Toy Model Overview

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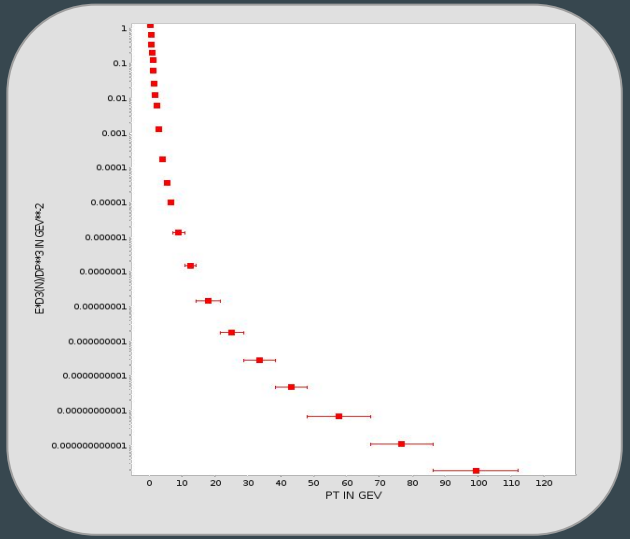
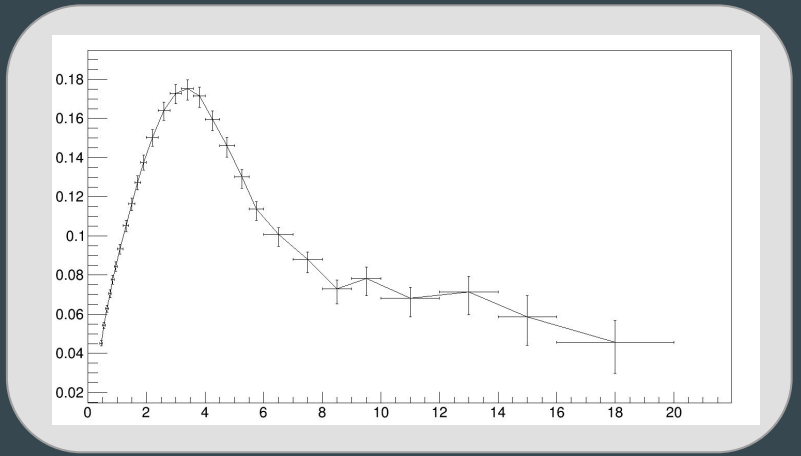
Raw Data Sampled

- p_T spectra ← CMS data from Pb-Pb nuclei collisions at $\sqrt{s_{NN}}$ = 2.76 TeV.[1]
- $v_2(p_T)$ ← ALICE data from Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV.[2]

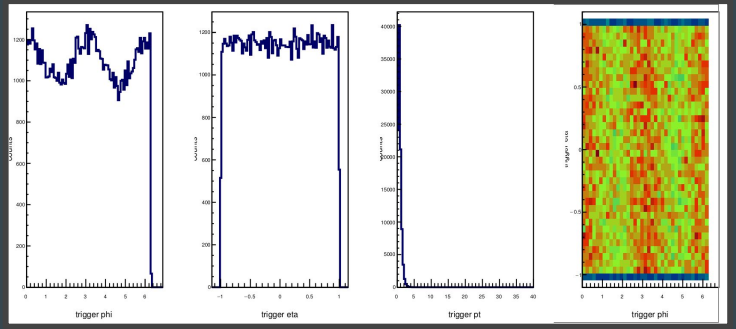




1: http://arxiv.org/abs/arXiv:1202.2554
2: http://arxiv.org/abs/ARXIV:1205.5761

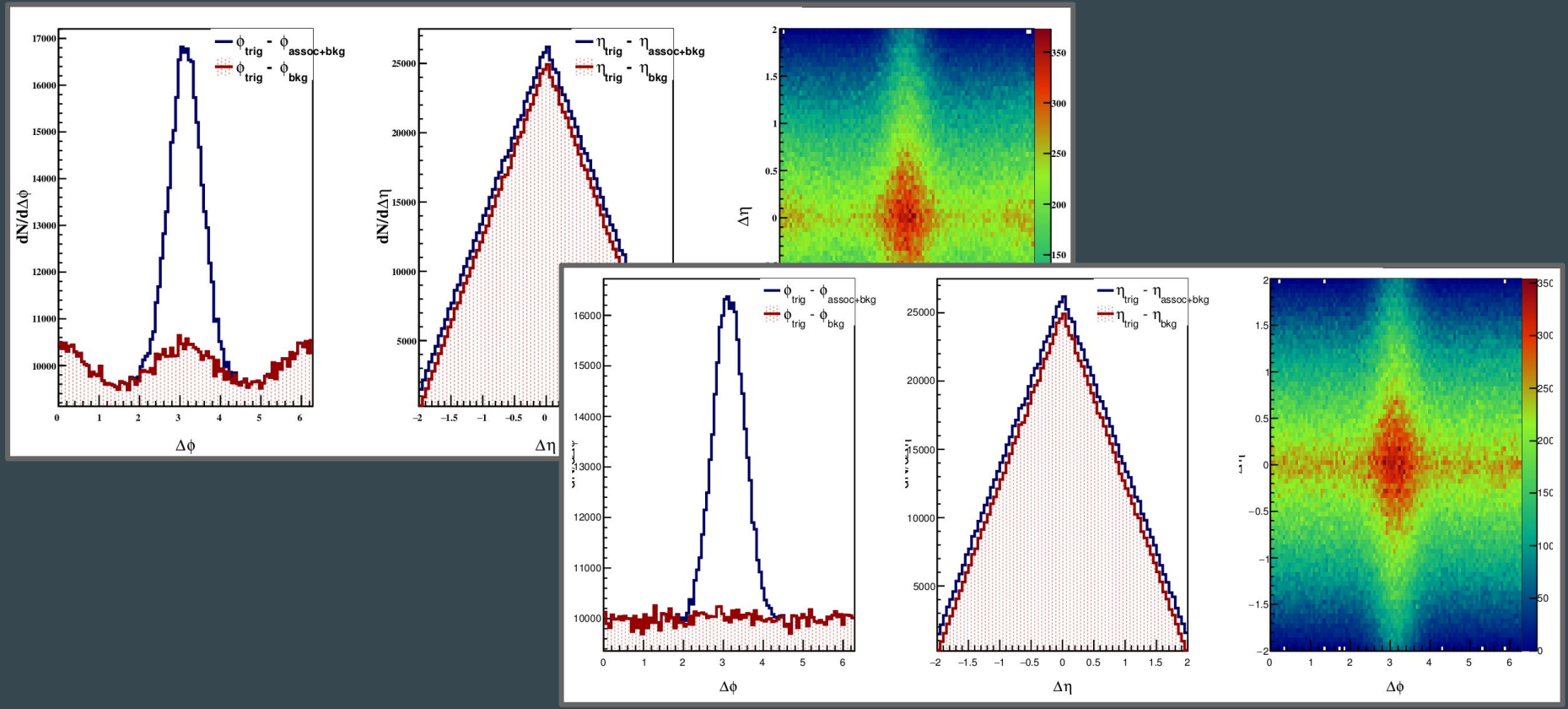
From Data to Particles

- For each collision event, want to simulate N number of particles defined by multiplicity at given centrality.[1]
- For each particle, want to generate:
  - $p_T \leftarrow$ Sample from data with Prob(p_T) $\propto dN/dp_T$
  - $\eta \leftarrow$ Assign randomly from uniform[-1, 1].
  - $\varphi \leftarrow$ Sample with Prob(φ) $\propto 1 + 2 * \mathbf{v_2(p_T)} * \cos(2 * \varphi)$
- If p_T > threshold (e.g. 5 GeV):
  - Flag as a “trigger” particle.
  - Generate high-p_T artificial single-particle “jet” opposite in η; $\Delta\varphi$ centered at π w.r.t trigger (Gaussian spread).



1: http://arxiv.org/abs/1012.1657

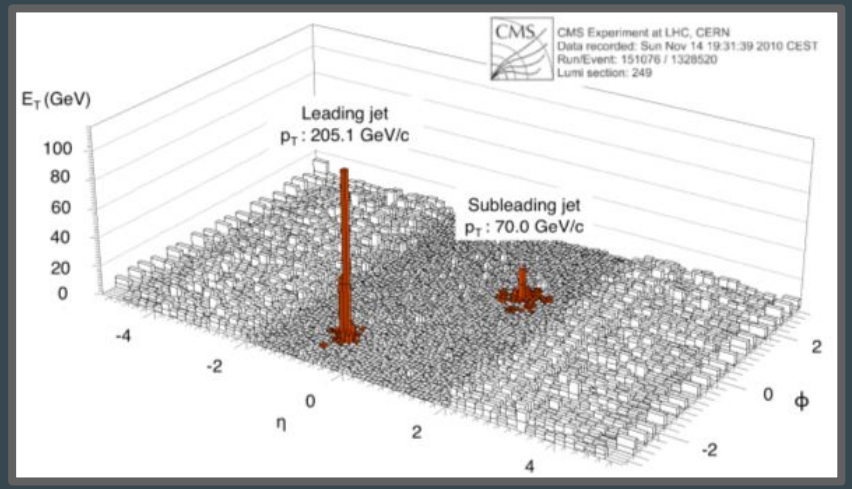
Particle Spectra



Relationships between trigger, associated, and background particles in η and φ.

Jet Finding with FastJet

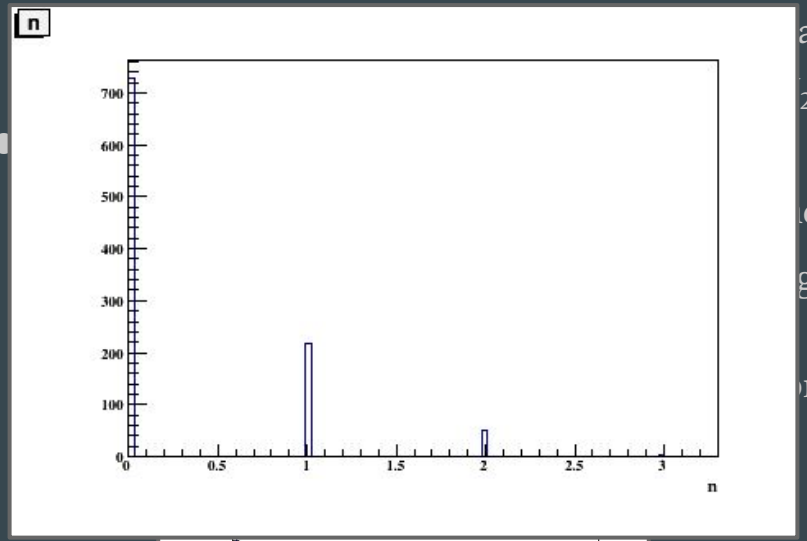
- Using vector of all particles in a given event as input, FastJet can return clusters of PseudoJet objects, defined via
  - A jet radius. Using (arbitrary) R = 0.2 for now.
  - Clustering algorithm. Using anti-kt.

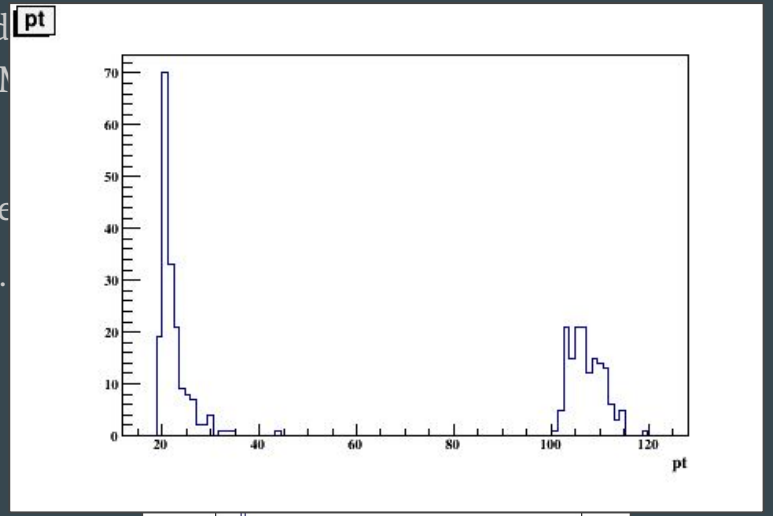


Want to write a jet finder optimized for reconstructing with high purity and efficiency in events similar to our toy model (i.e. grab only the red bins in events similar to figure to the left).

Current Status

- Event Generation:





What's Next

- Ensuring our jet finder returns sensible results of (currently buggy)
  - Δp_T, $\Delta\eta$, and $\Delta\varphi$ between reconstructed jet object and embedded (known) jet object.
  - Reconstruction purity: fraction of reconstructed jets that correspond to actual embedded jets.
  - Reconstruction efficiency: fraction of embedded jets that were found in reconstruction.
- Simulating many more events on the grid so we can analyze jet finder performance in the absence of artificially embedded jet objects.
- Possible extension: implementing jet fragmentation (as opposed to single high-pt objects).