Introduction to HSF Reconstruction and Software Triggers WG

Jin Huang, for the WG

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Reconstruction and Software Triggers WG

- Considers approaches and solutions to common challenges in the area of event reconstruction and software triggering
- Algorithms and data structures that perform the heavy lifting data processing linking real/simulated data → analysis
  - At the conceptual design/performance baseline stages of EIC experiment, play an important role in studying/demonstrating experiment reach, uncertainty control, and requirements for detectors, streaming readout, and computing
  - Natural connection with online/offline software for the streaming DAQ of EIC
- How to get connected:
  - WG page: https://hepsoftwarefoundation.org/workinggroups/recotrigger.html
  - Email list: https://groups.google.com/forum/#!forum/hsf-recotrigger
  - Indico category: https://indico.cern.ch/category/10917/

2022 WG co-conveners

Dorothea vom Bruch

Research Scientist, CPPM

LHCb

Andreas Salzburger

Scientist, CERN

ATLAS

Jin Huang

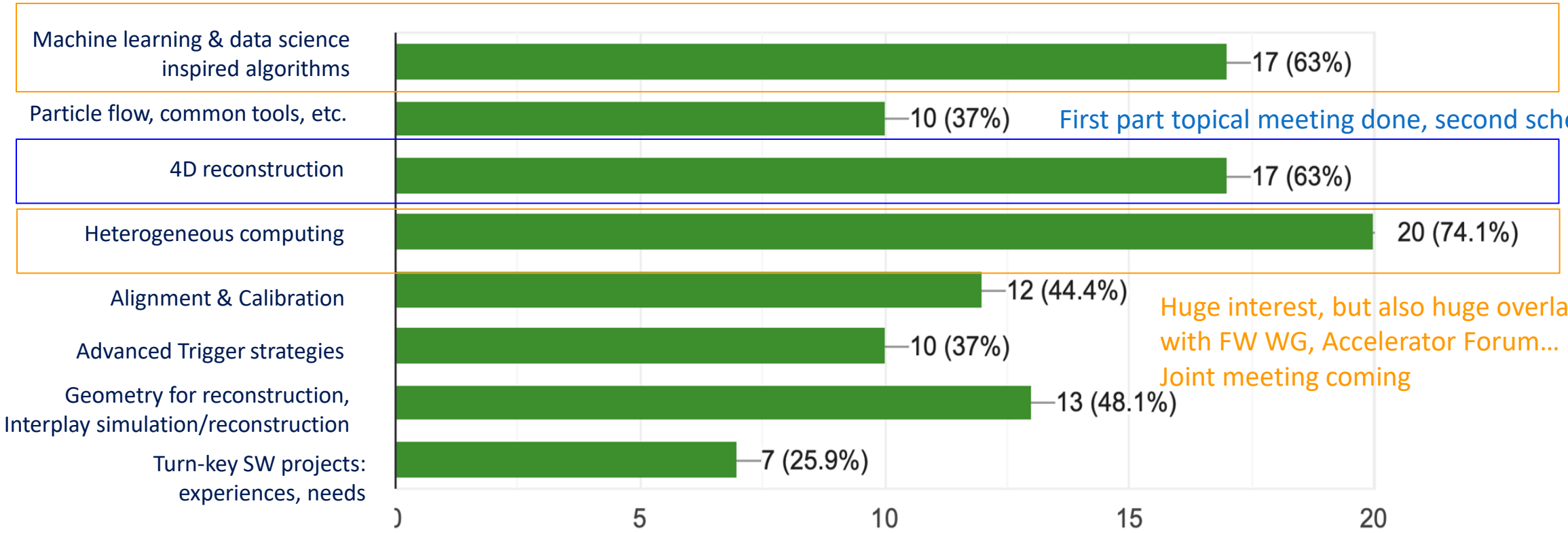
Physicist, BNL

PHENIX, sPHENIX, EIC

Brookhaven National Laboratory

2021 review - Survey outcome & follow-ups

Planned for a topical meeting close to “Learning to Discover Workshop” (next attempt Apr 2022)



Many shared interest with EIC and time for EIC community to bring up on new topics too

Suggested topics for 2022, and relation to EIC

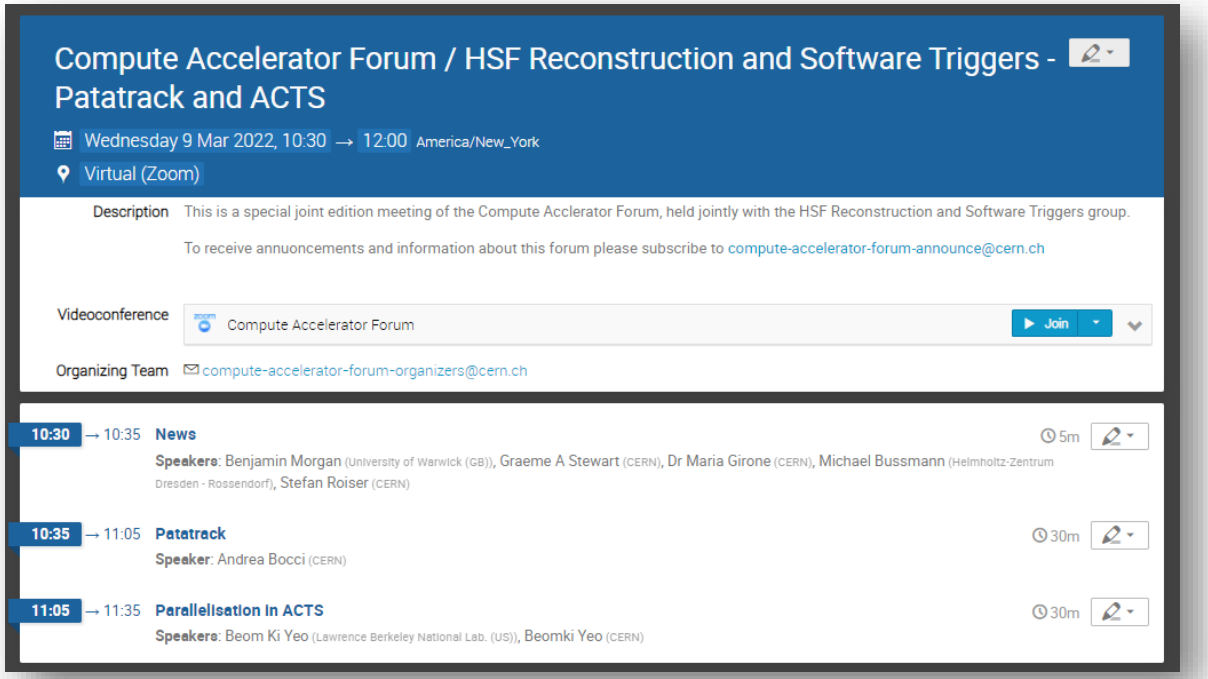
- 4D reconstruction topical meeting
  - 2nd meeting on March 16! (later slide), related to EIC LGAD tracking and streaming reco.
- RICH/PID reconstruction (topical meeting)
  - One of the challenges for EIC reco
  - EIC community should play a prominent role here
- Particle flow (topical meeting)
  - LHC experiments experience
  - Current status and plans including the EIC experiments
- Flavor tagging (topical meeting, possibly joint with analysis WG)
  - HF resonance reconstruction and HF jet tagging, widely applicable to EIC too

Suggested topics for 2022, and relation to EIC

- Machine learning
  - Graph neural networks for reconstruction (topical meeting)
  - Learning to discover workshop summary wrap-up (topical meeting)
  - Coordinate with reco session at AI4EIC workshop (2022 workshop TBD)
- Open data sample
  - Create calorimeter data sample (discussion started)
  - Possible EIC open data for particle flow reconstruction?
- Software trigger and reconstruction for streaming readout experiments
  - Coordinate HSF joint session at Streaming Readout Workshop X and XI
- Cross-WG topics
  - Compute accelerator forum : Heterogeneous computing in reco & triggers
    - "Classical" approach: Patatrack + additional project <- coming event on Mar 9 (next slide)
    - "Exotic" approaches: quantum computing, IPUs, TPUs etc.
  - FW WG: calibration / alignment & conditions handling in reconstruction
  - Training WG: training material on heterogeneous computing for reconstruction & triggers

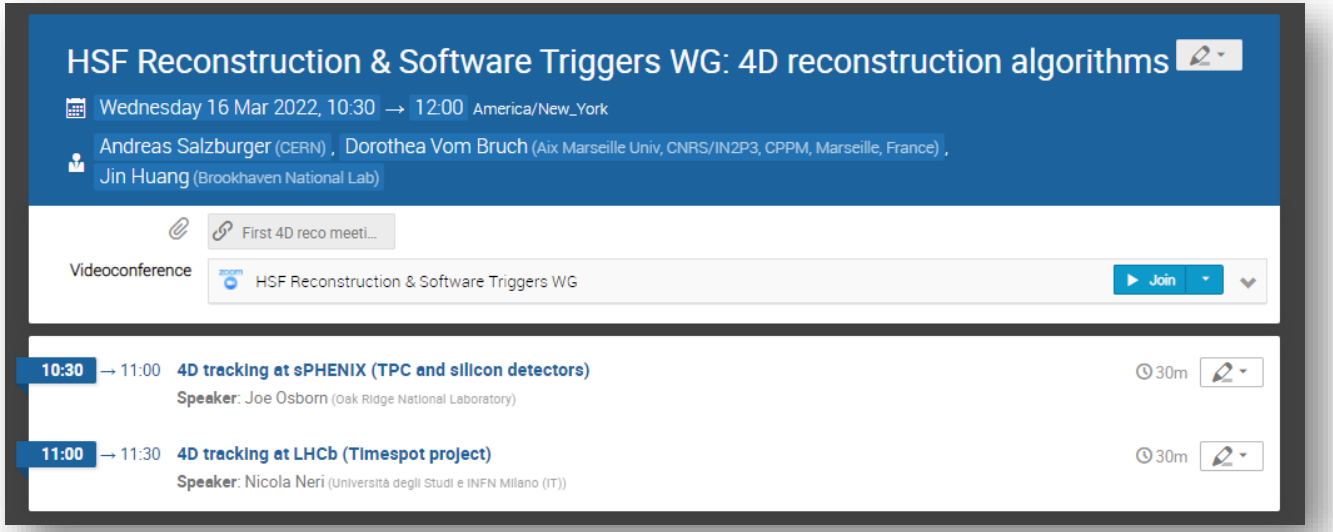
Mark your calendar: Wed Mar 9 10:30AM
Joint Meeting with Compute Accelerator Forum

- Wed Mar 9 10:30AM ET
- https://indico.cern.ch/event/1073640/
- Highlights:
  - Patatrack (GPU accelerated pixel tracking at CMS HLT)
  - Parallelization in ACTS (based on the vectorised data model)



Mark your calendar: Wed Mar 16 10:30AM
2nd topical meeting on 4D reconstruction

- Wed Mar 16 10:30AM
- https://indico.cern.ch/event/1128087/
- Highlights:
  - 4D tracking with TPC+silicon in streaming readout (Joe Osborn)
  - 4D tracking at LHCb upgrade, (would be interesting for EIC LGAD-integrated tracking)



Summary

- Reco./Software-Trigger WG: algorithms and data structures that perform the heavy lifting data processing: real/simulated data → analysis
- Many topics considered for topical meetings in coming months are directly related to the EIC development
  - Suggestions welcomed!
- Coming meetings:
  - Wed Mar 9 10:30AM, Joint Meeting with Compute Accelerator Forum, https://indico.cern.ch/event/1073640/
  - Wed Mar 16 10:30AM, topical meeting on 4D reconstruction, https://indico.cern.ch/event/1128087/