Science and Technology Facilities Council

DRD7.5a Update

Will Panduro Vazquez

Overall Status

- 7.5a Group now focusing on development of work plans covering next year, with clear deliverables
  - https://indico.cern.ch/event/1411160/
  - Ongoing discussions about opening up potential avenues for collaboration
    - E.g. meeting at RAL a few weeks ago with members of Valencia group on potential GPU studies
  - Still a lot of space available for new proposals/effort to help shape the direction of the group
  - Interest in the development of generic toolsets and algorithms for AI/ML with accelerators (GPU/FPGA)
    - Bristol, Birmingham
  - Tracking and jet-finding-related algorithms also regularly raised
    - Birmingham: Anti-kt ‘like’ algo with FPGA, tracking-related compression
  - Groups are open to algorithm suggestions and possible collaboration

Potential Funding/Project Overlap

- Contact Caterina Doglioni at Manchester for more info!

caterina.doglioni@manchester.ac.uk, with Jiri Masik, Pratik Jawahar, Alessandra Forti, James Smith and Tobias Fitschen

Connections for DRD7.5a with other ongoing projects (anyone is welcome!)

- EVERSE, European Institute for Software Excellence - establishing metrics to improve software and software recognition, with pilots that also include compute accelerators
  - In this context: call for cascading grants with focus on Open Science / software sustainability-related projects with deadline in late 2024 (https://oscars-project.eu/)
  - Could think of **training**, **documentation** and **codebase-related initiatives**
  - Let CD know if you are interested in applying, o(200k) funding for 2 years
- EuCAIF, European Coalition of AI in Fundamental Physics - ECFA-supported studies on infrastructure for AI/ML, including FPGAs (CD can't attend because she is at the EuCAIF Conference)
  - Whitepaper (commissioned by ECFA) on ML algorithms and infrastructure
  - Could be input of the update of the European Strategy of Particle Physics

Overall Status

- Unsuccessful bid for ‘Early Stage R&D’ funding through STFC
  - Would have facilitated the hire of a postdoc based at Manchester to support the work of multiple institutes by developing common tools/infrastructure
  - Feedback to be taken on board ahead of future funding calls
    - Primarily the need for more focus on the short-term deliverables to counter perception that early stage R&D not needed in this area
- General message seems to be that there is funding out there
  - Both internationally and in the UK
  - Need to be positioned to unlock it as it materialises

Tentative RAL Workplan (1 year)

- Improving existing e/gamma and tau low-level trigger algorithms with ML
  - Goal: investigate how tau BDT, deployed in ATLAS L1 trigger this year (Tel Aviv group) outperforms heuristic algorithm and assess practicality of recovering the gap
  - Step 1: Implement reliable simulation of the old and new tau algorithms
    - Done
  - Step 2: Produce suitable event sample for comparison
    - In progress
  - Step 3: Test simulated algorithms with simulation and compare results
  - Step 4: Implement improvements in heuristic algorithm (iterative testing and development)

Other RAL contributions?

- How should we move to more concrete proposals
  - IPbus
    - Already public and documented – opportunity to advertise this to next generation of detectors with relatively little overhead?
  - FPGA/GPU
    - ATLAS: GPU algorithms for tracking @ HL-LHC (including work with ACTS/TRACCC), host testbed featuring multiple accelerator platforms
    - CMS: offloading workloads into FPGA/GPU, alpaka code for ECAL reco, track trigger firmware
    - Discussions ongoing on what generic tooling could be offered as a deliverable
      - E.g. tracc on Intel/Altera FPGA – developing workplan
- Are there UK-based experiments coming up which could provide more focused requirements?
  - Might be primarily in Nu/DM space
    - Numerous smaller scale experiments – follow up with RAL Nu/DM team
    - Longer term… XLZD@Boulby…?