STATUS REPORT OF NUCLEAR DATA ACTIVITIES AT OAK RIDGE NATIONAL LABORATORY

1. Members

The Nuclear Data Group consists of Michael Smith (Group Leader for Experimental Astrophysics & Nuclear Data Program), Caroline Nesaraja (ENSDF evaluator and XUNDL compiler), Murray Martin (ENSDF evaluator and consultant), Eric Lingerfelt (Software Developer), and Larry Zhang (Computational Astrophysics Programmer)

2. Activities

i) Nuclear Structure Data

ENSDF

This activity consists of the mass chain evaluations, and our responsibility is in the actinide region A=241-249. Currently the literature cutoff dates for mass chain A=241-249 are listed below:

Mass Chain and Literature cut of dates from ENSDF database

241 C.D. Nesaraja. NDS 130, 183 (2015) (Lit cut-off Sept. 2015)
242 Y. A. Akovali. NDS 96, 177 (2002) (Lit cut-off Sept. 2001)
243 C.D. Nesaraja & E.A. McCutchan. NDS 121, 695 (2014) (Lit cut-off Sept. 2013)
244 Y. A. Akovali. NDS 99, 197 (2003) (Lit cut-off June 2002)
245 E. Browne & J.K. Tuli . NDS 112,447 (2011) (Lit cut-off June 2011)
246 E. Browne & J.K. Tuli. NDS 112,447 (2011) (Lit cut off Jan. 2011)
247 C.D. Nesaraja. NDS 125, 395 (2015) (Lit cut-off March 2014)
248 M.J. Martin. NDS 122, 377 (2014) (Lit cut-off Sept. 2014)
249 K. Abusaleem. NDS 112, 2129 (2011) (Lit cut-off Dec. 2010)

Since the last NSDD meeting in 2013, several mass chains are being evaluated and are in their various stage of evaluation process as shown below.

Mass Chain	Evaluator	#Nuclides	Status
41	McCutchan & Nesaraja	11	Published
241	Nesaraja	8	Published
242	Martin	12	Submitting soon
244	Nesaraja	8	Post Review

Both Murray Martin and Caroline Nesaraja are also reviewing mass chains as requested by the National Nuclear Data Center

XUNDL

Critical compilation of nuclear structure data from most current publication. Frequent communications with authors of papers to resolve inconsistencies in data and to obtain addition details of data. At request of XUNDL Coordinator, current ORNL contribution is the compilation of 1 paper/month.

Caroline Nesaraja and Chris Smith – until August 2016

Caroline Nesaraja – present

ii) Nuclear Astrophysics Data

The astrophysics data research is closely coupled with our program of measurements of reactions with unstable and stable nuclei. One recent example of such work, Shisheng Zhang a guest visitor from Beihang Univ. in Beijing collaborated with Michael Smith and others to calculate the direct capture of neutrons on ^{124,126,128,130,132}Sn with the FRESCO code using information from recent ^{124,126,128,130,132}Sn(d,p) measurements at ORNL. This project is utilizing FRESCO input parameters that were determined in a prior project (Shi-Sheng Zhang, Jin-Peng Peng, M. S. Smith, G. Arbanas, R. L. Kozub, Phys. Rev. C 91 (2015) 045802) to give the best agreement with neutron direct capture measurements. Captures on exotic Sn nuclei with mass greater than 132 is also being carried out, using information from a RMF-based structure code. Another project involves the conversion of two recent collections of point-wise thermonuclear reaction rates into analytical functions that can be used with a wide variety of astrophysical simulation codes. This conversion required fitting the point-wise rates with functions that range over 30 orders of magnitude to a precision of approximately 2%. Approximately 90 different rates are undergoing revised fit and will soon be available for use in nucleosynthesis codes. A paper describing this work is in preparation. Other reaction compilations are being explored for parameterization and eventual incorporation into standard reaction rate libraries.

iv) Other activities in collaboration with other USNDP members

Michael Smith: Organizing committee for the **Nuclear Data Needs and Capabilities for Basic Science** Workshop held at University of Notre Dame from August 10-11, 2016. The needs and capabilities for Basic Science presented at the workshop was compiled into a White Paper

Caroline Nesaraja: Organizing committee for the **Nuclear Data Needs and Capabilities for Applications (NDNCA)** Workshop held at Lawrence Berkeley National Laboratory from May27-29, 2015. The needs and capabilities for Application presented at the workshop was compiled into a white paper

3. Future Activities

Future mass chains will be evaluated within the range A=241-249 the range assigned to ORNL, as well as others assigned by USNDP/ NNDC.