GATE Optical Imaging Simulation for the Range Estimation of Radioactive Ion Beam

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*Abstract*—In the previous study, we implemented a lens into GATE Monte Carlo simulation toolkit for a realistic optical imaging. Recently, optical imaging has been used for the range estimation of heavy ion beam. The aim of this study is to combine the optical imaging system with the heavy ion beam environment for the range estimation of radioactive ion beam. The radioactive oxygen ion beam (15O) was irradiated into PMMA (10 × 10 × 9.9 cm3) with different momentum acceptances of 1, 2, and 4% at the Heavy Ion Medical Accelerator in Chiba (HIMAC). The experimental results showed a good agreement with those of GATE simulation in terms of the Bragg peak. In conclusion, we demonstrated that the GATE can be used for the optical imaging simulation of heavy ion beam.

*Index Terms*— GATE, optical imaging simulation, radioactive ion beam

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