

Novel PMTs of worldwide best parameters for the CTA project

Photo-multiplier Tubes (PMT) are the most wide spread detectors for measuring fast and faint light signals. In cooperation with the companies Hamamatsu Photonics K.K. (Japan) and Electron Tubes Enterprises Ltd. about six years ago we started an improvement program for the PMT candidates for the Cherenkov Telescope Array (CTA) project (England). CTA is the next major Imaging Atmospheric Cherenkov Telescopes array for ground-based high energy gamma-ray astrophysics. A total of ~100 telescopes of sizes of 23m, 12m and 4m in diameter will be built in Northern and Southern hemispheres. For CTA we need PMTs with the highest quantum efficiency and photo electron collection efficiency, short pulse width of a few ns, very low after-pulsing and transit time spread. The manufacturers were able to produce 1.5' PMTs of enhanced peak quantum efficiency of ~ 40%. These collect up to 95-98% of photo electrons onto the first dynode for the wavelengths $\geq 400\text{nm}$. A pulse width of $\leq 3\text{ns}$ has been achieved at the selected operational gain of 40k. The after-pulsing for a threshold of ≥ 4 photo electrons is dramatically reduced, down to the level of 0.02%.

We will report on the measurements of 1.5' PMTs from Hamamatsu and Electron Tubes Enterprises as candidate PMTs for the CTA project. The novel 1.5' PMTs have the worldwide best parameters.

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