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Development of a Central Trigger Processor board for the Advanced SiPM based camera of the CTAO Large-Sized Telescopes

Current Imaging Atmospheric Cherenkov Telescopes (IACT) use combined analog and digital electronics for their trigger systems, implementing simple but fast algorithms. Such trigger techniques are needed in order to cope with the extremely high data rates and strict timing requirements. In recent years, in the context of the Advanced camera design for the Large-Sized Telescopes (LSTs) of the Cherenkov Telescope Array Observatory (CTAO) based on Silicon PhotoMultipliers (SiPM), a new fully digital trigger system incorporating Machine Learning (ML) algorithms is being developed. The main concept is to implement those algorithms in Field Programmable Gate Arrays (FPGAs) and take advantage of the higher camera resolution, in order to improve the ability to distinguish between low-energy gamma ray showers and noise. Thus, the sensitivity to low-energy gamma rays will be improved, while being able to fulfill the previous constraints of CTAO-LST. We will describe the project to develop a Central Trigger Processor (CTP) board for the Advanced LST SiPM-CAM, with the aim to run such advanced trigger algorithms and additionally perform a hardware stereo trigger among LSTs. We will present the CTP conceptual design, as well as the prototypes built so far.

AI keywords

FPGAs; Trigger; Real-Time; ML; Image Processing

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