

SiPM and front-end electronics performance for Cherenkov Telescope Array camera development

In the last years many efforts in developing new technology related to Silicon Photomultipliers (SiPMs) have been done. These photosensors consist of an array of identical Avalanche Photodiodes operating in Geiger mode and connected in parallel to a single output. The Italian Institute of Nuclear Physics is involved in a R&D program in order to develop a SiPM-based camera that will be part of the Cherenkov Telescope Array (CTA). In this framework tests on innovative devices suitable to detect Cherenkov light in the blue and near-UV wavelength region, the so called Near Ultra-Violet Silicon Photomultipliers (NUV SiPMs), are ongoing. Tests on photosensors produced by Fondazione Bruno Kessler (FBK) are revealing a promising behaviour in term of performance: low operating voltage, capability to detect very low intensity light down to single photon, high Photo Detection Efficiency in the range 390-410 nm. A campaign of test on SiPMs with several micro-cell size ($40\mu\text{m}$ and $30\mu\text{m}$) arranged in different geometrical structures have been performed to choose the best device for CTA requirements. In particular a comparison between technology of sensors characterized by a micro-cell of $40\mu\text{m}$ (NUV-SiPM) and $30\mu\text{m}$ (NUV-HD SiPM) arranged in a layout of $6\times 6\text{mm}^2$ pixel size in single configuration and in a matrix arrangement will be presented. In addition results on studies for the development of a front-end electronics optimized for the new NUV SiPM will be given.

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