

HSF Detector Simulation on GPU Community Meeting

Report of Contributions

Contribution ID: 1

Type: **not specified**

Introduction

Tuesday 3 May 2022 15:00 (10 minutes)

Presenter: POKORSKI, Witold (CERN)

Session Classification: Workshop Sessions

Contribution ID: 2

Type: **not specified**

AdePT project overview, current status and performance

Tuesday 3 May 2022 15:10 (1 hour)

Functionality overview:

- project structure, components, library organization
- targeted/achieved functionalities

Implementation overview:

- components internals, basic data structures host/device
- random number handling and reproducibility
- workflow(s), scheduling and event loop implementations
- scoring and data transfers

Performance overview

- Current performance status
- Main bottlenecks discussion

Presenters: GHEATA, Andrei (CERN); AMADIO, Guilherme (CERN); HAHNFELD, Jonas (CERN); HAGE-BOECK, Stephan (CERN); POKORSKI, Witold (CERN)

Session Classification: Workshop Sessions

Contribution ID: 3

Type: **not specified**

Celeritas project overview, current status and performance

Tuesday 3 May 2022 16:30 (1 hour)

Code overview:

- background and motivation
- codebase overview, including dependencies
- components overview

Performance:

- Metrics
- OLCF Summit results
- Profiling

Presenters: LUND, Amanda; JOHNSON, Seth (Oak Ridge National Laboratory); EVANS, Tom (Oak Ridge National Laboratory)

Session Classification: Workshop Sessions

Contribution ID: 4

Type: **not specified**

Coffee break

Tuesday 3 May 2022 16:10 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 5

Type: **not specified**

AdePT geometry and magnetic field

Wednesday 4 May 2022 15:00 (1 hour)

VecGeom overview and experience

Current VecGeom GPU support

- data model on host/device and dependency on CUDA
- model data transfer and initialization on GPU
- geometry optimizations (navigation states, single-precision, BVH)
- navigation and current fundamental problems on GPU
- evolution path for VecGeom GPU support: surface models

Magnetic field handling

Presenters: GHEATA, Andrei (CERN); MORGAN, Benjamin (University of Warwick (GB)); AMADIO, Guilherme (CERN); APOSTOLAKIS, John (CERN); HAGEBOECK, Stephan (CERN)

Session Classification: Workshop Sessions

Contribution ID: 6

Type: **not specified**

Coffee break

Wednesday 4 May 2022 16:00 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 7

Type: **not specified**

Celeritas geometry and magnetic field

Wednesday 4 May 2022 16:20 (1 hour)

Celeritas/VecGeom integration

ORANGE: Oak Ridge geometry engine

- background
- features, status, goals
- code examples

Magnetic field in Celeritas

- background and methods
- standalone field performance

Presenters: LIMA, Guilherme (FermiLab (US)); JOHNSON, Seth (Oak Ridge National Laboratory); JUN, Soon Yung (Fermi National Accelerator Lab. (US))

Session Classification: Workshop Sessions

Contribution ID: **8**

Type: **not specified**

Discussion

Wednesday 4 May 2022 17:20 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 9

Type: **not specified**

Discussion

Tuesday 3 May 2022 17:30 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: **10**

Type: **not specified**

Celeritas physics

Thursday 5 May 2022 16:20 (1 hour)

Physics interface

- transport loop and control flow
- physics kernels

Physics “perspectives”

- available processes
- data management and components

Physics verification/validation

- geant4 helper app
- current test problems

Presenters: JOHNSON, Seth (Oak Ridge National Laboratory); JUN, Soon Yung (Fermi National Accelerator Lab. (US)); TOGNINI, Stefano

Session Classification: Workshop Sessions

Contribution ID: **11**

Type: **not specified**

Coffee break

Thursday 5 May 2022 16:00 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 12

Type: **not specified**

AdePT physics

Thursday 5 May 2022 15:00 (1 hour)

- general design and interface with transport
- available processes
- physics validation
- GPU vs CPU performance and issues

Presenters: HAHNFELD, Jonas (CERN); NOVAK, Mihaly (CERN)

Session Classification: Workshop Sessions

Contribution ID: **13**

Type: **not specified**

Discussion

Thursday 5 May 2022 17:20 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 14

Type: **not specified**

AdePT integration ideas

Friday 6 May 2022 15:00 (30 minutes)

- key integration goals
- constraints from external frameworks
- Geant4 interfacing approach
- current workflow limitations

Presenters: GHEATA, Andrei (CERN); POKORSKI, Witold (CERN)

Session Classification: Workshop Sessions

Contribution ID: 15

Type: **not specified**

Celeritas integration ideas

Friday 6 May 2022 15:30 (30 minutes)

Experiment integration

- potential workflows
- challenges

Acceleritas: Celeritas/Geant4 integration

- offloading strategy and integration details
- theoretical and actual performance
- future work

Presenters: JUN, Soon Yung (Fermi National Accelerator Lab. (US)); TOGNINI, Stefano

Session Classification: Workshop Sessions

Contribution ID: **16**

Type: **not specified**

Coffee break

Friday 6 May 2022 16:00 (20 minutes)

Session Classification: Workshop Sessions

Contribution ID: 17

Type: **not specified**

AdePT perspectives

Friday 6 May 2022 16:20 (30 minutes)

- summary of performance assessment and main bottlenecks
- further development ideas
- strategies, follow-ups and collaboration

Presenters: GHEATA, Andrei (CERN); MORGAN, Benjamin (University of Warwick (GB)); POKORSKI, Witold (CERN)

Session Classification: Workshop Sessions

Contribution ID: **18**

Type: **not specified**

Celeritas perspectives

Friday 6 May 2022 16:50 (30 minutes)

- summary of performance assessment and main bottlenecks
- further development ideas
- strategies, follow-ups and collaboration

Presenter: JOHNSON, Seth (Oak Ridge National Laboratory)

Session Classification: Workshop Sessions

Contribution ID: **19**

Type: **not specified**

Final discussion

Friday 6 May 2022 17:20 (1 hour)

Session Classification: Workshop Sessions