

AMPX Cross-Section Processing Status

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AMPX conversion to double precision

AMPX is a module code system with many modules to manipulate endf, point-wise, CE, MG and covariance data. Some are also distributed with SCALE

AIM COMPRESS ALUM LARD SPLICER JERGENS
AJAX MALT LIPTON TABASCO KFC TGEL
ALPO COMPARE TOMATO CAMELS
POLIDENT CHOPEZE COVCOMP TABU LAVA
BONAMI COVERR CONTAC CLAROL MONTEGO TIDE MALOCS WAX
BROADEN COVCONV RUFFLES MOONPIE WINE NITAWL WORKER
MOTRIN EXTRACT COLLINS WISK PALEALE
CADILLAC VEL COMET WORM PERFUME Y12
CATMANDU FABULOUS FILTER PLATINUM PICKEZE
CHARMIN FLANGE6 FRESH PLAVIX CAJUN PMC X10
ICE FRESH PRELL CENTRM PRUDE XSDRN
COGNAC JAMAICAN PRILOSEC DCON PUFF-IV
COMPARE MAKPEN JOINTAB1 PURM EXTRACT RADE
MALOCS KINKOS SKOAL FABULOUS
SMILER SIMONIZE FLANGE6

AMPX conversion to double precision

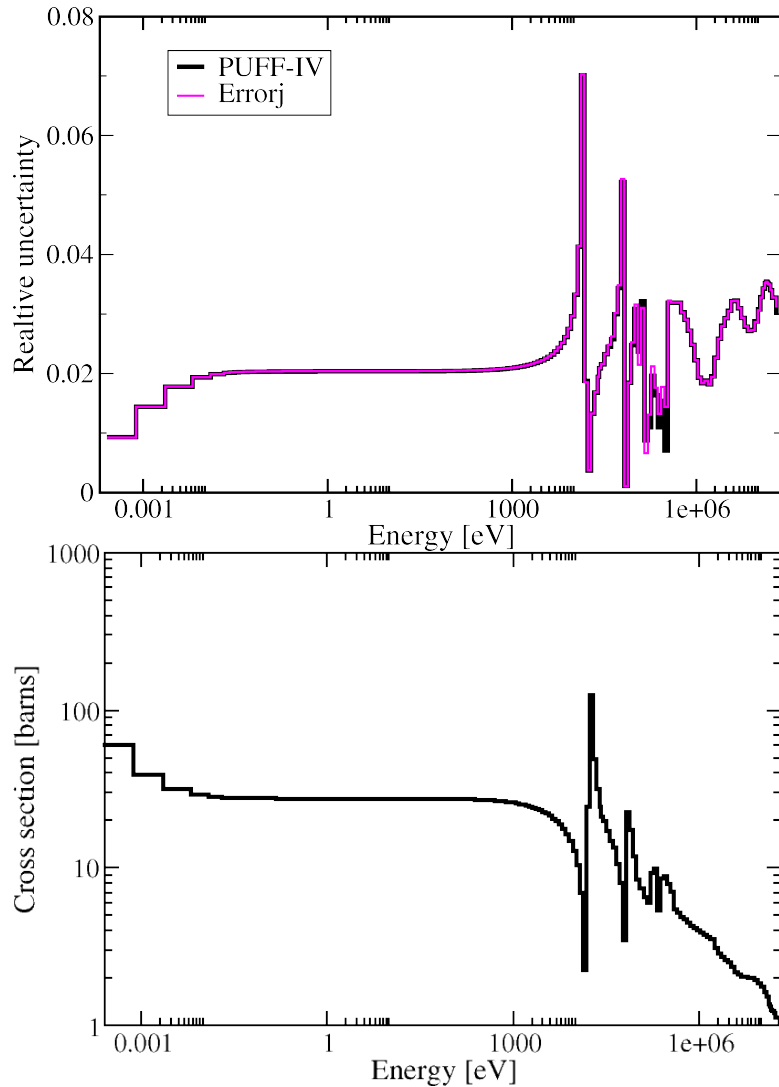
- All the programs needed to create MG libraries have been converted
 - polident, broaden (point-wise cross section)
 - y12, x10, flange6, simonize (scattering matrices, MG libraries)
- Many of the modules needed to create continuous energy libraries have been converted.
- Library functions have been converted to use double precision internally
- Library functions to read/write endf, point-wise data and MG data been written to make file access consistent across modules.

Effective Radius Uncertainty in PUFF-IV

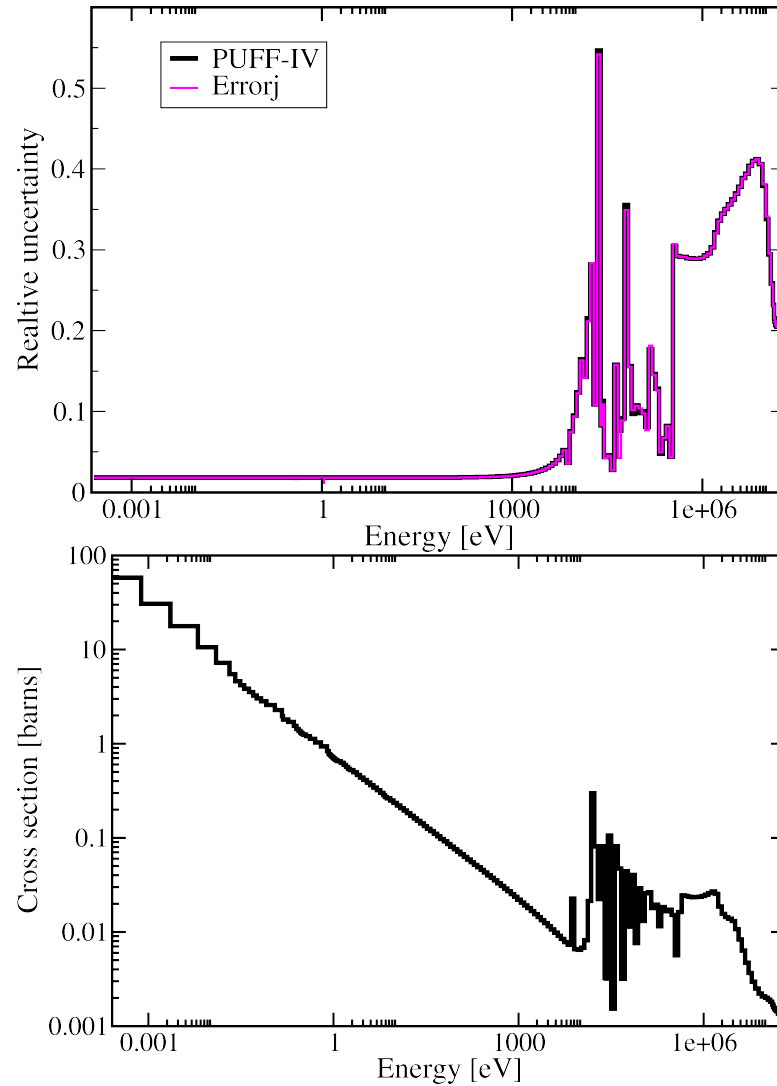
- **New format proposal for Radius uncertainty in ENDF**
- **SAMRML (used in PUFF-IV to generate derivatives) was enhanced to calculate derivatives with respect to the true and effective channel radius**
- **This allows to use full correlation between radius and resonance parameters – if given in ENDF file.**
- **PUFF-IV reads and uses the TENDL radius uncertainty using the new format proposal.**
- **A patched version of PUFF-IV has been prepared and is available upon request.**

Ni58 Tendl-2008 endf files

Elastic



Capture



AMPX Nuclear Data for SCALE 6

- **ENDF/B-VI.8 238 neutron group general purpose library**
- **ENDF/B-VII.0 238 neutron group general purpose library**
- **ENDF/B-VI.8 200 neutron/47 gamma coupled shielding library**
- **ENDF/B-VII.0 200 neutron/47 gamma coupled shielding library**
- **ENDF/B-VII.0 27 neutron/19 gamma coupled library primarily to perform adjoint discrete ordinance calculations.**
- **ENDF/B-V, ENDF/B-VI.8 and ENDF/B-VII.0 continuous energy libraries**
- **Comprehensive Covariance library for use with all libraries. Low-fidelity data are used if no other data are available.**

Library features

- **Full range Bondarenko factors for multi-group libraries**
- **CE Data for Resonance Region self shielding**

New ORIGIN Depletion Data libraries for SCALE

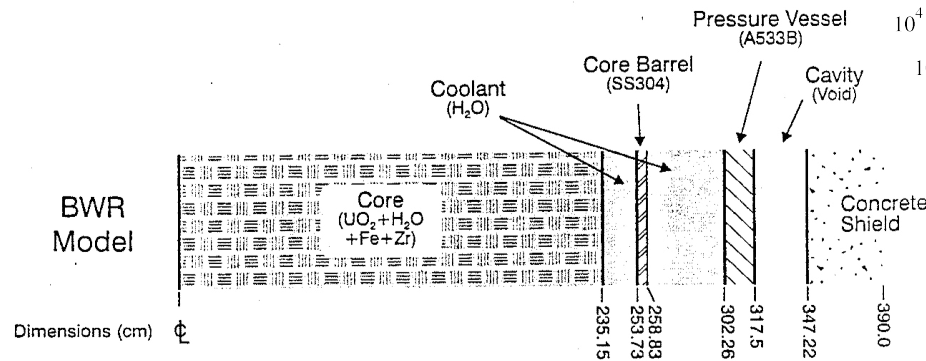
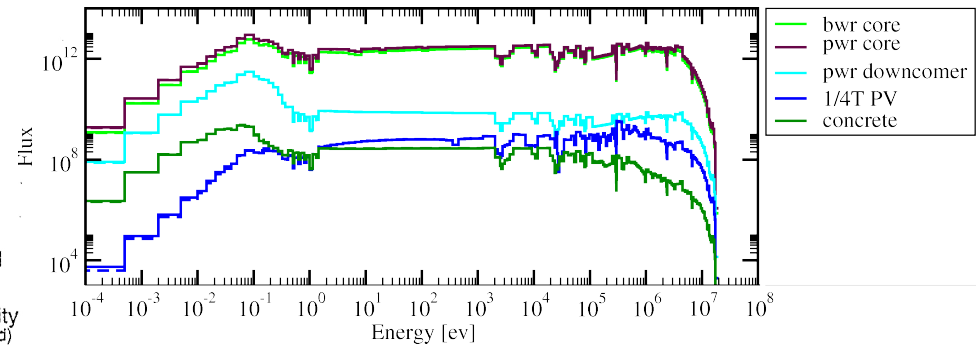
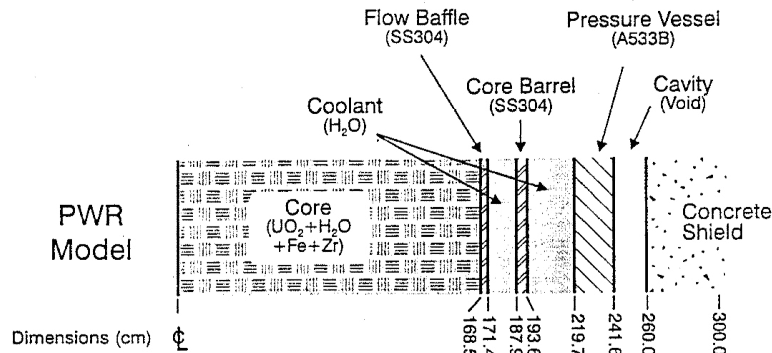
- Decay and fission product libraries are update using ENDF/B-VII.0 data.
- Cross section libraries are generated from the JEFF-3.0/A Joint Evaluated Fission and Fusion File special purpose activation files.
 - JEFF data are processed with AMPX modules LIPTON, BROADEN and PRILOSEC using a LWR fuel pin flux.
 - Cross section data are generated for
 - 238-group neutron (thermal applications)
 - 200-group neutron (fast applications and shielding)
 - 44-group neutron (collapsed version of 238-group)
 - 47-group neutron (BUGLE shielding library structure)
 - 199-group neutron (VITAMIN-B6 library structure)

Creating new VITAMIN-B6 and Bugle library

- ORNL is preparing a new VITAMIN-B6 library based on ENDF/B-VII.0
- $^{199}\text{n}/^{42}\text{g}$
(neutron groups are similar to $^{200}\text{n}/^{47}\text{g}$ group library
gamma groups differ)
- Weighting is different from $^{200}\text{n}/^{47}\text{g}$ library to closely mirror the previous VITAMIN-B6 library
- KERMA factors will be produced using NJOY

Collapse VITAMIN-B6 to BUGLE

199n/42g → 47n/20g



Anticipated release of new BUGLE library is 2011

Consistency checks

- **ENDF files created at ORNL are checked in the AMPX code system**
 - **MG libraries are created**
 - **Covariance matrices are produced and plotted.**
- **New endf files checked and sent to NNDC are:**
 - **Ti46, Ti47, Ti49, Ti50**
 - **Cr52 Cr53**
 - **Ni58, Ni60**

Template engine in ExSite

The screenshot displays the ExSite application interface. At the top, the title bar reads "ExsiteLib 200805300101". The main window is titled "neutron_sp_5.tem" and contains a code editor with the following template text:

```
=neutronFast
broaden=../point/neutron_sp/broaden
master=neutron_sp/neutron_leg_5 temperature=300
neutgroups=199 gamgroups=42 thermalgroups=36
weighting=2
akt=4.8356 fcut=820.8e3 neutleg=5 yieldleg=5
makeyield=yes thermcut=6 thermalleg=5
thermaltemp=300.0 600.0 1000.0 2100.0
makethermal=yes
input=input_neu_sp/in_5
evals=/Users/dw8/ampx/running/endf7/Endf7_template.xml
end
```

Below the code editor, there is a "Tasks List" and a "Process List" section. The "Tasks List" shows a series of "default finished" entries. The "Process List" shows a summary: "Total: 393 Finished: 393 Running: 0 Pending: 0 Failed: 0". At the bottom, there are buttons for "Scheduler(s)", "Add Task(s)", "(Re)Schedule", "Update Status", "Remove", and "Unschedule".

On the right side, there is a "Palette" window showing a list of templates:

- Custom Templates
 - njoyAllKerma
 - njoyKerma
- Full Templates
- Partial Templates
 - ampxmaster
 - bind
 - bondarenko
 - compare
 - gamma
 - neutronFast
 - point_data
 - puffonly

A "Configure x10" dialog box is open in the foreground, showing various configuration options for the "Generate neutron interaction data" mode. The options include:

- Use: ☒ mode Generate neutron interaction data
- Execution mode for x10
- Use: ☐ icore 200000 (Number of words of core to allocate)
- Use: ☐ master 1 (Logical unit of the AMPX Master)
- Use: ☐ logwt 31 (Logical unit for the weighting spectrum)
- Use: ☐ logpt 32 (Logical unit for the point cross sections)
- Use: ☐ logk 33 (Logical unit for the kinematics file)
- Use: ☒ id19 (Identifier of the nuclide on the AMPX Master Library)
- Use: ☒ igm (The number of neutron energy groups)
- Use: ☒ neg (The number of thermal neutron energy groups. Note that when the library is a full range library, NEG will be less than IGM, and the group structure for the thermal energy range will be the NEG lowest energy groups in the overall group structure.)
- Use: ☒ ipm (The number of gamma-ray energy groups)
- Use: ☐ nlneutron 5 (The maximum order of Legendre fit to neutron scattering processes. Note that numerical approximations or procedures may require X10 to select a lower order of fitting)
- Use: ☐ nlvield 5

At the bottom of the dialog are "OK" and "Cancel" buttons.

```

<Materials>
  <Material tag="h1"
    endf="125"
    za="1001"
    tape="n-001_H_001.endf"
    ...
  <Material tag="u238"
    endf="9237"
    za="92238"
    tape="n-092_U_238.endf"
    ...
</Material>

```

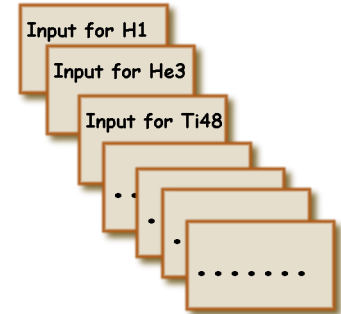
+

```

<InputData>
  <openFile name="&batch;"/>
  <loop restrict="+neutron(yes)">
    <openFile name="&case;"/>
    <writeFile name="&case;">

  <text>=shell
  ln -sf &broaden_file; ft34f001
  end
  =pickeze          <!-- pickeze -->
  -1$$ 3000000
  0$$ 34 35

```



List of endf related information.
Retrieved automatically from a directory containing endf files

Defines sequence
Uses a few user defined parameters

ExsiteLib 200805300101

marks

Start Page x neutron_sp_5.tem x in_7_u238.inp x

```

=shell
ln -sf /Users/dw8/ampx/running/endl7/re10/n-092_U_238.endf ft11f001
ln -sf ${RTNDIR}/../../point/neutron_sp/broaden_u238 ft34f001
end
=pickeze
-1$$ 3000000
0$$ 34 35
1$$ 1 0 0 1 0 e t
2$$ 9237
5** 300 t
end
=jergens
-1$$ all 3000000 e
0$$ 0 30 18 1$$ 1 e
2** 1.0E-5 2.0E7 e t
3$$ 2099 0 2
4** 300.0 4.8356 1273000.0 820.8e3 e
t
end
=y12
0$$ 32 11 0 0
1$$ 9237
2$$ 2 6
3** 32 0 0 0 0 7

```

24:21 INS

Tasks List

finished

finished

finished

: finished

: finished

ult finished

: finished

nished

Total: 393 Finished: 393 Running: 0 Pending: 0 Failed:

uler(s)

Add Task(s)

(Re)Schedule

Update Status

Remove

Unschedule

Process List

Palette

kfc

lard

lipton

lucks

makpen

malt

montego

motrin

nop

paleale

pickeze

plavix

polident

prestone

kinkos

lava

listrine

mad

malocs

mate

moonpie

nitawl

pal

perfume

platinum

pmc

prell

prilosec

Configure x10

Use: ☒ mode Generate neutron interaction data

Execution mode for x10

Use: ☐ icore 200000
Number of words of core to allocate

Use: ☐ master 1
Logical unit of the AMPX Master

Use: ☐ logwt 31
Logical unit for the weighting spectrum

Use: ☐ logpt 32
Logical unit for the point cross sections

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Logical unit for the kinematics file

Use: ☒ id19
Identifier of the nuclide on the AMPX Master Library

Use: ☒ igm
The number of neutron energy groups

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The number of thermal neutron energy groups Note that when the library is a full range library, NEG will be less than IGM, and the group structure for the thermal energy range will be the NEG lowest energy groups in the overall group structure.

Use: ☒ ipm
The number of gamma-ray energy groups

Use: ☐ nlneutron 5
The maximum order of Legendre fit to neutron scattering processes Note that numerical approximations or procedures may require X10 to select a lower order of fitting

Use: ☐ nlvfield 5

OK

Cancel

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paradigm shift

OAK
RIDGE
National Laboratory

Future Development Activities

- **Convert remaining modules to FORTRAN 90 and double precision**
- **Develop the capability to produce a continuous energy gamma library**
- **Expand ExSite capabilities**
- **Continue work on a 999 group fine group library**
- **Frame work for test suite in AMPX exists, but test cases need to be selected and added.**
- **Package and release AMPX by 2011**