

Novel Micropixel Avalanche Photodiodes (MAPD) with super high pixel density.

In many detectors based on scintillators the photomultiplier tubes (PMT) are used as photodetectors. At present photodiodes are finding wide application. Solid state photodetectors allow operation in strong magnetic fields which are often present in applications, e. g. some calorimeters operate near magnets, combined PET and MRT –tomographies, etc. The Photon Detection Efficiency (PDE) of photodiodes may reach values few times better than for PMT. Also, they are rigid, compact and have relatively low operating voltage. In last few years Micropixels Avalanche PhotoDiodes (MAPD) are being developed and started to be used. The MAPD combines a lot of advantages of semiconductor photodetectors and has a high gain, which is close to PMT. But there are some disadvantages of these photodetectors and one of them is a limited dynamic range which corresponds to a total number of pixels. Novel deep micro-well MAPD with high pixel density produced by Zecotek Company partially avoids this disadvantage. In this paper characteristics of these photodetectors in comparison with PMT are presented. These results refer to measurements of the gain, PDE, cross-talks, photon counting and applications - beam tests results of two different “Shashlyk” EM calorimeters for COMPASS (CERN) and NICA-MPD (JINR) with the MAPD readout and possibility of using the MAPD in PET.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

Novel Micropixel Avalanche Photodiodes (MAPD) with super high pixel density, their characteristics and application will be presented. The beam test results on PS accelerator at CERN of two different “Shashlyk” EM calorimeters for COMPASS (CERN) and NICA-MPD (JINR) experiments with the MAPD readout and possibility of using the MAPD in PET will be shown.

Author: Mr ANFIMOV, Nikolay (Joint Institute for Nuclear Research)

Co-authors: Dr OLCHEVSKI, Alexander (Joint Institute for Nuclear Research); Mr NAGAYTSEV, Alexandr (Joint Institute for Nuclear Research); Mr GUSKOV, Alexey (Joint Institute for Nuclear Research); Mr DOVLATOV, Ali (Joint Institute for Nuclear Research); Mr SADOVSKIY, Andrey (Joint Institute for Nuclear Research); Dr ZEROUK, Faouzi (Zecotek Company); Mr YARYGIN, Gennadiy (Joint Institute for Nuclear Research); Mr MESHCHERYAKOV, Gleb (Joint Institute for Nuclear Research); Mr CHIRIKOV-ZORIN, Igor (Joint Institute for Nuclear Research); Dr SAVIN, Igor (Joint Institute for Nuclear Research); Dr TYAPKIN, Igor (Joint Institute for Nuclear Research); Mr KHOVANSKIY, Nikolay (Joint Institute for Nuclear Research); Mr GAVRISHCHUK, Oleg (Joint Institute for Nuclear Research); Dr LEITNER, Rupert (Joint Institute for Nuclear Research); Mr TCHALYSHEV, Vyacheslav (Joint Institute for Nuclear Research); Mr KRUMSHTEIN, Zinoviy (Joint Institute for Nuclear Research); Dr SADYGOV, Ziraddin (Joint Institute for Nuclear Research)

Presenter: Mr ANFIMOV, Nikolay (Joint Institute for Nuclear Research)