EP R&D Software Working Group, Core Team

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Inventory of EP Software Products

- Geant
- DD4Hep
- Gaussino
- ROOT
- Gaudi
- VecCore
- ACTS
- TrickTrack
- CernVM-FS
- Rucio
- Dirac

Timeline

- 16 March: 1st EP wide workshop (done)
- 18 April: convenors meeting
  - We expect to hear more about the funding envelope and the decision process
- June 6 to 8: workshop on software proposals
  - Presentation and discussion of software R&D proposals
  - Around 2 hours per proposal foreseen
  - We probably only need 2 days
  - 3rd day could be filled by topical events within proposal groups
- June to August: topical meetings within proposal groups
- 25 September: 2nd EP wide workshop
  - Presentation of concrete R&D line proposals
  - Draft version of the software chapter in the EP R&D report
- End of the year
  - Final version of the software chapter

Guidelines for concrete proposals

- Funding envelope: pending information from the convenors meeting, we think it is realistic to plan per proposal with
  - 2-3 fellows or students over 5 years
  - A fraction of 1-2 staff
  - We expect small material budgets for software, covering travel and perhaps test hardware; exception could be a ML training facility
- We think a good proposal should cover
  - A clear problem statement that is generally seen as worthwhile solving
  - Focus on topics that nobody else will solve for us,
    - such as detector simulation, event data model
  - Address a challenge of current experiments with a perspective on solving future problems
  - Details about the people and roles involved
  - Deliverables and milestones with early code artifacts that are given to users

Proto Proposals: Fast Simulation

- Driver: Witek

- Simulation keeping up with increased data rates considered crucial
- ML techniques offer promising new approach to fast simulation
- R&D goal: integration of fast simulation infrastructure and algorithms into common framework(s)

Proto Proposals: Tracking and Reconstruction in High Pile-up Environment

- Driver: (Andy & David)?

- Investigate adaptability of ACTS tracking infrastructure
  - On algorithmic level: missing algorithms, use of GPUs and FPGAs
  - On infrastructure level: facilitate adoption by new experiments
- Investigate common pile-up mitigation in particle flow analysis frameworks for tracking calorimeters, e.g. timing information

Proto Proposals: File-Less ROOT I/O for Future Analysis Facilities

- Driver: Danilo

- Connecting ROOT I/O to object stores, curtail *xyz*-AOD reduction runs
- Use of random-access distributed storage in future analysis facilities
- Active management of data caching layers
  - Possible a separate proposal around Rucio?
- Guided by micro-service data center application design

Other Useful Ideas

- Driver?

- ML Infrastructure: connectors between tools, model management, inference, shared training facility
- Data center infrastructure: common message-passing layer
- Common analysis-level conditions data
- Programming models and abstractions, e.g. DSLs, actor-model concurrency
- VecCore “standard library”
- Integration of online disk buffers
- Turn-key framework for future collider studies