

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



Andreas Salzburger

Scientist, CERN

ATLAS



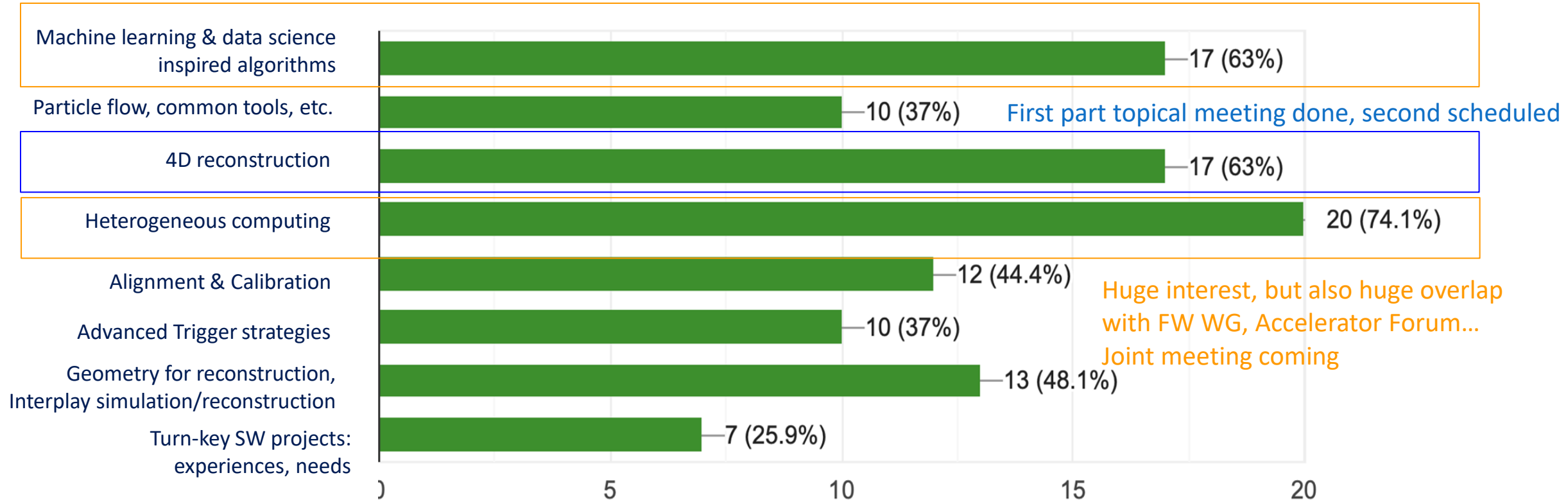
Jin Huang

Physicist, BNL

PHENIX, sPHENIX, EIC

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, IPU, 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)

The screenshot shows the Indico event page for the Compute Accelerator Forum / HSF Reconstruction and Software Triggers - Patatrack and ACTS. The event is scheduled for Wednesday 9 Mar 2022, 10:30 → 12:00 in America/New_York, and is a Virtual (Zoom) event. The description states it is a special joint edition meeting held jointly with the HSF Reconstruction and Software Triggers group, and provides an email address for announcements. The videoconference link is 'Compute Accelerator Forum' with a 'Join' button. The organizing team is 'compute-accelerator-forum-organizers@cern.ch'. The agenda includes a 'News' segment from 10:30 to 10:35 with speakers Benjamin Morgan, Graeme A Stewart, Dr Maria Girone, Michael Bussmann, and Stefan Roiser; a 'Patatrack' segment from 10:35 to 11:05 with speaker Andrea Bocci; and a 'Parallelisation in ACTS' segment from 11:05 to 11:35 with speakers Beom Ki Yeo and Beomki Yeo.

Compute Accelerator Forum / HSF Reconstruction and Software Triggers - Patatrack and ACTS

Wednesday 9 Mar 2022, 10:30 → 12:00 America/New_York

Virtual (Zoom)

Description This is a special joint edition meeting of the Compute Accelerator Forum, held jointly with the HSF Reconstruction and Software Triggers group.

To receive announcements and information about this forum please subscribe to compute-accelerator-forum-announce@cern.ch

Videoconference Compute Accelerator Forum [Join](#)

Organizing Team compute-accelerator-forum-organizers@cern.ch

10:30 → 10:35 News 5m

Speakers: Benjamin Morgan (University of Warwick (GB)), Graeme A Stewart (CERN), Dr Maria Girone (CERN), Michael Bussmann (Helmholtz-Zentrum Dresden - Rossendorf), Stefan Roiser (CERN)

10:35 → 11:05 Patatrack 30m

Speaker: Andrea Bocci (CERN)

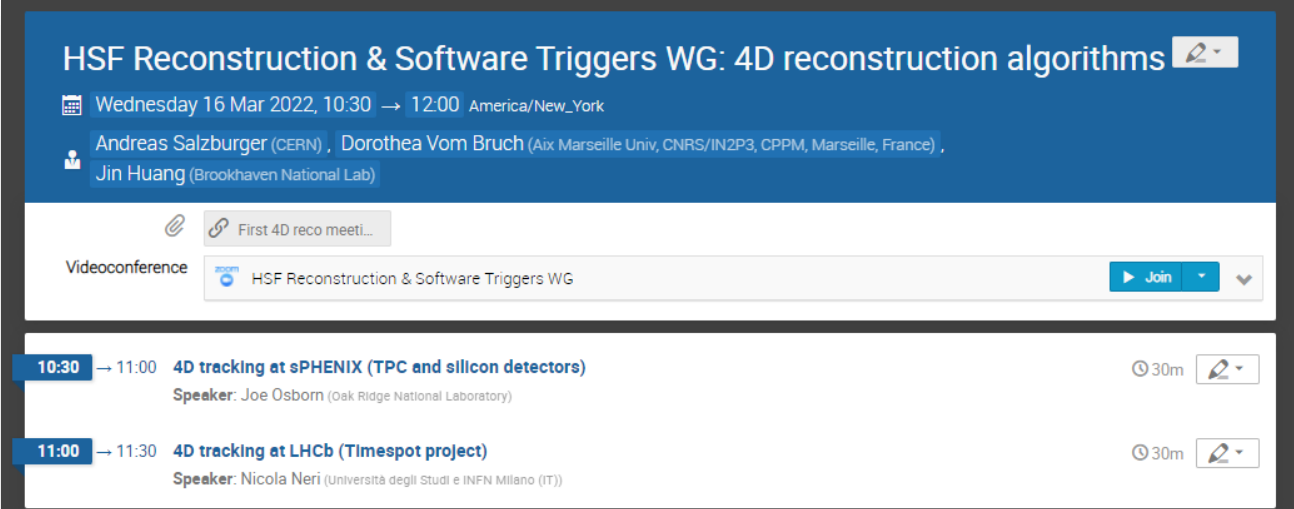
11:05 → 11:35 Parallelisation in ACTS 30m

Speakers: Beom Ki Yeo (Lawrence Berkeley National Lab. (US)), Beomki Yeo (CERN)

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)



The screenshot shows the Indico event page for "HSF Reconstruction & Software Triggers WG: 4D reconstruction algorithms". The event is scheduled for Wednesday, 16 Mar 2022, from 10:30 to 12:00 in the America/New_York time zone. The organizers listed are Andreas Salzburger (CERN), Dorothea Vom Bruch (Aix Marseille Univ, CNRS/IN2P3, CPPM, Marseille, France), and Jin Huang (Brookhaven National Lab). A link to the event is provided: "First 4D reco meeti...". Below this, there is a "Videoconference" section with a "Join" button. The agenda lists two sessions: "4D tracking at sPHENIX (TPC and silicon detectors)" from 10:30 to 11:00, featuring Joe Osborn (Oak Ridge National Laboratory) as the speaker, and "4D tracking at LHCb (Timespot project)" from 11:00 to 11:30, featuring Nicola Neri (Università degli Studi e INFN Milano (IT)) as the speaker. Both sessions are marked as 30 minutes long.

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/>