

AU Cadu, A, Le Padellec, A, Jradi, K, Pellion, D, Bazer-Bachi, AR  
AF Cadu, A., Le Padellec, A., Jradi, K., Pellion, D., Bazer-Bachi, A. R.  
TI The use of silicon photomultipliers for very high energy gamma ray astronomy: the optical issues

SO EXPERIMENTAL ASTRONOMY

LA English

DT Article

DE G-APD; Optics; Microlenses; Cerenkov effect; VHE astronomy

ID ATMOSPHERIC CHERENKOV TELESCOPES; SYSTEM; TUBES

AB Due to its sensitivity and speed, the detector still widely used in Cerenkov astrophysics experiments remains the Photo-Multiplier Tube(PMT). 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 a subsequent large weight. Hence, we have investigated the possibility to design future Cerenkov telescope cameras based on solid state technology, specifically Geiger Avalanche PhotoDiodes (G-APD's). This paper describes our extensive simulations to design the optical setup to be employed with G APD's. We also discuss the reflector configurations, pixel layouts, light concentrators, microlens arrays and spectral efficiencies to optimize light collection. The electronic aspects of our work were presented in a recent companion paper (Pellion et al., *Exp. Astron.* 27(3):187, 2010).

C1 Univ Toulouse, UPS, Inst Rech Astrophys & Planetol, F-31028 Toulouse 9, France. CNRS, UMR 5277, F-31028 Toulouse, France.

RP Cadu, A (reprint author), Univ Toulouse, UPS, Inst Rech Astrophys & Planetol, 9 Ave Colonel Roche, F-31028 Toulouse 9, France.

EM alexandre.cadu@irap.omp.eu

FU Region Midi-Pyrenees; Observatoire Midi-Pyrenees (France)

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PU SPRINGER

PI DORDRECHT

PA VAN GODEWIJCKSTRAAT 30, 3311 GZ DORDRECHT, NETHERLANDS

SN 0922-6435

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