The McMaster-MSU JAVA-NDS program

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1. What is JAVA-NDS?

It is a program in JAVA language to produce a reader-friendly (or publish-ready) PDF output from an ENSDF-format input file. It converts an ENSDF file to a LaTeX file, from which a PDF output is produced using a LaTeX compiler. The program was initially started and developed at McMaster University and completed and maintained at Michigan State University (MSU).

2. System requirements and prerequisites:

--- 8G RAM memory for running the program smoothly for large ENSDF mass-chain files. If RAM is less than 8G, code will be quite slow, for example about 2-3 minutes with 8GB, 10 min with 6 GB, and >15 min for 4 GB.

--- latest version of Java:
JRE 8 or above, which can be downloaded at http://java.com/en/download/

--- LaTeX compiler:
for Windows, **MiKTEX,** free to download at http://miktex.org/download
Download MiKTEX 64-bit (or 32-bit) version appropriate to your computer.
for Linux and MacOS, a LaTex compiler should come with the system.

Recommended cross-platform LaTeX editor: **Texmaker**, free to download at
http://www.xm1math.net/texmaker/download.html

3, How to run and use JAVA-NDS?

To run JAVA-NDS program:

Download the code in .zip format and unzip the files.

In Windows:

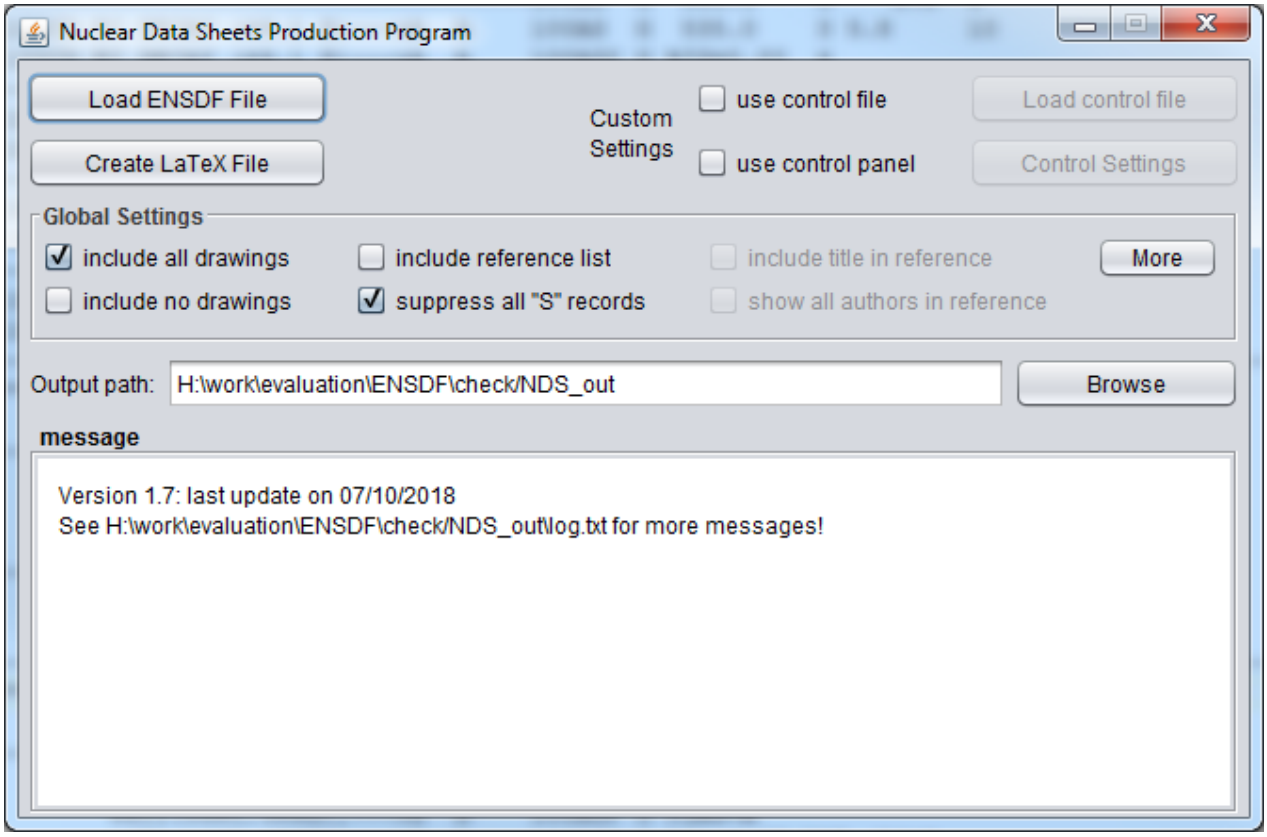
double-click the executable ".jar" file;

In Linux and MacOS:

open a terminal and type,

"*java -jar PATH_TO_THE_JAR_FILE*"

A window titled as "Nuclear Data Sheets Production Program" will open, as shown below.



(main GUI window of JAVA-NDS)

To use JAVA-NDS program:

The simplest way is to run JAVA-NDS in auto-mode in which the layouts of tables and figures in the output PDF file are automatically adjusted and no custom settings are needed. Further fine adjustments or manual settings can be made either by loading a control file containing custom settings that are written in specific formats, or by using a graphical control panel containing all settings, which are simply clicked to set.

NOTE: please check the input file against format errors using the FMTCHK checking program before running JAVA-NDS, otherwise the content in the input file could be read and printed incorrectly if there are format errors.

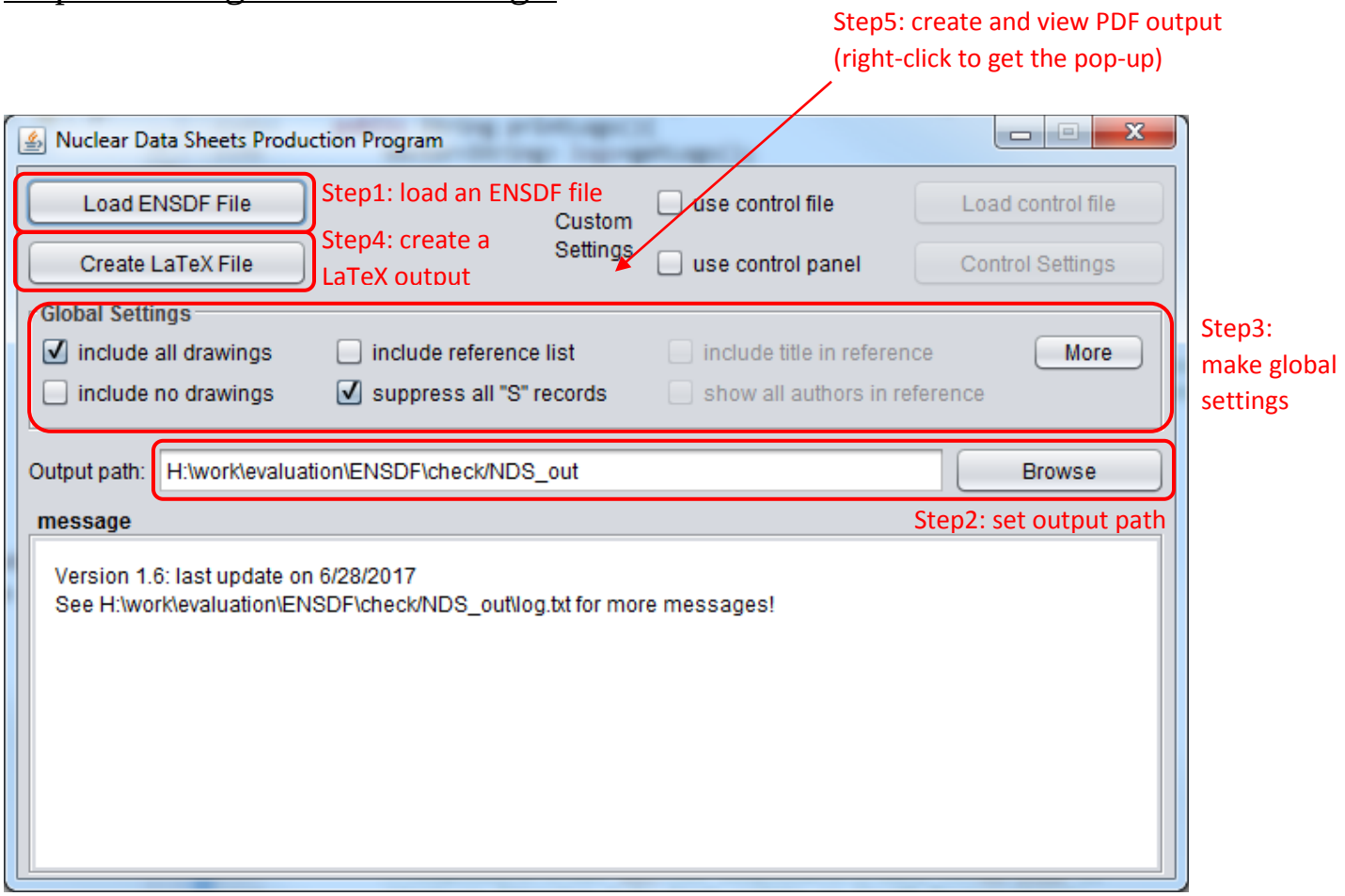
Steps of the simplest way with default settings:

Step 1: click on “Load ENSDF File” button to load an input ENSDF file.

Step 2: double-click on “Create LeTeX File” button to create the output LaTeX file as well as the PDF file produced from it. Set the output path if needed before this click.

(See detailed instructions in the following pages)

Steps for using automatic settings:



Step 1: Click "Load ENSDF File" button to load an ENSDF file.

Step 2: Choose a directory for the output files by typing in the “output path” field or browsing. Skip this step if using the existing path.

Step 3: Make global settings in the “Global Settings” panel. For example, click “Include reference list” button to include the references in the file. Skip this step if using default global settings, as indicated in the “Global Settings” panel after an ENSDF file is loaded.

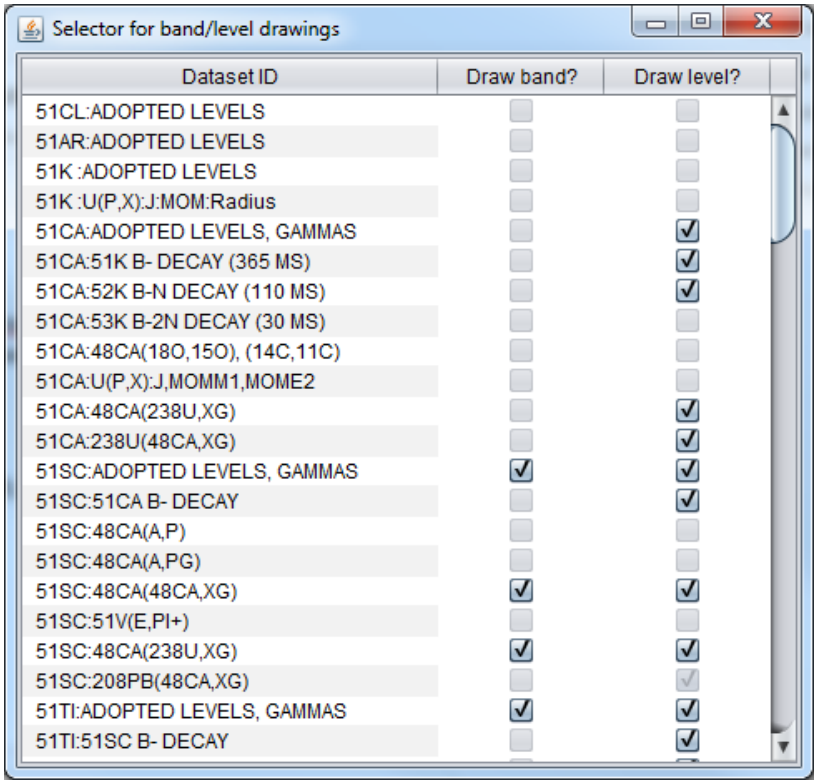
For more settings, click on “More” button. In the pop-up window, selecting drawings to be drawn for each dataset can be made in the “Drawings Selector”.

Step 4: Click "Create LaTeX File" button to create a LaTeX file from the input ENSDF file with automatic settings. A script file ("**NDS.dat**" for Windows system; "**NDS.sh**" for Linux and MacOS) is also generated which is to be run to produce a PDF file from the created LaTeX file.

Step 5: Right-click on the blank area to get a small pop-up menu and click “Create PDF” to produce a PDF file from the LaTeX file (this runs the script file generated in previous step in the background). Alternatively, one can double-click the “Create LaTeX File” button in previous step to create the PDF output. In case it does not work either way, one can run the script file manually. To do that in Windows system, in the output folder, look for “**NDS.dat**” script file and double-click it to produce a PDF file from the LaTeX file. (for Linux and MacOS, run "**NDS.sh**" from command line). Click “Delete figures files” in the pop-up menu to clean up all figure files in the output folder if they are not needed.

Selecting drawings to be shown in output:

Settings for showing drawings (level and band drawings) can be made in the “Control Settings” panel for each dataset. Alternatively, for quick settings, a “Drawings Selector” is available in the “Global Settings” panel after clicking on “More” button.

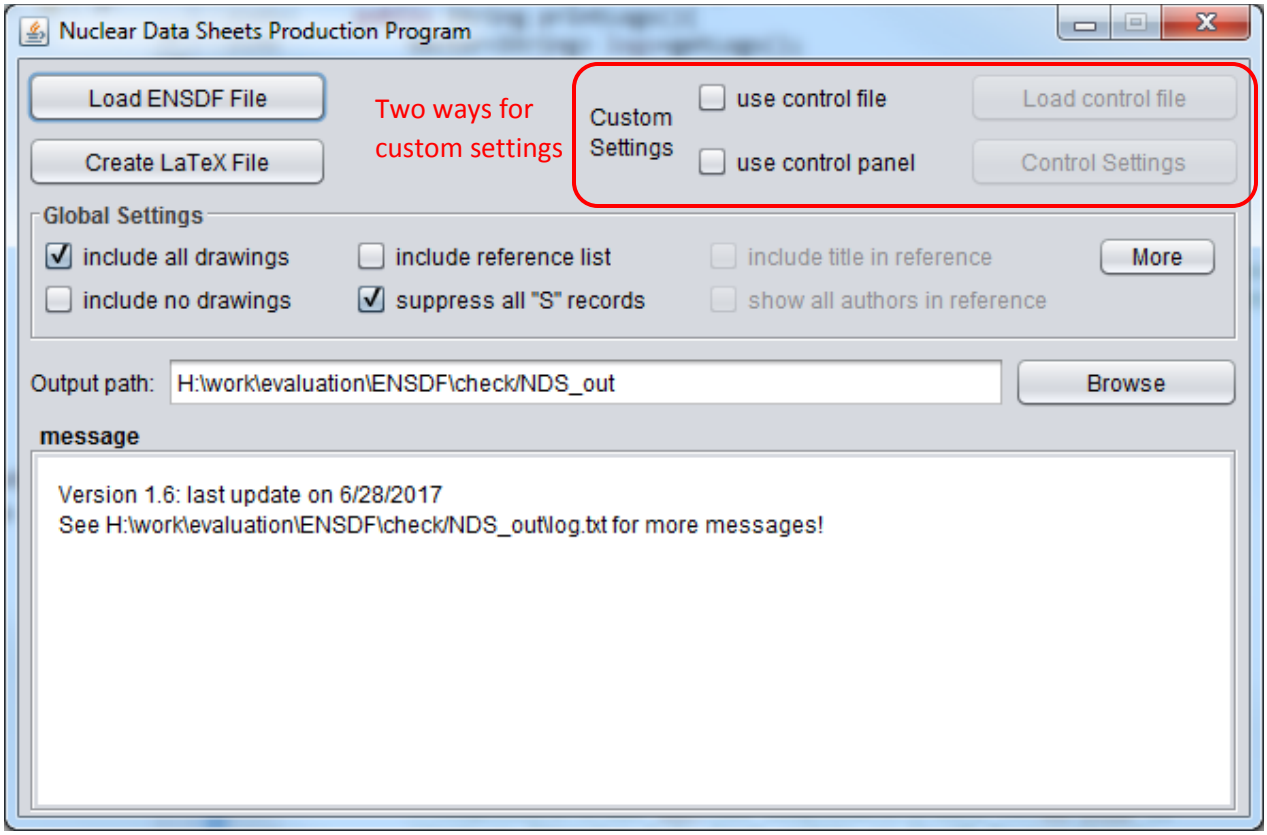


Steps for using custom settings:

Same steps as above for using automatic settings, except for that in step3 (before clicking on "Create LaTeX File" button) custom settings are made using one of the following two ways:

1) By loading a control file containing custom settings that are written in specific formats;

2) By using a graphical control panel containing all settings, which are simply clicked to set.



Two ways for custom settings:

1) Using a control file

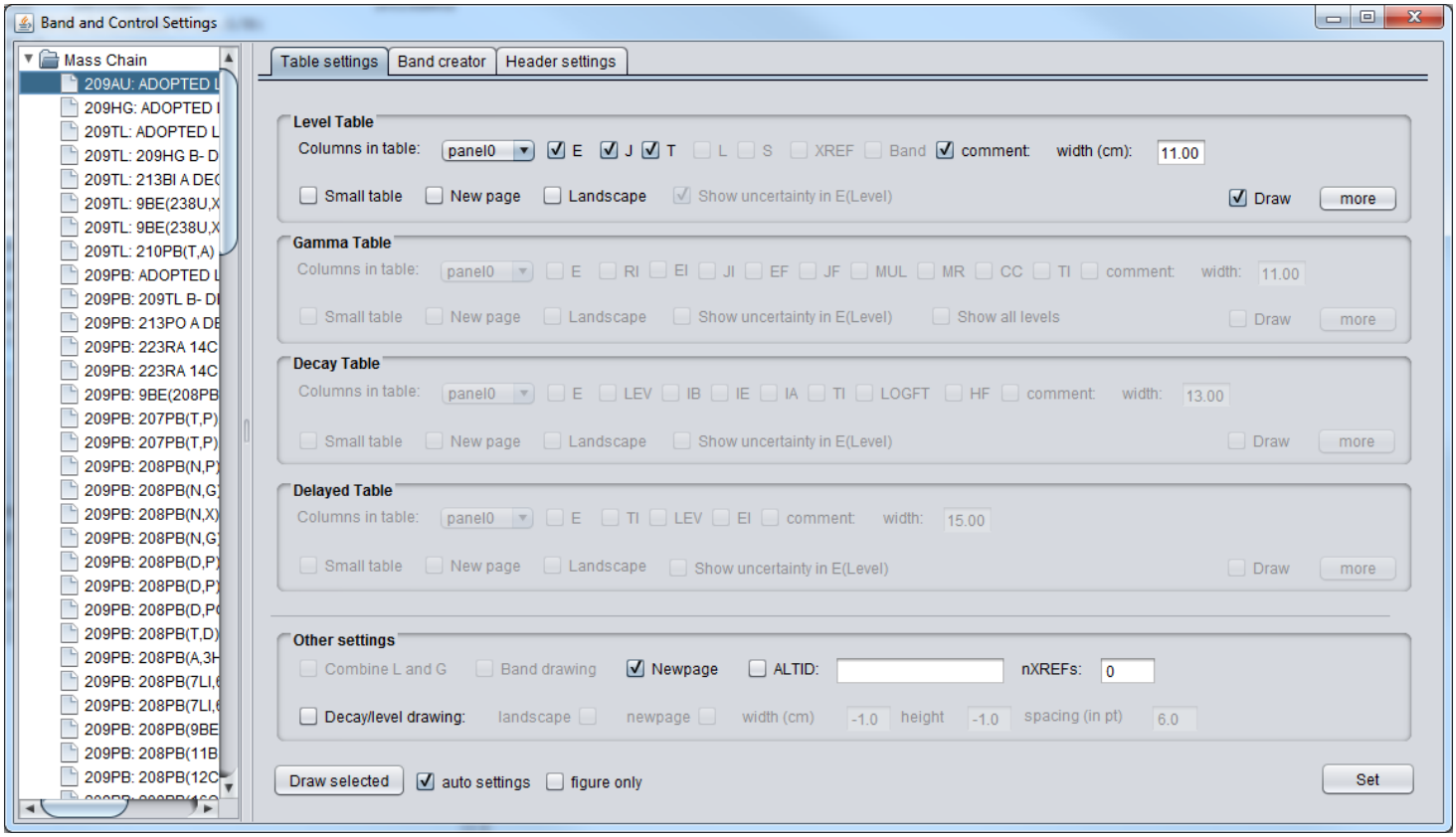
   Check the “use control file” box and click on “Load control file” to load a control file with custom settings. Shown below is the screenshot of a part of an example control file. For how to read and make a control file, refer to the instruction in Appendix.

```
REVIEW
ABSTRACT/V:xx/Y:****/R:****
SKELETON/P:1/W:2.1/S:0.5/T:1.5/X:17.71898/Y:17.708
INDEX/B:
 15BE    ADOPTED LEVELS
LEVEL/D:E,J,T,XREF,COMM/W:11.3/M:
PAGE
XREF 2
 15BE    2H(14BE,15BE)                  2013SN02
LEVEL/D:E,J,T,COMM/W:12.5/M:
XREF 0
 15BE    9BE(17C,15BE2P)                2011SP01
XREF 0
 15B     ADOPTED LEVELS                 1991AJ01                  91NP     200204
LEVEL/D:E,T,COMM/W:14.6/M:
PAGE
XREF 0
 15C     ADOPTED LEVELS, GAMMAS         1991AJ01                  91NP     200204
LEVEL/D:E,J,T,XREF,COMM/W:8.5/M:
GAMMA/D:LEV,JI,E,RI,LEVF,JF,M,COMM/W:10.0/E:/P:/M:
DRAW/M:6.0/N:1
PAGE
REORDER
XREF 7
```

2) Using the control panel

   Check the “use control panel” box and click on “Control Settings” button to launch the control-settings panel in which one can view and adjust all settings for tables (“Table settings” sub-panel) and drawings including band drawings (“Band creator” sub-panel) for each data set as well as settings for abstract and skeleton pages (“Header settings” sub-panel). In the control panel, there are options to generate and view output only for selected data set or only for figures (level scheme and band drawings) or only for band drawings. See the following for more details.

Control-Settings panel:



Launched by clicking on the “Control Settings” button in the main window.

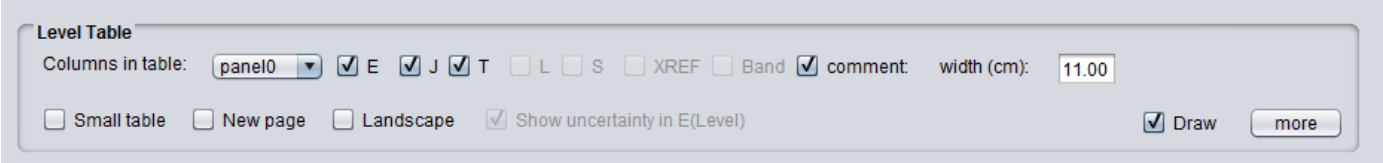
It has three tabbed sub-panels: “Table settings”, “Band creator” and “Header settings”.

Once a data set is selected from the list of data sets in the left side-panel, the current settings for that dataset are reflected in the “Table settings” tabbed panel for all available tables and in the “Band creator” tabbed panel for all available bands.

“Table settings” tabbed panel:

One can adjust those settings, for example, uncheck a box in “Columns in table” to remove a column from the corresponding table in the output file. Once all adjustments are done, click the “Set” button to apply the changes.

To generate and view the output for the selected data set only, double-click the “Draw selected” button. If “auto settings” is checked, the custom setting will not be used; if “figure only” is checked, only figures will be generated in the output.



“**Columns in table**”: columns of data to be displayed in the corresponding table in the output. For long tables that have multiple panels (one in each page), settings can be made for each panel. Uncheck a box to remove the corresponding column from the output table. Disabled columns means such column of data are not available in selected data set.

“**width**”: width of the comment column in the output.

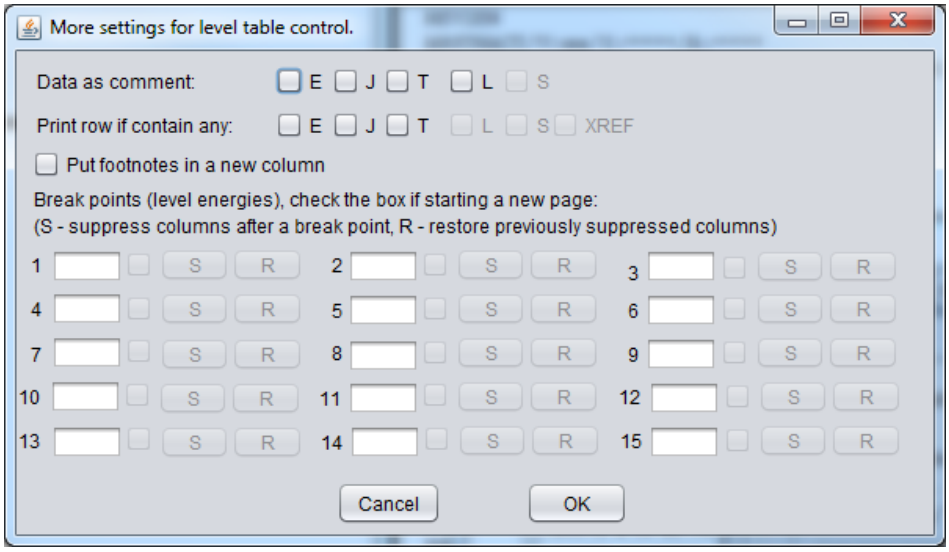
“**Small table**”: check it if the table is small enough to be put in one page.

“**New page**”: check it if the table is to be put in a new page.

“**Landscape**”: check it if the table is to be displayed in landscape orientation.

“**Draw**”: check it if the table is to be displayed in the output.

“**more**” button: click it to launch more table settings, see below.



“**Data as comment**”: put selected column of data in comments.

“**Print row if contain any**”: print the table row if only it contains any of the selected columns.

“**Put footnotes in a new column**”: put footnotes in a table column instead of at the end of table.

"**Break points**" fields: set points at which (before the point) the table breaks:

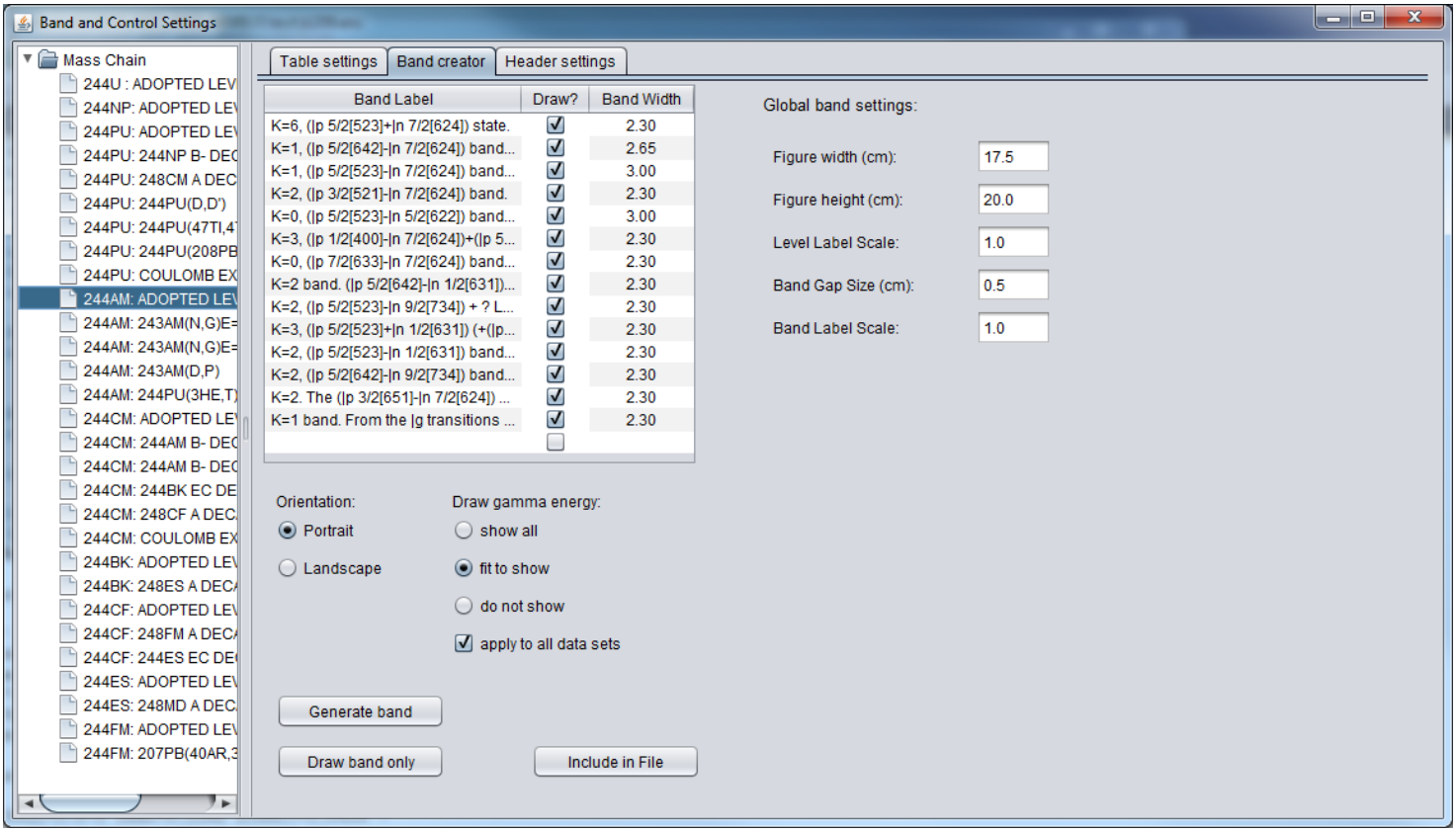
a) start a new sub-table side-by-side if the box after the break-point value is not checked;

b) start a new page if the box is checked.

"**S**" and "**R**" buttons: click to get a pop-up menu in which one can select to suppress columns or restore suppressed columns after the corresponding break point.

Click "OK" button to apply the settings.

"Band creator" tabbed panel:



"**Orientation**": display the band drawing in "**Portrait**" or "**Landscape**" orientation.

"**Draw gamma energy**":

"**show all**": show energy labels for all gamma transitions in the bands.
"**fit to show**": show only energy labels where there is enough room and no overlap.
"**do not show**": do not show energy labels.
"**apply to all data sets**": if not checked, the setting is only applied to selected dataset.

"**Generate band**" button: generate band drawings (LaTeX) for the selected dataset only.

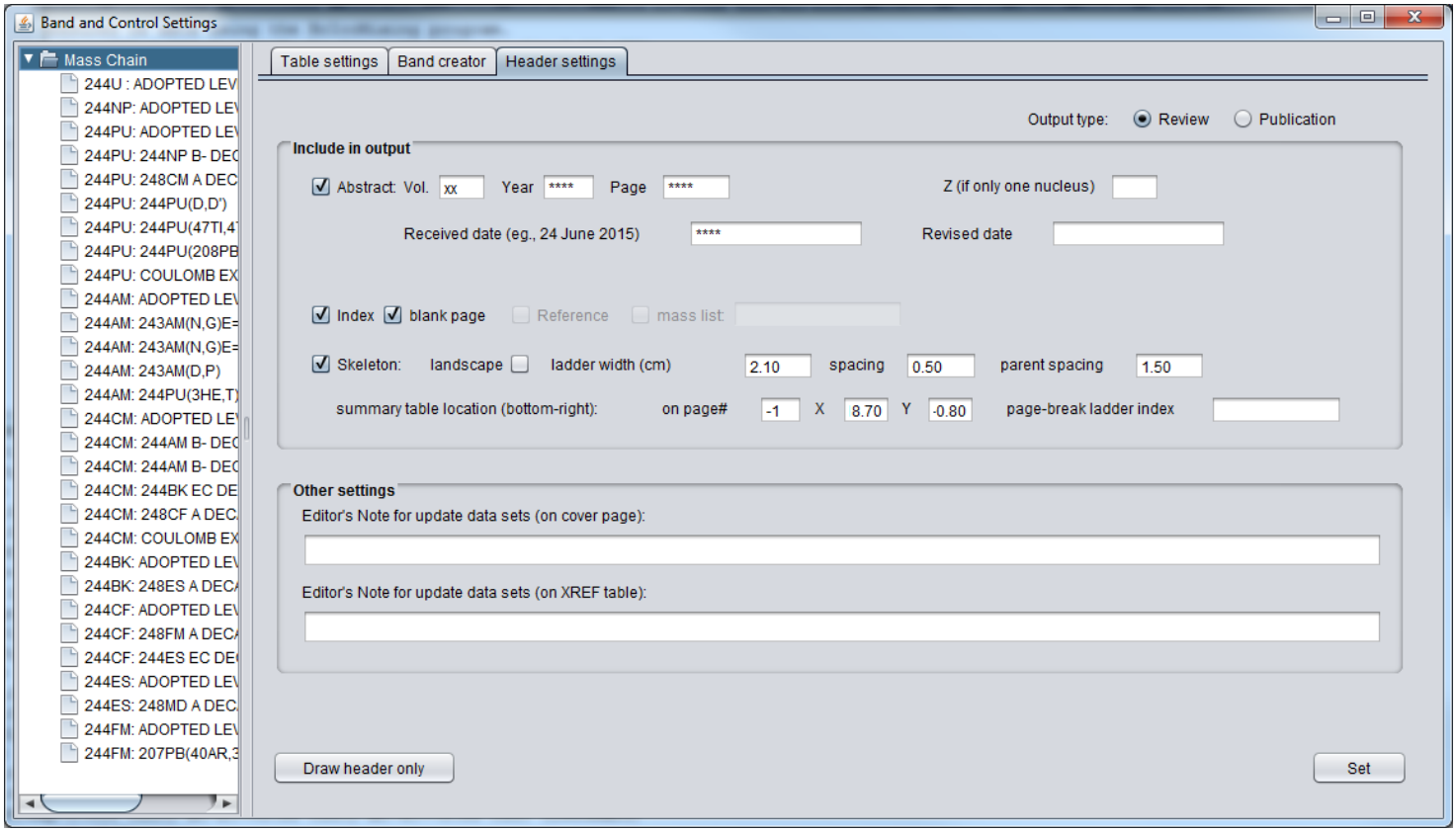
"**Include in File**" button: click to include the generated band drawings in the output file.

"**Draw band only**" button: generate and view band drawings only for the selected dataset.

"**Global band settings**" fields:

"**Figure width**" and "**Figure height**": width & height of the figure of band drawings in cm.
"**Band Gap Size**": gaps between bands.
"**Band Label Scale**": scale factor for the font size of the band title.
"**Level Label Scale**": scale factor for the font size of the level labels.

<u>"Header settings" tabbed panel:</u>



"**Abstract**" box: check it to make settings for abstract page.

"**Index**" box: check it to include the index page.

"**blank page**" box: check it to add a blank page after index page.

"**Skeleton**" box: check it to make settings for the skeleton page.

"**landscape**": check it to put the skeleton in landscape mode.

"**ladder width**": width of the ladder of each nucleus in the skeleton.

"**spacing**": gap in cm between ladders.

"**parent spacing**": vertical gap between parents of a nucleus in the skeleton.

"**on page#**": index of the page where to put the summary table among skeleton pages.

"**X**" & "**Y**": x and y coordinates of the bottom-right corner of the summary table in the page. Note the zero point (0,0) is at the bottom-left of the page.

"**page-break ladder index**": index of the ladders at which the page breaks (the ladder starts a new page).

"**Draw header only**" button: double-click it to generate and view the header only.

Click on "Set" button to apply the changes.

4. New features in ENSDF format introduced by JAVA-NDS

Local dictionary using "DICT":

The JAVA-NDS has an internal global dictionary which contains translations for a large amount of reaction names, nuclide names, and ENSDF keywords in upper-case "C" comments, DSID, or continuation records. But there are names or words in some cases for which there are no translations in the global dictionary, resulting in them printed in the output not as expected. For example, in the following DSID line of a data set,

" 27P PB(27P,P26SI):XUNDL-5 2016MA26 "

the reaction name "PB(27P,P26SI)" is not in the internal dictionary and thus is printed as is. To resolve this issue, instead of expanding the internal dictionary which needs updating and recompiling the program that is not accessible to users and lacks of flexibility, a local dictionary using "DICT" command which the users can define and control on their own is introduced in JAVA-NDS. For the above example, add the following line anywhere in the top comment section before data records.

" 27P c DICT$PB(27P,P26SI)=Pb({+27}P,p{+26}Si)"

This adds a translation "PB(27P,P26SI)=Pb({+27}P,p{+26}Si)" to the local dictionary which only applies in the dataset where the translation is defined and tells the program to convert "PB(27P,P26SI)" wherever in DSID or other places like upper-case "C" comments to "Pb({+27}P,p{+26}Si)" that can be correctly recognized and printed.

Here is the format for defining a translation in the local dictionary:

"DICT$word_in_uppercase=translation_in_lowercase"

Put it in a new general comment line, as shown in the example above. The type of the new comment line doesn't matter, as long as it has "c" or "C" at column 7.

Note that the local dictionary works not just for words in DSID but also for words in all uppercase comments or continuation records in the whole data set and the local dictionary takes no effect outside of the data set in which it is defined.

Particle-unbound levels in beta-decay datasets:

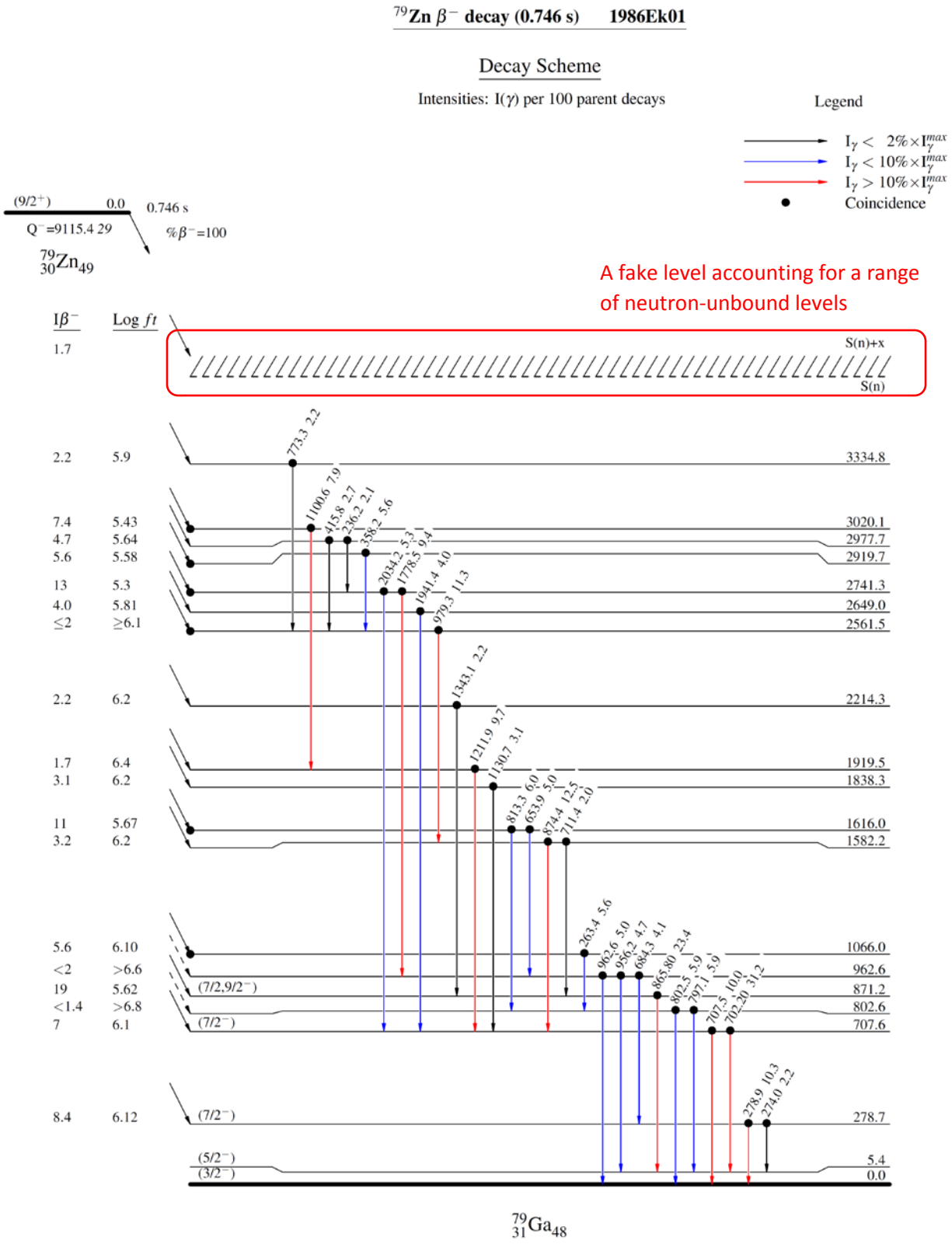
For a decay that has decay branches to particle-unbound levels in daughter nucleus, it is useful as well as for completeness to include information for these levels in data tables and decay scheme in the output. A fake level representing a range of the unbound levels is introduced into the ENSDF file by JAVA-NDS to account for the total decay branches to these levels. This fake level is placed at the end of the data set with the energy record of "SN+X" for neutron-unbound levels and "SP+X" for proton unbound levels, where "SN" and "SP" represents neutron and proton separation energies, respectively. To distinguish it from the real levels and to indicate it is for a range of levels for plotting purpose, a mark "R" representing "Range" is inserted at column 78 of this level-record line. Below is an example, from the data set of "79ZN B- DECAY (0.746 S)".

In the ENSDF file (only the end part is shown below):

```
79GA  G 1941.4    4   12.9  20                                          C
79GA  L 2741.3    3
79GA  B                13   3             5.3   1                     C
79GAS B EAV=2912.1 15
79GA CB E$5900 80 from B(1778G). Other: 6200 90 from B(2034G)
79GA  G 1778.5    4   30    6                                           C
79GA  G 2034.2    5   17    4                                           C
79GA  L 2919.7    4
79GA  B               5.6   7             5.58   6                     C
79GAS B EAV=2825.4 15
79GA CB E$5900 40 from BG coin
79GA  G  358.2    2   18.1  20                                          C
79GA  L 2977.7    4
79GA  B               4.7   4             5.64   5
79GAS B EAV=2797.2 15
79GA  G  236.2    3    6.6  20                                          C
79GA  G  415.8    4    8.5  20                                          C
79GA  L 3020.1    4
79GA  B               7.4   7             5.43   5                     C
79GAS B EAV=2776.6 15
79GA CB E$5900 100 from BG coin
79GA  G 1100.6    2   25.4  20                                          C
79GA  L 3334.8    5
79GA  B               2.2   5             5.9    1
79GAS B EAV=2623.6 15
79GA  G  773.3    3    7.2  15                                          C
79GA  L SN+X                                                           R
79GA cL $S(n)({+79}Ga)=6913.0 {I27} (2012Wa38)
79GA  B               1.7   5
79GA CB IB$%B-N=1.7 5 (from 79ZN ^Adopted ^Levels)
```

A fake level accounting for a range of neutron-unbound levels

In the decay scheme:



Appendix:

1. Format of Table Records in ENSDF and alignment:

a) Table Records:

Column 7=“t” or “T”, similar to “c” or “C”, respectively, for translations and for positioning with column 8=“ ”, “L”, “G”, etc.

b) New table lines:

All lines with non-“+” character at column 6 are recognized as new lines with heading spaces kept, except for “$” at column 10 being ignored.

c) Continuation lines:

Lines with “+” at column 6 are added at the end of previous lines with heading spaces kept.

d) Tailing spaces:

All spaces from the end of the line text to column 80 are kept by default. If length of the line is less than 80, spaces are added at the end until length=80. Continuation lines are added right after those tailing spaces. If a backslash “\” is inserted after the line text but before column 80, spaces only before “\” will be kept and spaces after it will be ignored.

e) Alignments:

What is made in ENSDF is what will be seen in PDF for alignments of columns.
Positions (or alignments) of all words following a space remains the same in the PDF output as in the ENSDF file. If there are non-printable ENSDF characters in a word, like, “{+”, “{-”, etc., the same number of whitespaces will be added at the end of this word after translation, to keep the positioning and alignment of the following word separated by whitespaces.

In cases where the single space needs to be kept between the next word and the prior word which has non-printable characters (by default spaces to replace those will be added at the end of that word), “~” should be used to connect the two words, so that they can be translated as a whole with “~” being printed as a single space in output and those extra spaces being added at the end of the second word, to keep the positioning and alignment of the next following word if there is. See examples in next page.

Example:

Table records in ENSDF:

```
160DY tG
160DY2tG          I|g(x-ray) (relative to I|g(879.38|g)=100) (1986Me07)
160DY3tG                          I(x-ray)                          I(x-ray)
160DY4tG                         ---------                         ---------
160DY5tG      Dy L{-S}~x~ray       0.90 {I6}     Dy K|a| x ray       53.0  {I7}
160DY6tG      Dy L{-|a}~x~ray+                   Dy K|b{-1} x ray+
160DY7tG      Dy L~x~ray(eta)     15.5 {I7}      Dy K|b{-3} x ray    10.70 {I15}
160DY8tG      Dy L{-|b}~x~ray     14.9 {I6}      Dy K|b{-2}'| x ray   2.76 {I6}
160DY9tG      Dy L{-|g}~x~ray      2.62 {I11}    Dy K|b| x ray       13.50 {I17}
```

In PDF output **WITH** the use of "~" to connect words:

Iγ(x-ray) (relative to Iγ(879.38γ)=100) (1986Me07)

	I(x-ray)		I(x-ray)
Dy L_S x ray	0.90 *6*	Dy $K\alpha$ x ray	53.0 *7*
Dy L_α x ray+		Dy $K\beta_1$ x ray+	
Dy L x ray(eta)	15.5 *7*	Dy $K\beta_3$ x ray	10.70 *15*
Dy L_β x ray	14.9 *6*	Dy $K\beta_2$' x ray	2.76 *6*
Dy L_γ x ray	2.62 *11*	Dy $K\beta$ x ray	13.50 *17*

In PDF output **WITHOUT** the use of "~" to connect words:

Iγ(x-ray) (relative to Iγ(879.38γ)=100) (1986Me07)

	I(x-ray)		I(x-ray)
Dy L_S x ray	0.90 *6*	Dy $K\alpha$ x ray	53.0 *7*
Dy L_α x ray+		Dy $K\beta_1$ x ray+	
Dy L x ray(eta)	15.5 *7*	Dy $K\beta_3$ x ray	10.70 *15*
Dy L_β x ray	14.9 *6*	Dy $K\beta_2$' x ray	2.76 *6*
Dy L_γ x ray	2.62 *11*	Dy $K\beta$ x ray	13.50 *17*

f) Footnotes in table records:

While extra spaces for non-printable characters to be added at the end of a word are used to preserve the alignments of table-record data columns, they are unwanted in footnotes. So a "#" mark at column 6 is used to mark the first line of a footnote to be processed without those extra spaces so that the original spacing between words are kept as is. Note that the use of "+" at column 6 for continuation lines is still valid in this case.

2. Use of LaTeX text in ENSDF

To ues LaTeX text in ENSDF comments, just put the text in the brackets of "^{}" and it will be written to the LaTeX output as is and will be translated as expected in LaTeX.

3. Save datasets in an ENSDF file to separate files

Step 1: load an ENSDF file containing multiple ENSDF datasets.

Step 2: right click on any blank area of the main window and then click on "Split and save datasets" in the pop-up menu.

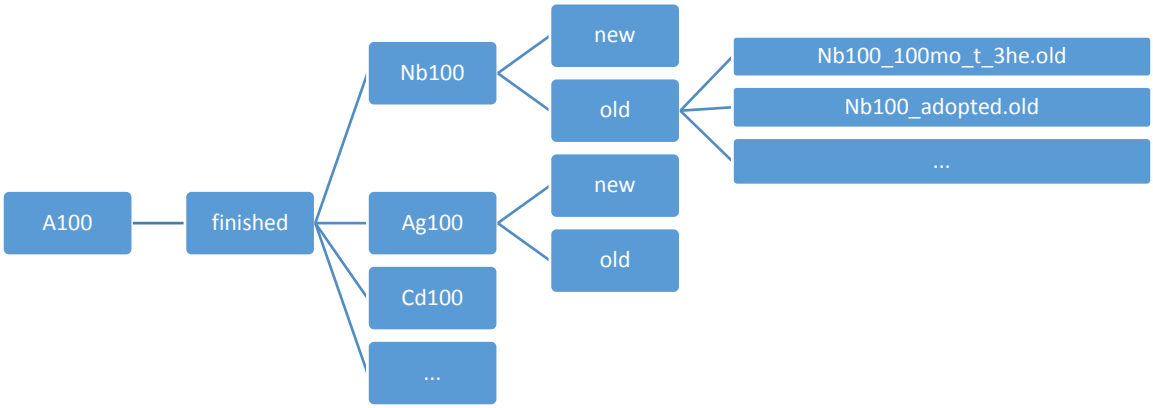
4. Setup evaluation folders

Step 1: load an ENSDF file of a mass chain

Step 2: right click on any blank area of the main window and then click on "Setup evaluation folder".

A default folder structure as explain below is then created in the output path and the input mass-chain file is split to files for individual datasets which are saved into sub-folders of corresponding nuclei.

Default folder structure, for example, A=100



5. Note for band labeling:

By default, the first sentence (all text before the first ending period ".") in a band comment is used as the band label in the corresponding band drawing. But if the second line of the comment in an ENSDF file is marked by "x" or "X" instead of "2" at column 6, all text in the first line of the comment will be used as the label, overriding the default first-sentence rule above.

6. Control File:

The Control File is composed of a few commands at the top of the file that relate to the whole data set (the "header"), and then a list of commands following the DSID for each dataset.

Each command consists of a keyword followed by a number of options. The options are given by "/*:#", where * is a capital letter that determines the type of option and # is a set of arguments. A basic control file will be generated by the program if it is run without importing a control file.

Example control file:

for Header

```
REVIEW
ABSTRACT/V:xx/Y:****/R:****
SKELETON/P:1/W:2.1/S:0.5/T:1.5/X:17.71898/Y:17.708
INDEX/B:
```

for data sets

```
 15BE     ADOPTED LEVELS                                          Dataset DSID
LEVEL/D:E,J,T,XREF,COMM/W:11.3/M:
PAGE                                                             commands
XREF 2
 15BE     2H(14BE,15BE)                  2013SN02
LEVEL/D:E,J,T,COMM/W:12.5/M:
XREF 0
 15BE     9BE(17C,15BE2P)                2011SP01
XREF 0
 15B      ADOPTED LEVELS                 1991AJ01                 91NP      200204
LEVEL/D:E,T,COMM/W:14.6/M:
PAGE
XREF 0
 15C      ADOPTED LEVELS, GAMMAS         1991AJ01                 91NP      200204
LEVEL/D:E,J,T,XREF,COMM/W:8.5/M:
GAMMA/D:LEV,JI,E,RI,LEVF,JF,M,COMM/W:10.0/E:/P:/M:
DRAW/M:6.0/N:1
PAGE
REORDER
XREF 7
```

An example command in the sample control file above:

"**LEVEL/D:E,J,T,XREF,COMM/W:11.3/M**:"

Explanation:

LEVEL --- command keyword. It is for level table in this example.

/D:E,J,T,XREF,COMM --- an option for level table. It sets the data columns to be shown in level table in this example.

/W:11.3 --- option for setting the comment column width=11.3cm in the level table.

Legend for arguments in option commands:

ss: the option takes anything as its argument
xx: the option must take a numerical value
[ ]: this is an optional argument

Header commands:

Command	Option	Purpose
REVIEW/PUBLICATION		This must be the first line of the file. REVIEW datasets show suppressed continuation records, PUBLICATION datasets do not.
ABSTRACT		Include an Abstract as the first page
	/V:ss	The volume number of the abstract
	/Y:ss	the year of the abstract
	/R:ss	The received date
	/C:ss	revised date (optional)
	/Z:xx	Z number if this is a publication on only one nucleus and not a whole mass chain
INDEX		Include a table of contents
	/B:	include a blank page after the table of contents
REFERENCE		Include a bibliography at the end of the publication
	/A:	A list of masses if this bibliography refers to more than one mass chain
UPDATE		This is an update dataset. A comment will be placed on the abstract page saying that some datasets are not included. Any dataset in an XREF but not included in the control file will generate a comment on the XREF table saying that the dataset is available online
SKELETON		Write a skeleton drawing
	/H:	Print the drawing in landscape mode
	/W:xx	The width of the nucleus ladders in the diagram (in cm)
	/S:xx	The spacing between adjacent ladders (in cm)
	/P:xx	The number of the page to put the summary table on
	/T:xx	The spacing between the nuclei and the parent nuclei drawn above. Increase if they are overlapping(in cm)
	/B:xx[,yy,zz]	the index of bands before which there should be a page break
	/X:xx	x coordinate of the bottom-right corner of the summary table
	/Y:xx	y coordinate of the bottom-right corner of the summary table

Dataset commands:

Command	Option	Purpose
LEVEL		Write a level table
GAMMA		Write a gamma table
BETA		Write a table of beta-minus decays
ALPHA		Write an alpha table
ELECTRON		Write a table of beta+/EC decays
PARTICLE		Write a table of delayed particles
UNPLACED		Write a table of unplaced gamma rays. The table will share its comments with the GAMMA table, and the unplaced gammas will not appear in the gamma table
Options for all commands above	/D:ss[,tt,uu,..]	The columns to draw in this table, according to the legend given on the following page
	/O:ss[,tt,uu,...]	write the data in these columns as a comment
	/E:	Do not show uncertainties on the level energies
	/P:	This table starts a new page
	/M:	SmallTable option. This is used to fix tables with very few columns (one to three) which are not long enough to be split. The table must not span multiple pages. This command removes certain structures important to spanning pages in order to allow the table to be properly centered. If the table is long enough to span multiple pages, it should be broken up using the {/B:...} command instead
	/A:	Shows all levels (for gamma tables)
	/F:ss[,tt,uu,...]	Print a row of the table only if it contains one of the columns given here. Write a comment at the end of the table indicating which columns were used
	/W:xx	The width of the comments column in this table. Changing this can be a good way to make slight changes to the length of a table.
COMBINE		Write the level and gamma table beside each other
DRAW		Include a decay drawing
	/H:	landscape the decay drawing
	/X:	width of the decay drawing
	/Y:	height of the decay drawing
	/P:	start this drawing on a new page. To get a drawing at the top of the page with the next dataset below it, add this option.
PAGE		option from the following dataset.
	/M:	Minimum spacing (in pt) between levels in the drawing
ALTIDsss		Replace the old DSId of the dataset with the one given
PAGE		This dataset starts a new page
REORDER		sort the gamma ray table by level energy, not gamma energy
XREFxxx		The number of Xrefs to include in adopted levels tables

The following options LEVEL,GAMMA,BETA,ALPHA,ELECTRON,PARTICLE and UNPLACED commands must be enclosed in {brackets}. Each set of brackets can contain one, and only one, /B: option

Option	Purpose
/B:xx[,yy,zz...]	All entries greater than xx should be given in a new column. The number compared to xx is the number the table is sorted by.
/B:F	The footnotes for this dataset should be in a new column beside the table
/S:ss[,tt,uu,...]	Suppress these columns for the rest of the table
/R:ss[,tt,uu,...]	Restore previously suppressed columns
/N:	This break also begins a new page

Explanations of column names used in option arguments:

Column name	Description
E	Energy (all)
LEV	Level (Gamma, Decay and Delayed Particle)
LEVF	Final Level (Gamma)
J	Spin and Parity (Level)
JI	Initial Spin and Parity (Gamma)
JF	Final Spin and Parity (Gamma)
BND	Band (Level)
XREF	XRefs (Level)
T	Half-life (Level)
L	Angular Momentum (Level)
S	Spectroscopic Strength (Level)
RI	Relative Intensities (Gamma,Delayed Particle)
M	Multipolarity (Gamma)
MR	Mixing Ratio (Gamma)
CC	Conversion Coefficient (Gamma)
TI	Total Intensity (Gamma, Decay)
IB,IA,IE,IP	Decay Intensity (Decay), IP for delayed-particle
LOGFT	Logft (Decay)
HF	Hindrance Factor (Decay)
EI	Intermediate Level Energy (Delayed Particle)
COMM	Comment