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Silicon Photomultiplier Research and Development Studies for the Large Size Telescope of the Cherenkov Telescope Array

Saturday 1 August 2015 15:30 (1 hour)

The Cherenkov Telescope Array (CTA) is the the next generation facility of Imaging Atmospheric Cherenkov Telescopes; two observatories will cover both hemispheres. CTA will reach unprecedented sensitivity, energy and angular resolution in very-high-energy gamma-ray astronomy. Each CTA array will include four Large Size Telescopes (LSTs), designed to cover the low-energy range of the CTA sensitivity (˜20 GeV to 200 GeV). In the baseline LST design, the focal-plane camera will be instrumented with 265 photodetector clusters that include 7 1.5-inch photomultiplier tubes (PMTs). The PMT design is based on mature and reliable technology. Recently, silicon photomultipliers (SiPMs) are emerging as a competitor. Currently, SiPMs have advantages (e.g. lower operating voltage and tolerance to high illumination levels) and disadvantages (e.g. higher capacitance and cross talk rates), but this technology is still young and rapidly evolving. SiPM technology has a strong potential to become superior to the PMT one in terms of photon detection efficiency and price per square mm of detector area. While the advantage of SiPMs could be proven for high-density, small-size cameras, it is yet to be shown for large area cameras as the one of the LSTs.
The CTA-LST SiPM R&D team is committed to developing a SiPM-based module for the LST camera, in view of a possible camera upgrade. We will describe the solutions we are exploring in order to balance a competitive performance with a minimal impact on the overall LST camera design.

Collaboration

CTA

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