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Silicon Photomultiplier: Novel Photodetector for Medical Imaging Systems

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Development of photodetectors for detecting of low intensity photon flux is one of the critical issues for experimental physics, medical imaging system and many others. Review of silicon photomultipliers SiPM, novel type of avalanche photodetector with Geiger mode operation is presented. The structure of photodetector is based on the matrices of microcells with density of 1500/mm2, working in Geiger mode with internal gain of amplification 105 –106 and integrated quenching mechanism. Photon detection efficiency of order 20-30 % for green spectrum of light and estimated time resolution is about 30 ps. The structure of the photodetector gives the possibility of detecting the low flux up to 1500 photoelectrons with proportional responce.
The physics of silicon photomultipliers, recent development and experimental test with different kind of scintillation materials will be presented.
Novel type of photodetector - Silicon Photomultiplier is compact, robast, not sensitive to magnetic fields and will find wide application in medical imaging system especially in Positron Emission Tomography (PET) and combine PET imaging system.

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