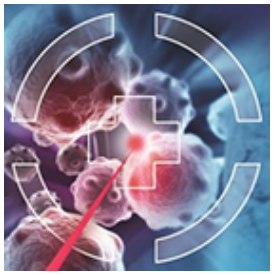

Contribution ID: **33** Type: **not specified**

The SiFi-CC project - prompt gamma imaging for real time monitoring of proton therapy

Wednesday 4 September 2019 12:40 (20 minutes)

As proton therapy has become a well-established cancer treatment modality, research towards improvement of quality assurance and new treatment monitoring methods have intensified. Proton therapy offers more favorable dose deposition pattern than conventional radiotherapy, however it could be further improved if currently applied safety margins were reduced. This would be possible if methods of real time monitoring were introduced into standard clinical practice. Various real time treatment monitoring techniques based on the detection of secondary radiation have been proposed so far, with prompt gamma imaging (PGI) being one of the most promising candidates.

In my presentation I will introduce the SiFi-CC project, which is a joint effort of physicists from the Jagiellonian University and the RWTH Aachen University. The aim is to develop a method for real time monitoring of dose distribution deposited during proton therapy exploiting prompt gamma radiation. For that reason, a dedicated setup is being under development, taking advantage of the latest advances in the field of scintillating detectors - heavy inorganic scintillating fibers read out by silicon photomultipliers (SiPMs). Hence the name of the collaboration - SiPMs and Fiber-based Compton Camera. The proposed detection setup will be operating in two modes: as a Compton camera (CC) and as a coded mask detector (CM). In order to optimize performance of the detector, Monte Carlo simulations of the geometry and physics performance have been carried out. Similarly, laboratory tests of various inorganic scintillators have been conducted in order to find the optimal material. The use of suitable heavy scintillating material for the active part of the detection system ensures large light output, high detection efficiency, good energy resolution and timing properties. High granularity of the proposed detector along with the fast signals and modern electronics allow for high rate capability and reduced background. The data acquisition system will be based on FPGA technology, with first stage of data processing and reduction performed on-board, which will provide high throughput, fast image reconstruction and flexibility needed for the operation of the two detection modalities.

Author: Ms RUSIECKA, Katarzyna (Marian Smoluchowski Institute of Physics, Jagiellonian University)

Co-authors: Prof. STAHL, Achim (Physics Institute 3B, RWTH Aachen University); Dr WROŃSKA, Aleksandra (Marian Smoluchowski Institute of Physics, Jagiellonian University); Prof. MAGIERA, Andrzej (Marian Smoluchowski Institute of Physics, Jagiellonian University); Mr KASPER, Jonas (Physics Institute 3B, RWTH Aachen University)

Presenter: Ms RUSIECKA, Katarzyna (Marian Smoluchowski Institute of Physics, Jagiellonian University)