

PPG Software/Computing Discussion session

Authors

The Software/Computing WG

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2026 UPDATE

OPEN SYMPOSIUM
**European Strategy
for Particle Physics**



23-27 JUNE 2025



Introduction

- Computing played its role in LHC scientific success
- HL-LHC : Next challenge for CPU performance and optimise stored objects
 - Large scale facilities spread worldwide (WLCG)
- Standardization of tools among Particle Physics experiments (LHC, Belle, Dune)
 - WLCG tools, Root,...
- New IT technologies emerging from industry (GPU, AI, Quantum Computing)
 - A decade to embark new tools as operational technology in experiments

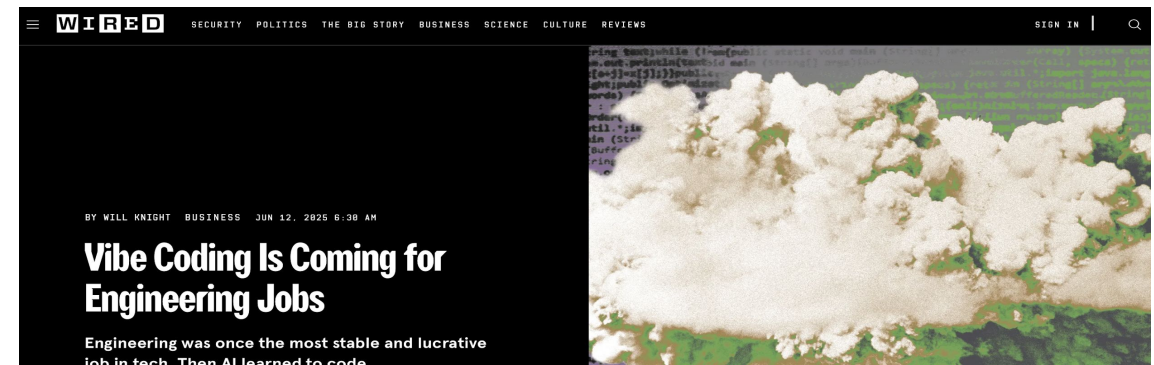
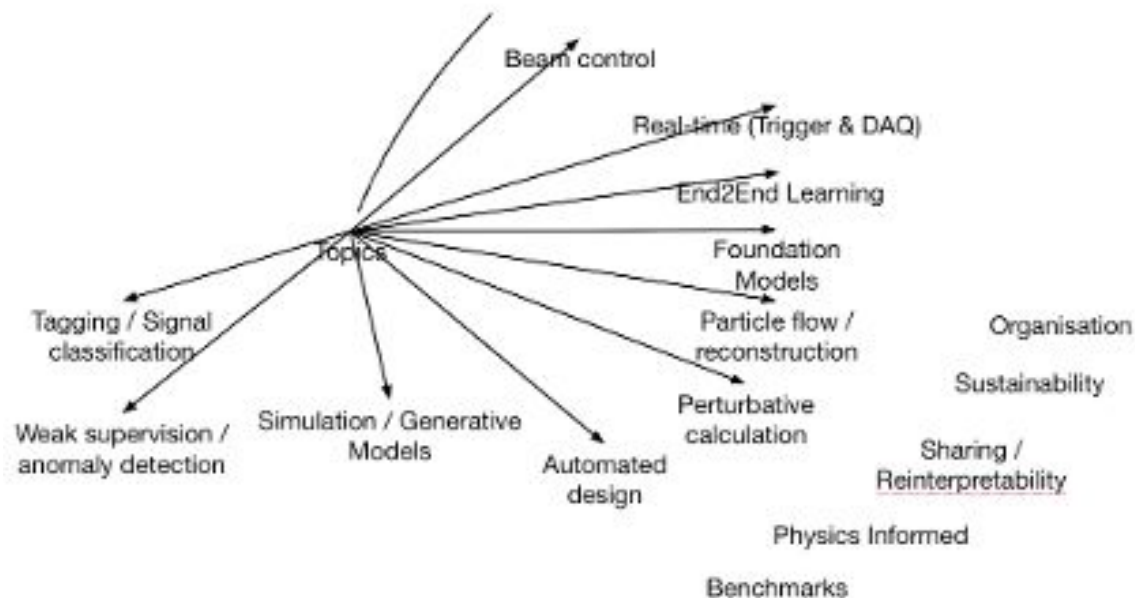
Hot topics for ESPP 2025

- Artificial Intelligence
- Computing facilities
- Software
- Modelling
- New Technologies

Questions: AI

How can our scientific community profit from the EU/public fundings for AI and its developments?
And what can it give in exchange?

Has AI reached an importance level to require a formal domain wise R&D? D-RD → AI-RD



European Commission

President von der Leyen launches initiative to mobilise €200 billion for AI investment

President von der Leyen announced the InvestAI initiative, which will aim to mobilise €200 billion for AI investments in Europe.

10 Feb 2025



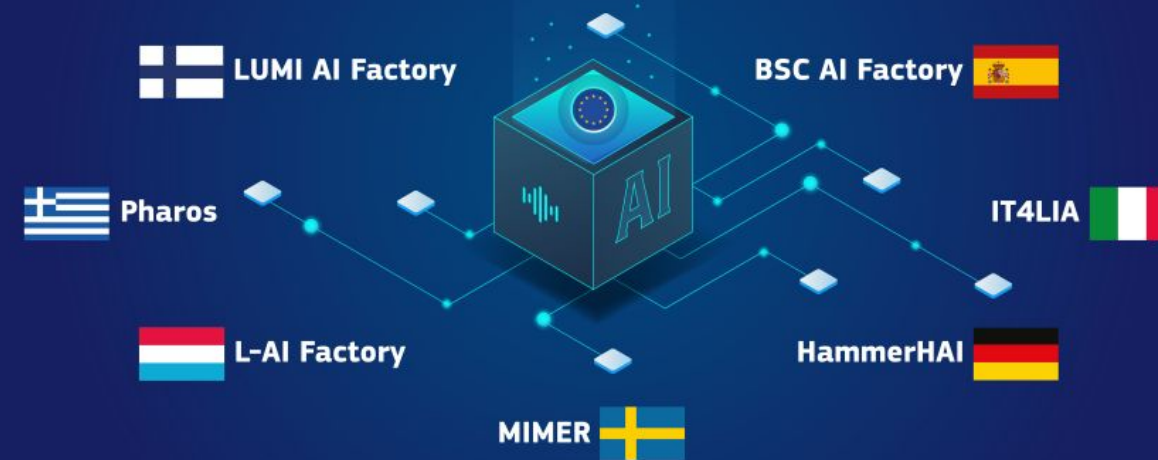
Question : HPC for HEP ?

How can we, as a scientific domain, make sure to have our needs aligned with the development of HPC centers, and how to have them integrated with our WLCG distributed computing?

EuroHPC Supercomputers



1st EuroHPC AI Factories

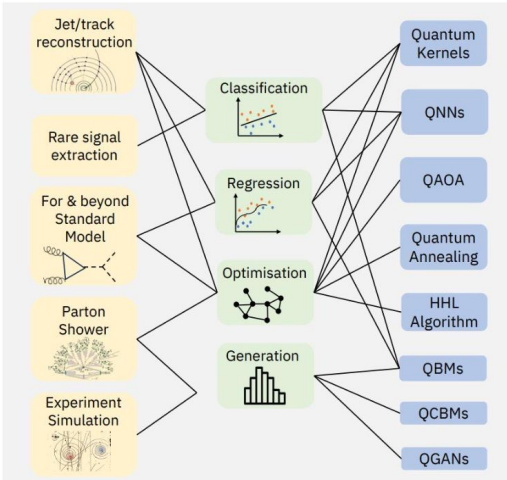
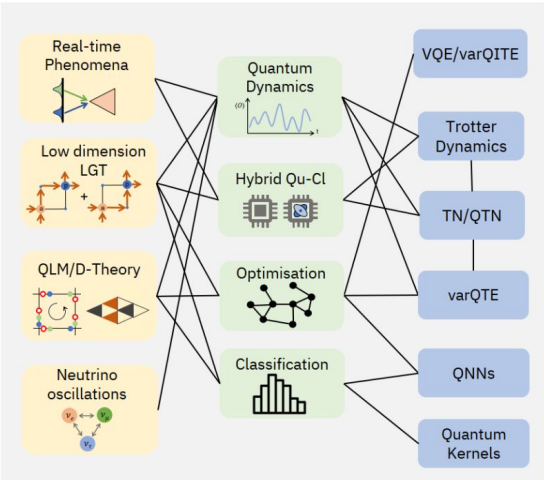


Question : New technologies

Given the time scale for next generation experiments, what impact and role can technologies such as quantum computing or other emerging or disruptive technologies play?

New IT technologies emerging: GPUs/AI in the near future and Quantum/neuromorphic computing in the more distant future.
 -> Need focused R&D program to integrate new tools and adapt to the technological evolution, currently driven by industry

A wide range of algorithms useful for HEP



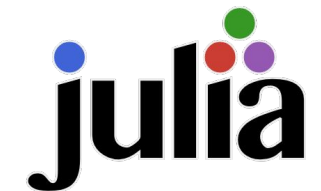
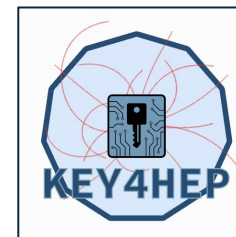
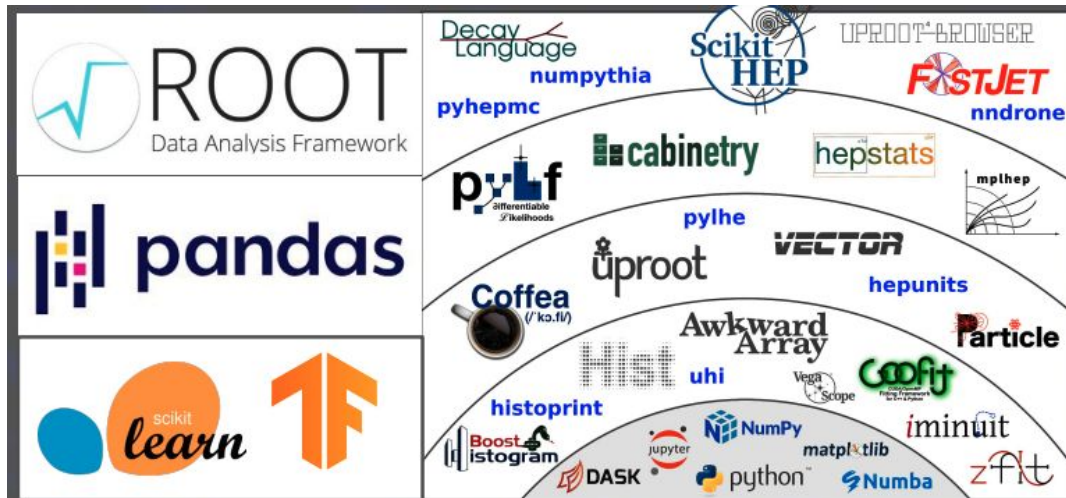
	OpenMP Offload	Kokkos	dpc++ / SYCL	HIP	CUDA	Alpaka	Python	std::par
NVidia GPU			codeplay and intel/llvm				numba	nvc++
AMD GPU		feature complete for select GPUs	via hipSYCL and intel/llvm			hip 4.0.1 / clang	numba	
Intel GPU		native and via OpenMP target offload		HIPLZ: early prototype		prototype	numba-dppy	via oneapi::dpl
CPU single-core								
CPU multi-core								nvc++ g++ & tbb
FPGA						possibly via SYCL		

Question : Expertise and effort sustainability

Long term collaborations and projects: how to ensure that ROOT, KEY4HEP, HSF, GEANT4, etc remain well supported as long as appropriate given their role in the HEP ecosystem?

Same for WLCG, which is assumed “working at the start” of large projects. How should it evolve ?

Career problems in HEP computing is long standing, and not getting appreciably better. Any new ideas/paths we can try? What do we need to avoid to making it worse?



Other questions from audience ?