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Track finding using GPUs

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The reconstruction and simulation of collision events is a major task in modern HEP experiments involving several ten thousands of standard CPUs. On the other hand the graphics processors (GPUs) have become much more powerful and are by far outperforming the standard CPUs in terms of floating point operations due to their massive parallel approach. The usage of these GPUs could therefore significantly reduce the overall reconstruction time per event or allow for the usage of more sophisticated algorithms.

In this contribution the track finding in the ATLAS experiment will be used as an example on how the GPUs can be used in this context: the seed finding alone shows already a speed increase of one order of magnitude compared to the same implementation on a standard CPU. On the other hand the implementation on the GPU requires a change in the algorithmic flow to allow the code to work in the rather limited environment on the GPU in terms of memory, cache, and transfer speed from and to the GPU.

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