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AF Pellion, D., Jradi, K., Le Padellec, A., Rennane, A., Moutier, F., Borrel, V., Esteve, D., Magenc, C., Bazer-Bachi, A. R.

TI Geiger avalanche photodiodes as tentative light detectors for VHE gamma ray astronomy
SO EXPERIMENTAL ASTRONOMY

LA English

DT Article

DE SiPM; Cerenkov astronomy

ID TELESCOPE OBSERVATIONS; CERENKOV TELESCOPE; CRAB-NEBULA; FLUX

AB Due to its sensitivity and speed, the detector still widely used in Cerenkov astrophysics experiments remains the PhotoMultiplier Tube (PMT). For instance, recent pathbreaking experiments in Very High Energy astrophysics (VHE), such as MAGIC and HESS, have used mainstream PMT technology [Aharonian, F. et al *Astron. Astrophys.* 492(1):L25-L28 (2008)]. Moreover the Cerenkov Telescope Array (CTA) which is now in its design phase, is also planned to be based on PMT's. However, there are some disadvantages to the PMT technology: the rather poor quantum efficiency, the use of high voltages, the high cost when used in large number in a matrix arrangement and the large weight. Hence, we have investigated the possibility to design future Cerenkov telescopes based on solid state technology, specifically Geiger avalanche photodiodes. In a preliminary development test, we placed HAMAMATSU avalanche photodiodes at the focal plane of a 60 cm diameter telescope at the Pic du Midi in the French Pyr,n,es, in order to record incident cosmic rays. In this paper, we describe not only the experimental setup but we also put special emphasis to the reduction of the semi-conductor noise. We also show first data that were recorded during two runs in the fall of 2006, and conclude by the presentation of the design of an "integrated, low-cost solid state photodiode arrangement" which might be an alternative to PMT's for future VHE telescopes.

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