EPIC Tracking Efficiency Studies Using Realistic Seeding

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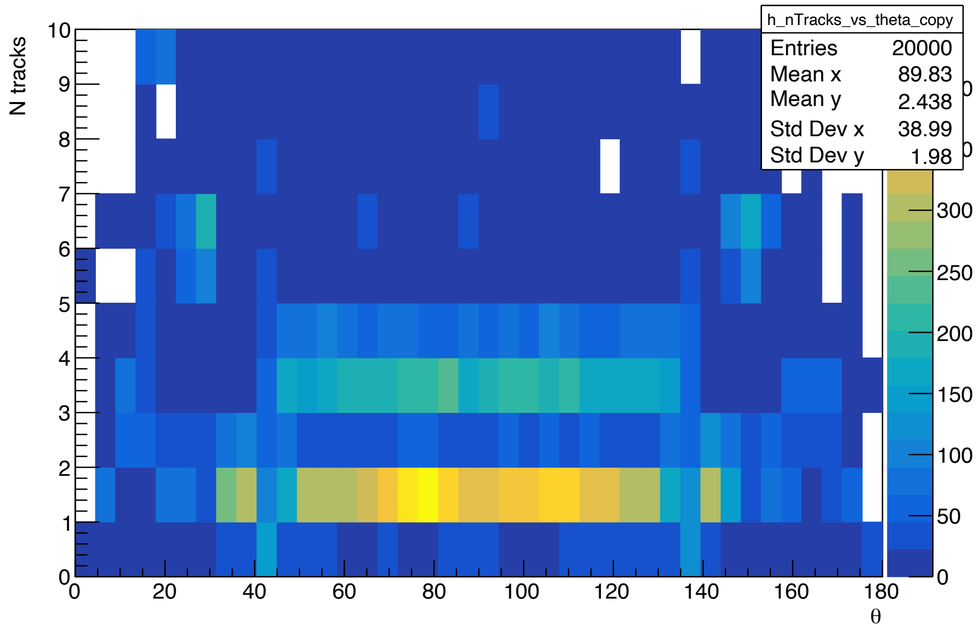
Introduction: Realistic Seeding Status

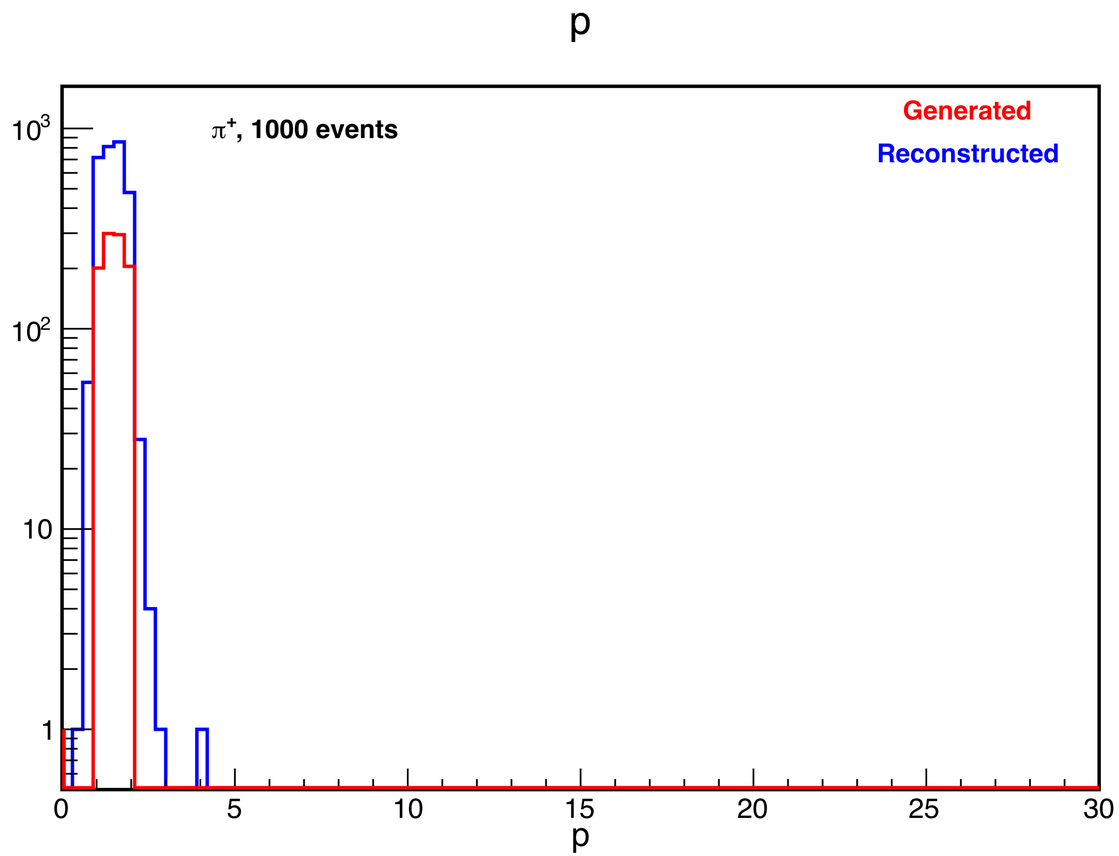


- Juggler/ACTS 19.9 version, using ACTS' binned seeder
- Maximum seeds per space point middle set to 2 (minimum not yielding a poor efficiency)
- Mostly 1 seed/track, but some 3 or 4 seeds/track

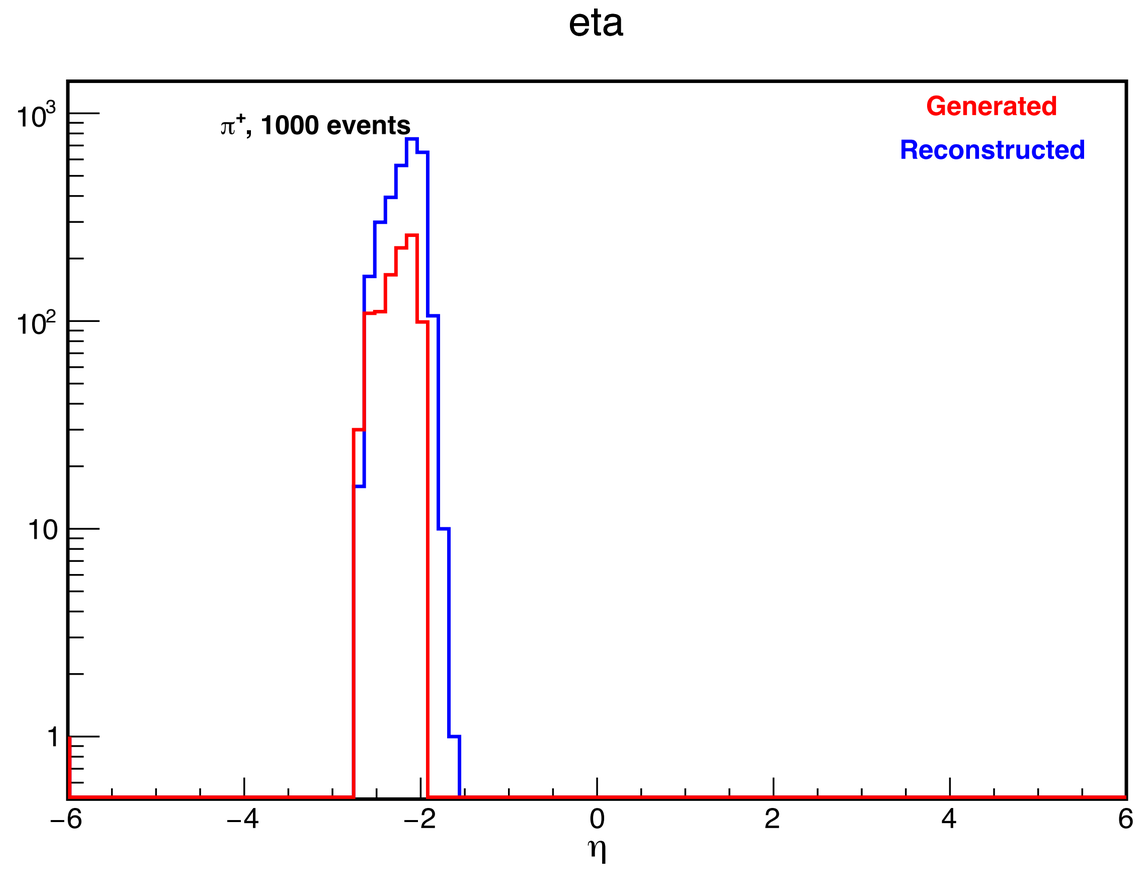
- Many remaining issues tied to the binning and accomodating our tracking acceptance
- Plan to have a initial attempt at the orthogonal seeder later this week

Slide from Yue Shi Lai

p and η Distributions



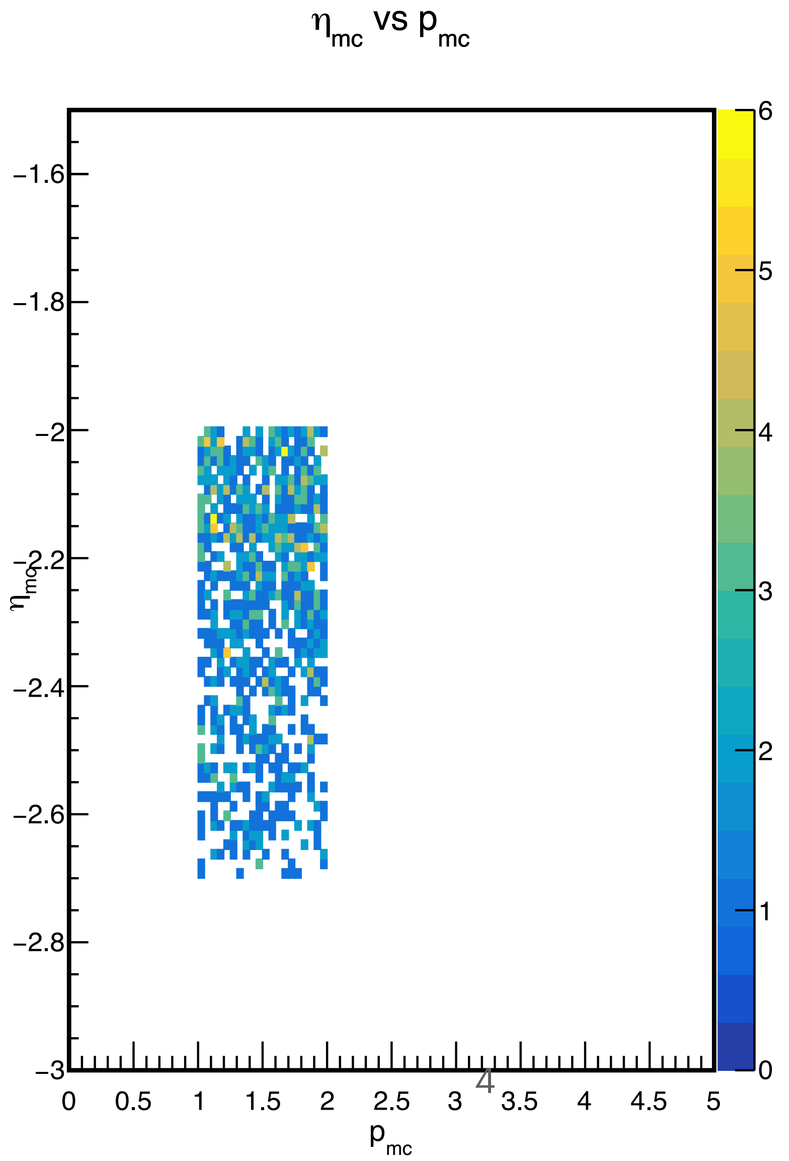
- Single particle (pion) events
- $1 \leq p \leq 2$ and $-2.75 \leq \eta \leq 2$

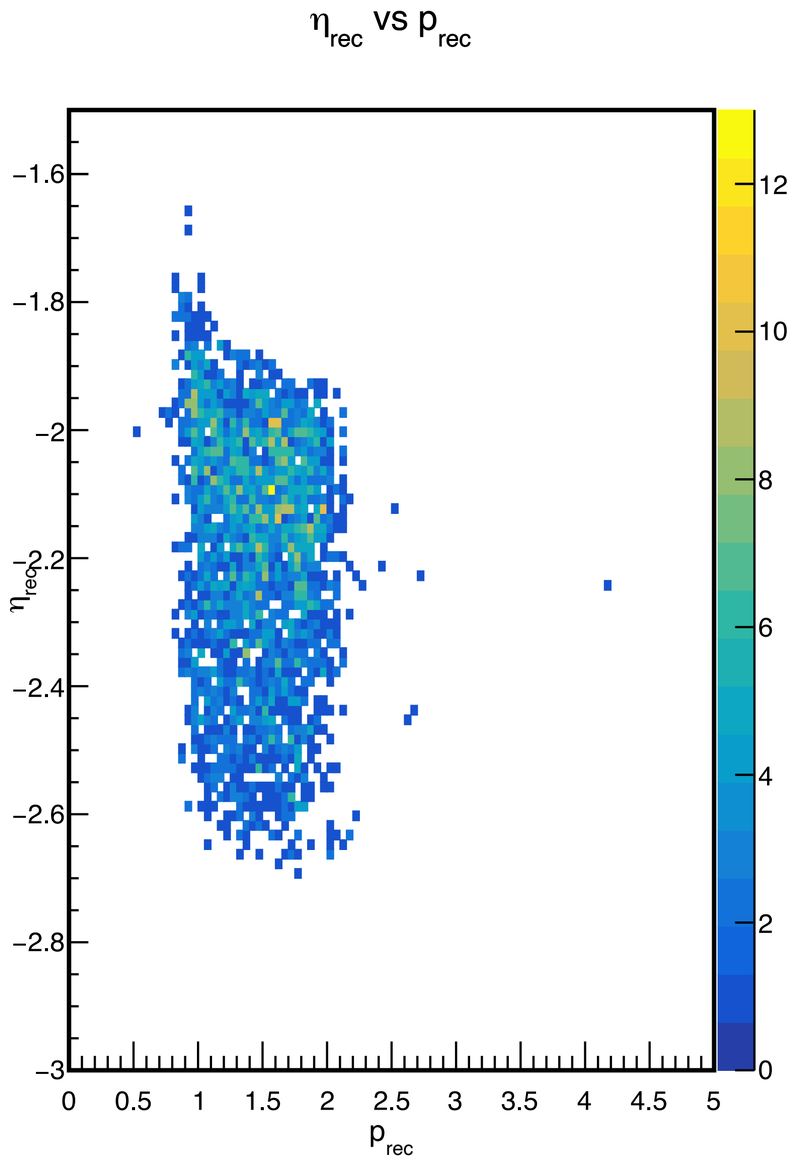


- Track reconstruction efficiency used to be low in this region

η vs p for MC and reco

- 1000 events
- Events are reconstructed worse in the higher η ranges



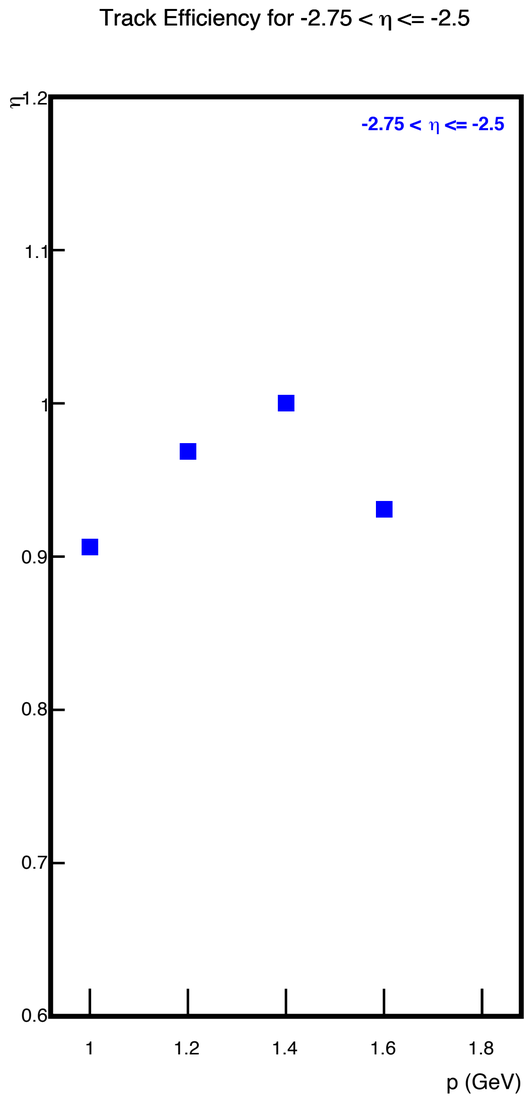


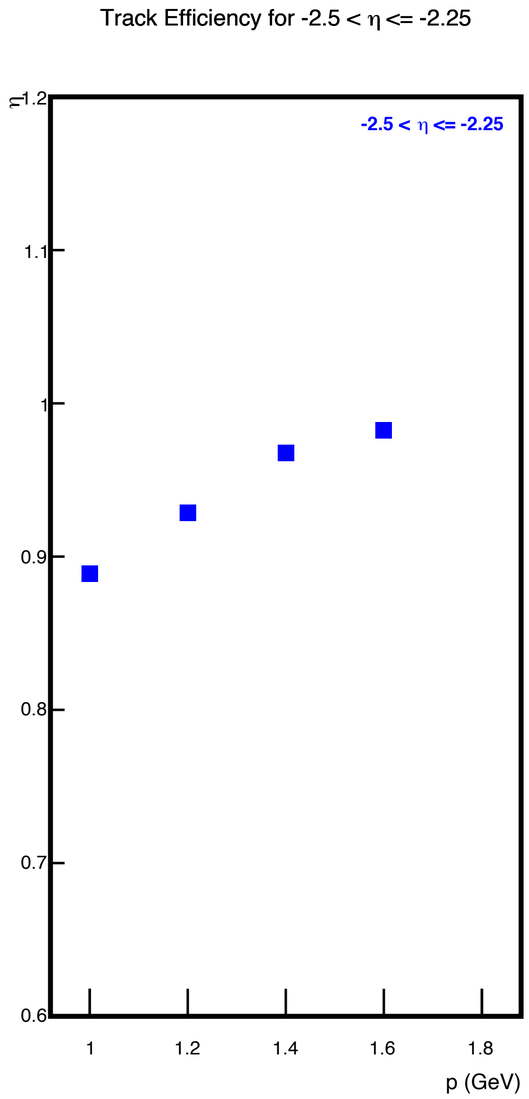
Matching Criteria

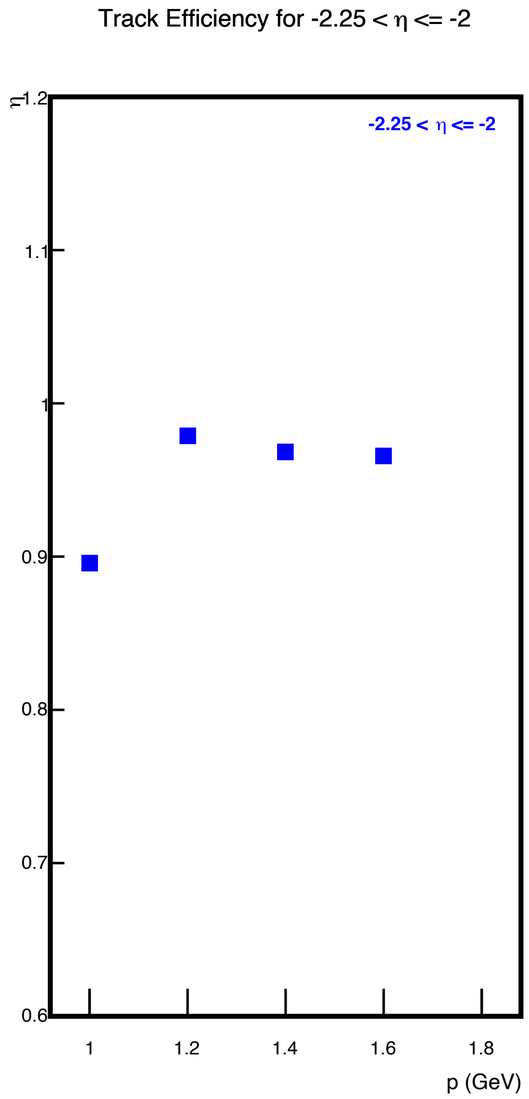
$$\text{efficiency} = \frac{\text{num of matched tracks}}{\text{total num of tracks}}$$

- Matching criteria:
  - Pick the reco particle with the same charge and the closest momentum
  - $\frac{p_{rec} - p_{truth}}{p_{truth}} < 0.1$
- Cannot have >100% efficiency because each track that is reconstructed is counted as 1 track
- Do not currently have access to the # of hits

Tracking Efficiency







- High efficiency is observed at low p and high η range
- We are seeing around ≥90% efficiencies in this region

Next Steps

- Make a 2D efficiency plot in ϕ and η
- Set a matching requirement in $\Delta\phi$ and $\Delta\theta$ to find reconstructed tracks
- Generate events for $-3.5 \leq \eta \leq 3.5$ and $0.1 \leq p \leq 30$
- Use realistic seeding to reconstruct these events
- Check efficiency as a function of η and p
- Get access to the # of hits and χ^2 (track quality variable)