

Contributions to Reference Data Libraries *

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Introduction

In 2008, European nuclear physics research institutions instigated an effort to intensify their participation in the international task of establishing “Reference Data Libraries for Nuclear Applications” [1]. Researchers at the II. Physikalisches Institut at Gießen and GSI are participating in these tasks with their expertise.

Masses

The systematic screening of all relevant literature for experimental results on nuclear masses, half-lives, β -delayed proton and neutron emission probabilities, spins, parities and isomeric states has been continued. The values collected since 2003 have been entered into the data bases underlying two new compilations / evaluations:

A. The Atomic Mass Compilation AMC2012

In collaboration with Prof. Venkataramaniah from Sri Sathya Sai Institute for Higher Learning all new experimental results on nuclear masses have been combined with the older data included in AME03 [3] in the *Atomic Mass Compilation – AMC2012* [2].

B. The Atomic Mass Evaluation AME2012

Updated versions of the 2003 Atomic Mass Evaluations [3] have been prepared by an international collaboration including GSI / Gießen and been published in December 2012 [4, 5, 6].

Beta-delayed neutrons

The β -delayed neutron emission probabilities P_n and the energy spectra for fission products are important input data for the calculation of nuclear reactors, decay heat, and nuclear safeguard applications, requiring evaluated data sets. The latest compilations / evaluations date to around the year 2000 [7] and are limited to the fission product region. With the advent of radioactive beam facilities, the production of very neutron-rich nuclei is now possible for a wider range of elements. The decay of these nuclei is studied at GSI applying a variety of detection methods. One technique detects the β -delayed neutrons emitted by very neutron-rich isotopes. Such experiments will be an important research program at the future SUPER-FRS.

As a basis for these studies a new evaluation encompassing

all known delayed-neutron emitting isotopes has to be undertaken. Given the experience of the IAEA in Vienna with these evaluations, the Nuclear Data Group was contacted to establish an IAEA coordinated research program. In October 2011 an *IAEA Consultant’s Meeting on Beta-Delayed Neutron Emission Evaluation* [8] was held as a first step. The proposal for a Coordinated Research Program (CRP) on *Beta-Delayed Neutron Emission Evaluation* [9] has now been accepted by the IAEA: “The overall CRP objective is to enhance Member States knowledge and calculational capabilities in the fields of nuclear energy, safeguards, used fuel and waste management and nuclear sciences by creating a Reference Database for Beta-Delayed Neutron Emission that contains both a compilation of existing data and recommended data, which will be made readily available to the user community. The project is due to start in 2013 and is envisioned to have a length of five years” [10].

References

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