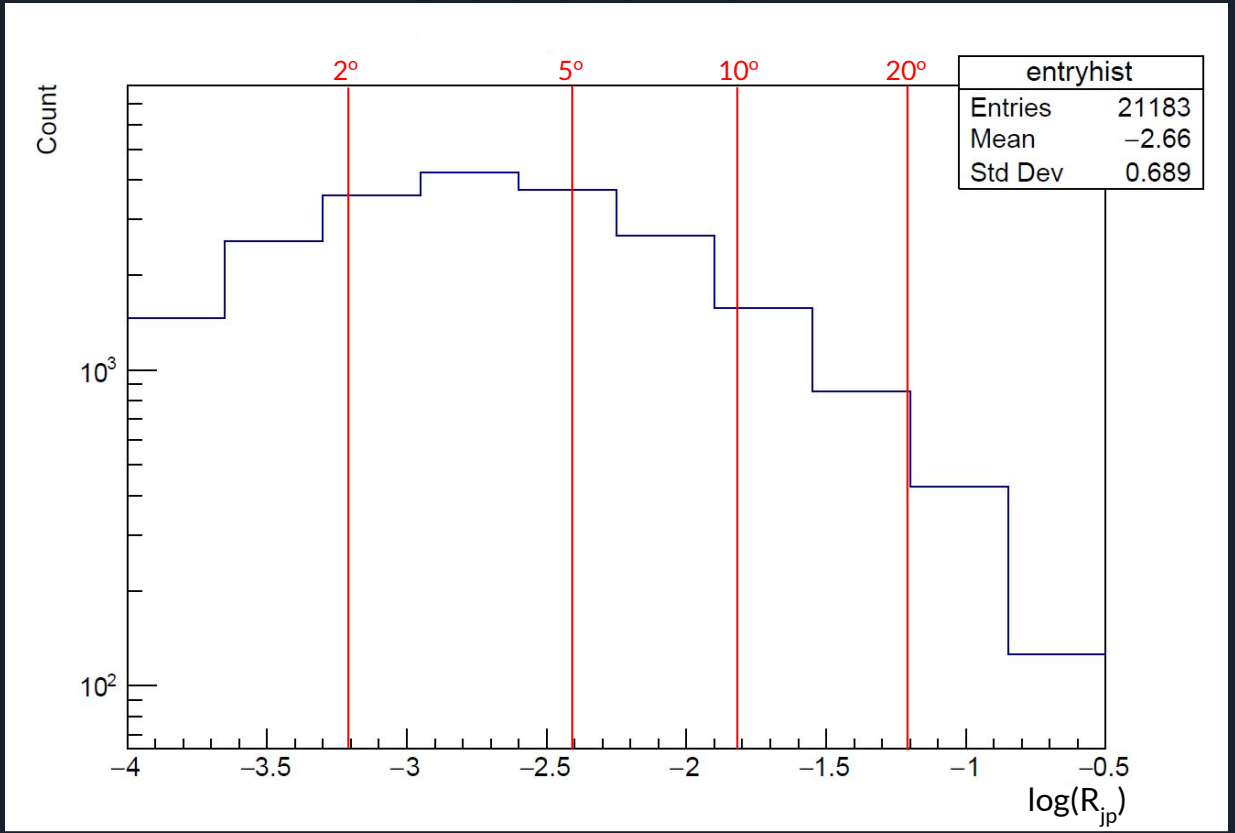
γ's Near Jet Axis ECal Performance

Bayley Burke, Jim Brau
University of Oregon

Jet and γ's Selections & Parameters

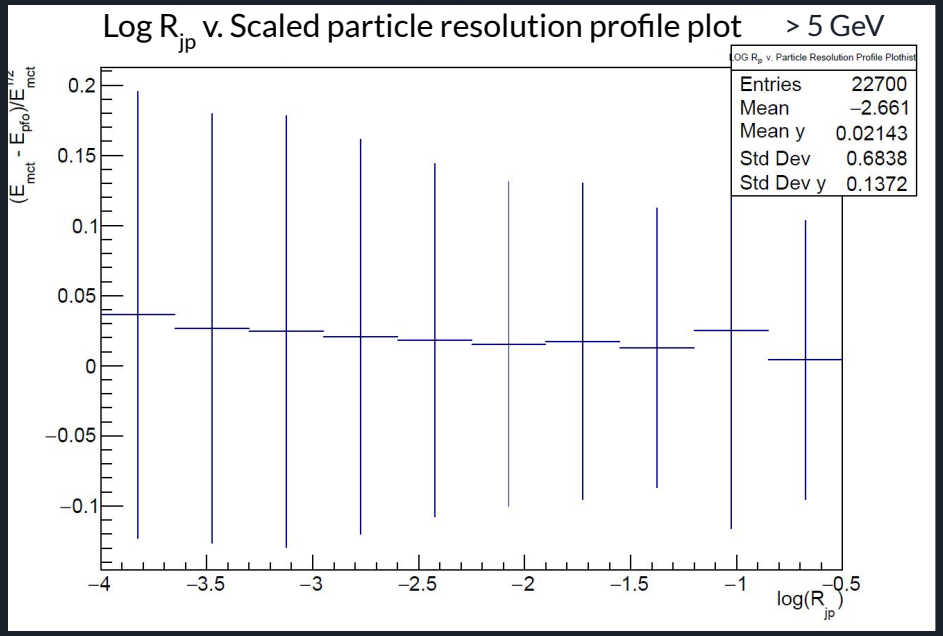
- Standard SiD Model
- E_{cm} = 250 GeV
- $e^+e^- \rightarrow Zh$, Higgs $\rightarrow$ Invisible, Z $\rightarrow$ qqbar events only
- $R_{ij} = 1 - i \bullet j = 1 - \cos(\theta_{ij})$
  - i, j are the unit vectors of particles or jets
    - $R_{jp} = 1 - \cos(\theta_{jp})$, where θ_{jp} is the angle between the jet axis and the constituent particle
- Jets
  - > 5GeV
  - 2 jet events, both jets in barrel, sum of both jets > 100 GeV, each jet > 35% total event energy
  - Selects 9,333 out of 65,742 qqbar events
- Particles - matching and selecting Monte Carlo γ's & PFO's
  - $R_{pp} < .00005$
    - (R between Monte Carlo particle and PFO particle)
  - $|E_{mct} - E_{pfo}| < E_{mct}^{(1/2)}$
    - Removing extreme outliers
  - γ only

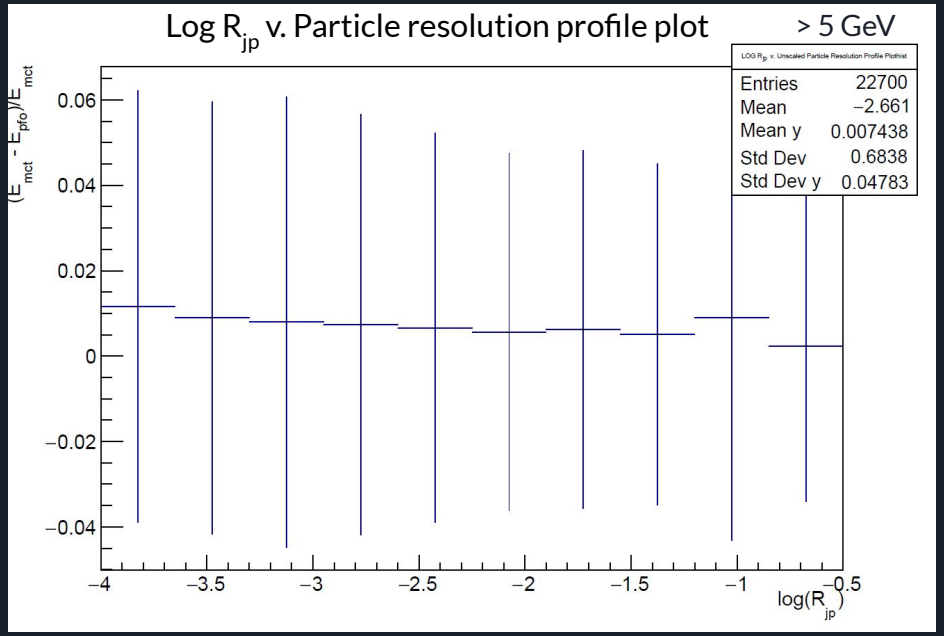
> 5 GeV γ's distribution relative to jet axis



> 5 GeV γ's

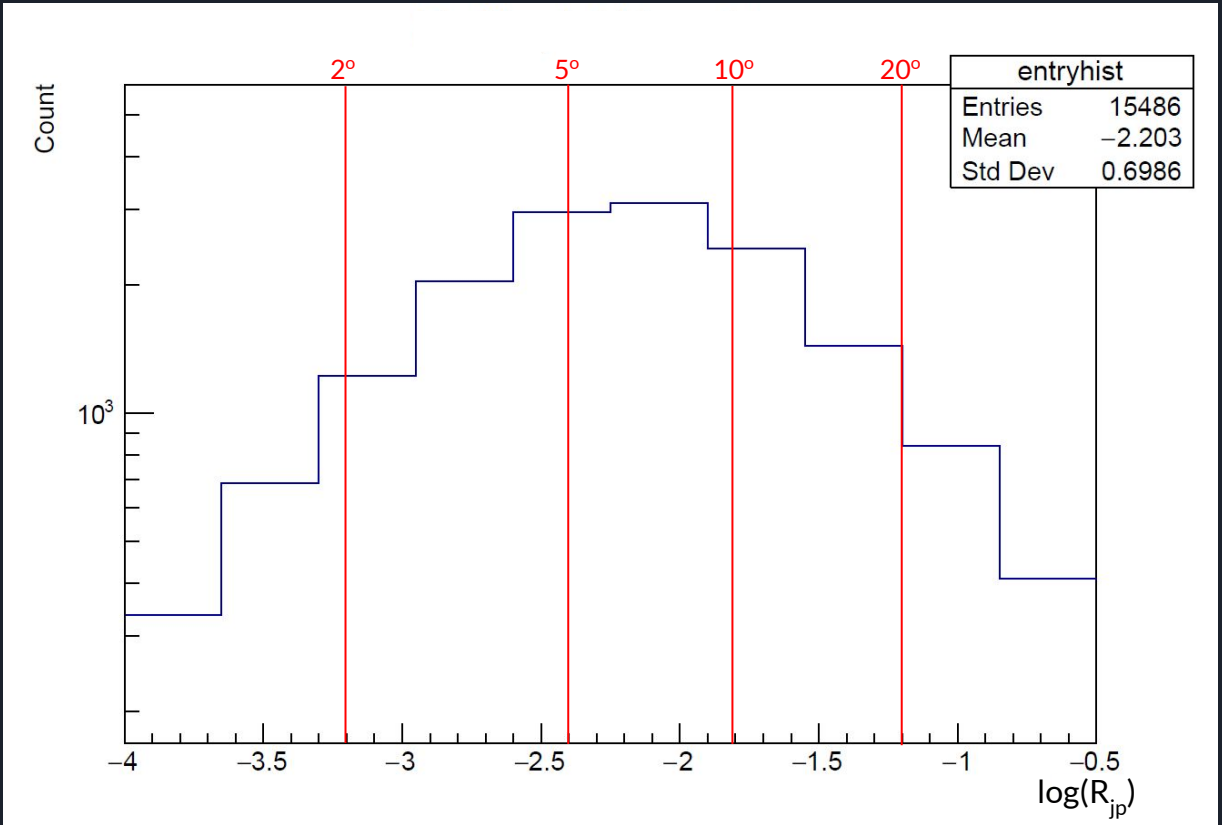
Profile plots showing mean and standard deviation of gamma energy measurement





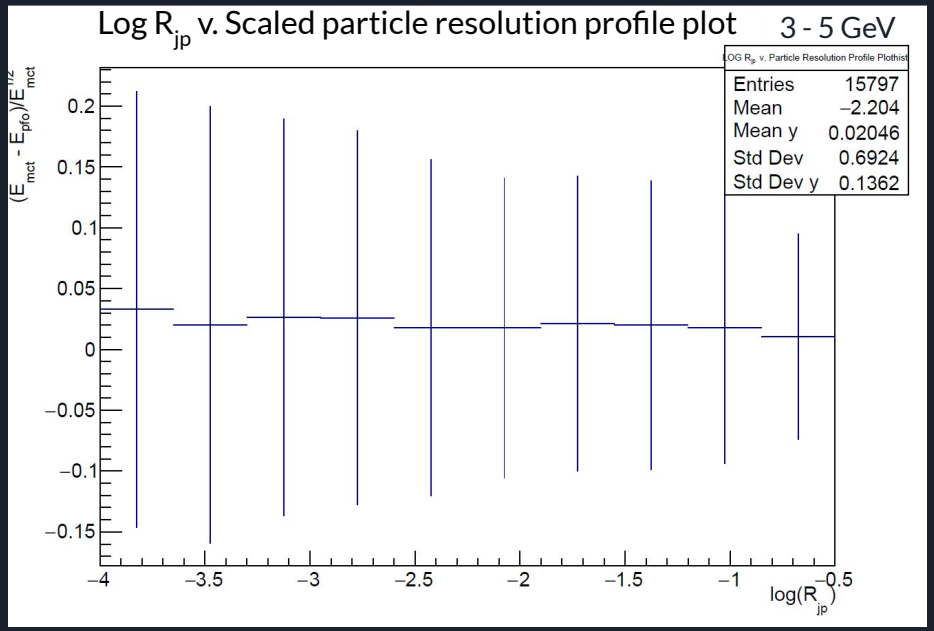
Resolution of gammas degrades near jet axis, as expected
(systematic positive offset)

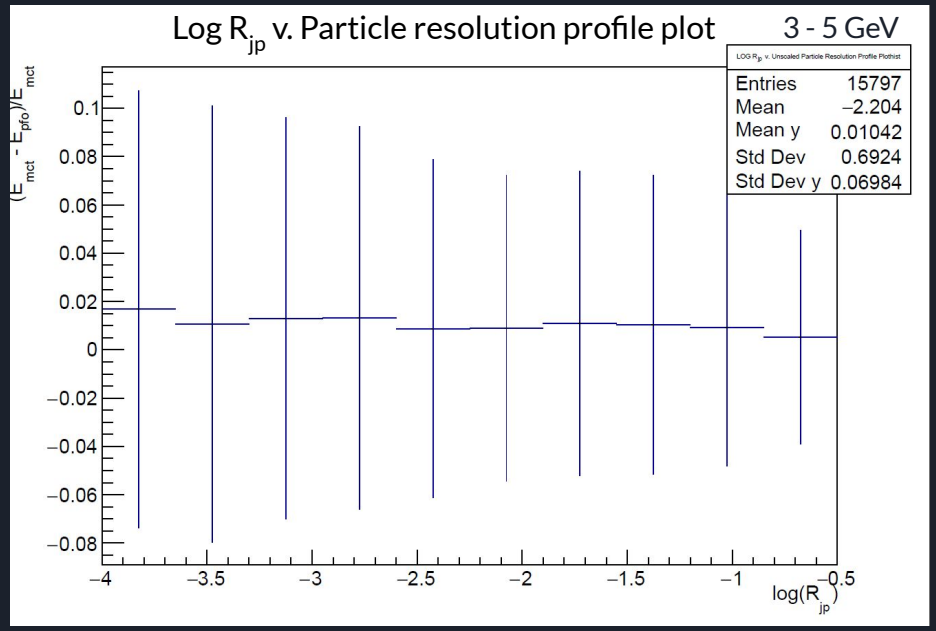
3 - 5 GeV γ's distribution relative to jet axis



3-5 GeV γ's

Profile plots showing mean and standard deviation of gamma energy measurement





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Next Steps

- Investigating how MAPS can improve these results
  - Should perform better in busy inner-jet environment
    - Better spatial resolution → better able to disentangle close-together particles
    - Improve measurement close to jet axis