Contribution ID: **64** Type: **Oral presentation Users Workshop**

INVESTIGATING THE ACCURACY OF HADRONIC MODELS FOR CARBON ION THERAPY

Friday, 16 October 2009 18:10 (20 minutes)

Introduction:
An accurate prediction of radiation fields resulting from therapeutic carbon ions in the patient is needed in order to evaluate correctly their biological effectiveness.

Materials and Methods:
Hadronic models of the Monte Carlo transport codes: Geant4 and Fluka, are benchmarked for regimes relevant for therapeutic carbon ions. The ability of the Monte Carlo codes to reproduce measured
fluencies of secondary fragments for a thick-target experiment at differing depths in water is evaluated by simulating the detailed experimental set-up and time-of-flight measurement techniques. Integral and double-differential fluencies are compared. The Geant4 models: BIC, QMD, Fermi Break-up, and Multifragmentation are tested.

Conclusions:
Agreement within approximate limits of 50% is found for both codes for integral fragment fluencies. Discrepancies between simulations and measurements are specially for forward-directed fragments (0-2 degree). Geant4 tends to underestimate small-angle fluencies whereas larger angles tend to be overestimated.

Are you a Memeber of the Geant4 Collaboration (yes/no)

currently under consideration

Keymords

validation study, hadron therapy, carbon ion, fragmentation, hadronic models

Summary

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Session Classification: Parallel Session VIII - Medical

Track Classification: Users' Workshop