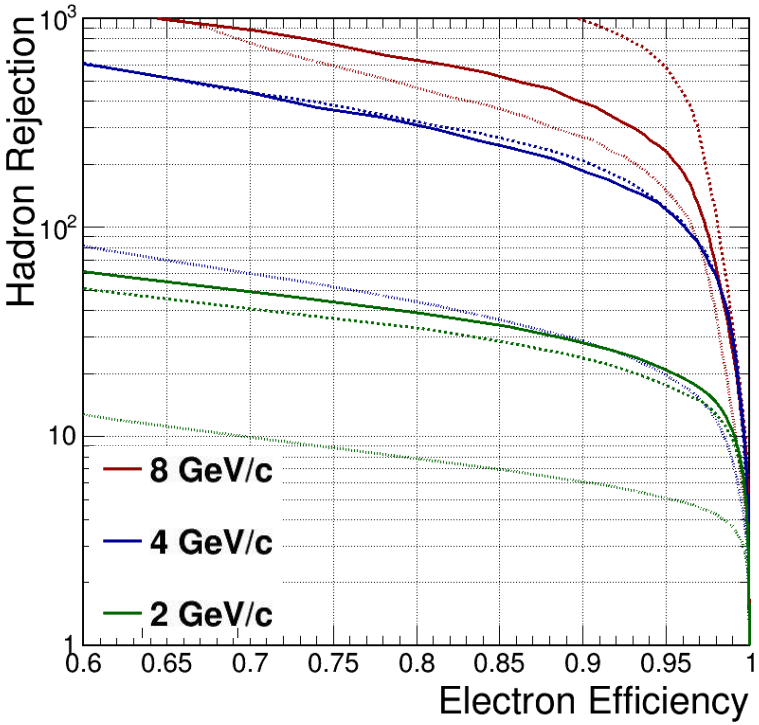
One readout per tower

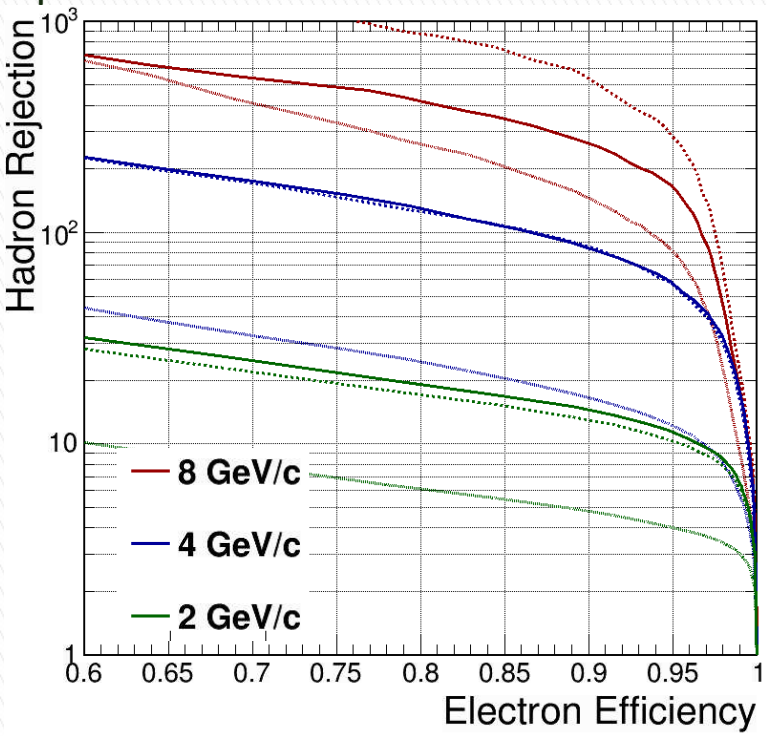
One readout per 2x2 tower
Cluster size x (1.2x1.2)

In Hijing, rapidity dependency

10% Central Hijing embedding in 2D proj. SPACAL @ |eta|<0.1

Solid Line: Pion; dash: K-; dotted line: anti-proton





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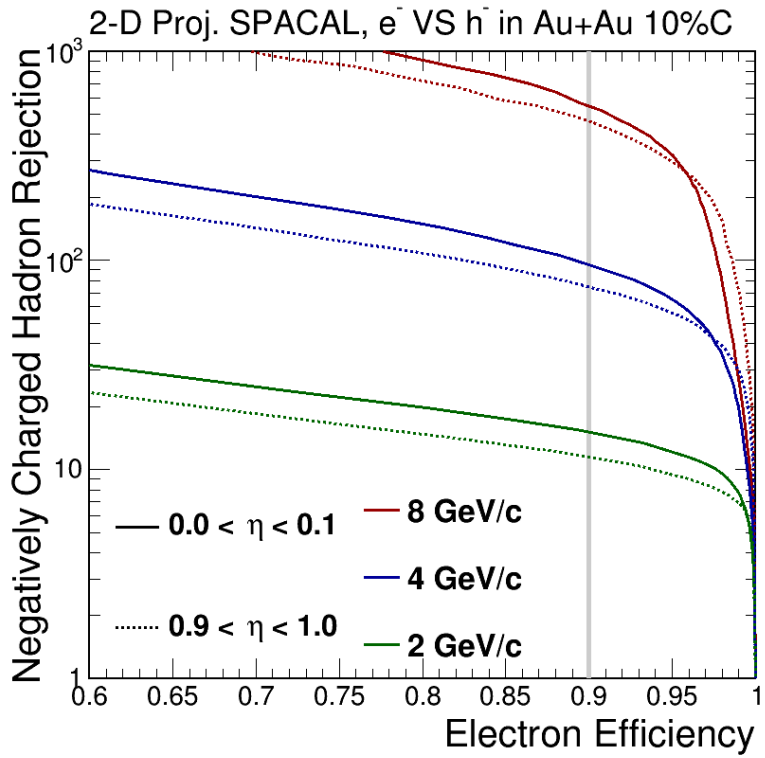
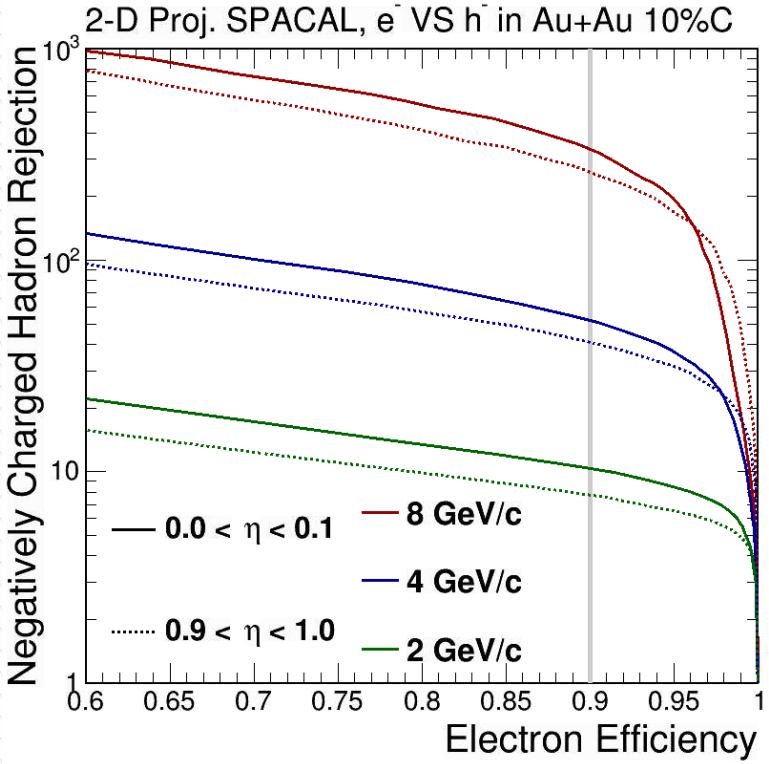
In Hijing –2D SPACAL summary: h-

10% Central Hijing embedding in 1D/2D proj. SPACAL





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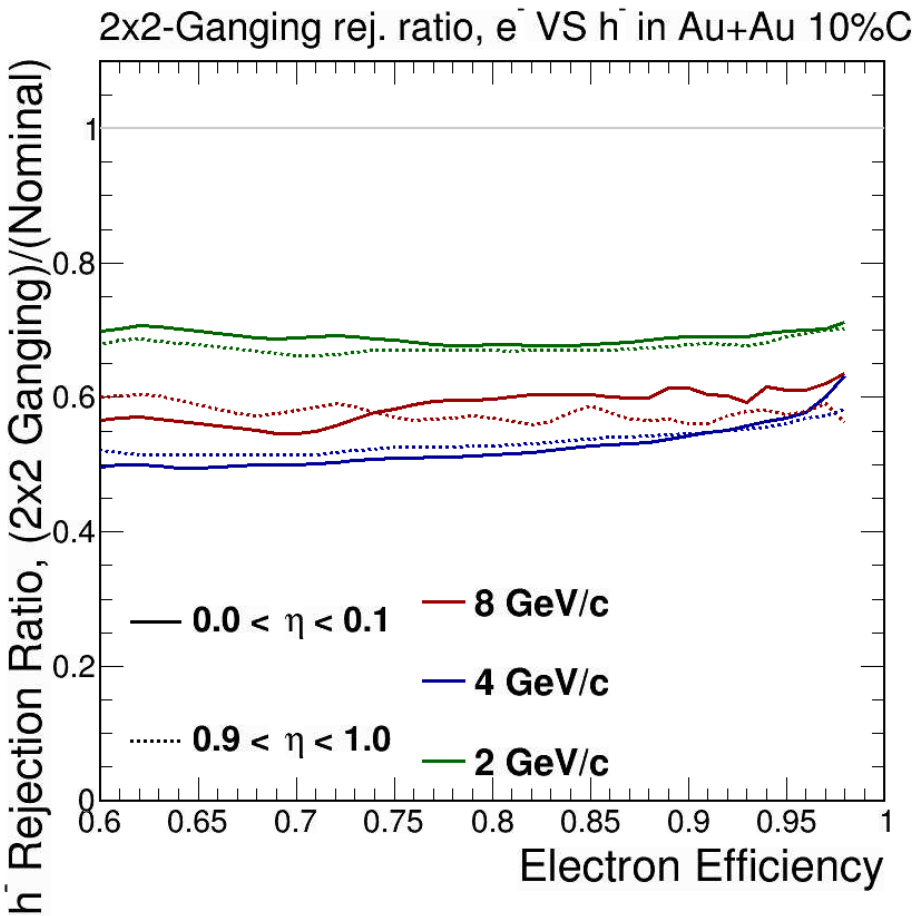
Summary

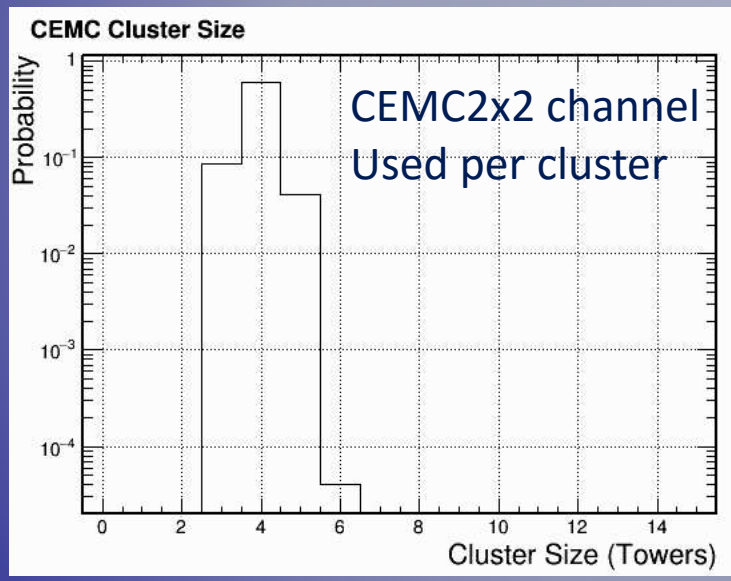
- Electron-ID updated with post-production 2x2 ganging readout using pre-CDR 5M HIJING-embedded simulation
- Minor impact to single particle/pp performance
- Factor of ~2 worse for central HIJING events, ~100:1 inclusive hadron rejection @ 70% electron efficiency for p ~ 4 GeV

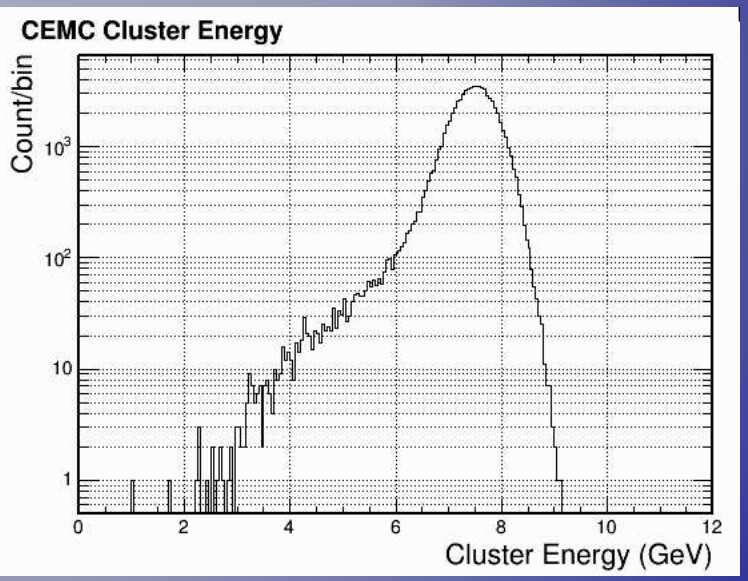


Extra information

- Previous steps in cluster size tuning

Pre-CDR VS CEMC2x2 Cluster size x (1.4x1.4)





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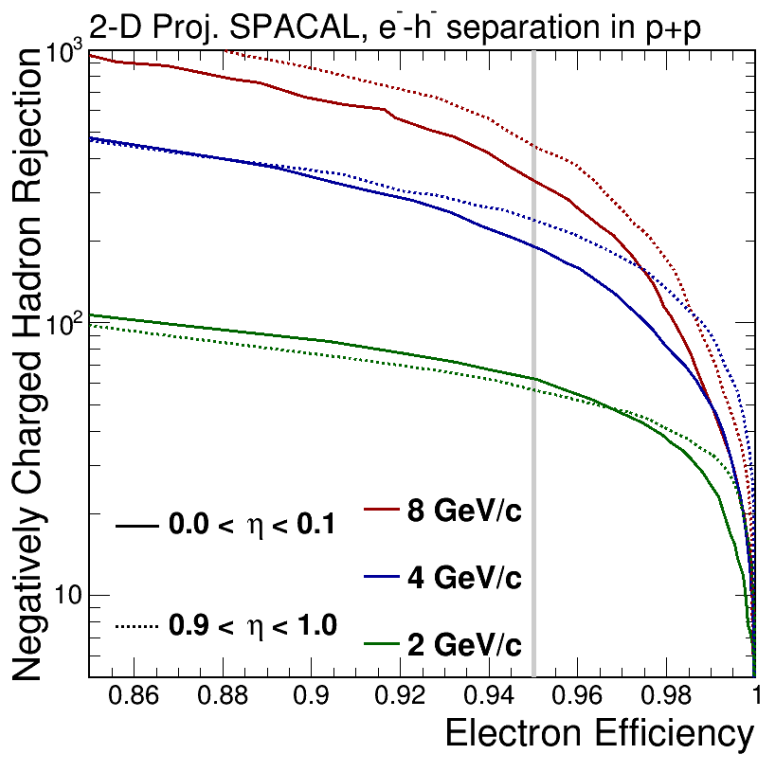

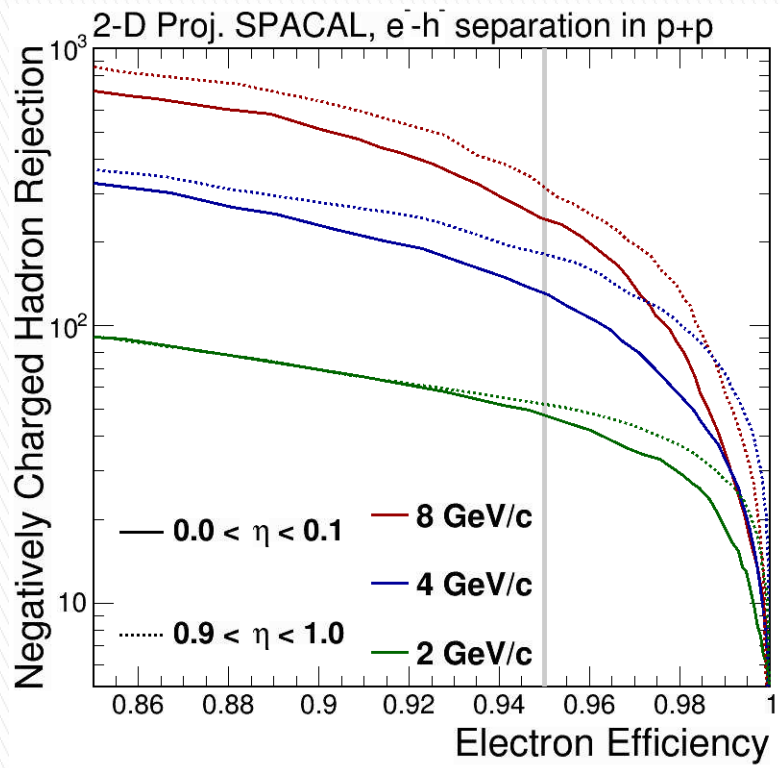

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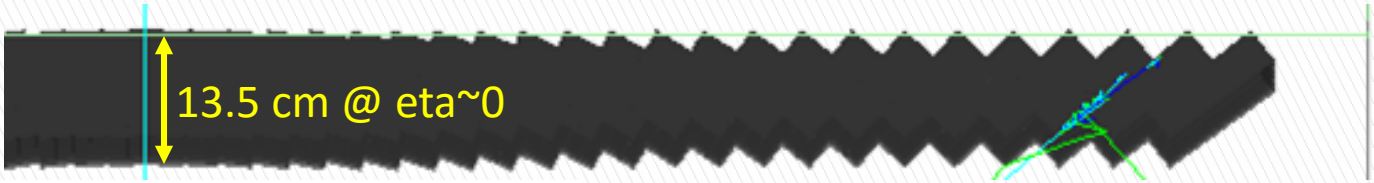

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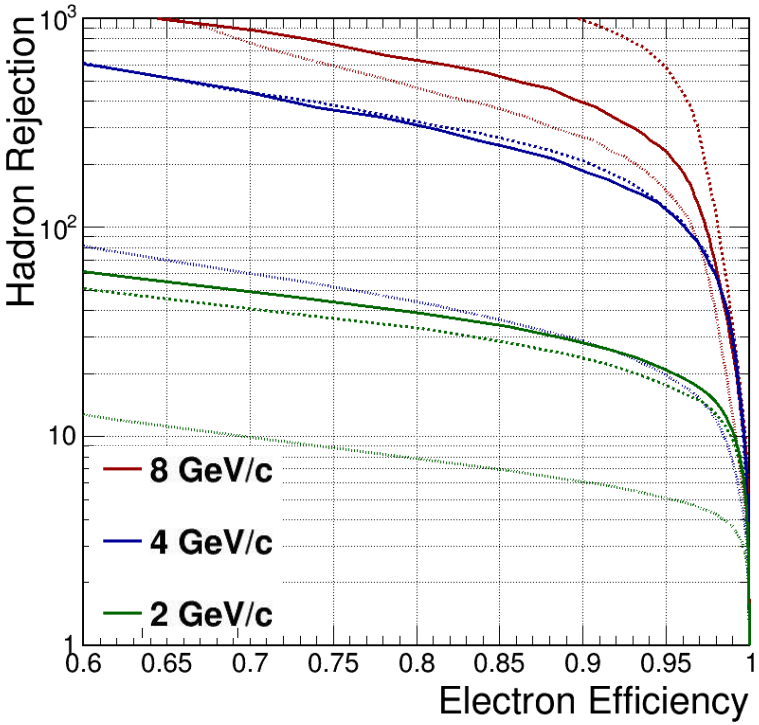

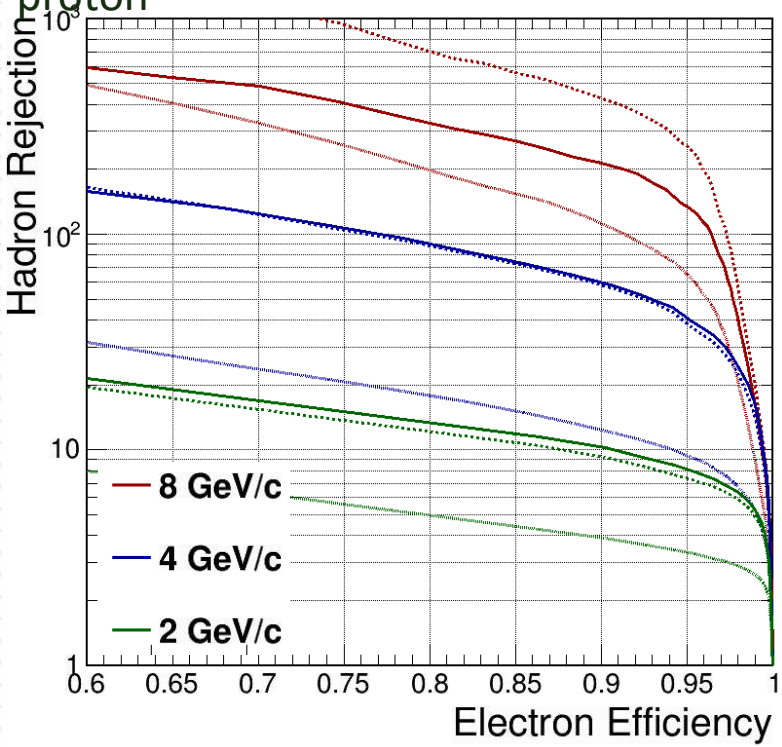

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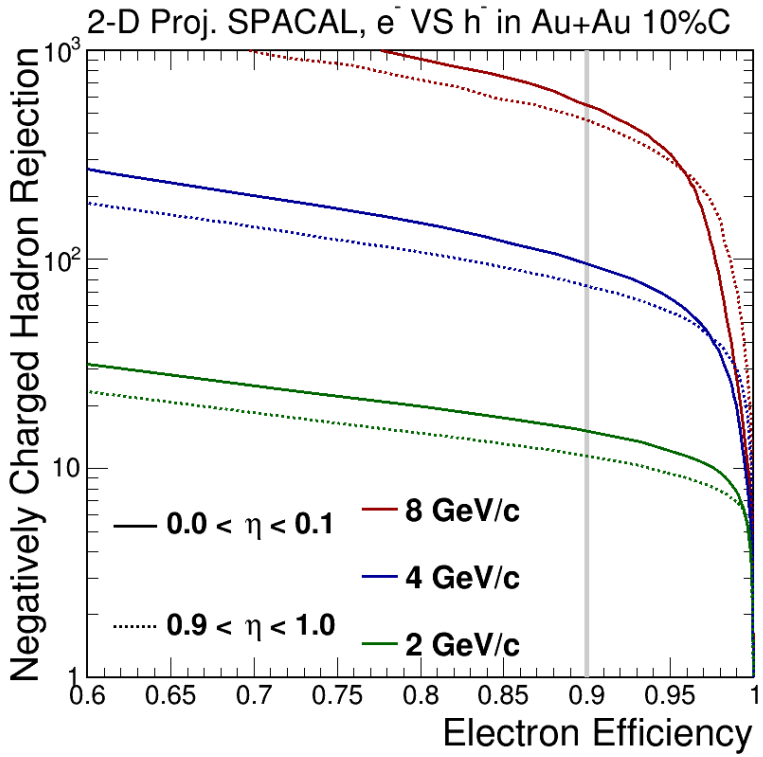

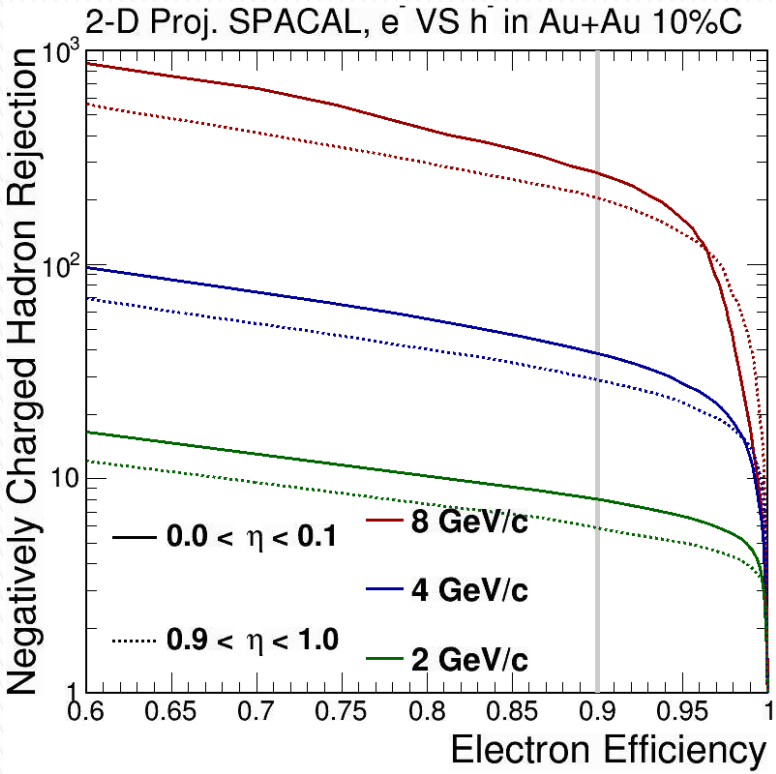

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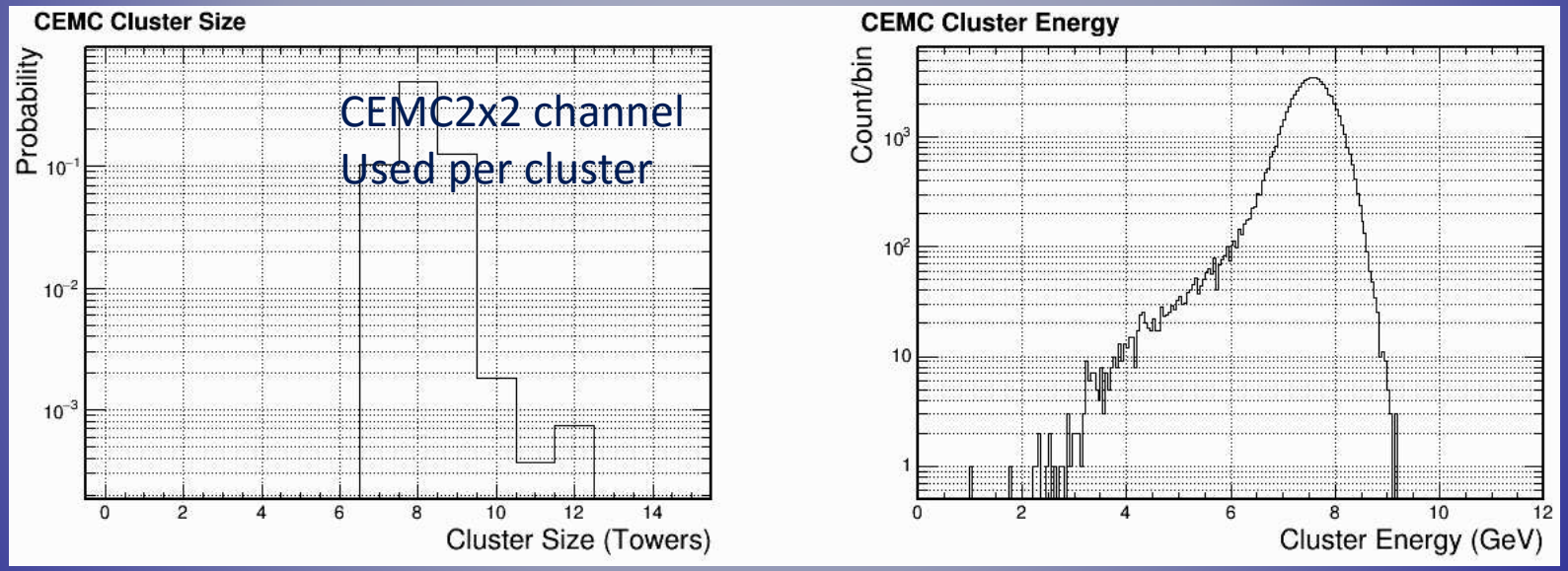
Pre-CDR VS CEMC2x2 Cluster size x (2x2)



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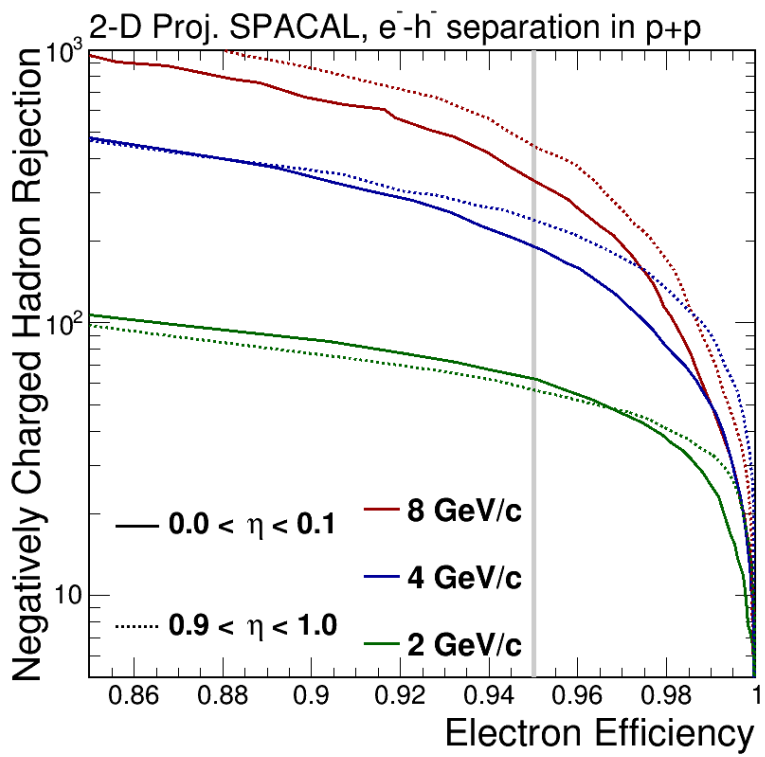

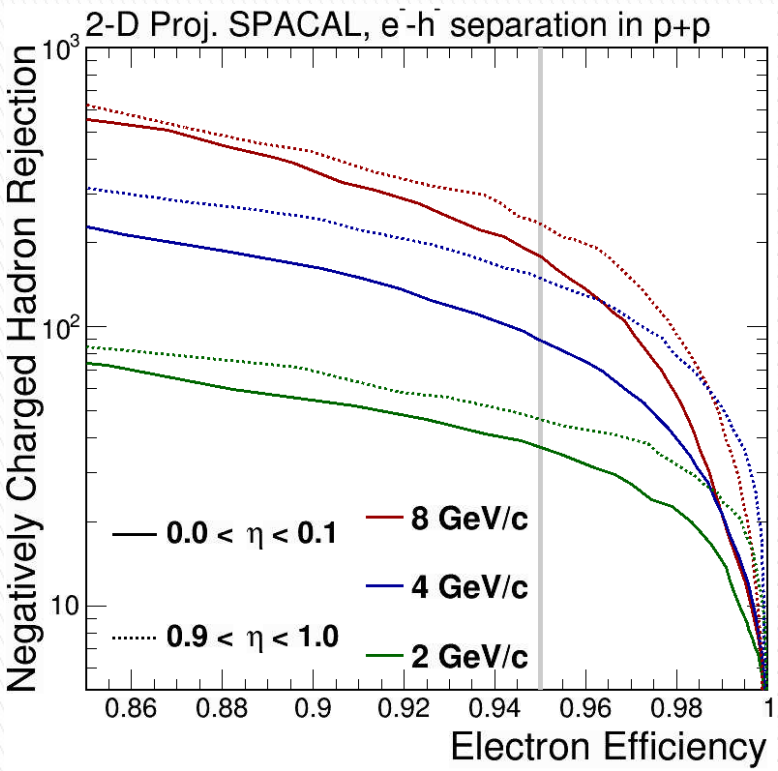

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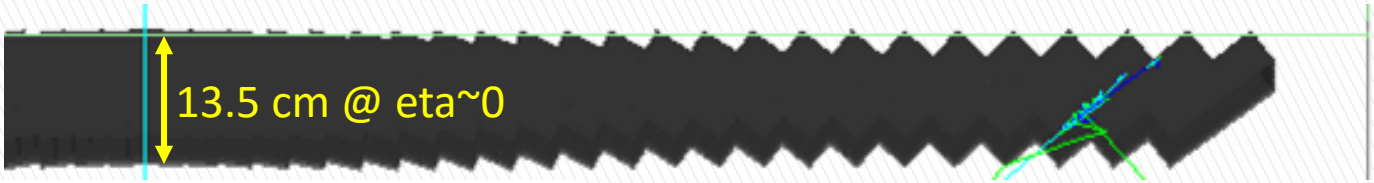

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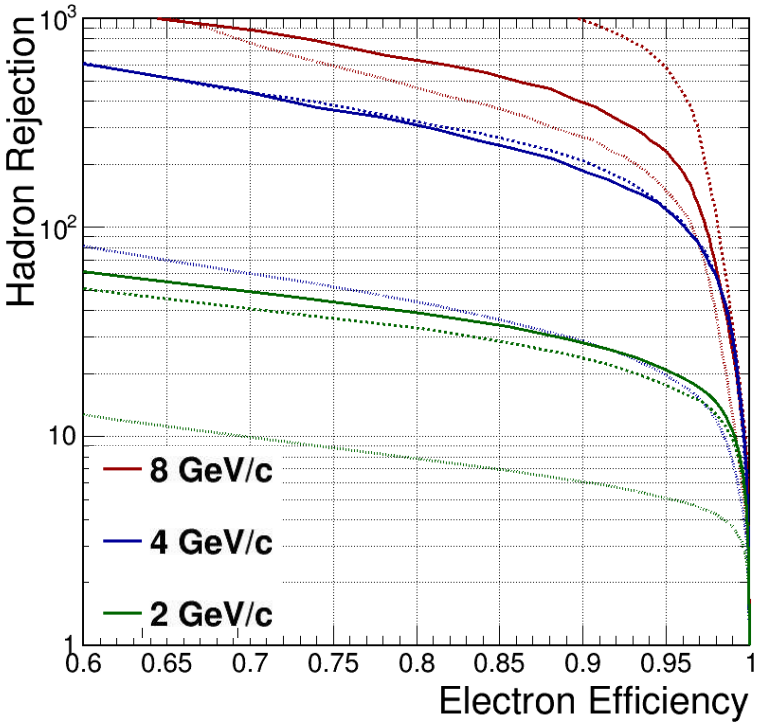

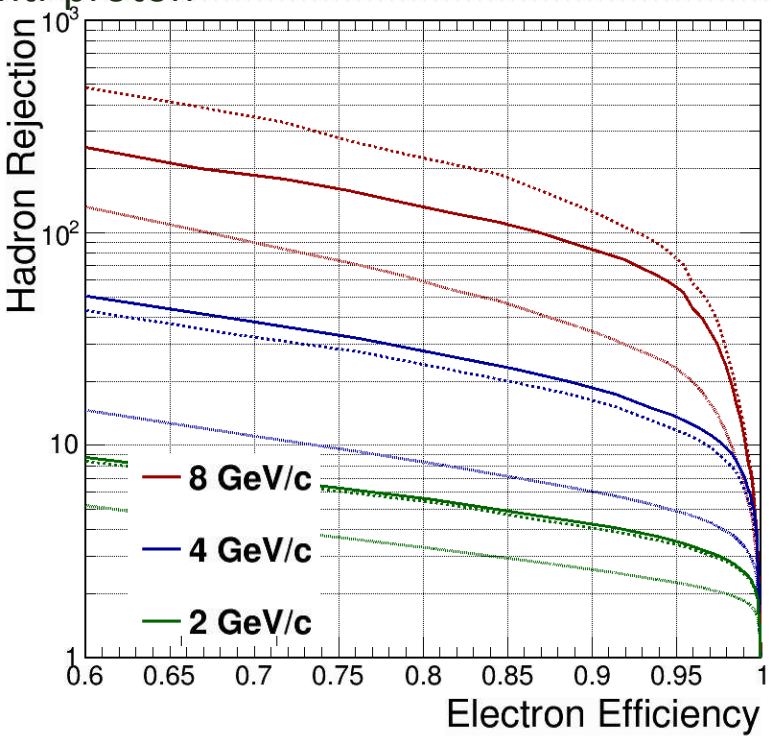

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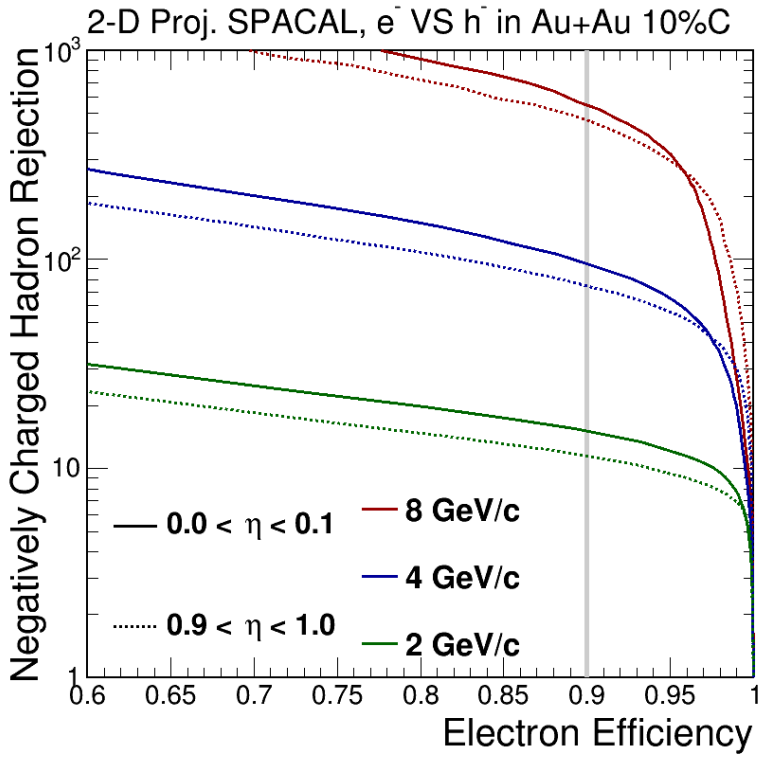

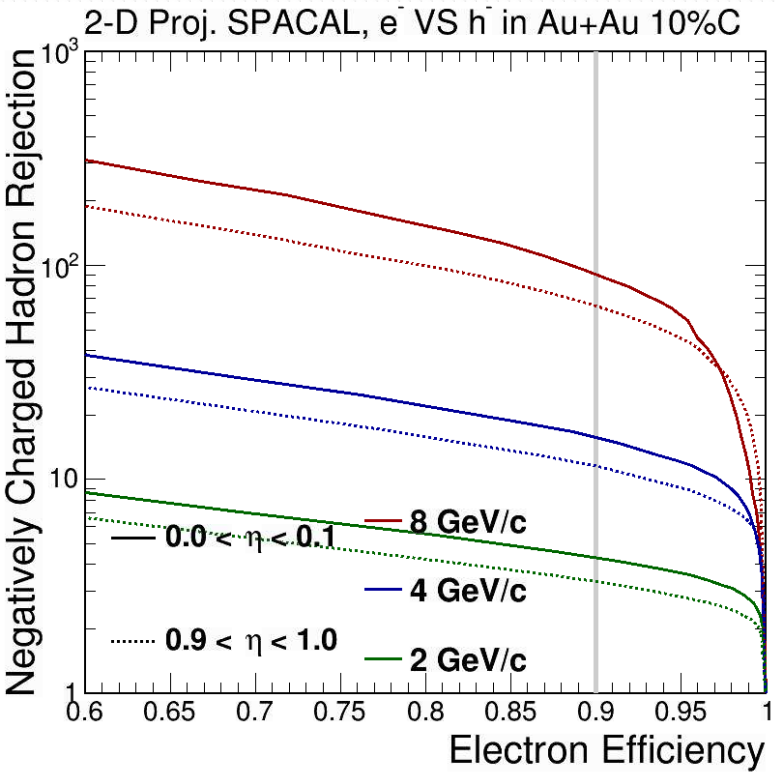

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