Contribution ID: **579** Type: **Oral (Student, In Competition) / Orale (Étudiant(e), inscrit à la compétition)**

Calculation of isotope yields for radioactive beam production

Tuesday 16 June 2015 14:45 (15 minutes)

Access to new and rare radioactive isotopes is key to their application in nuclear science. Radioactive ion beam (RIB) facilities around the world, such as TRIUMF (Canada's National Laboratory for Particle and Nuclear Physics, 4004 Westbrook Mall, Vancouver, BC, V6T 2A3), work to develop target materials that generate ion beams used in nuclear medicine, astrophysics and fundamental physics studies. At Simon Fraser University, we are developing a computer simulation of the RIB targets at TRIUMF to augment the existing knowledge and to support future target developments.
This simulation will be used to predict the amounts of isotopes produced by the targets in use at TRIUMF to allow for better experiment preparation as well as to gauge the efficiency of using new target materials and varying driver beam intensities to generate different ranges of isotopes.
The simulation, built in GEANT4 (Geant4 - A Simulation Toolkit, S. Agostinelli et al., Nuclear Instruments and Methods A 506 (2003) 250-303), a Monte Carlo nuclear transport toolkit, consists of a target of 300 uranium carbide disks, each 120 microns thick, encased in a tantalum container, which is then bombarded by a 480 MeV proton beam, as per the specifications of the TRIUMF target station. The simulation records the isotopes generated as well as their formation process (i.e. fission, fragmentation and neutron capture) and other related properties such as residual kinetic energy of the reaction products. These results are then compared to data gathered at the TRIUMF yield station (P. Kunz, C. Anreoiu, et al. Rev. Sci. Instrum. 85 (2014) 053305), a nuclear spectroscopy experiment dedicated to RIB characterization.
Results from the simulation will be presented, along with benchmarking and comparison to the yield station data and other nuclear transport codes.

Author: Ms GARCIA, Fatima (Simon Fraser University and TRIUMF)

Co-authors: LAXDAL, Aurelia (TRIUMF); ANDREOIU, Corina (Simon Fraser University and TRIUMF); KUNZ, Peter (TRIUMF)

Presenter: Ms GARCIA, Fatima (Simon Fraser University and TRIUMF)

Session Classification: T2-6 Nuclear Physics in Medicine (DNP-DMBP-DIAP) / Physique nucléaire en médecine (DPN-DPMB-DPIA)

Track Classification: Nuclear Physics / Physique nucléaire (DNP-DPN)