Fast(er) simulation

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AIDA++

Advanced Software package proposal preparation

17/06/2019

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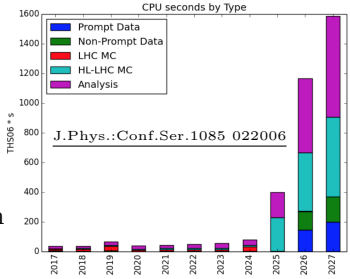

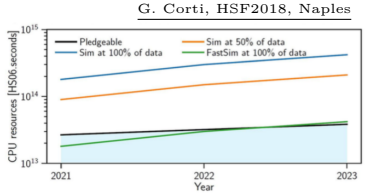

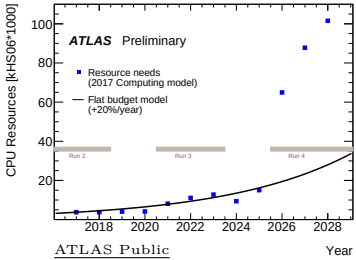

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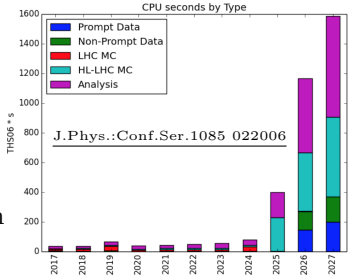

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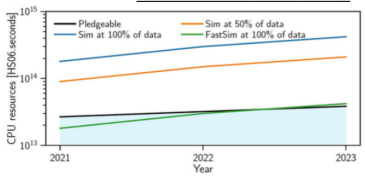

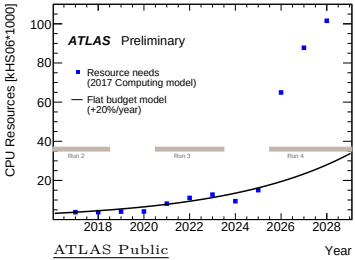

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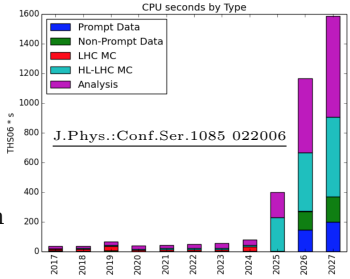

4 proposals:

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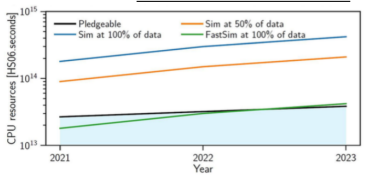

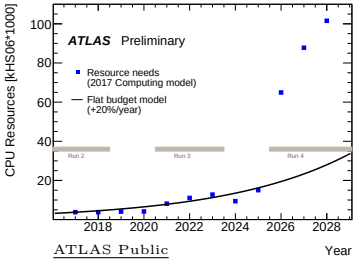

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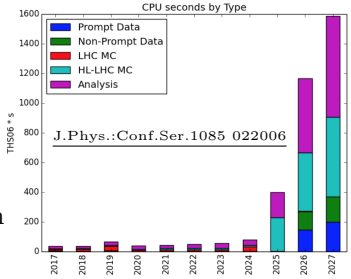

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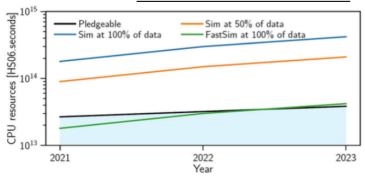

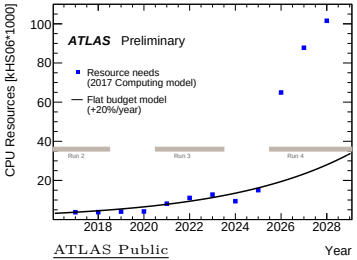

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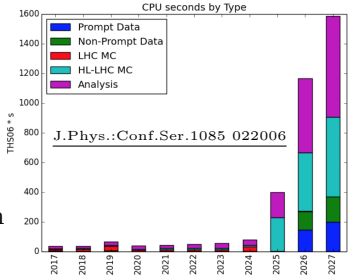

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2. Parametrisation

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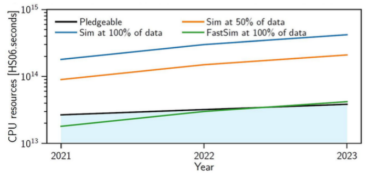

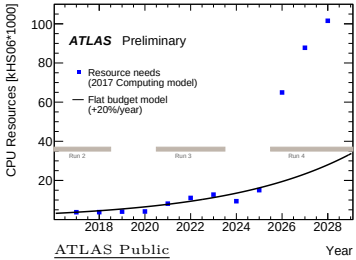

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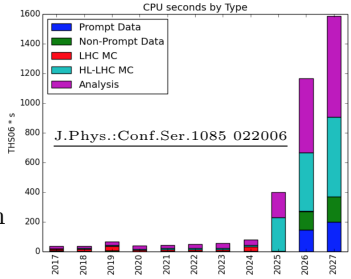

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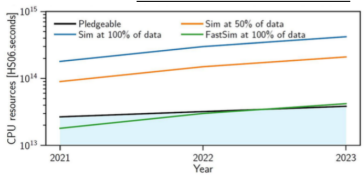

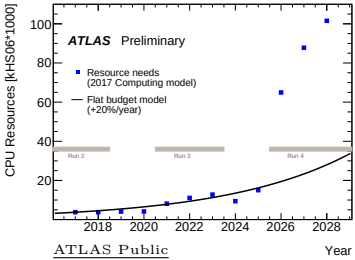

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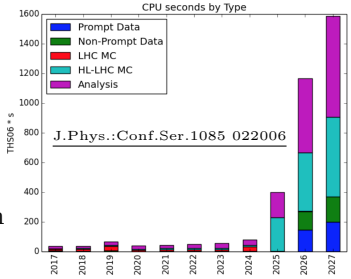

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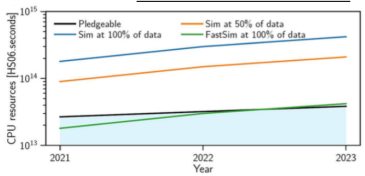

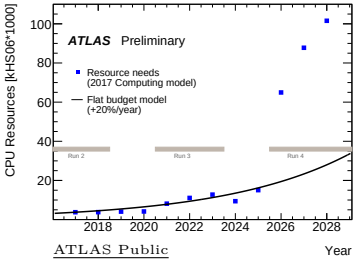

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- Developed in many experiments/detectors (network architecture, training)
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  HSF-simulation 6/03/2019

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- Integration with main framework (C++) necessary (inference)
- Use Geant4 to generate samples, validate trained network, use inferred showers within simulation

Parametrisation of showers

- Parametrisation of:
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  - start of shower
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- Time-consuming tuning of parameters to achieve satisfactory accuracy, need of re-tuning with changes to the detector (or for new sub-detectors)
- Need for a more automatised way of tuning and reusable infrastructure for parameterisations

Material and interactions approximation

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Material and interactions approximation

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- Two possible approaches:
  - Simplify geometry of the detector by effective material calculations and doing tracking in that simplified geometry
    - Kind of ‘compiler optimization level’ for the geometry
  - No tracking (in some volumes) at all, but only ‘exit point’ calculation (and generation of secondaries) based on material budget, MSC, interactions, etc

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Full simulation profiling

- Provide more ready-to-use tools within Geant4 to do “physics profiling”, identifying simulation “hot spots”
- Analyse region by region where changes could be made:
  - production cuts
  - biasing techniques applied
  - ...
- e.g. ATLAS’ diagnostic tools (HSF simulation 12/06/2019)