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Large-Area Silicon Photomultipliers (SPMs)

Large-area optical detection systems are required for applications including cell imaging, spectroscopy, nuclear medicine, bio diagnostics, radiation detection and high energy physics. The silicon photomultiplier, or SPM, has emerged as an attractive alternative to the photomultiplier tube in these applications. However, large areas of silicon detector are required and the performance of the SPM must be optimised to work in such a large area array. In this paper, the performance of 1mm² and 9mm² SPM detectors will be reviewed as well as the scaling of the SPM to tile across a large area will be presented. In particular, a novel method is discussed for compact packaging of SPM detectors into a tiled 2D detector array for large area imaging and 2D spatial detection. The SPM will be shown to have many operation and performance advantages to the PMT and with the ability to form large area arrays a solution where a large area detector is required