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FPGA implementation of the General Triplet Track Fit

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Online reconstruction of charged particle tracks is one of the most computationally intensive tasks within current and future filter farms of large HEP experiments, requiring clever algorithms and appropriate hardware choices for its acceleration. The General Triplet Track Fit is a novel track-fitting algorithm that offers great potential for speed-up by processing triplets of hits independently. FPGAs, with their inherent parallelism, power efficiency and reconfigurability, are becoming increasingly attractive as co-processors for large data centres, such as the filter farms, to meet the challenges of increasing throughput and computational complexity.

We present an FPGA implementation of the General Triplet Track Fit suitable for future use in heterogeneous online farms. The algorithm is implemented on AMD FPGAs using high-level synthesis. We discuss algorithmic optimisation strategies to exploit the full potential of the device.

Primary authors: NANDI, Abhirikshma (Heidelberg University (DE)); SCHÖNING, André (Heidelberg University (DE)); SAUER, Christof (Heidelberg University (DE)); TASTEPE, Kadir Murat (Heidelberg University (DE)); DITTMEIER, Sebastian (Ruprecht-Karls-Universität Heidelberg (DE))

Presenter: TASTEPE, Kadir Murat (Heidelberg University (DE))

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