

Service de Physique Nucléaire



Séminaire

le vendredi 29 juin 2012 à 11h00
CEA Saclay, Orme des Merisiers, Bât. 703, Salle 135

Light Fragment Production Cross Sections for Nucleon Induced Reactions at Intermediate Energies

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Nucleon-induced fragment ($Z > 2$) production reactions are of importance to estimate radiation effects, energy deposition, material damage and radionuclide production. Since the fragments have large linear energy transfer (LET), considerable amount of energy can be deposited in a micro-meter region. So far a number of experimental and theoretical studies were performed in the energy range above 1 GeV to study the property of highly excited nucleus. However, few data are available covering the energy range for tens of MeV to hundreds of MeV and target mass range for light to medium, which are needed for the application studies such as estimation of the soft error of micro devices induced by terrestrial cosmic-rays, dose in the proton therapy and the production of cosmogenic radionuclides.

We measured the double-differential cross sections (DDXs) for the inclusive reactions producing heavy nuclei with $2 < Z < 9$ (fragments) from C, N, O, Al, Ti and Cu targets induced by nucleons in the energy range from 40 and 300 MeV at several angles from 30 to 135 degrees using a Bragg curve counter and the energy-time-of-flight method (partially). The present results are compared with past experimental data, the LA150 evaluated data by the Los Alamos group and several intranuclear cascade models (Bertini, ISOBAR and INCL), and the JAEA-version quantum molecular dynamics model (JQMD) coupled with some evaporation models (ABLA, GEM, etc.). The present results agree well with the past experimental data and LA150 data for alpha -particle production. For the fragments heavier than lithium, the present results show forward-peak angular distributions rather than isotropic ones stored in LA150. Calculations with intranuclear cascade + evaporation models well reproduced our experimental results except for high-energy tail in the DDXs of light fragments.

Le café sera servi 10 minutes avant

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