

CHIPP Computing board

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CH- LHC Computing Resources

Switzerland operates two **Tier-2** Regional Centres at [CSCS](#) and [AEC](#) (UBe)
Switzerland is committed as [member of WLCG](#) to contribute resources via MoU
Resources provided to WLCG are exploited centrally by experiments

Tier-2 at CSCS (Piz Daint) serves all 3 experiments: ATLAS, CMS, LHCb

- old Linux cluster PHOENIX phased out (2017) —> hardware to be given to AEC
- ATLAS/CMS/LHCb workflows integrated on CSCS HPC (High Performance Computing)

Tier-2 at AEC-UNIBE serves ATLAS only

Swiss **Tier-3** resources are indispensable tools and exist in quite different “flavours”:

(IT = institute provided resources)

- ATLAS: one each for UBern (T2/T3 merged) and UniGe (small T3 —> IT)
- CMS: common T3 for ETHZ, UZH, PSI at PSI
- LHCb: one each at UZH (Small--> IT) and EPFL (small cluster —> IT).

SWITCH network infrastructure: <https://traffic.lan.switch.ch/pub/swiss-map/>

Collaboration Agreement

CHIPP - CSCS/ETHZ

CHIPP – CSCS cooperation (to provide resources and deliver our pledged resources to WLCG) is fixed in a “Collaboration Agreement” (CA) between ETHZ and CHIPP.

- This CA describes the duties and rights of both parties:
 - originally negotiated 2007
 - latest renewal in July 2018 for the duration [1.1.2019-31.12.2022](#)
- In the CA, ETHZ also commits additional voluntary funding by ETHZ, which covers costs for electricity & cooling, and additional personnel (1 FTE)

The T2@CSCS and 2.5 FTEs funded by the "FLARE – Computing Infrastructure for LHC Experiments" to be renewed this year (15 November)

CSCS - Piz Daint

Challenge for LHC computing for the HL-LHC era in the 2027+ :

- computing needs are expected to go up $\sim 50 \times$ in around 8-10 years; technology advance alone will accommodate a factor ~ 5
→ need roughly another order of magnitude increase

Many activities exist worldwide to face this HL-LHC challenge

Switzerland started project LHConCRAY in 2016 to test possibility and economy of LHC workloads on HPCs.

- In December 2017: concluded tests successfully
- Meeting of “CHIPP LHC computing board” on 7.12.2017, decided to transition to HPC for providing the Swiss T2-resources @CSCS.

We are presently experiencing some issues already identified in that project study:

- LHC computing models (ever evolving) may not be able to be easily accommodated
- transitions to new systems could be more costly (integration/commissioning)
- interferences can surface between users in a shared system (fair share)
- less flexibility for VO-representatives / higher dependency on CSCS
- (no hw to be reused for the T2 in Bern)

CHIPP / CSCS

Some issues has surfaced within the operations team:

- CHIPP / CSCS collaboration has transitioned to a “Service provider - Customer” relationship
 - communication bottleneck between CHIPP VO-representatives and CSCS
 - CSCS exclusively deals with VO-Reps and not with experiment IT Ops teams
 - limited resources available for R&D projects (e.g. GPU / resources federations)
 - “fit in the business model”-approach (if CSCS works on X all the others will suffer because we will not work on the rest)
- while generally pledges are met, the ATLAS computer model (nucleus - satellites) also requires constant efficiency for a reliable operation, which is difficult to achieve
- a significant fraction of the decommissioned HW (27kHS06), property of ETHZ but promised by CSCS to AEC, was never delivered

Next machine at CSCS

Piz Daint is going to be decommissioned within the next 2 years, in the meantime a new machine is going to be integrated.

So far we have no information about the new system

- CHIPP was not part of the specs definition

All we know is that new system is going to be heavily loaded with GPUs, but:

- ATLAS has no plan to transition to GPU reconstruction
- CMS will test GPUs at trigger level in Run 3, but not ready to deploy GPU reconstruction now
- LHCb is heavily using GPUs online, but has no plan to use it in reconstruction

The new machine is promised to be easier to use (each user will effectively interact with a separate virtual machine and the software will be fully containerised)

—> transition to a cloud-like system - develop common R&D (CERN/WLCG - CSCS).

Next steps

A FLARE fund request will be filed on 15 November for the next 2 years (2021-2023) to finance the T2 @ CSCS, covering the WLCG Swiss pledges

- discussion on going (CHIPP - CSCS) to sort out the issues in operations
 - go back to a collaboration relationship
 - design a configuration fulfilling the needs of all experiments
- examine the resources available in the next machine
 - evaluate the effective power of the solution (GPUs use)
 - estimate the effort needed for a the transition to the new system

The decision to exploit the new system will have to be taken in the next two years.

Implications on:

- CHIPP / CSCS collaboration agreement ending on 31.12.2022
- integration of other experiments with LHC-like requirements

WLCG is stressing the need for a structured software development in view of the HL-LHC. We will evaluate the possibility to file in an additional FLARE (around 2026) to invest in ~2 more FTE to help on a common R&D (CERN/WLCG - CSCS) project.