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U.S. DEPARTMENT OF ENERGY
Office of Science

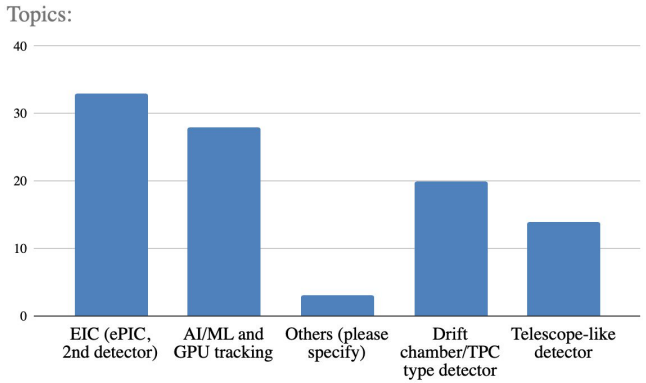
ACTS4NP Workshop Summary

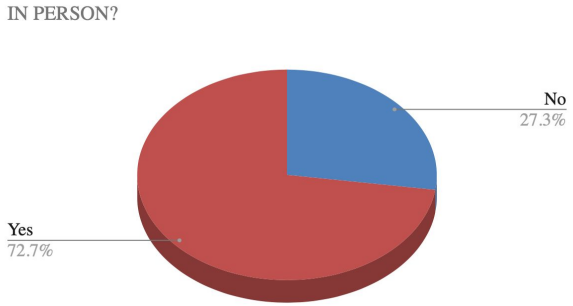
Shujie Li

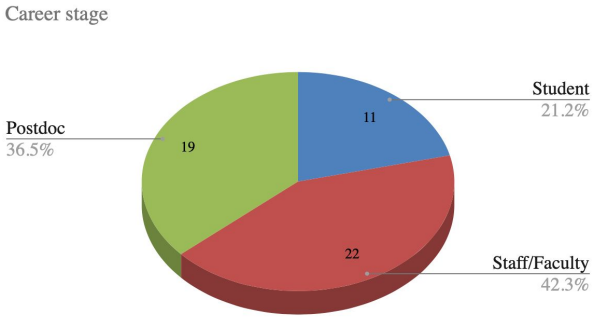
ePIC tracking++ meeting, May 29, 2025

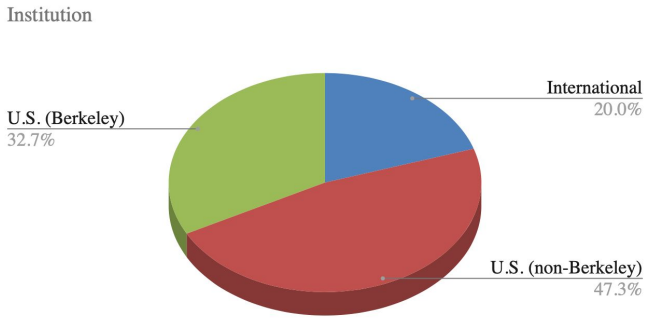
Workshop scope

58 registered. ~30 attended in person.









ACTS committee:

Corentin ALLAIRE
(IJCLab)

Paul GESSINGER
(CERN)

Andreas SALZBURGER
(CERN)

Experiment committee:

Wouter DECONINCK
(University of Manitoba)

Joe OSBORN
(BNL)

Shujie Li's cat
(LBNL)

Local committee:

Louis-Guillaume GAGNON
(LBNL/UC Berkeley)

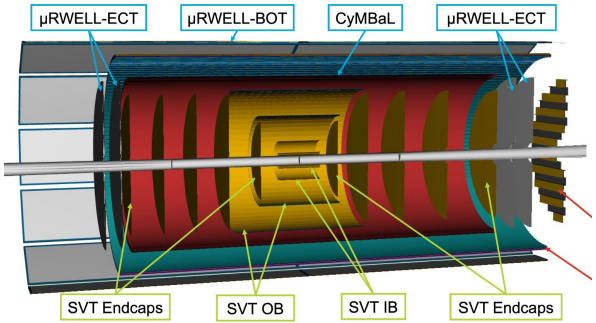
Tomohiro YAMAZAKI
(LBNL/UC Berkeley)

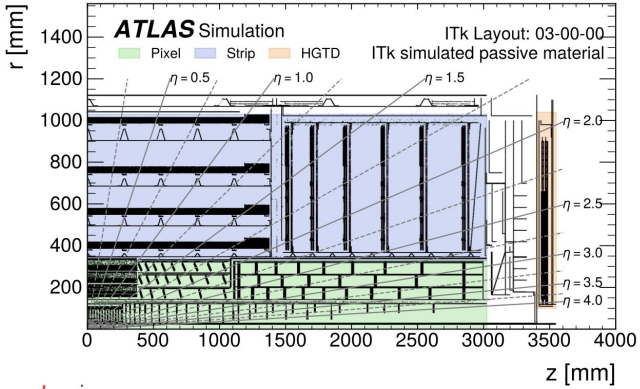
Beomki YEO
(LBNL/UC Berkeley)

logo designer 😎

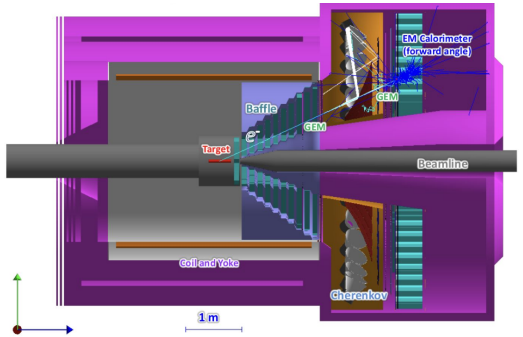
Experiment engagement

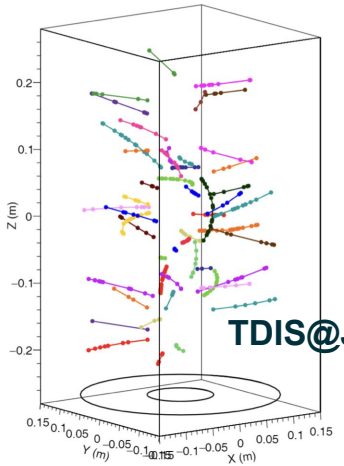
ePIC@EIC



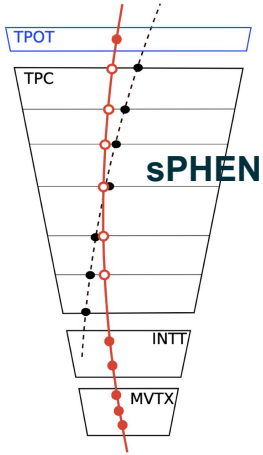


SoLID@JLab



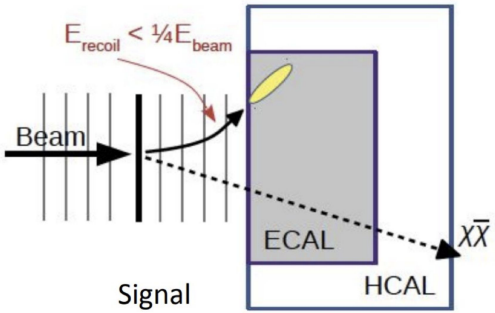


TDIS@JLab

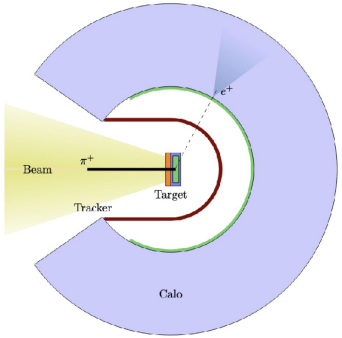


sPHENIX

LDMX



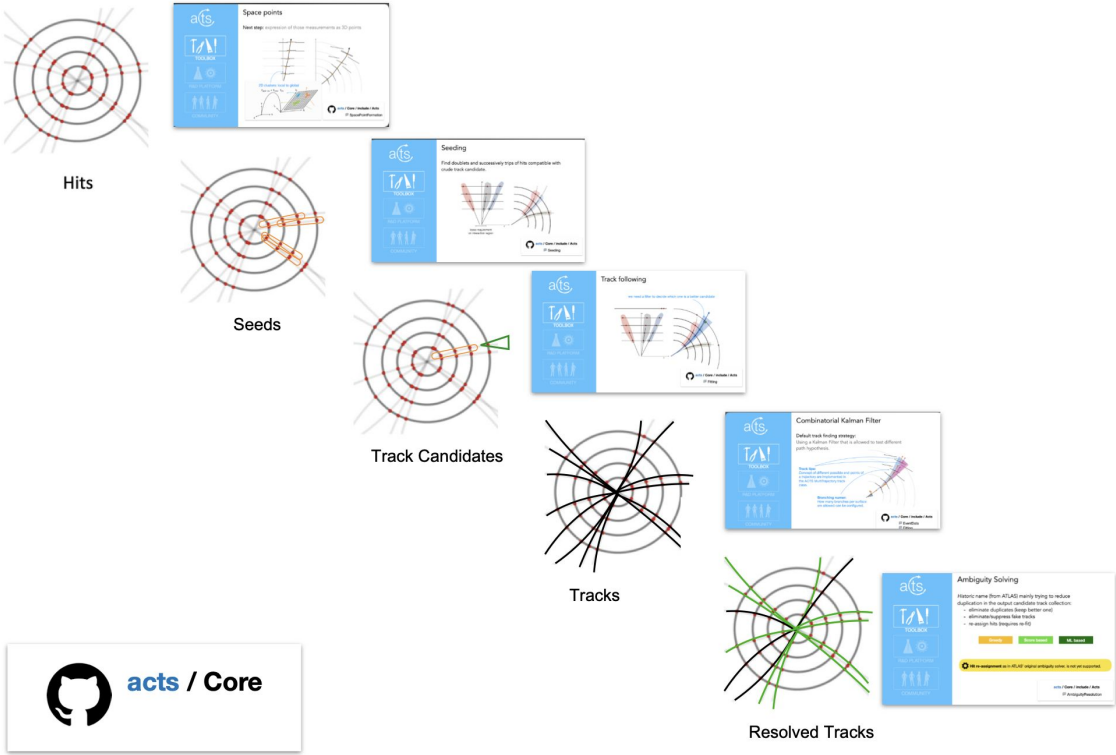
PIONEER



Tutorial, discussion, and development

Recordings available on indico

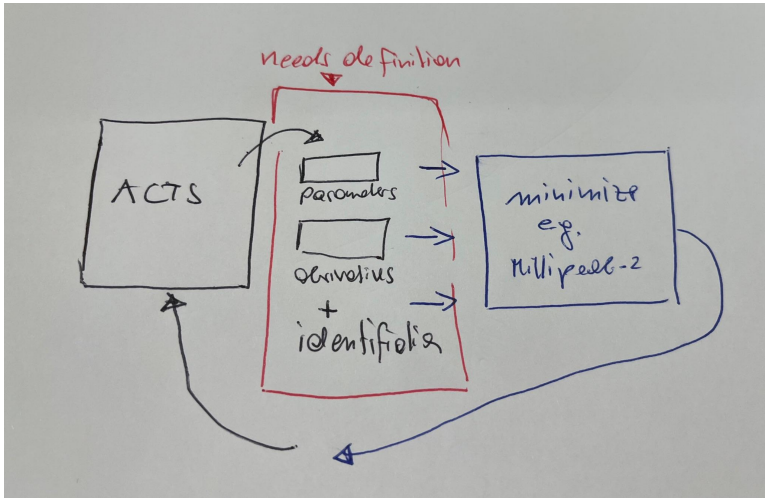
- geometry model
  - navigation with gen3 model
  - geometry check
  - material mapping
- data model
- alignment
- track finding/fitting:
  - ML-based seed filter
  - auto parameter tuning
  - use time info
  - GNN
  - track projection
- GPU tracking



A few follow-up projects: Alignment

Alignment & ACTS:

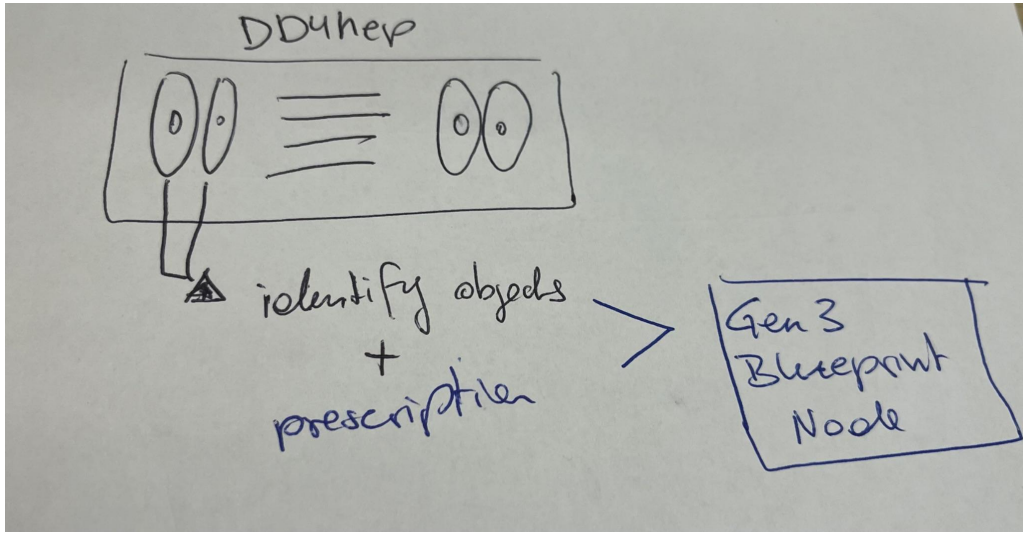
- leveraging experience of sPHENIX (successfully interfaced with Millepede-2)
- development of testbed with Open Data Detector (Xiaocong Ai, Zequn Sun, AS)
  - PR in development



A few follow-up projects: DD4hep + Gen3

New DD4hep plugin

- High priority to implement a new Gen3-ready DD4hep plugin



Q&A for ePIC:

- Geometry:
  - provided example scripts to check navigator behavior, and all sensitive surfaces.

- Tracking:
  - the default behavior of CKF branch stopper (Trimtrack) will change in acts v37, which allows saving the last tracker hit as a hole or outlier.
  - navigation at the surface edge is not perfect (may point to wrong neighbor surfaces).
  - may use different seeding strategies for tracks with different eta and momentum.
  - always good to check the truth seed result for debugging.
  - can directly add time as an additional dimension for MPGD and TOF measurements.
  - better to use a separate local pattern recognition algorithm for B0 tracker (where only four hits available.

- Track projection:
  - Should use the track segment from the nearest surface instead of the track parameter from the vertex to start the propagation for correct error estimations.
  - create projection surfaces as part of the geometry instead of on the fly.

Thank You