Overall cuts

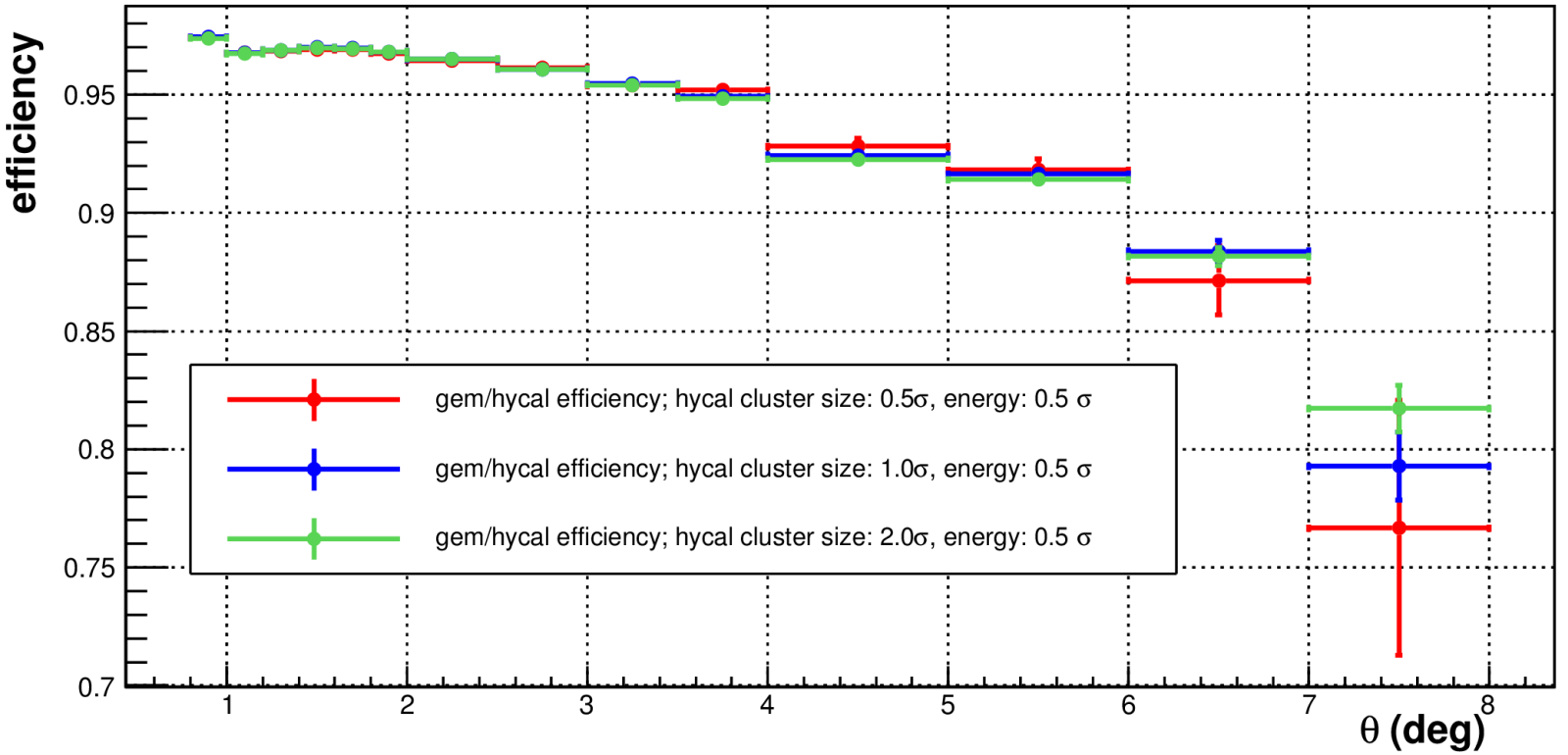
Cuts used in efficiency

- 6 sigma (HyCal resolution) matching between GEM and HyCal
- 5 sigma zero suppression, GEM signal pedestal cut
- HyCal cluster size cut
- HyCal cluster energy cut
- No cluster quantity cut

Dead area cut (only for GEM efficiency)

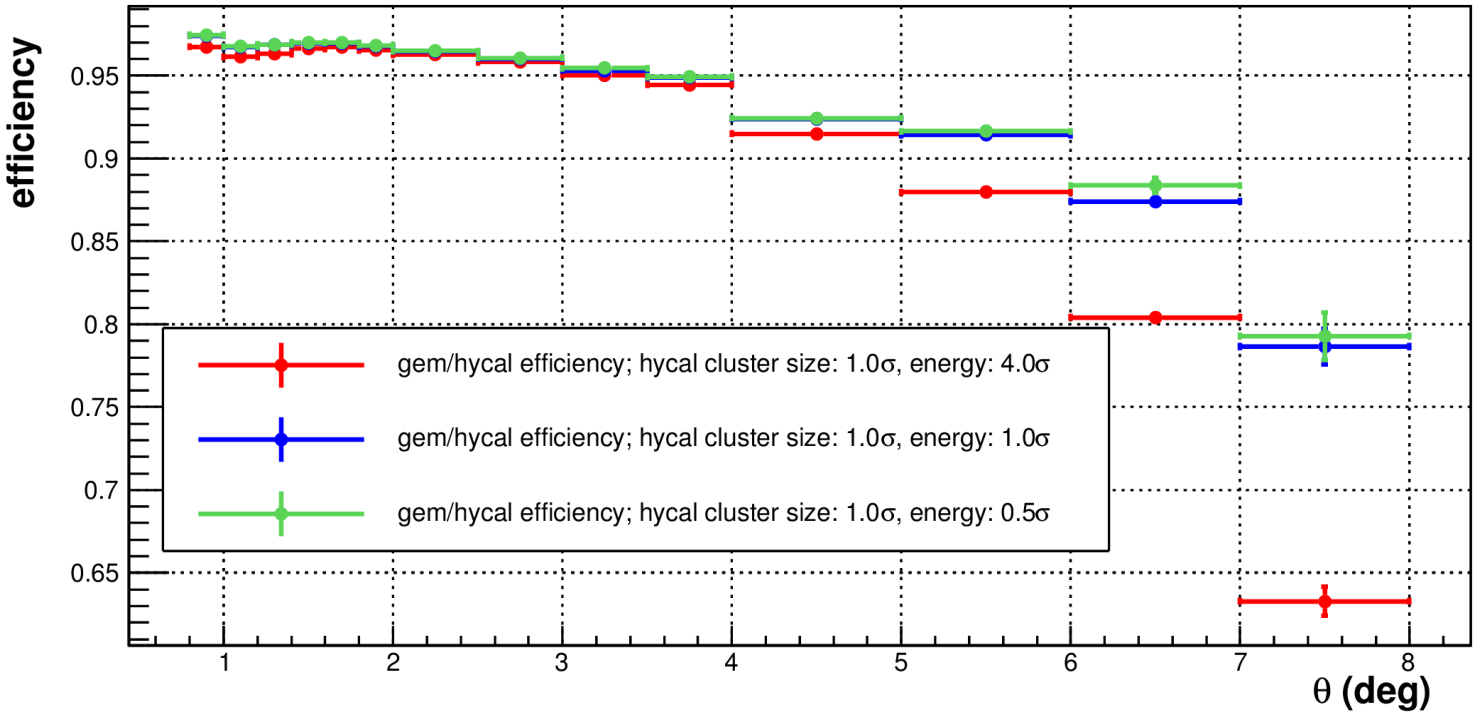
- Spacer cut
- Broken strips cut

Efficiency from production runs



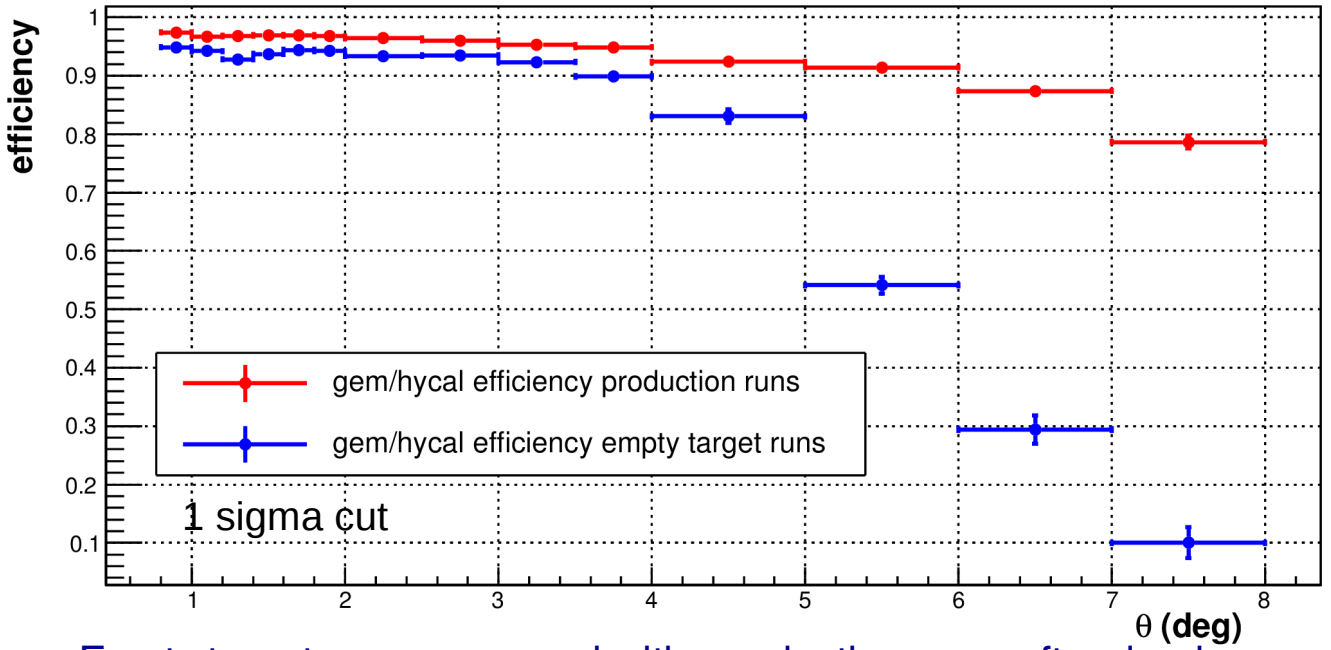
- Combined 113 production runs
- HyCal cluster: pwo mean: 23.16, sigma: 3.37; lg mean: 14.86, sigma: 3.88; transition: 18.3, sigma: 3.87
- Removed dead area

Efficiency from production runs



- Combined 113 production runs
- HyCal cluster: pwo mean: 23.16, sigma: 3.37; lg mean: 14.86, sigma: 3.88; transition: 18.3, sigma: 3.87
- Dead area removed

Efficiency from empty target runs



Empty target runs compared with production runs, after dead area cut

- Cosmic rate is even through the whole HyCal surface
- Cosmic event has higher percentage in large angle, and opposite in small angle
- Cosmic effect should be more obvious in empty target runs, given that the real e-p events are rare for empty runs in large angle
- Need to do cosmic removal for efficiency study
- The new cosmic removal results show that cosmic only contribute ~0.2% difference, need to study efficiency drop in other ways

On-going work

- Cosmic simulation for NN training
- Comparing efficiency between simulation and data
- Pedestal search (GEM zero suppression)
- Efficiency from calibration runs