

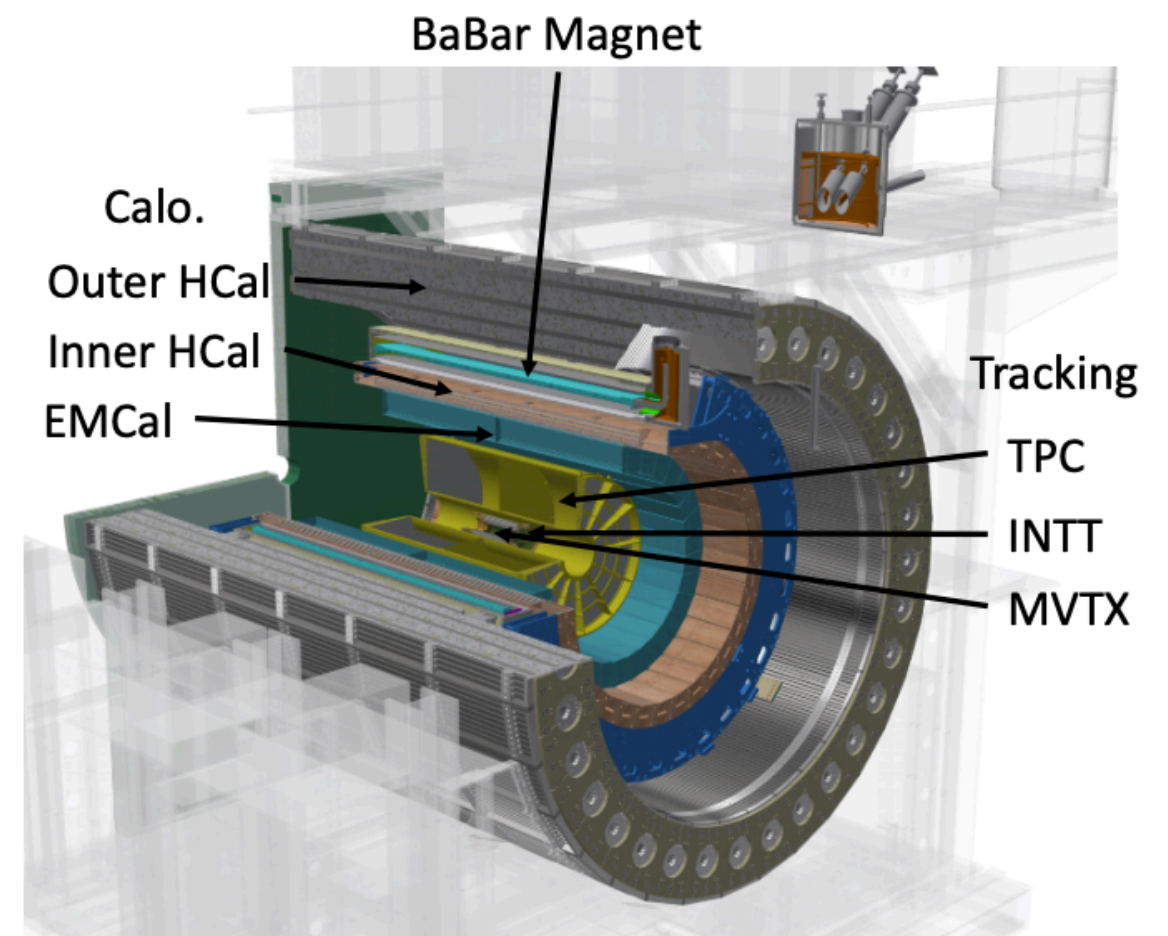
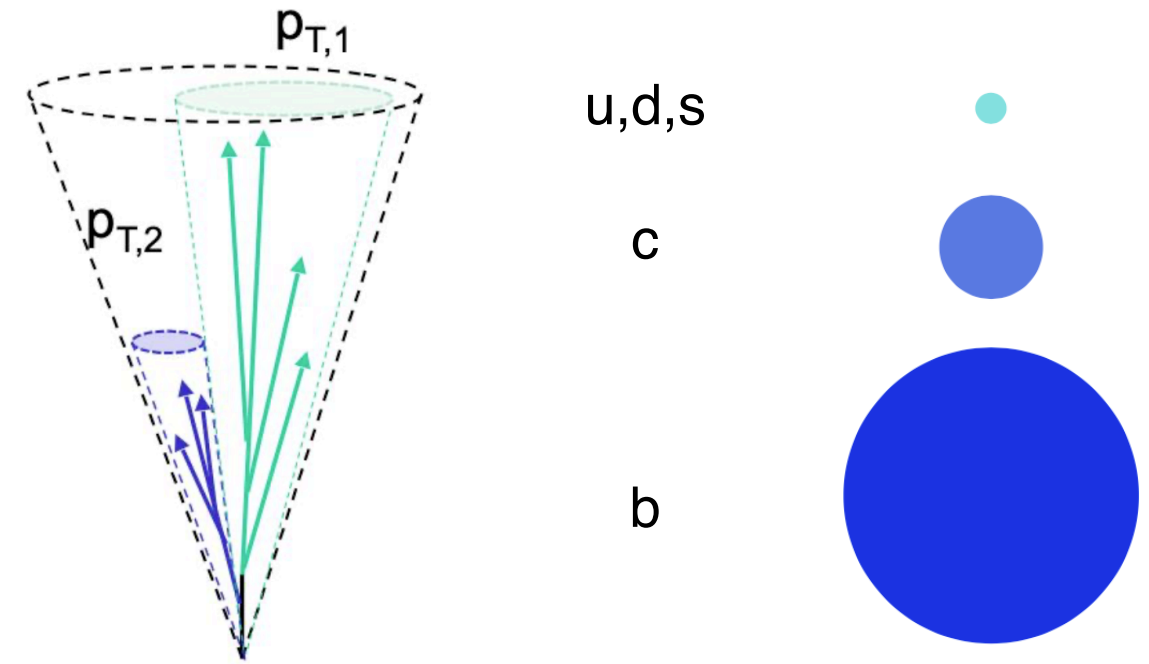
Track Reconstruction with the sPHENIX Experiment

Joe Osborn

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on behalf of the **sPHENIX** collaboration

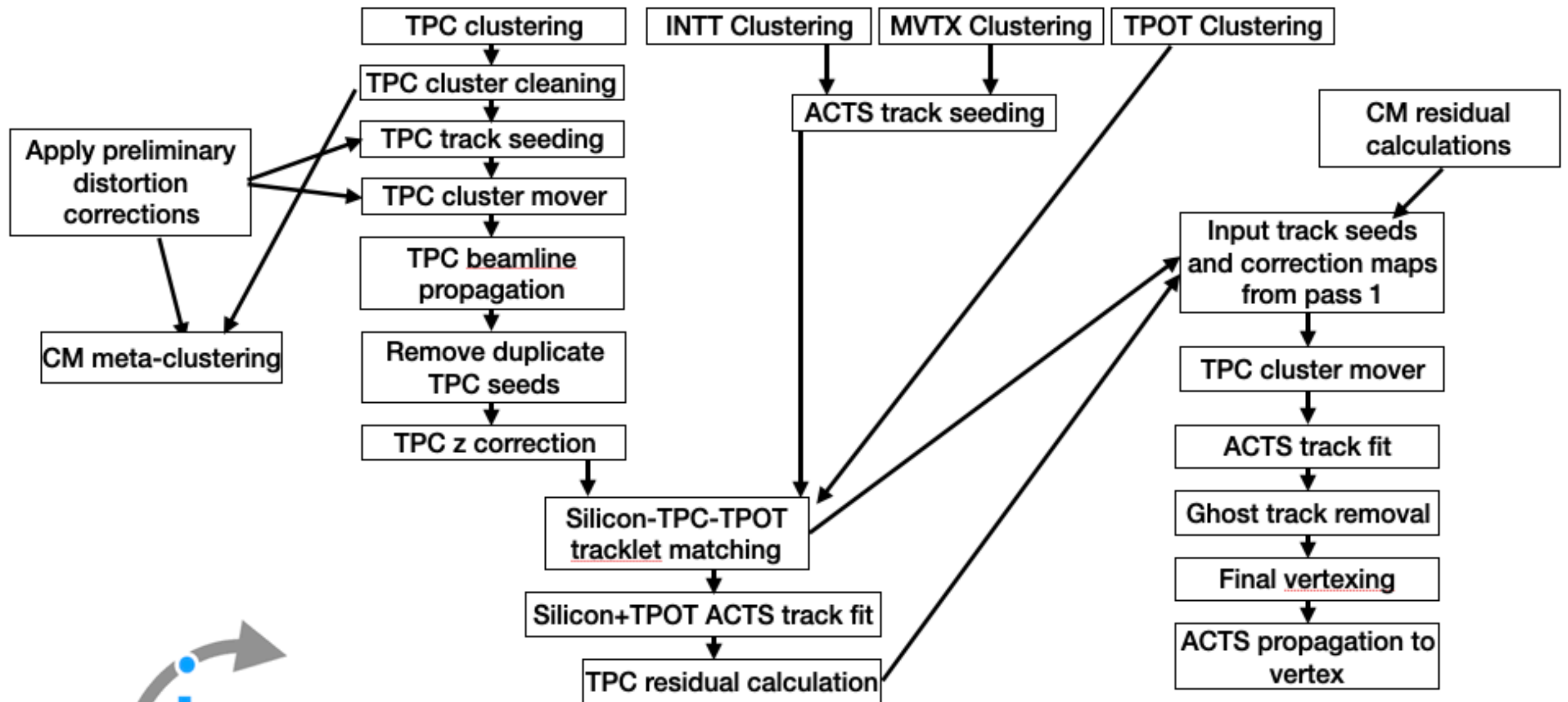
**Quark Matter 2022 - the 29th International Conference
on Ultra-relativistic Nucleus-Nucleus Collisions**
4-10 April 2022, Krakow, Poland

- sPHENIX - a precision jet and heavy flavor experiment at the Relativistic Heavy Ion Collider (RHIC)
 - ➔ See overview talk at:
 - <https://indico.cern.ch/event/895086/contributions/4743918/>
- sPHENIX tracking system is composed of 4 primary detectors
 - ➔ Micro Vertexing (MVTX)
 - 3 layers of MAPS staves
 - ➔ Intermediate Tracker (INTT)
 - 4 layers of silicon strips
 - ➔ TPC
 - Compact GEM based TPC
 - ➔ TPC Outer Tracker (TPOT)
 - 8 modules of micromegas



July 28, 2020

sPHENIX at RHIC

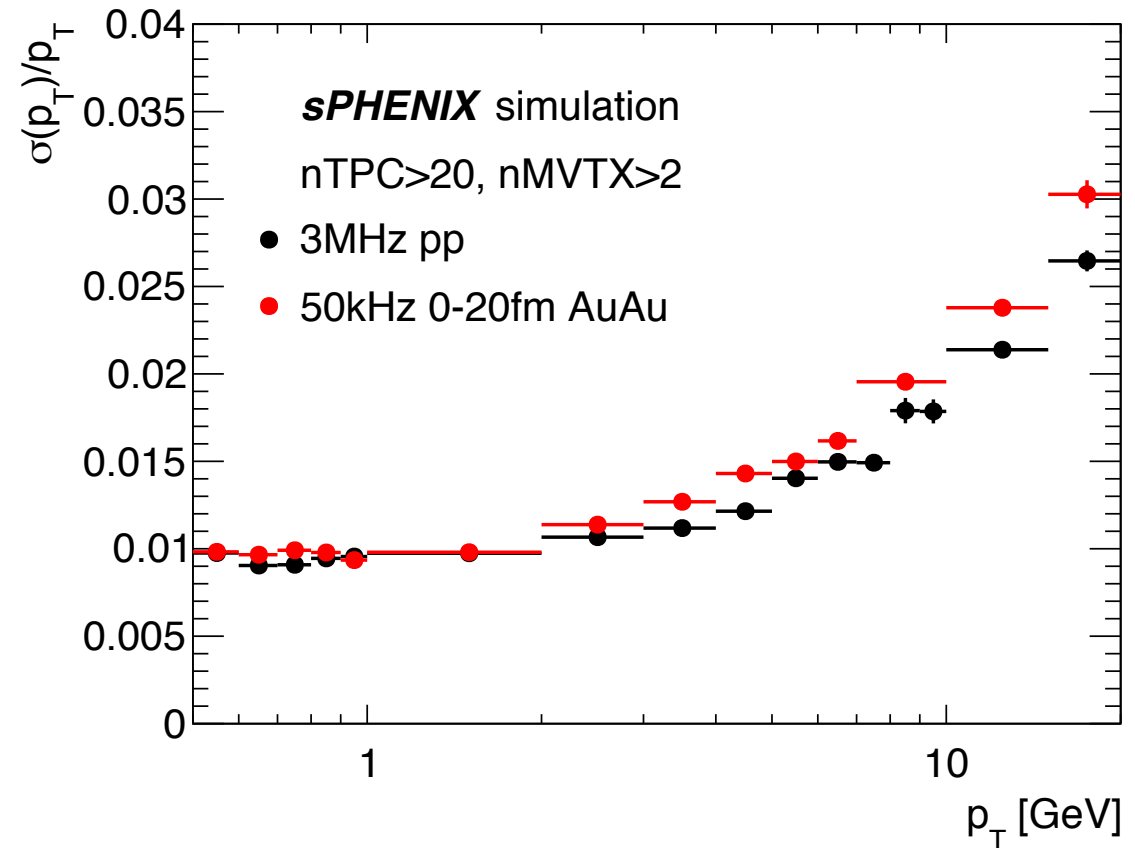
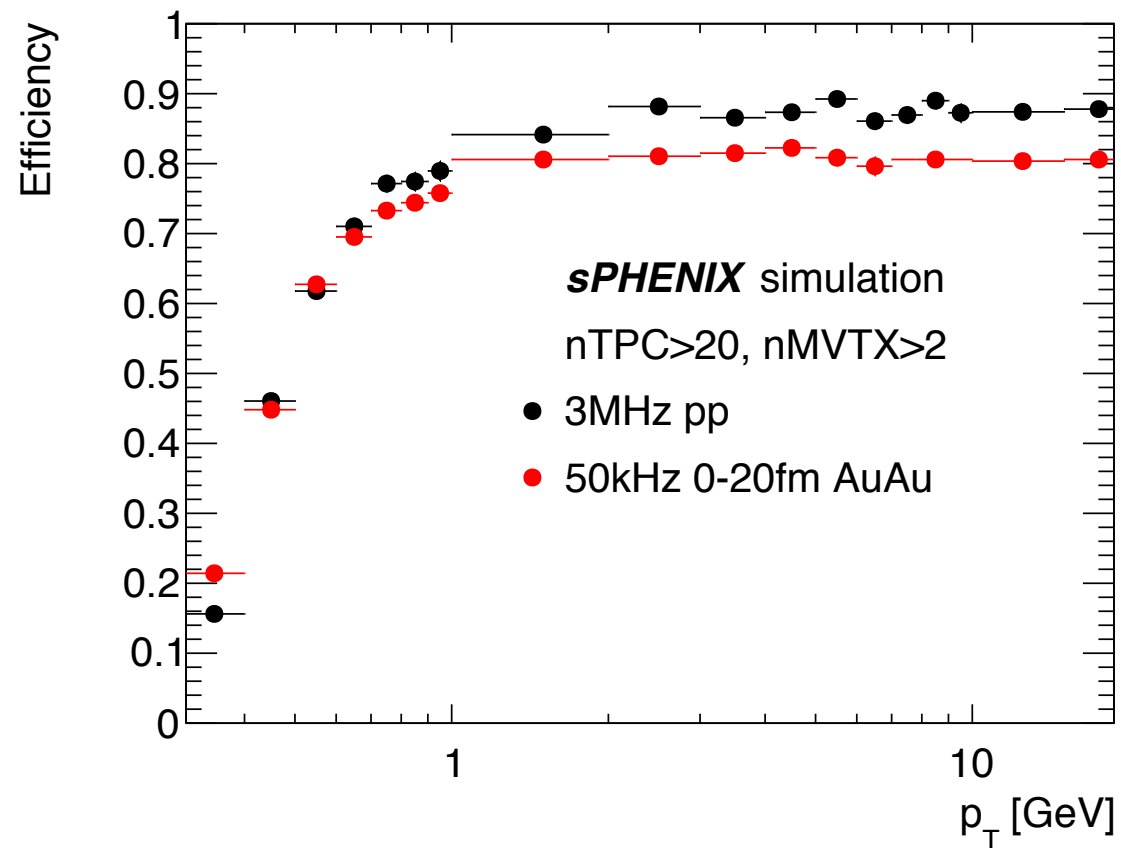
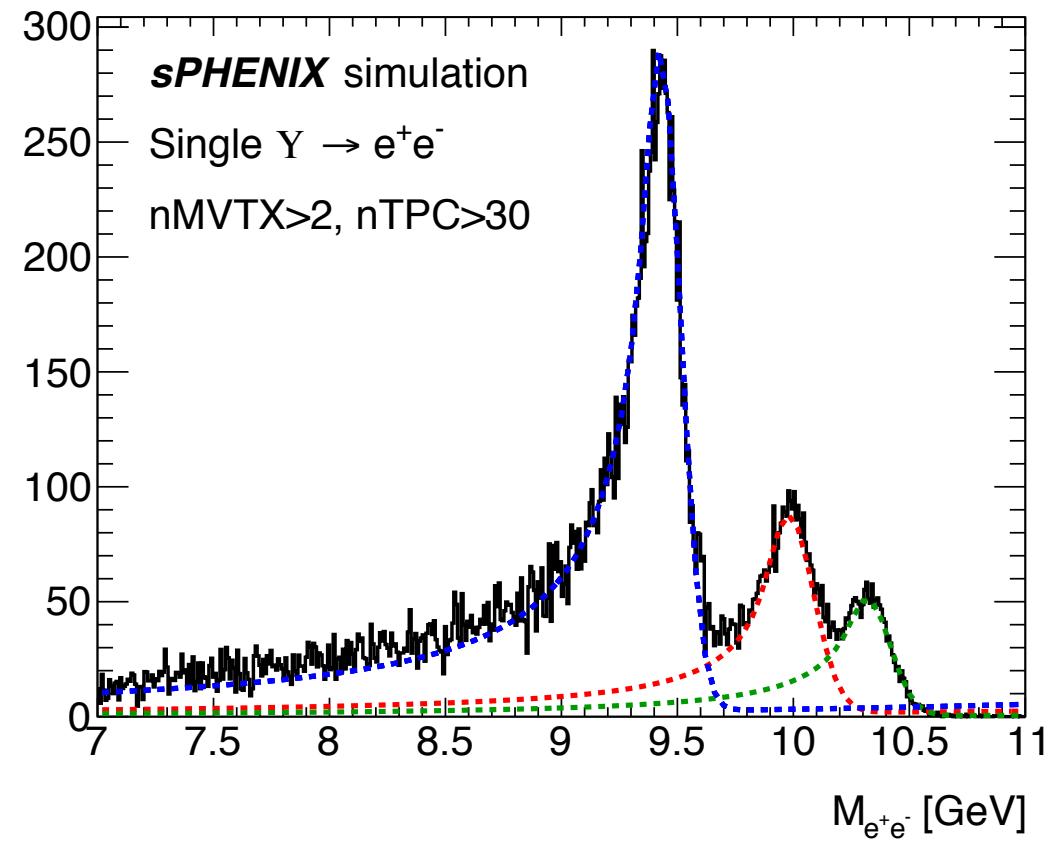
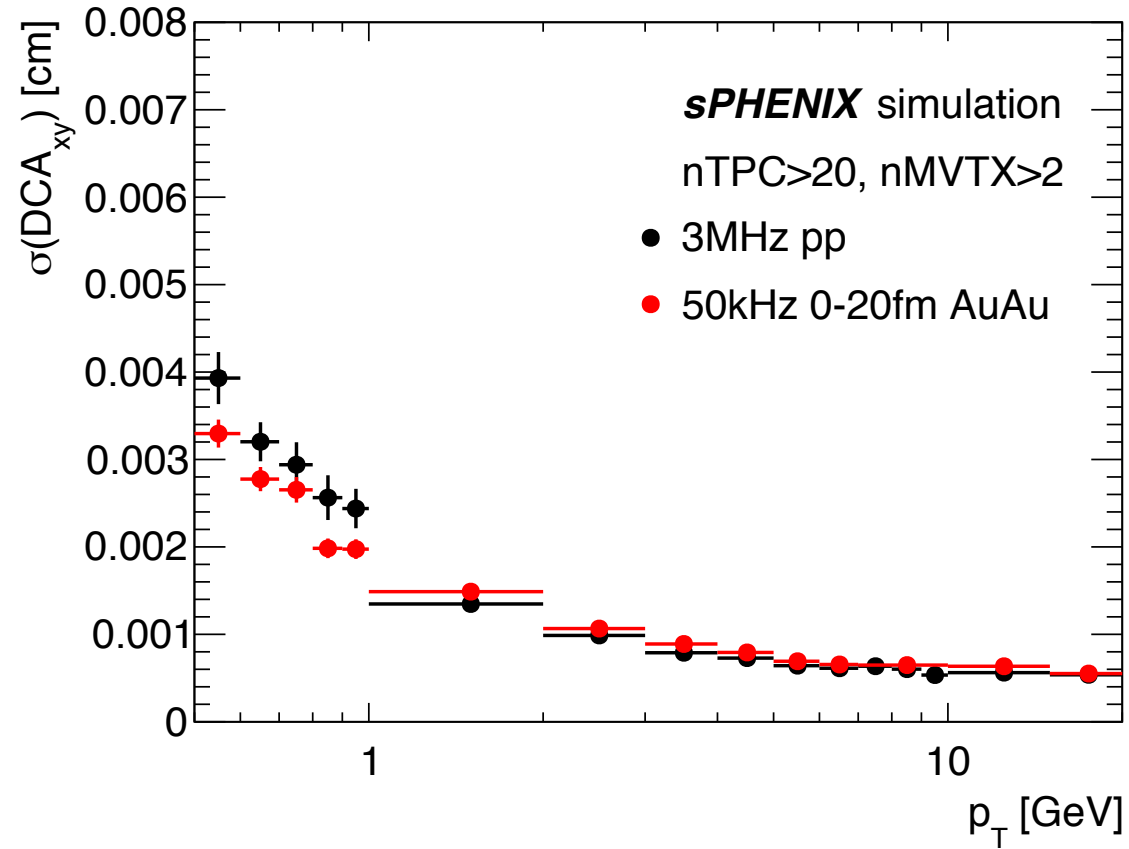


- Distortion correction scheme
 - ➔ Move clusters associated to tracks onto Acts surfaces based on a variety of correction schemes for static, beam induced, or event-by-event fluctuations

github.com/acts-project/acts

JDO et al., Computing and Software for Big Science 5, 23 (2021)

Track Reconstruction Performance



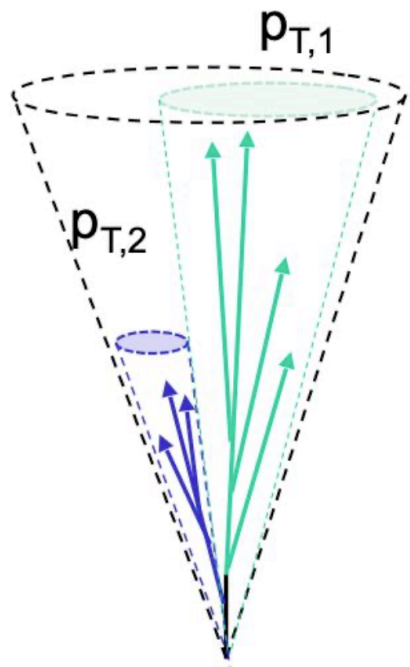
- **sPHENIX** will be the first new collider detector at RHIC in over 20 years
 - ➔ Precise and fast track reconstruction a major challenge in high occupancy environments sPHENIX will experience
- To meet these challenges, sPHENIX has implemented the A Common Tracking Software (ACTS) track reconstruction package
 - ➔ Track reconstruction performance meets current physics goals
 - ➔ Improvements in workflow ongoing with e.g. implementation of TPC distortions and 4D track reconstruction with timing information
- sPHENIX will collect first data in 2023! Detector construction and commissioning ongoing

sPHENIX is supported by



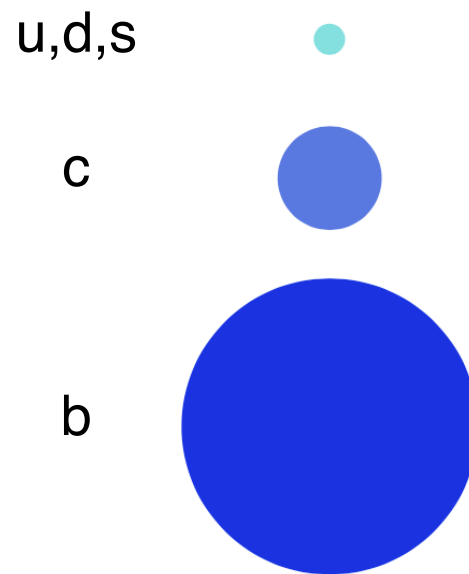
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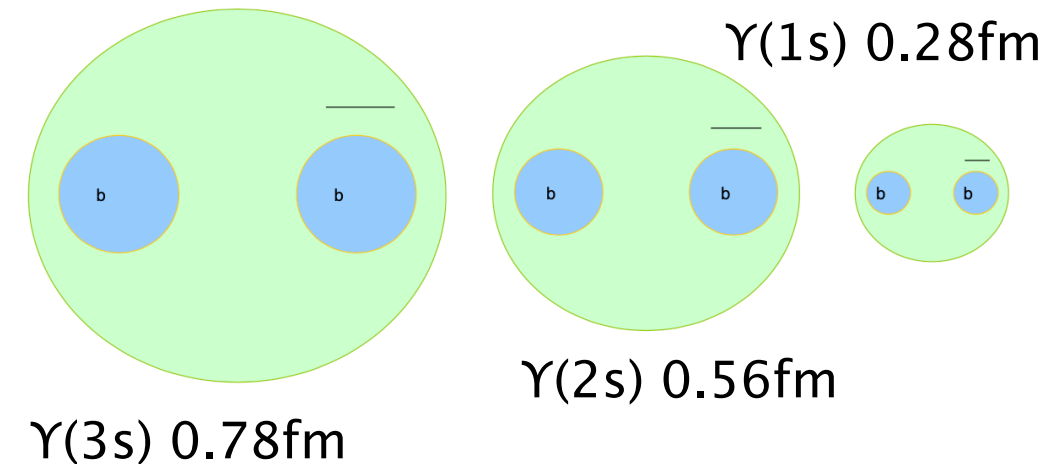
Jet structure

vary momentum/angular scale of probe



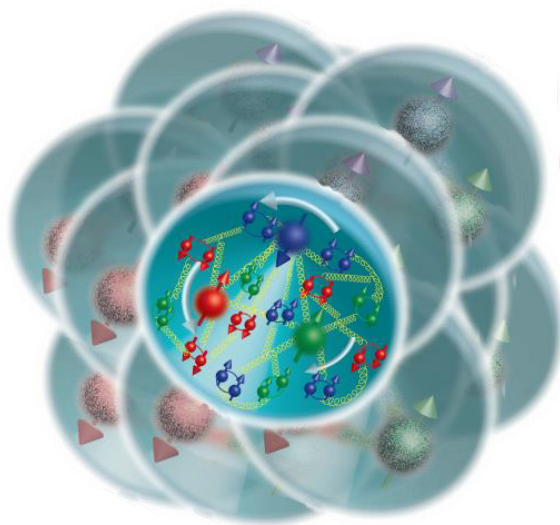
Parton energy loss

vary mass/momentum of probe



Quarkonium spectroscopy

vary size of probe



Cold QCD

study proton spin,
transverse-momentum,
and nuclear effects

- sPHENIX has a broad QCD physics program
- Requires precise and computationally fast track reconstruction in extremely high occupancy environments