Effect of carbon-ion range by different stopping-power tables calculated in Geant4

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We evaluated the difference in the range of carbon ions in water according to the difference in the stopping-power table using Geant4 toolkit. In Geant4 toolkit, pristine carbon beams were simulated to be incident on the virtual water phantom for each therapeutic kinetic energy of carbon ions. In the case of the stopping-power table that is involved in energy loss among electromagnetic physics models, the stopping-power values of the ICRU49 report are used when the ion is less than 2 MeV/u, and the stopping-power values from the ICRU report 73 (ICRU73) or ICRU report 90 (ICRU90) are used when the ion exceeds 2 MeV/u. We evaluated the difference in the range of carbon ions according to the stopping-power values from ICRU73 and ICRU90. In addition, we were also able to calculate the stopping-power table provided by MSTAR or SRIM by substituting the values of the existing ICRU table. The difference in the range of carbon ions according to each different stopping power table can be confirmed to be within a few mm. It was confirmed that the difference in range due to the difference in stopping power is mostly contributed by the low kinetic energy part, and the user's awareness of which stopping power table to select and perform the simulation is required.

Paper submission Plan

Yes

Best Presentation

No

Contribution track

ICABU WG4. Applications of Particle Beams

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