High-spin Task-Force / XUNDL Status Report (Dec. 1998- Dec. 2000)

(Prepared by B. Singh, McMaster, Dec, 1, 2000)

XUNDL database

Provides prompt Internet access to recently published or completed (fully analyzed but not published) primarily high-spin level-scheme data that are not yet available in ENSDF database. (The database is not limited to high-spin papers, there are some low-spin compilations also.)

Convenient access to different viewers (LBNL's Isotope explorer, Oak Ridge's RADWARE, BNL's on-line retrieval) and, to the published article on journal Web page (if the user has valid internet access to the journal). Database is indexed by mass number, nuclide and reference keynumber.

The XUNDL database is organized and managed by David Winchell and Tom Burrows at NNDC, BNL.

STATUS

Since Jan. 1999, 585 data sets have been added to XUNDL, mostly from papers published in 1998-2000. (Almost all the high-spin papers in 1998-2000 are included (2001: 1; 2000: 115; 1999: 108; 1998: 115; 1997: 41; 1996: 64; 1995: 42; 1994-1990: 31).

About 455 data sets were compiled at McMaster, using semi-automated translation procedures. About 130 data sets were received by McMaster group from other data centers (about 90 from Berkeley and about 40 from Grenoble). These data sets were checked and edited at McMaster, prior to inclusion in XUNDL.

A lot of actual compilation work is done by undergraduate summer students (Jordan Chenkin: May 1999-April 2000; George Reed: May 2000- present). The students are trained in basic nuclear physics, ENSDF formats, semi-automatic translation codes, consistency checking codes such as FMTCHK, GTOL, etc. The students' work is checked thoroughly by data evaluator before submitting a dataset to BNL. Generally, one undergraduate student works full time during the summer months (May to August) and part-time (7-10 hours/week) during the study semesters.

Data errors found in original published level schemes, based on level-scheme checking codes, are routinely communicated to the original authors for corrections or comments. Most common type of data errors found in the publications are: 1. Quoted gamma-ray energy does not match the level-energy difference. 2. Spins and parities quoted in tables are different from those in figures.

Presently XUNDL has 585 data sets from 511 papers covering data for 478 nuclides from ^{36}Ar to ^{254}No, amongst 174 A-chains (A=39 to 254, 95% content is high-spin level chemes.)

We are almost up-to-date (as of Dec. 1, 2000) with the coverage of high-spin papers for XUNDL. Only 3 papers remain to be included, which are being worked on at present.

When we run out of current papers to compile, we compile high-spin papers for A-chains, which are quite outdated in ENSDF. During this year we have compiled high-spin data for about 5 mass chains which were more than 10 years old in ENSDF.

Other high-spin updates

Superdeformed structures:

Full update of SD band data for ENSDF was completed at McMaster in September 1999, and another one in Nov. 2000. All published SD band data (as of Dec 1, 2000) are included in ENSDF.

Magnetic rotational bands:

A compilation of all the known dipole bands of this type (about 120 bands) with literature coverage up to August 99 has been published in Atomic and Nuclear Data Tables (March 2000 issue). Since then there are only two more papers on this subject. This work was done in collaboration with a theoretical nuclear physics group in India.

Semi-automated Procedures to Translate Tabular data in journals into ENSDF format

• **Step 1: Create text file of tabular data.**

In the literature the level-scheme data are generally presented in one of the three styles:

1. Complete Tabular data: E_γ, I_γ, $E_{initial}$, $J_{initial}$, A_2, A_4, DCO, Multipolarity, Mixing ratio, Band label, etc. (Almost fully automatic; takes ~ 30 minutes to get a first draft of a dataset in ENSDF format, irrespective of the complexity of level scheme and number of gamma rays and levels involved).

2. Partial Tabular data: No $E_{initial}$, $J_{initial}$, Band label, etc. (Partially automatic).

3. No Tabular data, only the level-scheme figure in paper. (<50% automatic).

For style #1: Create text file by extracting tabular data, using:
Adobe Acrobat for PDF files from web; or Scanner for hard-copy tables from LATEX; or Postscript Files, followed by the use of OCR software.

For style #2: Create text file #1 as above for style #1.Create text file #2, by entering $E_{initial}$ and Eγ's, as read from the level-scheme figure in a spreadsheet program such as EXCEL. Combine the two text files in EXCEL to get a final text file.

For style #3: Create text file by entering $E_{initial}$ and Eγ's, as read from the level-scheme figure in a spreadsheet program such as EXCEL.

For styles #2 and #3, it may take up to 3-4 hours, depending upon the complexity of the level scheme.

- **Step 2: Edit the text file created in step 1, using a text editor.**

Arrange the data in columns with appropriate headings: (Ei, Eg, Ig, Ji, A2, MR, MU, DCO). At present T1/2 and A4 headings are not allowed in the code. The file must be free of any tabs (i.e. there should be spaces only). Use Radford's **TXT2ENSDF** (PC) code to convert the text file in step #1 to ENSDF format.

- **Step 3: Check the ENSDF formatted data set for level-scheme consistency and possible data problems in publications:**

Use BNL's **GTOL** code to perform a least-squares adjustment of the level-scheme and check for poorly fitted Eγ's. Use BNL's FMTCHK to check the formatting of the data set. (Communicate with original authors if there are data problems in a paper).

- **Step 4: Check the final ENSDF formatted data set using LBNL's viewer 'Isotope Explorer' to verify that the level scheme and the band assignments, correctly, match the publication.**