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# Evaluation of GPUs as a level-1 track trigger for the High-Luminosity LHC

*Monday 3 April 2017 16:24 (24 minutes)*

## Der Titel muss eingetragen sein.<BR> Für Aussteller: <BR>ein oder ein paar Stichpunkte<br> zum Sortiment.<BR><BR>Wer will, kann einen Abstrakt bereitstellen.<BR>Er wird dann mit dem Programm<BR> allen Teilnehmern bereitgestellt.

We investigate the use of GPUs as a way of realizing a low-latency, high-throughput track trigger, using CMS as a showcase example.
After the high luminosity upgrade, the CMS detector will require a substantial upgrade of its trigger system. With only 12 us of turnaround time for the global trigger signal, allotting 6 us for the track finding step, realizing a system that can handle the expected pileups of 140 events on average, is a challenge.
Most investigated systems heavily rely on the use of ASICs and FPGAs. We investigated the use of GPUs as an alternative to realize a low-level trigger, capable of meeting the given requirements. We are focusing on the track finding steps of the trigger system, based on the information created by the silicon tracker, using a Hough transformation. We establish data transfer directly into the GPUs memory by using RDMA connections, avoiding most overheads that are commonly associated with GPU data transfer.
Preliminary results show data transfer times as low as 2 us and processing times for the Hough transformation as low as 3.6 us. These results show that latency is of lower concern than previously expected. However, hardware limitations of current generation GPUs have proven to be problematic in terms of computing throughput. With the rapid enhancements in GPU development and performance over the last decades, it is reasonable to believe that GPUs might become feasible for track triggering in the near future.

## Bitte eintragen, ob ich den Vortrag<BR>”WIE GEHALTEN”,<BR> ”GAR NICHT”<BR> in die Proceedings aufnehmen darf, <BR>oder ob eine Version <BR>”NACHGEREICHT” wird. <BR> Ich ”ENTSCHEIDE SPAETER”

WIE GEHALTEN

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**Session Classification:** Schneller Umgang mit großen Datenmengen

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