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An efficient data protocol for encoding preprocessed clusters of CMOS Monolithic Active Pixel Sensors

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CBM aims to measure open charm particles from 15-40 AGeV/c heavy ion collisions by means of secondary vertex reconstruction. The measurement concept includes the use of a free-running DAQ, real time tracking, primary and secondary vertex reconstruction and a tagging of open charm candidates based on secondary vertex information. The related detector challenge will be addressed with an ultra-light and highly granular Micro Vertex Detector (MVD) based on CMOS Monolithic Active Pixel Sensors (MAPS).

Performing the real time vertex reconstruction at collision rates of $\sim 1e5$ coll./s will introduce a substantial CPU-load to the computing system (FLES) of CBM. To reduce this load, we consider to perform pre-processing steps like cluster finding already in DAQ-instances upstream the FLES. A successful pre-processing concept should be FPGA-compatible. Moreover, it should provide a lossless encoding of the original information as much as the newly computed information on the cluster position and shape without extending the data volume.

To fulfill those requirements, we developed a cluster encoding concept which may encode the above mentioned information in a single 32-bit word. This concept is introduced and its validity is discussed based on data from the recent beam test of the MVD-prototype at CERN-SPS.

Summary

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