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Study of imaging system in Proton computed tomography with data acquisition from ALPIDE sensor

Cancer, the second leading cause of death worldwide, causes people death by growing normal cells larger than cells larger than its boundaries and invade adjoining organs of the body. Currently, proton therapy is one of the radiotherapy techniques for cancer treatment, which is more effective in many ways compared to conventional photon therapy. That's because of unique depth-dose characteristics of the proton. Proton computed tomography (pCT) is an imaging technique prior to the proton therapy. For proton therapy plan, it will be easier and uncomplicated for calculation in proton therapy if we used the same type of particle in imaging process and therapy process, because both processes will provide the same particle interaction with matter. Nowadays, imaging system for medical purposes has been being developed in many research groups. We're also working on it by this work. We went to KCMH Proton Center to do pCT experiment. Proton beam with Gaussian profile is exposed, pass through our sample, and then proton data will be tracked by ALPIDE sensor. We're still facing many errors that we can't control so far. The result from sensor shows the ratio of data from proton that interact on sensor is quite low significantly, so we perform pre-processing data by using mean filter on it instead of median filter or gaussian filter. The result looks a bit better but It's not enough for real using in clinical industry yet, so we're trying to find a technique for image quality improvement to acquire the best 3D reconstruction for pCT by using Inverse radon transformation in the final process.

Author: RATSUNTIA, Nakarin (Suranaree university of technology)

Presenter: RATSUNTIA, Nakarin (Suranaree university of technology)

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