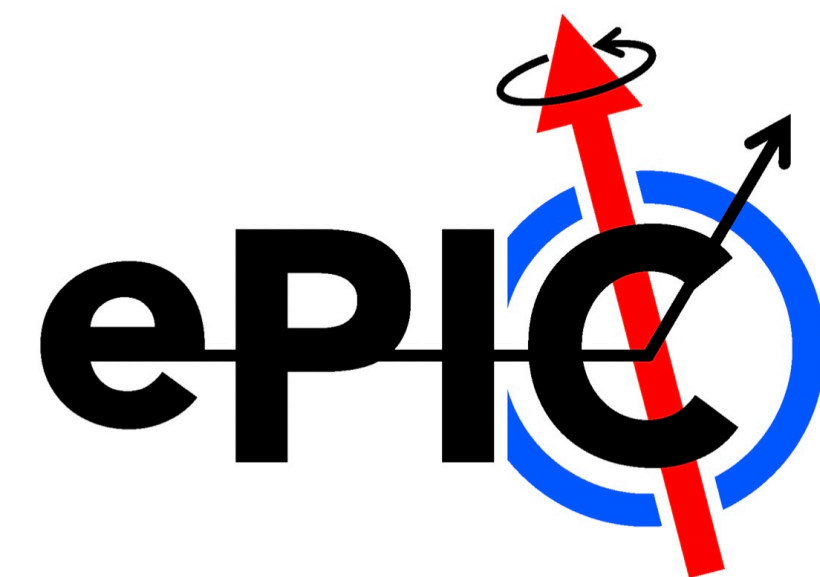


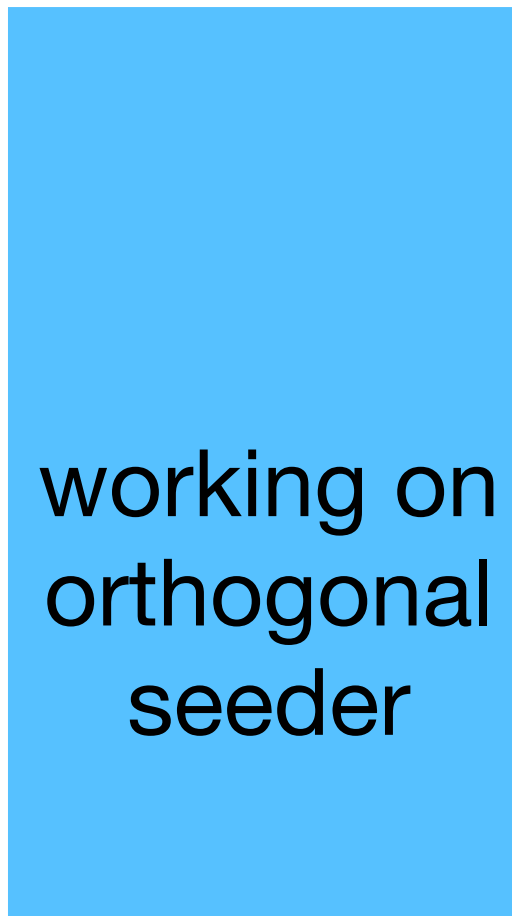
Realistic seeding status

Reynier Cruz-Torres
Lawrence Berkeley National Laboratory
EIC RNC meeting
January 17th, 2023



Intro

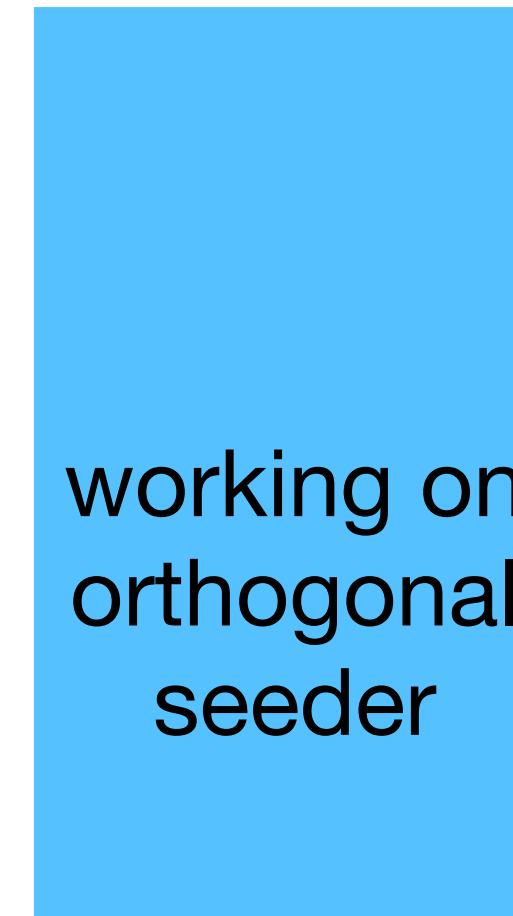
Yue Shi Lai



working on
orthogonal
seeder

Based on Juggler

Joe Osborn



working on
orthogonal
seeder

Based on EICrecon

Slides from J. Osborn (last ACTS meeting)

Overview

- Right now there is no reconstructed seeding algorithm implemented in EICRecon
 - There is ongoing parallel work in Juggler framework
- Both Acts seeding algorithms (binned and orthogonal) have been implemented in Fun4All for sPHENIX. I decided I could port the orthogonal seeder into EICRecon
 - I will likely not have the time to tune the algorithm. However, my hope was that this would serve as a foundation for others to get involved
- Status - algorithm implemented and runs. Naively just copied the parameters used for the sPHENIX MVTX - obviously won't work for ePIC

Slides can be found [here](#)

Slides from J. Osborn (last ACTS meeting)

Seeder

- Code on orthogonal_seeder [branch](#) in eicrecon
- Algorithm works as follows:
 - Takes all hits, converts to eicrecon::SpacePoint
 - SpacePoints provided to Acts, which produces seeds
 - 1 seed == 3 hits grouped together (no more, no less)
 - Simple circle (xy plane) + line (rz plane) fit to get estimate of track parameters
 - Momentum determined from assumed 1.7T field
 - Track position is point of closest approach to (0,0,z)
 - Assign arbitrary covariance to track parameters at the moment. Could be later tuned based on further studies of e.g. phi/theta/p resolution

Slides can be found [here](#)

Current work / next steps

J. Osborn

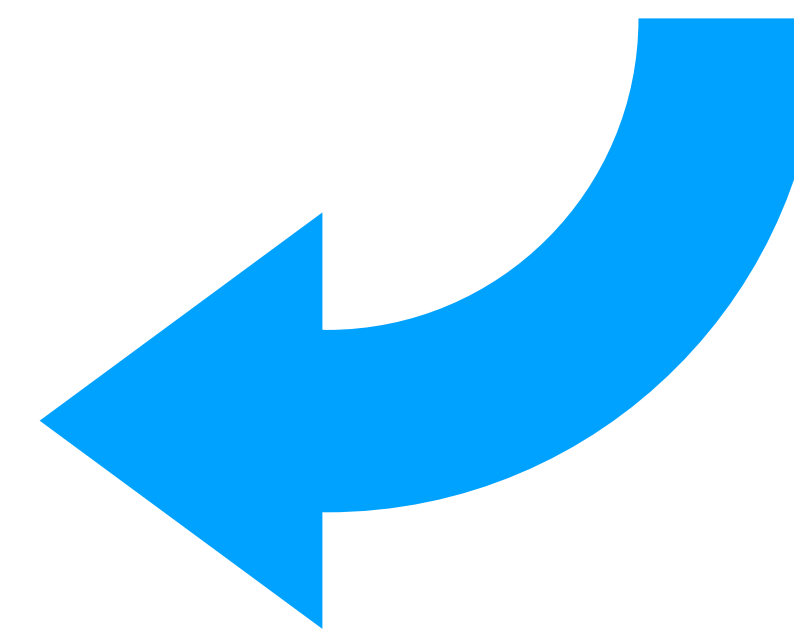
Modifying seeder so that parameters can be defined at the command line, without needing to recompile software after each iteration



Seeder performance optimization

RCT

Developing code to quickly analyze results from seeder to optimize seeder parameters

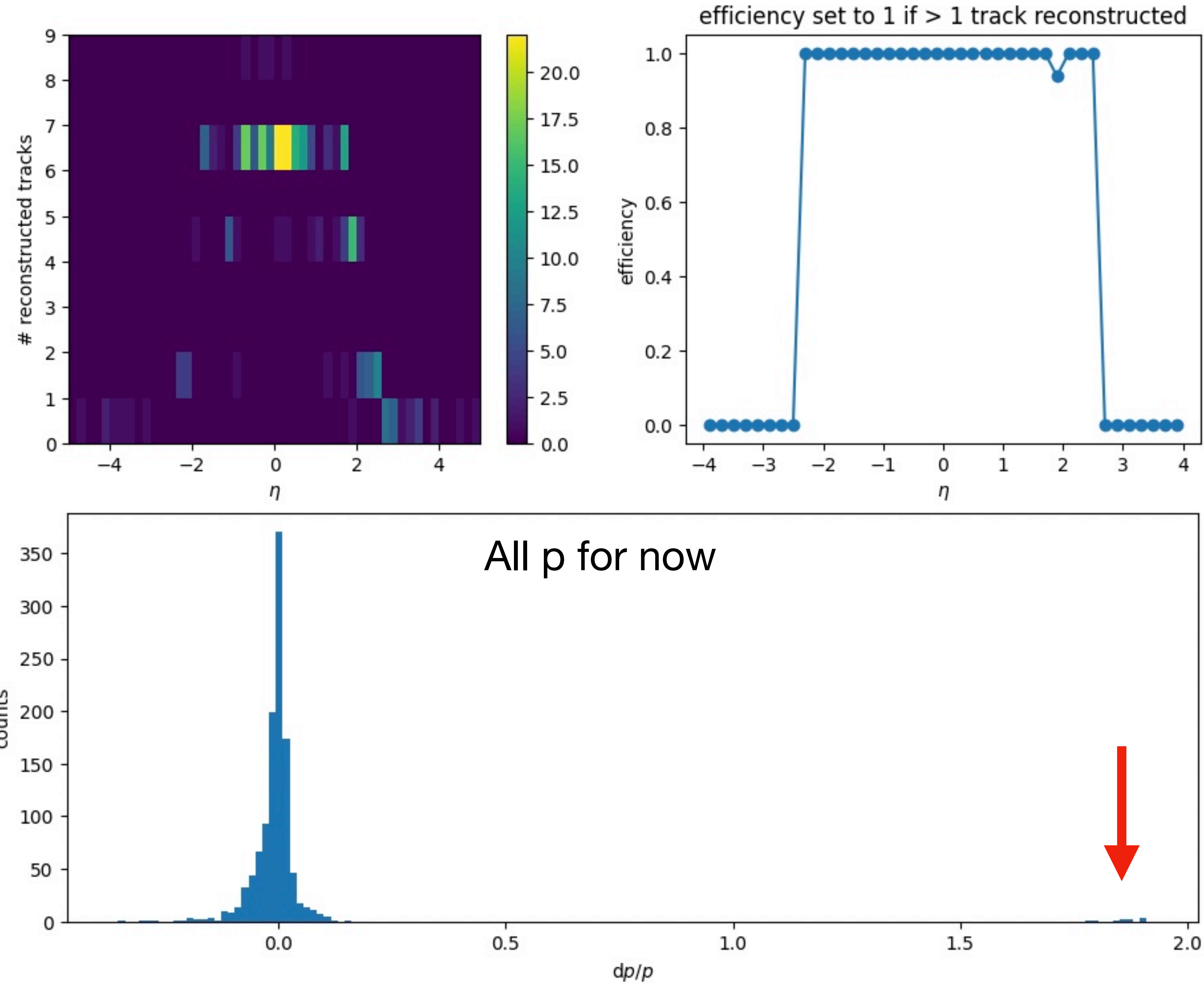


Code to analyze seeder performance

- Identifies good generated events (single-particle gun)
- Matches all seeds (or no seeds) to their corresponding generated event
- Makes plots to assess seeder performance

Writing the code based on a single (EIC) file provided by J. Osborn with sPHENIX seeder parameters naively ported over (i.e. the following plots are only presented to show the work that has been done and are not meant to show an attempted optimization yet)

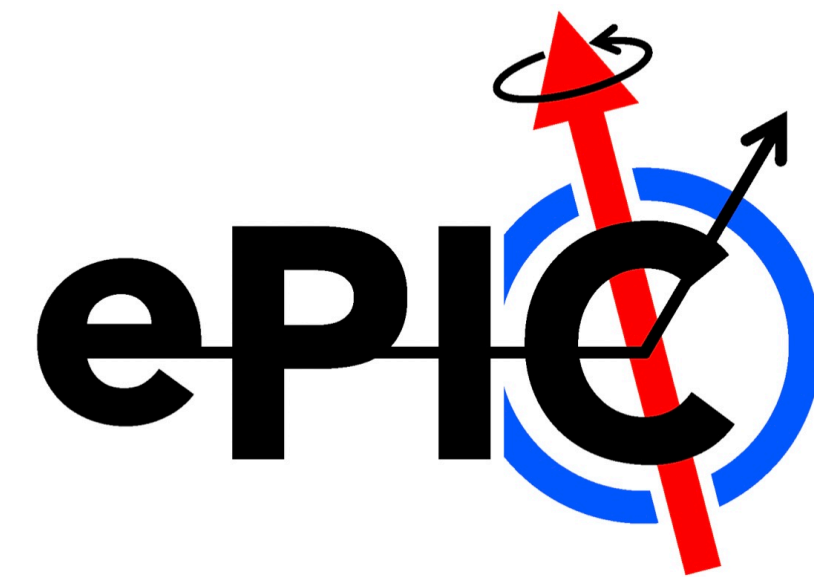
Status of code to analyze seeder performance



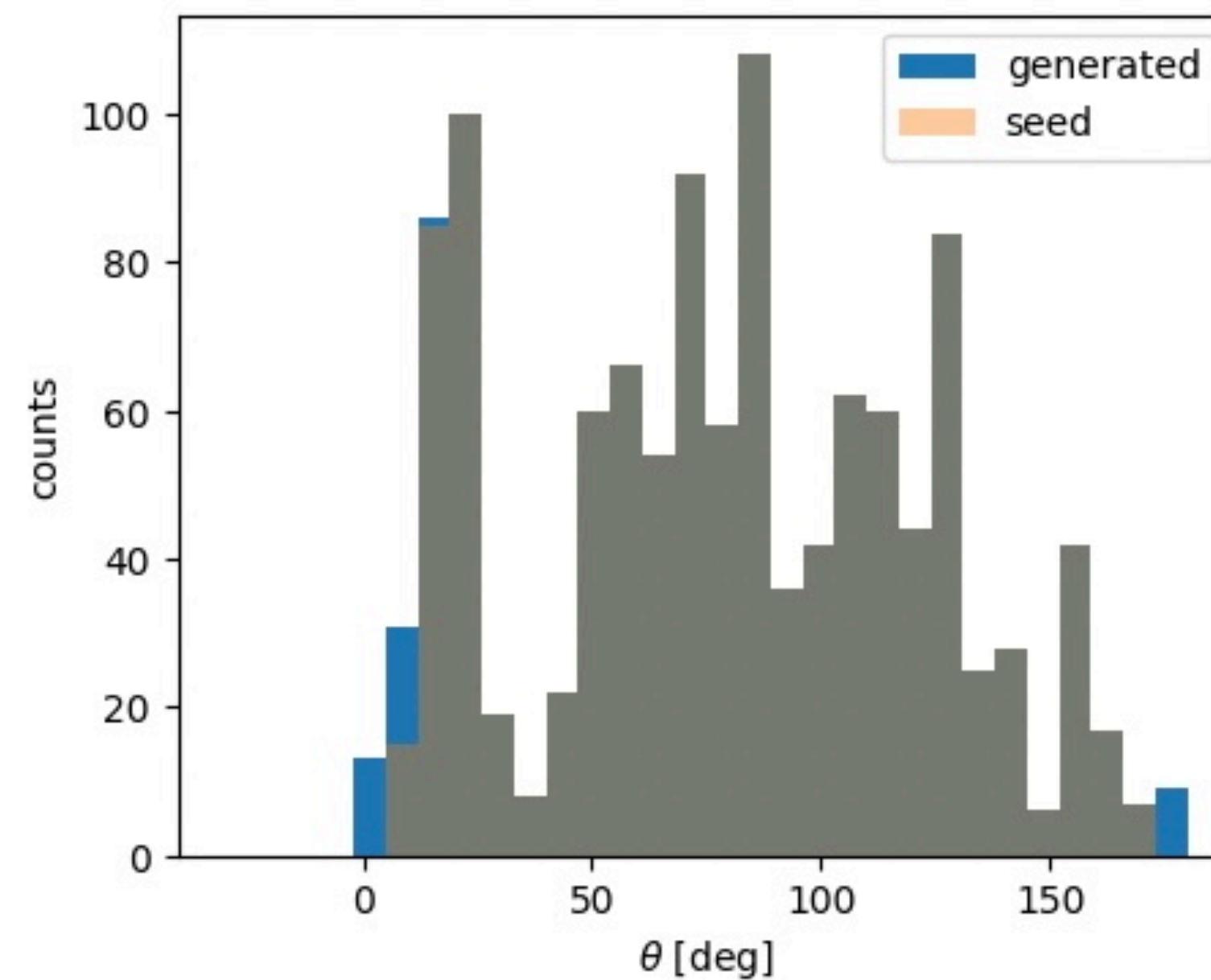
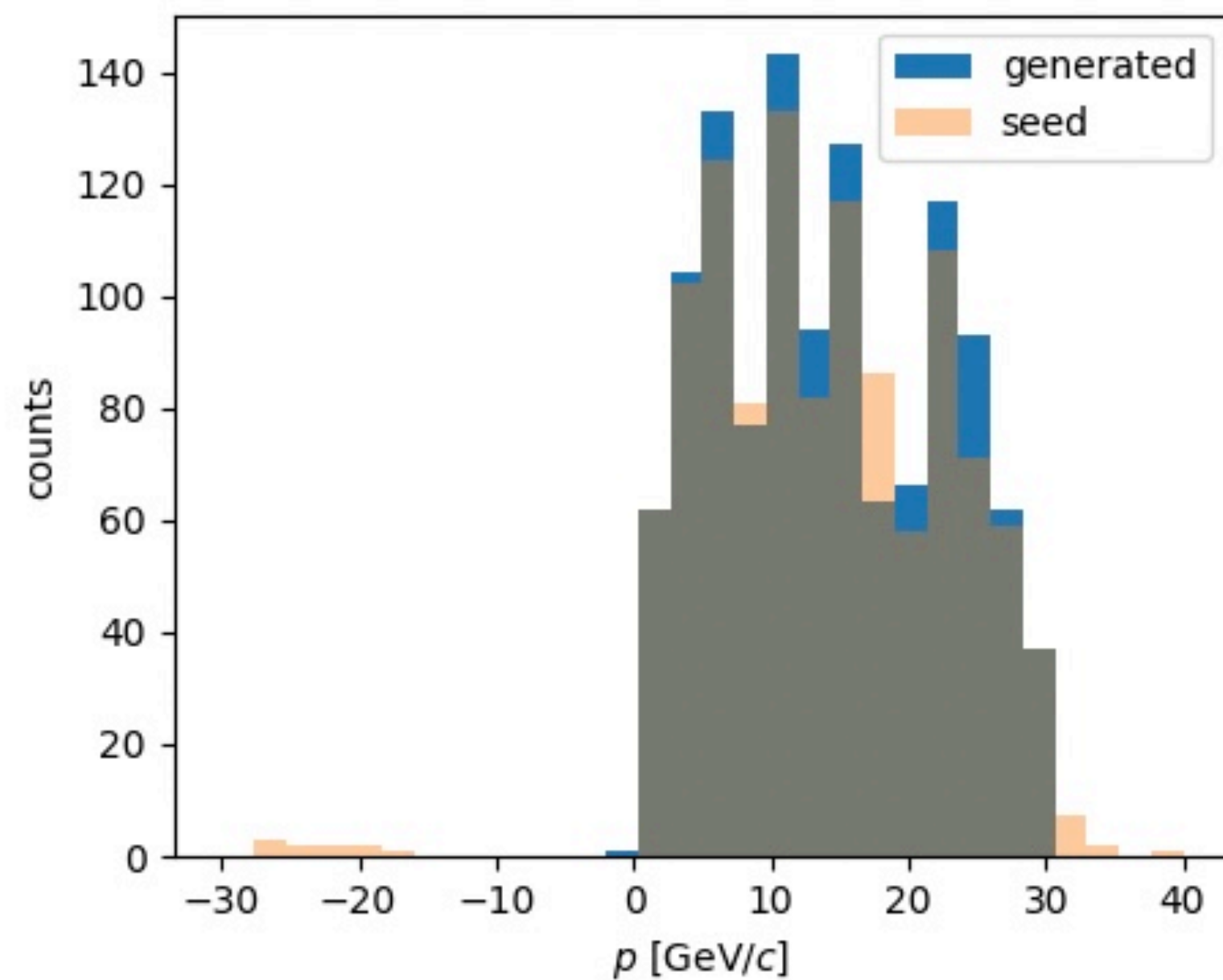
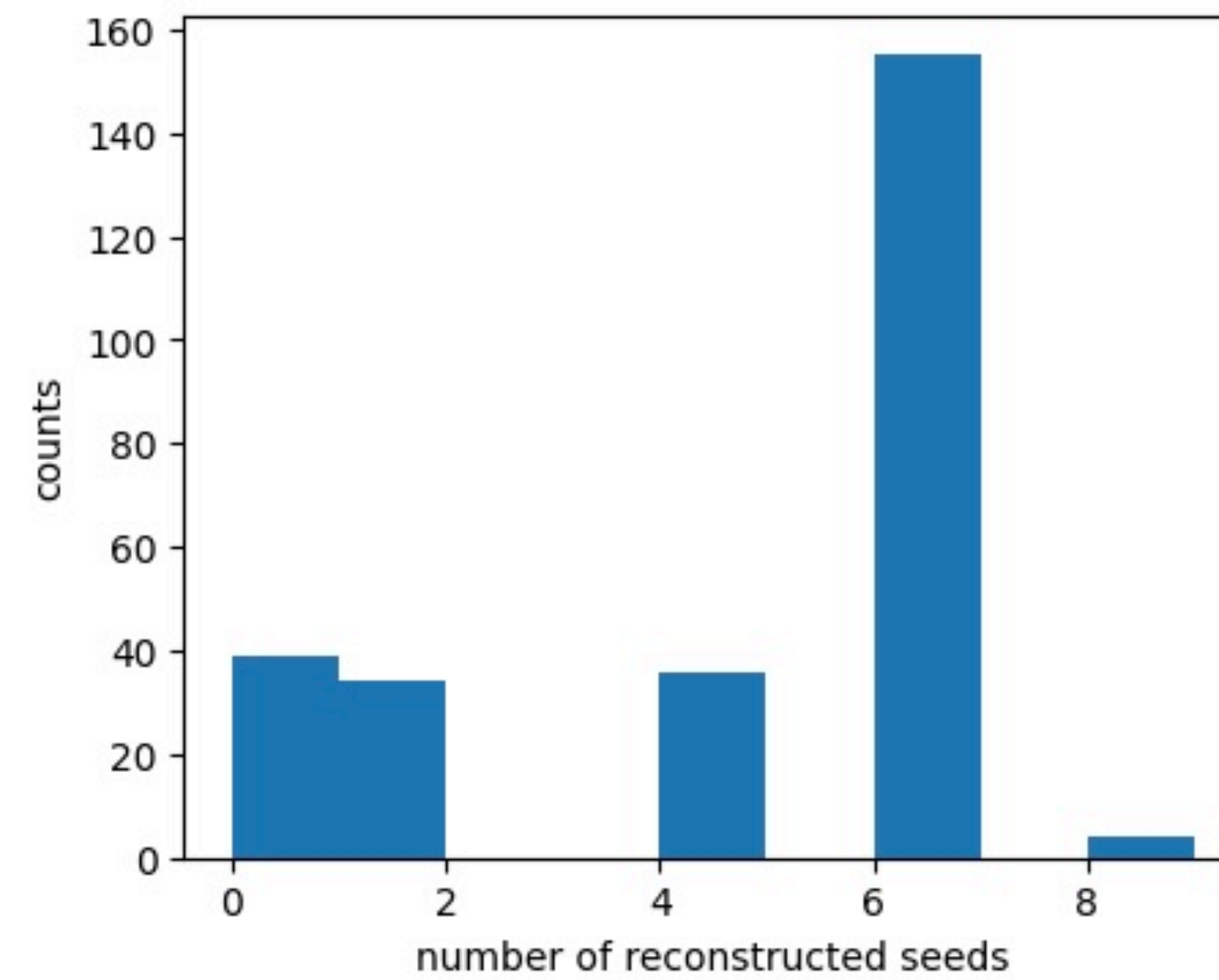
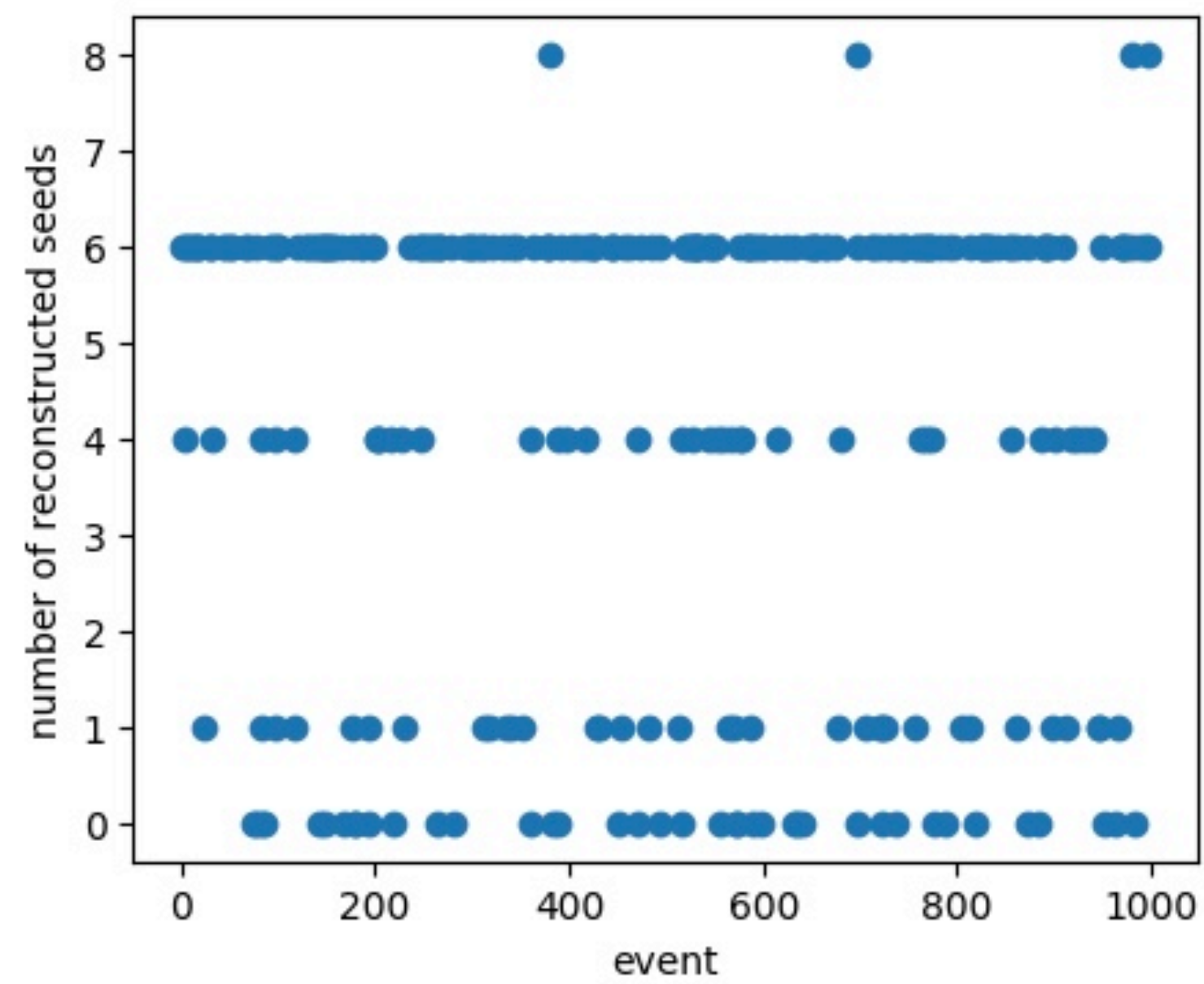
Summary and Conclusions

- Volunteered to participate in / coordinate effort between EICrecon and Juggler orthogonal seeders
- Met with J. Osborn last Friday to coordinate the work
- J. Osborn currently implementing EICrecon seeder in a way that can be easily optimized (i.e. no need to recompile code / many parameters can be tried in parallel)
- RCT started writing analysis code to optimize seeder parameters
- Y.S. Lai's (et al.) insights will be invaluable (not clear how similar the two orthogonal seeders are)

Thanks for your attention



Status of code to analyze seeder performance



Seeder based on EICrecon

J. Osborn ported the orthogonal seeder used by sPHENIX to EIC code.

He asked for human power to help him finish implementing / tuning this seeder

I volunteered also with the idea of liaising with Y.S. Lai / J. Osborn