

Progress Report
NUCLEAR REACTION DATA GROUP at ATOMKI
(NRDC Meeting 23-24 May 2011)

S. Takács, F. Tárkányi, B. Király,
F. Ditrói, F. Szelecsényi, Z. Kovács, Z. Szűcs, J. Csikai

Introduction

The ATOMKI is stands for Institute of Nuclear Research of the Hungarian Academy of Sciences. The general profile of the Atomki Nuclear Reaction Data Group consists of measurement, compilation, evaluation and application of low and medium energy charged particle induced nuclear reaction data. The work is done in international collaborations. The experiments, data compilation and data evaluation are mainly connected to running international projects. Every day applications at home and collaborating institutes also initiate the required data measurements.

Experimental works

The main task of our research group is to gather experimental cross section data of reactions induced by low and medium energy charged particles. We have continued the systematic investigation of excitation functions of reactions for different applications during the last year. Main effort was made on investigation of deuteron induced reactions on metals up to 50 MeV bombarding energy. The investigated reactions can be grouped as:

- Activation cross sections for accelerator and target technology.
- Cross section data for production of medical radioisotopes for diagnostic and for therapy.
- Excitation functions of monitor reactions.
- Activation cross sections for charged particle activation analysis (CPAA).
- Activation cross sections for Thin Layer Activation (TLA).

Results are reported in scientific journals or relevant conferences 30 new papers 15 conference lectures.

Data compilations and evaluations

EXFOR compilations

In the last period all publications on charged particle induced nuclear reactions with experimental data reported from Debrecen, Brussels and Jülich were compiled in EXFOR format in collaboration with IAEA NDS.

CRP and TC participations

- Database for fusion evaluated nuclear data library (2011)
- Development of TLA database (2011)
- Development of database for production of therapeutic radionuclides (2009)

- Improved High Current Liquid and Gas Targets for Cyclotron Produced Radioisotopes (2009)
- Charged particle cross-section database for medical radioisotope production: diagnostic radioisotopes and monitor reactions (2001) Maintenances and upgrade (2008)

Nuclear data service

The ATOMKI group continues to distribute compiled or evaluated cross section/thick target yield data for low and medium energy charged particle nuclear reactions mainly for cyclotron applications according to the requirements.

Staff

The staffs connected to the experimental nuclear reaction data measurement consist of six physicists and two chemists. Out of them three (F. Tárkányi, B. Király, S. Takács,) physicists are working in part time on data compilation and evaluation.

Collaborating laboratories

- Cyclotron Laboratory, Vrije Universiteit Brussels (VUB), Brussel, Belgium
- Cyclotron Radioisotope Centre, Tohoku University, Sendai, Japan
- Nuklearchemie (INB-4) für Neurowissenschaften und Biophysik, Forschungszentrum Jülich, Jülich, Germany
- Institute of Theoretical Physics, Institute of Physics and of Power Engineering (IPPE), Obninsk, Russia
- Nuclear Data Section, Division of Physics and Chemistry, IAEA, Vienna, Austria
- Division of Advanced Technology for Medical Imaging of the National Institute of Radiological Sciences (Chiba, Japan)
- Radionuclide Production Laboratory of the iThemba Laboratory for Accelerator Based Sciences (Somerset West, South Africa).

Publications in 2010-2011

Papers published in 2009-2011 in which our group was involved containing experimental cross section data measured on different target materials bombarded by proton, deuteron, helium-3 and/or alpha particles are more than 40. The relevant papers are compiled in EXFOR database.