IOP Seminar Notes

Program

Science & Technology Facilities Council

IOP Institute of Physics
Particle Accelerators and Beams Group

Particle Accelerators and Beam Group '**HPC for discovery at accelerator facilities**' Workshop *27th April 2017*
Asia House 63, New Cavendish Street, W1G 7LP, London

Time	Item
10:00 – 10:20 (20')	**Coffee on Arrival**
10:20 – 10:30 (10')	**Welcome and Overview of the Day**
	Dr Brian McNeil will outline the aims of the workshop hosted in conjunction with the IoP Particle Accelerators and Beams Group, to consider the current computing facilities and future computing needs of the community. The workshop will provide a high level overview of current capability, and discuss future directions
10:30 – 11:00 (30')	**Large-Scale Simulations**
	An outline the current and future needs and requirements for the accelerator related to industrial applications with a focus on medical applications.
11:00 – 11:30 (30')	**HPC for FELs**
	A presentation from PSI discussing the potential HPC needs and requirements for various aspects of the FEL R&D activities in the lead up to the implementation of the FEL strategy and a potential UK FEL Facility.
11:30 – 12:00 (30')	**Novel Acceleration Simulations**
	Laser and proton driven plasma wakefield acceleration simulations using the modern particle-in-cell codes: EPOCH, SMILEI and OSIRIS – benchmarks and computational techniques.
12:00 – 12:30 (30')	**Data Visualisation**
	An outline talk on current advances in visualisations of large datasets and how this can relate to the current and future computing for the accelerator community.
13:30 – 13:50 (20')	**STFC Computing Advisory Panel**
	An introduction the STFC Computing Advisory Panel (CAP) and it role, an overview of the current computing landscape and the outcome of the 2015 computing strategic review.
13:50– 14:50 (1h)	**STFC Computing Facilities**
	• The Hartree Centre • DiRAC • STFC Facilities Computing
14:50 – 15:20 (30')	**Cloud Computing**
	An outline the current state and use of Cloud computing at STFC, the ongoing work in the UK and internationally, as well as its potential uses for accelerator facilities in the future.
15:20 – 16:20 (1h)	**Open Discussion**
	Discussions to be chaired by Dr Brian McNeil
16:20 – 16:30 (10')	**Review of the Day**
	Dr Brian McNeil will review the day, drawing out the next steps incorporating the information and ideas generated by the workshop.
16:30 – 17:00 (30')	**Coffee and Networking**

Notes

1. Medical application uses HPC, google service (e.g. 10$ core-month, paid by the minute, very short queue regardless of number of cores) , turn-around-time, verification.
2. FEL: framework for particle exchange (Desy, swissFell) and lattice description, 1-1 simulation (1e9 particles) to get micro-bunch shot noise right. Automatic optimization works better than human, but computational expensive. Cluster needs are very discontinuous in time.

Notes

1. EPOCH, OSIRIS, SMILEI open sources code for plasma. ARC: 0.01$ core-hour
2. Visualization: use topological analysis on isosurface, continuous scatter plot, fiber surfaces, topological analyses (<10GB data)
3. Software engineer, data science: formation and career.
4. DIRAC 2.5: 76k cores 1PFlops, 149k cores, 17k cores, 75 Tflops KNL, 150TFlops GPU, 7000 cores. Classification: Loosely (no inter-core communication), Weakly (sporadic communication), Strongly (constant communication) Parallel, Data Intensive