Advances in Radiation-Hard Monolithic Pixel Detectors

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Scientific Programme

On 10th March 2016 the "UK community meeting on CMOS sensors for particle tracking" was hosted at Cosener's House in Abingdon. Following this in July the document "R&D on High Granularity HV/HR-CMOS Detectors for Future Experiments" was submitted to the PPAP followed by submission to STFC of the "Statement of Interest in the Development of an STFC Strategic Investment in R&D on Depleted Monolithic Active Pixel Sensor (DMAPS) Technologies".

The possibility for using variants of the mainstream commercial CMOS Imaging Sensor (CIS) technology that is ubiquitous in mobile phones, tablets, digital cameras etc to detect ionising radiation has been around for well over a decade although application in experiments has only become a reality much more recently. Despite a number of developments which improve the suitability for particle physics and heavy ion applications, many applications require a radiation-hardness well beyond that of the current generation of detectors. However, given the attraction of using monolithic, as opposed to hybrid, pixel modules in terms of material, the potential fine pitch and cost, there has been a major international programme, including UK participation, to define processing variants which could also deliver the levels of radiation hardness needed at hadron colliders.

Recent progress in this this respect has been remarkable, and the potential for new technologies to be a complete game-changer not just for vertexing and tracking, but even for high granularity calorimetry makes this a topic of wide interest across the experimental particle and nuclear physics communities as well as an extremely timely topic for an IoP Half Day Meeting.

The University of Birmingham is one of several UK institutes involved in a number of these developments for nuclear and particle physics experiments and also offers a central and inexpensive location for many groups to reach by public transport, so we are hosting a meeting to discuss the most recent progress and to discuss how to take the further the approach to STFC for a coordinated strategic investment in this highly significant technology.