



Contribution ID: 1955 Contribution code: WEPA081

Type: **Poster Presentation**

## **OPAL and Future Directions Towards the Exascale Area**

*Wednesday, 10 May 2023 16:30 (2 hours)*

OPAL (Object Oriented Parallel Accelerator Library) is a C++ based massively parallel open-source program for tracking charged particles

in large scale accelerator structures and beam lines, including 3D space charge, collisions, particle-matter-gas interaction, and 3D undulator radiation.

The meticulous parallel architecture allows large and difficult problems, including one-to-one simulations with high resolution and no macro

particles, to be tackled in a reasonable amount of time. The current code state as well as the most recent physics advancements and

upgrades are discussed, including the unique feature of a sampler for creating massive, labeled data sets with tens of thousands of cores

for machine learning. We also demonstrate scalability of our core algorithms up to 4600 GPUs and 32'000 CPUs, as part of our effort to make OPAL exascale ready.

### **Funding Agency**

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

**Primary author:** ADELMANN, Andreas (Paul Scherrer Institut)

**Co-authors:** ALBÀ, Arnau (Paul Scherrer Institut); JOLLY, Carl (Science and Technology Facilities Council); Dr WINKLEHNER, Daniel (Massachusetts Institute of Technology); SNUVERINK, Jochem (Paul Scherrer Institut); FREY, Matthias (University of St Andrews); NEVEU, Nicole (SLAC National Accelerator Laboratory); CALVO, Pedro (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas); MURALIKRISHNAN, Sriramkrishnan (Paul Scherrer Institut)

**Presenter:** ADELMANN, Andreas (Paul Scherrer Institut)

**Session Classification:** Wednesday Poster Session

**Track Classification:** MC5: Beam Dynamics and EM Fields: MC5.D11: Code Developments and Simulation Techniques