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# New Micropixel Avalanche Photon Detector with Fast Response

The design and operation principle of a new avalanche photon detector are presented. The innovative avalanche photon detector consists of a matrix of photosensitive micropixels with individual quenching resistors, as in the known SiPM with surface pixels, and a matrix of microtransistors with individual ballast resistors. The new device has two independent signal outputs; standard output from the pixels connected in parallel and fast output from microtransistors, connected in parallel. Signals from each pixel operating in Geiger mode have an additional amplification in the individual phototransistor operating in digital mode. The design of the new device make it possible to solve the main problems of the known SiPMs, namely, significantly reduce the probability of cross-talk and after-pulses, as well as significantly increase the area of the device and improve its performance. The basic idea underlying the new photon detector is the reduction the avalanche amplification in photosensitive pixels and uses an individual amplifying element for each pixel to obtain a sufficiently high gain.

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