Contribution ID: **52**   Type: **poster**

Study of prompt gamma imaging using heavy scintillating fibers for future application in proton therapy

Tuesday, 25 June 2019 13:30 (1h 30m)

The aim of the project is the development of a method for on-line monitoring of dose distribution in proton therapy based on detection of prompt gamma (PG) radiation emitted from a patient during irradiation. During this project, an imaging prototype of Compton Camera (CC) based on heavy scintillating fibers together with the corresponding data handling and an image reconstruction framework will be presented in the future. Currently, computer code is being developed to implement algorithms which will be needed for image reconstruction from the detection setup, comparing obtained simulation results for different design options. In this work, the reconstructed images using back-projection and list-mode MLEM are evaluated. A spatial resolution of 5 mm FWHM for 22Na point sources in 20 cm distance which were reconstructed by means of 10 iterations of list-mode MLEM has been achieved by Geant4 simulation results. Moreover, data from laboratory measurements and comparing with simulated data will address the challenge of practical Compton imaging for proton therapy in the future work.

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Session Classification: Poster session