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## Proton Tracking for Medical Imaging and Dosimetry

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For many years, silicon micro-strip detectors have been successfully used as tracking detectors for particle and nuclear physics experiments. A new application of this technology is to the field of particle therapy where radiotherapy is carried out by use of charged particles such as protons or carbon ions. Such a treatment has been shown to have advantages over standard x-ray radiotherapy and as a result of this, many new centres offering particle therapy are currently under construction around the world today. The characteristics of a new silicon micro-strip detector based system for this application will be presented. The array uses specifically designed large area sensors in several stations in an x-u-v configuration to be suitable for very fast proton tracking with minimal ambiguities. The sensors will form a tracker capable of giving information on the path of ~200 MeV protons entering and exiting a patient allowing proton computed tomography (pCT) to aid the accurate delivery of treatment dose with tuned beam profile and energy. The tracker will also be capable of proton counting and position measurement at the higher fluences and lower energies used during treatment allowing monitoring of the beam profile and total dose. First results from the tracking stations will be presented along with details of the readout electronics together with simulation work from GEANT4. Radiation tests and studies completed with a 36 MeV beam at the University of Birmingham Cyclotron, UK, and a 62 MeV proton beam at the Clatterbridge Cancer Centre, UK will be shown as well as preliminary measurements with higher energy proton beams at the iThemba LABS in South Africa.

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