

# Service de Physique Nucléaire



## Séminaire

le vendredi 31 janvier 2014 à 11h00

CEA Saclay, Orme des Merisiers, Bât. 703, Salle 135

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### **95 MeV Carbon fragmentation measurements and comparison with GEANT4 simulations for hadrontherapy**

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LPC Caen

To keep the benefits of carbon ions in radiotherapy, a very high accuracy on the dose deposition location is needed. However, the dose deposition is affected by nuclear processes of the incident ions with tissues elements leading to a reducing number of projectiles with their penetration depth (up to 70% for 400 MeV/u  $^{12}\text{C}$  in water), to the production of lighter fragments having different biological effectiveness and longer traveling paths. Up to now, the simulation codes are not able to reproduce nuclear processes with the required accuracy for clinical treatments. To improve the models and reach the required accuracy for a reference simulation code for hadrontherapy, an experiment has been performed on thin targets by our collaboration on May 2011 at GANIL to study nuclear reactions of 95 MeV/u  $^{12}\text{C}$  ions with H, C, O, Al, Ti and PMMA (tissue equivalent) targets. These data have been completed with a second experiment performed on September 2013 in order to obtain fragmentation cross sections at an angle of  $0^\circ$ . GEANT4 simulations have been done using several entrance channel models : Binary Intra-nuclear Cascade, Quantum Molecular Dynamics and Liege Intra-Nuclear Cascade, coupled to either Generalized Evaporation Model or Fermi Break-Up as exit channel models.

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*Le café sera servi 10 minutes avant*

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