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Evaluation of Photo Multiplier Tube Candidates for the Cherenkov Telescope Array

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Photo Multiplier Tubes (PMT) are the most wide spread detectors for fast, faint light signals. Some five years ago, an improvement program for the PMT candidates for the Cherenkov Telescope Array (CTA) project was started with the companies Hamamatsu Photonics K.K. (Japan) and Electron Tubes Enterprises Ltd. (England). CTA is the next major Imaging Atmospheric Cherenkov Telescopes array for high energy gamma-ray astrophysics. For CTA we need PMTs with outstanding good quantum efficiency, high photo electron collection efficiency, short pulse width, very low after-pulsing and transit time spread. Both manufacturers were able to produce outstanding PMTs with an enhanced peak quantum efficiency of ~ 40%, which can collect up to 95-98% of photo electrons onto the first dynode for the wavelengths $\geq 400\text{nm}$. The pulse width averages around 3ns at the selected operational gain of 40000. Also, the after-pulsing for a set threshold level of ≥ 4 photo electrons is significantly reduced, down to 0.02%.

We will report on the measurements of PMT R-12292-100 from Hamamatsu as the final version and the PMT D573KFLSB as one of the latest test versions from Electron Tubes Enterprises as candidate PMTs for the CTA project.

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