United States nuclear data program evaluated nuclear structure data file (ENSDF) at Texas A&M

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This was the fifth year that the Cyclotron Institute at Texas A&M University has been an important participant in the nationwide United States Nuclear Data Program (USNDP). This is a national-interest activity financed by DOE, through which the relevant nuclear-science results in virtually all world publications are retrieved and put together in a large Evaluated Nuclear Structure Data File (ENSDF) database according to so-called *general policies* [1], a set of rules which make possible a standard approach through which the data are uniformly evaluated. The output is published in Nuclear Data Sheets, an Elsevier publication, and also it is disseminated via on-line databases, which can be retrieved at http://www.nndc.bnl.gov. The data are used by both the scientific and applications communities in the US and worldwide.

During these years we have covered essentially all the regions of the periodic table. The superheavy *A*=252 mass chain and the very data-rich mid-mass chains, A=147 and A=140, were published in past years. Last year we published or had accepted for publication the evaluations of four lighter mass chains: *A*=97 [2], *A*=84 [3], *A*=77 [4] and *A*=34 [5]. Since nuclear data evaluation depends critically on the experience of the evaluator, with an evaluator typically completing only a couple of mass chains per year, coverage of such a wide range of *A* chains in such a short time is a considerable accomplishment. This once more testifies to Texas A&M's qualifications to be a national evaluation center.

The studies actually performed in 2009-2010 were as follows: The individual nucleus, ^{84}Y, was evaluated in the framework of an international collaboration [3], which covered the entire *A* = 84 mass chain. The next two mass chains, *A* = 77 and 34, were done entirely by us. The former chain is a rather long one containing 12 nuclei (Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y) with, in total, about 400 references, of which about 20% were more recent than the chain's last full evaluation in 1997. Now, it has about 13,000 ens lines [6], which ranks it among the more data-rich chains, as can be seen from Fig. 1.

The second chain, A=34, is an interesting and complex one. It consists of 11 nuclei (Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, and Ca) and about 300 references in total, which might make it appear to be a simple case. However, before our evaluation, this mass chain was handled for many years by P. Endt, who periodically published surveys that covered all nuclei in the range *A*=21-44. The last of these surveys appeared in Nuclear Physics **A633**, 1 (1998) and no more will appear since the author has retired. Unfortunately the format used by Endt was very different from that prescribed for ENSDF so we had to build our new evaluation from scratch, which required an exceptional effort. Furthermore, for the first time in an ENSDF evaluation, we included unbound resonant states in response to a growing interest in

such states by the astrophysics community. In total, there are now 12,000 ens lines of data for the whole A=34 (compared with Fig. 1).

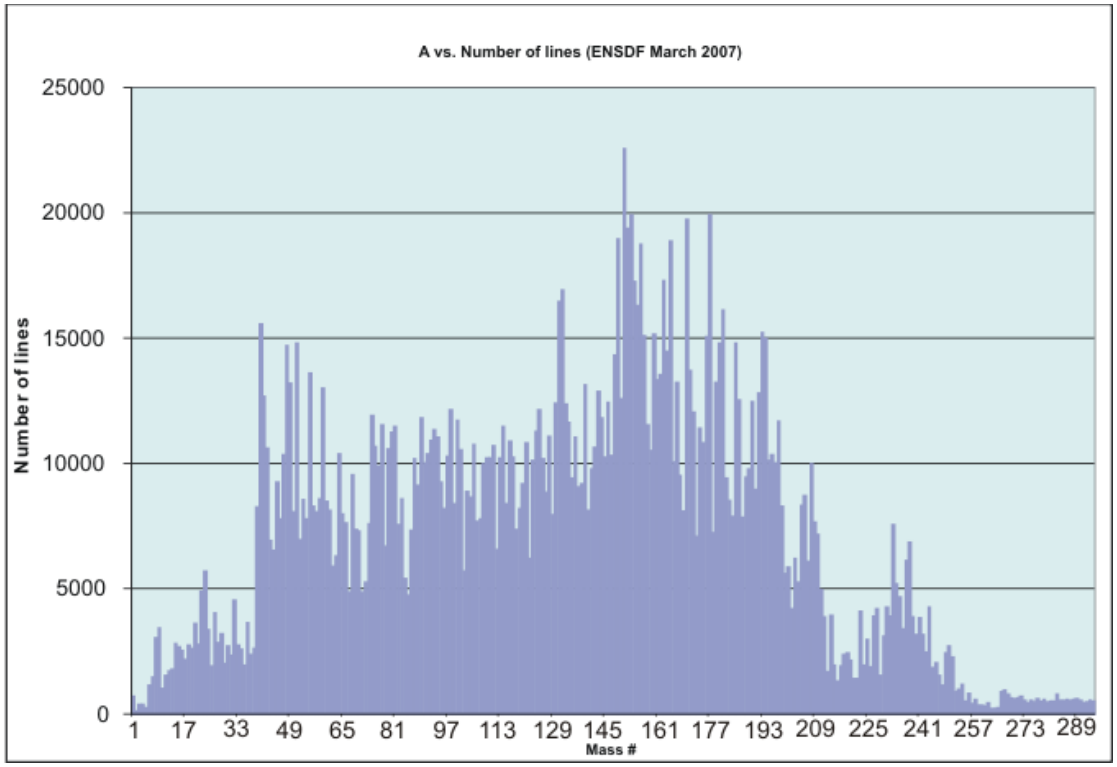

FIG. 1. The number of .ens lines for each mass chain in ENSDF on March 2007.

[1] Nucl. Data Sheets, **111**, p. v-vii, (2010).

[2] N. Nica, Nuclear Data Sheets **111**, 525 (2010).

[3] D. Abriola, M. Bostan, S. Erturk, M. Fadil, M. Galan, S. Juutinen, T. Kibedi, F. Kondev, A. Luca, A. Negret, N. Nica, B. Pfeiffer, B. Singh, A. Sonzogni, J. Timar, J. Tuli, T. Venkova, and K. Zuber, Nucl. Data Sheets **110**, 2815 (2009).

[4] B. Singh and N. Nica, Nucl. Data Sheets (accepted).

[5] N. Nica and B. Singh, Nucl. Data Sheets (accepted).

[6] The files in the ENSDF database are written in a special data format called ens format, and the total number of lines for an A chain is a measure of the amount of data collected for each mass chain.