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Type: **Plenary**

## **GPU-based algorithms for the CMS track clustering and primary vertex reconstruction for the Run 3 and Phase II of the LHC**

*Thursday 2 June 2022 10:00 (15 minutes)*

The high luminosity expected from the LHC during the Run 3 and, especially, the Phase II of data taking introduces significant challenges in the CMS event reconstruction chain. The additional computational resources needed to treat this increased quantity of data surpass the expected increase in processing power for the next years.

As a possible solution to this problem, CMS is investigating the usage of heterogeneous architectures, including both CPUs and GPUs, which can fulfill the processing needs of the Phase II online and offline reconstruction. A prototype system using this machinery has been already deployed and will be operated at the HLT reconstruction during the Run 3 data taking, both to prove the feasibility of the system and to gain additional experience in its usage towards the more challenging Phase II scenarios.

Track clustering and primary vertex reconstruction takes a significant fraction of the reconstruction chain and involves similar computations over hundreds to thousands of reconstructed tracks. As a consequence, it is a natural candidate for the development of a GPU-based algorithm that parallelizes the later. We will discuss the status of such algorithm, and the challenges introduced by the need to reproduce the high performance already provided by the CPU-based version.

### **Consider for young scientist forum (Student or postdoc speaker)**

No

**Primary author:** ERICE CID, Carlos Francisco (Boston University (US))

**Presenter:** ERICE CID, Carlos Francisco (Boston University (US))

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