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Beam Diagnostics for Medical Accelerators

Hadron therapy has proven to be a very sophisticated and precise technique in cancer treatment. A particular advantage of hadron therapy is the precise dose distribution, which can be limited exactly to the tumour volume, thus decreasing the dose in the organs at risk. Work on detectors for quality assurance of the proton beam at the Clatterbridge Centre for Oncology (CCO) has been started in the QUASAR Group and focuses on monitoring the following parameters: Beam energy, energy spread and beam position.
Three quality assurance monitors are presently under development: The LHCb VELO detector, a 'classic'Faraday Cup and a multi –layer Faraday Cup. The LHCb VELO detector is being adopted as a non–invasive beam current and beam position monitor. The mechanical design for integrating the detector in the treatment beam line has been finalized. The Faraday Cup design has been optimised in detailed simulations with the FLUKA Monte Carlo code to meet the needs of the 60 MeV proton beam available at CCO. The charged particle spectra w.r.t. energy and angle have been scored and analysed. These results were used to increase the charged particle suppression , the charge collection efficiency of the detector and thus its reliability. Finally, the multi-leaf Faraday Cup is being developed for energy spread measurements of the cyclotron's beam with a resolution in the 1 % range .
In this contribution results from the Faraday Cup design optimisation will be presented together with a description of the VELO detector implementation at the CCO's treatment beam line.

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