Davide Cieri

Abstract

An rz filter for the TM Track Trigger Track Finder At the HL-LHC, proton bunches collide every 25 ns, producing an average of 140 pp interactions per bunch crossing. To operate in such an environment, the CMS experiment will need a L1 hardware trigger, able to identify interesting events within a latency of 12.5 μs. Therefore, the novel L1 trigger will make use of data coming from the silicon tracker to constrain the trigger rate. The architecture that will be implemented in future to process tracker data is still under discussion. One possibility is to adopt a system entirely formed of FPGA-based boards. The proposed track finding algorithm is based on the Hough transform method. Many track candidates at the output of the Hough Transform correspond to fake hits correlations or contain spurious hits, making harder the job of a downstream track fitting stage. To reduce the fake rate and improve the purity of track candidates out of the Hough Transform, a rz filter can be implemented. The chosen algorithm, the Seed Filter, has been shown to provide excellent performance, and has been tested in software simulation and demonstrated in hardware, using the "MP7", which is a uTCA board with a powerful FPGA capable of handling data rates approaching 1 Tb/s.