



Contribution ID: 551

Type: **Oral**

Covariance Matrix Acceleration on a Hybrid FPGA/CPU Platform

Tuesday 5 November 2019 11:45 (15 minutes)

Covariance matrices are used for a wide range of applications in particle physics, including Kalman filter for tracking purposes, as well as for Primary Component Analysis and other dimensionality reduction techniques. The covariance matrix contains covariance and variance measures between all permutations of data dimensions, leading to high computational cost.

By using a novel decomposition of the covariance matrix and exploiting parallelism on FPGA as well as separability of subtasks to CPU and FPGA, a linear increase of computation time for 156 number of integer dimensions and a constant computation time for 16 integer dimensions is achieved for exact covariance matrix calculation on a hybrid FPGA-CPU system, the Intel HARP 2. This leads up to 100 times faster results than the FPGA baseline and 10 times faster computation time compared to standard CPU covariance matrix calculation.

Consider for promotion

No

Authors: ARNOLD, Lukas On (Columbia University); EWALDA, Mohsen (ETHZ)

Presenter: ARNOLD, Lukas On (Columbia University)

Session Classification: Track 9 –Exascale Science

Track Classification: Track 9 –Exascale Science