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The SiFi-CC project - towards online monitoring of proton therapy

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Over the last five years, the number of proton therapy centres in the World has doubled. In Kraków, Poland a new proton therapy facility Cyclotron Centre Bronowice (CCB) has been launched in 2013. The accuracy of proton therapy could be improved if on-line monitoring of deposited dose became a standard in clinical practice. Different approaches for beam range verification (one-dimensional) or monitoring of deposited dose distribution (two- or three-dimensional) are being developed, exploiting different types of secondary radiation. One of them is prompt-gamma imaging, for which the detectors of the Compton-camera type featuring a three-dimensional reconstruction allow to obtain the richest information.

Physicists from the Jagiellonian University and the RWTH Aachen University have established a collaboration to develop a method for on-line monitoring of dose distribution deposited in proton therapy exploiting prompt-gamma radiation. In the first project called γ CCB the relevant differential yields for gamma emission were measured at HIT Heidelberg and CCB Kraków. The new project aims at the development of a setup for prompt-gamma imaging, which will take advantage of the latest advances in scintillation detectors - fibres made from modern, heavy scintillators read out by SiPMs, hence the project name SiFi-CC (SiPMs and scintillating Fibre-based Compton Camera). Key features of detector design and the simulated performance will be discussed.

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