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F. Conte: Development of a Compact High-Energy Camera for the Cherenkov Telescope Array

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The Cherenkov Telescope Array (CTA) project is a next generation observatory for Very-High Energy gamma-ray astronomy. Two sites, in the northern and in the southern emisphere, have already been officially announced by the CTA consortium and will constitute the world largest detector for gamma rays. To push the energy sensitivity in the range of hundreds of TeV, about 70 small-sized telescopes (SSTs) will be deployed in the southern hemisphere, covering an area of about four square kilometers. Here I present the development status of the Compact High-Energy Camera (CHEC), the camera designed for SST-2M GCT (one of the proposed SST prototypes). It focuses on the higher-end of CTA energy range and thanks to the use of dual-mirror optics CHEC can be very compact and low-cost, despite a precision of 10 arcmin and a field of view of 8 degrees, providing an unprecedented sensitivity and angular resolution with respect to any existing Imaging Atmospheric Cherenkov Telescopes (IACTs). The camera contains 2048 pixels with a physical size of 6×6 mm 2 . It relies on electronics based on TARGET (TeV Array Readout with GSa/s sampling and Event Trigger) Application-Specific Integrated Circuits (ASICs) and Field Programmable Gate Arrays (FPGAs) allowing a continuous sampling of the full waveform with the precision of 1 ns. CHEC-S, the current prototype, features silicon photomultipliers (SiPM) which provide many advantages over classical photomultiplier tubes (PMTs), and even over multi-anode PMTs as proven with the first prototype, CHEC-M. This contribution is meant to give an overview on CHEC-S design and status, showing in particular how it answers the peculiar needs of Cherenkov ground-based gamma-ray detection, which requires a completely different approach with respect to IR/optical detection. Finally, latest results from laboratory measurements and calibrations are presented.

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