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Design and deployment of a fast neural network for measuring the properties of muons originating from displaced vertices in the CMS Endcap Muon Track Finder

We report on the development, implementation, and performance of a fast neural network used to measure the transverse momentum in the CMS Level-1 Endcap Muon Track Finder. The network aims to improve the triggering efficiency of muons produced in the decays of long-lived particles. We implemented it in firmware for a Xilinx Virtex-7 FPGA and deployed it during the LHC Run 3 data-taking in 2023. The new displaced muon triggers that use this algorithm broaden the phase space accessible to the CMS experiment for searches that look for evidence of LLPs that decay into muons.

AI keywords

FPGAs;real-time signal identification,ultra fast processing

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