UNIVERSITY OF SURREY

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POSITION SENSITIVE DETECTORS

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Position sensitive detector for fluorescence lifetime imaging.

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We present a detector system with a microchannel plate based photomultiplier tube and its application for fluorescence lifetime imaging (FLIM). A capacity coupled imaging technique (charge image) combined with a charge division anode is employed for the positional readout. Using an artificial neural networks computation model we are able to reconstruct the position of the incident photon as precise as 20 microns over the detector active area of 25 mm diameter. Thus, the resulting image quality corresponds roughly to a megapixel conventional CCD camera. Importantly, it is feasible to reach such resolution using only 9 charge acquisition channels supporting the anode structure of 14 interconnected readout electrodes. Additionally, the system features better than 50 ps temporal resolution allowing single photon counting FLIM acquisition with a regular fluorescence wide-field microscope.

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