Contribution ID: **3** Type: **not specified**

Image reconstruction with proton computed tomography

Wednesday 30 October 2024 09:45 (45 minutes)

Proton therapy is one of the most effective treatments for cancer, with radiation treatment planning being a crucial element. While photon CT is commonly used for this purpose, it does not provide sufficiently accurate information about proton range, making proton CT a more suitable option for treatment planning. Due to the Coulomb scattering of protons, a key task is the voxel-level calculation of Relative Stopping Power, which requires accurate handling of proton trajectories. Several algorithms have been developed for this purpose. My research focuses on testing, improving, and optimizing a software package that uses the Richardson-Lucy algorithm, developed within the Bergen Proton-CT Collaboration.

I conducted the necessary simulations using Geant4 and GATE software. The framework employing the Richardson-Lucy algorithm was optimized using appropriate methods to enhance speed and efficiency. I validated the algorithm's performance and image reconstruction across different energy levels and medical imaging phantoms designed to assess system accuracy.

As a result of my work, I successfully optimized the algorithm, significantly reducing computation time. The evaluation of phantom reconstructions confirmed that the algorithm operates with the desired accuracy. My long-term goals include further optimization and ensuring clinical applicability, with a focus on further reducing runtime.

Author: JOLESZ, Zsofia

Presenter: JOLESZ, Zsofia