2026/3/6

1. AMPX-J50

AMPX-J50 is a set of AMPX format libraries for SCALE produced from JENDL-5 neutron, thermal scattering law (TSL) and photo-atomic sub-libraries. It consists of AMPX continuous energy (CE), AMPX multigroup (MG) and AMPX covariance (COV) libraries.

2. Directory structure of AMPX -J50

The directory structure of AMPX -J50 is as follows:

AMPX-J50
|- README_en.pdf : this file
|- AMPX_CE_J50 : JENDL-5 AMPX CE library
    |- cekenolib_j5 : AMPX CE files produced from JENDL-5
    |- scale6.2 : files added to cekenolib_j5 directory for SCALE6.2
    |- scale6.3 : files added to cekenolib_j5 directory for SCALE6.3
    |- to_scale6.2.data : files added to data directory for SCALE6.2
    |- to_scale6.3.data : files added to data directory for SCALE6.3
|- AMPX_MG_J50 : JENDL-5 AMPX MG library
    |- scale6.2: JENDL-5 AMPX MG library for SCALE6.2
        |- scale.rev12.xn252v5 : neutron 252 group AMPX MG library produced from JENDL-5
        |- scale.rev12.xn252g47v5 : neutron 252 group + photon 47 group AMPX MG library produced from JENDL-5
        |- scale.rev12.xn200g47v5 : neutron 200 group + photon 47 group AMPX MG library produced from JENDL-5
        |- scale.rev12.xn56v5 : neutron 56 group AMPX MG library produced from JENDL-5
        |- scale.rev12.xn48g20v5 : neutron 48 group + photon 20 group AMPX MG library produced from JENDL-5
        |- scale.rev12.xn28g19v5 : neutron 28 group + photon 19 group AMPX MG library produced from JENDL-5
    |- scale6.3: JENDL-5 AMPX MG library for SCALE6.3
        |- scale.rev13.xn252v5 : neutron 252 group AMPX MG library produced from JENDL-5
        |- scale.rev13.xn252g47v5 : neutron 252 group + photon 47 group AMPX MG library produced from JENDL-5
        |- scale.rev13.xn200g47v5 : neutron 200 group + photon 47 group AMPX MG library produced from JENDL-5
        |- scale.rev13.xn56v5 : neutron 56 group AMPX MG library produced from

JENDL-5

|- scale.rev13.xn48g20v5 : neutron 48 group + photon 20 group AMPX MG library produced from JENDL-5

|- scale.rev13.xn28g19v5 : neutron 28 group + photon 19 group AMPX MG library produced from JENDL-5

|- AMPX_COV_J50 : JENDL-5 AMPX COV library

|- scale.rev08.252groupcov5.0 : neutron 252 group AMPX COV library produced from JENDL-5

|- scale.rev08.56groupcov5.0 : neutron 252 group AMPX COV library produced from JENDL-5

|- Modified_J50 : JENDL-5 files modified for AMPX-6 (Do not use these files with codes except for AMPX-6)

3. How to produce AMPX-J50

(1) AMPX_CE_J50

JENDL-5 u20 data, TSL sub-library and photo-atomic sub-library were processed (JENDL-5 u20 data was adopted because processing of JENDL-5 neutron sub-library caused infinite loop). All nuclei except for m2 nuclei were processed because SCALE cannot treat m2nuclei.

- Processing code：AMPX-6 in SCALE6.3.1
- Auxiliary Code for input data creation：ExSite
- Neutron processing condition
  - Temperature : 293, 565, 600, 900, 1200, 2400 K（all temperatures in TSL data for TSL data [For ^{1}H in H2O with 56 temperatures, temperatures of 270.0, 290.0, 293.6, 296.0, 300.0, 320.0, 340.0, 360.0, 380.0, 400.0, 420.0, 440.0, 460.0, 480.0, 500.0, 520.0, 540.0, 560.0, 580.0, 600.0, 620.0, 640.0, 660.0, 680.0, 700.0, 720.0, 740.0, 760.0, 780.0, 800.0 were processed because AMPX-6 cannot process all temperatures in HinH2O.]）
  - Background cross section for unresolved resonance（same as AMPX CE libraries in SCALE）
    - ✓ 10^{8}, 10^{6}, 10^{5}, 10^{4}, 10^{3}, 10^{2}, 10, 1, 10^{-6}（for nuclei which contain ^{90}Y and are lighter than ^{90}Y）
    - ✓ 10^{8}, 10^{6}, 10^{5}, $2x10^{4}$, $1x10^{4}$, $5x10^{3}$, $2x10^{3}$, 10^{3}, 6400, 320, 160, 120, 80, 60, 40, 30, 20, 15, 10, 8, 6, 4, 2, 1, 0.01, 10^{-6}（for nuclei which contain ^{90}Zr and are heavier than ^{90}Zr）
  - TSL is only H1 in H2O, H2 in D2O, H1 in polyethylene, Be9 in Beryllium metal, Be9 and O16 in BeO and Cnat in graphite (C12 is set to Cnat) (There were various issues with the TSL processing, so please refer to the JAEA report to be released in future for details).

- Photon processing condition

(2) AMPX_MG_J50

JENDL-5 u20 data, TSL sub-library and photo-atomic sub-library were processed. All nuclei except for m2 nuclei were processed because SCALE cannot treat m2nuclei.

- Processing code：AMPX-6 in SCALE6.3.1 (modified AMPX-6 in SCALE6.2.4 for TSL data)
- Auxiliary Code for input data creation：ExSite
- Neutron processing condition
  - Group structure : neutron 252 group, neutron 252 group + photon 47 group, neutron 200 group + photon 47 group, neutron 56 group, neutron 48 group + photon 20 group, neutron 28 group + photon 19 group
  - Weighting function : Maxwellian-1/E-fission-1/E spectrum(neutron), 1/E spectrum (photon)
  - Legendre expansion order : P_7 (matched with VITAMIN-B6)
  - Background cross section（same as AMPX CE libraries in SCALE）
    - ✓ 10^8, 10^6, 10^5, 10^4, 10^3, 10^2, 10, 1, 10^{-6}（for nuclei which contain ^{90}Y and are lighter than ^{90}Y）
    - ✓ 10^8, 10^6, 10^5, $2x10^4$, $1x10^4$, $5x10^3$, $2x10^3$, 10^3, 6400, 320, 160, 120, 80, 60, 40, 30, 20, 15, 10, 8, 6, 4, 2, 1, 0.01, 10^{-6}（for nuclei which contain ^{90}Zr and are heavier than ^{90}Zr）
  - Temperature : 293, 565, 600, 900, 1200, 2400 K（all temperatures in TSL data for TSL data [For H1 in H2O with 56 temperatures, temperatures of 270.0, 290.0, 293.6, 296.0, 300.0, 320.0, 340.0, 360.0, 380.0, 400.0, 420.0, 440.0, 460.0, 480.0, 500.0, 520.0, 540.0, 560.0, 580.0, 600.0, 620.0, 640.0, 660.0, 680.0, 700.0, 720.0, 740.0, 760.0, 780.0, 800.0 were processed because AMPX-6 can process temperatures less than 36.]）
  - Maximum energy of thermal neutrons : 5 eV for neutron 252 group, neutron 252 group + photon 47 group, neutron 56 group and neutron 28 group + photon 19 group, 5.0435 eV for neutron 200 group + photon 47 group, 1.8554 eV for neutron 48 group + photon 20 group (SCALE calculations cause errors unless Maximum energy of thermal neutrons is not less than 5.05 eV.)
  - TSL is only H1 in H2O, H2 in D2O, H1 in polyethylene, Be9 in Beryllium metal, Be9 and O16 in BeO and Cnat in graphite (C12 is set to Cnat) (There were various issues with the TSL processing, so please refer to the JAEA report to be released in future for details).
- Photon processing condition
  - Nothing in particular

(3) AMPX_COV_J50

Nuclei with covariance data in JENDL-5u20 data（H1, B10, B11, C13, N14, N15, O16, Na23, Ti48, Cr52, Cr53, Mn55, Fe56, Fe58, Co59, Ni59, Ni60, Zr90, Pb204, Pb206-208, Bi209, Ac225-227, Th227-234, Pa229-233, U230-238, Np234-239, Pu236-242, Pu244, Pu246, Am240-244, Am242m1, Am244m1, Cm240-250, Bk245-250, Cf246, Cf248-254, Es251-255, Es254m1, Fm255） were only processed. Note that H2, Be9 and C12 in JENDL-5 have no covariance data.

- Processing code：AMPX-6 in SCALE6.3.1 (modified AMPX-6 in SCALE6.2.4 for TSL data)
- Auxiliary Code for input data creation：ExSite
- Processing condition
  - Group structure : neutron 252 group, neutron 252 group + photon 47 group, neutron 200 group + photon 47 group, neutron 56 group, neutron 48 group + photon 20 group
  - Weighting function : Maxwellian-1/E-fission-1/E spectrum(neutron), 1/E spectrum (photon)
- AMPX COV files of TSL were set to be the same as those of free gas, matched with AMPX COV libraries in SCALE (HinH2O and HinCH2).

(4) Note

Several files in JENDL-5 were modified for AMPX-6. These files are stored in Modified_J50 directory of AMPX-J50.

4. How to use AMPX-J50

(1) AMPX_CE_J50

- To copy cekenolib_j5 directory in AMPX_CE_J50 to data directory of scale.
- For SCALE6.2, to copy all files in to_scale6.2.data of AMPX_CE_J50 to the above cekenolib_j5 directory and to copy ce_v5.0_jendl.xml in scale6.2 directory to data directory of scale.
- For SCALE6.3, to copy all files in to_scale6.3.data of AMPX_CE_J50 to the above cekenolib_j5 directory and to copy ce_v5.0_jendl.xml in scale6.3 directory to data directory of scale.
- If you adopt “ce_v5.0_jendl” in a SCALE input file, you can use AMPX_CE_J50.
- You should do the below in data directory of scale because MAVRIC etc. in SCALE use ce_v5.0_jend.xml or ce_v5_endf.xml, not ce_v5.0_jendl.xml.

  ln -s ce_v5.0_jendl.xml ce_v5.0_jend.xml

  ln -s ce_v5.0_jendl.xml ce_v5_endf.xml

(2) AMPX_MG_J50

- For SCALE6.2, to copy all files in scale6.2 of AMPX_MG_J50 to data directory of scale. If you adopt “n252v5.0” etc., which is a name by removing “scale.rev12.” from an AMPX MG library name, in a SCALE input file, you can use the AMPX MG library.
- For SCALE6.3, to copy all files in scale6.3 of AMPX_MG_J50 to data directory of scale. If you adopt “n252v5.0” etc., which is a name by removing “scale.rev13.” from an AMPX MG library name, in a SCALE input file, you can use the AMPX MG library.
- AMPX_CE_J50 must be installed because SCALE also use AMPX CE libraries in SCALE calculations with AMPX MG libraries.

(3) AMPX_COV_J50

- To copy all files in AMPX_COV_J50 to data directory of scale. If you adopt “252groupcov5.0” etc., which is a name by removing “scale.rev08.” from an AMPX COV library name, in a SCALE input file, you can use the AMPX COV library.

5. Known problem for AMPX-J50

When using xn200g47v5 with SCALE 6.2, a double free or corruption error may occur and the program may terminate abnormally. This error also occurred with xn200g47v7.1, which comes with SCALE. Probably it is due to not xn200g47v5 but a bug in SCALE 6.2. It has been confirmed that this error does not occur when using xn200g47v5 with SCALE 6.3. It is recommended to use SCALE 6.3.

6. Download site of AMPX -J50

https://rpg.jaea.go.jp/main/en/AMPX-J50/

7. References of AMPX -J50

(1) C. Konno, “Production of JENDL-5 AMPX Libraries,” JAEA-Data/Code 2025-019 (in Japanese) (https://jopss.jaea.go.jp/pdfdata/JAEA-Data-Code-2025-019.pdf)

The reference of JENDL-5 is

(2) O. Iwamoto, et al., “Japanese Evaluated Nuclear Data Library version 5: JENDL-5,” J. Nucl. Sci. and Technol., 60 pp.1-60 (2022).

8. Contact

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9. Appendix 1 Example of input to produce AMP_CE_J50

Input data for U235 are shown below as an example of input data to produce AMP_CE_J50.

```
=shell
ln -sf ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
end
=polident
-1$$ 0
0$$ 31 32 e 1$$ 1 t
2$$ 9228 11 2 6 e
4** a5 0.001 e
6$$    a3 0 15000 t
end
=shell
cp ft31f001 point_n_092-U-235_u20
cp ft32f001 point_n_092-U-235_u20_ft32
end
=tgel
input=31 output=33 total
end
=broaden
t= 0.0    293.0    565.0    600.0    900.0    1200.0    2400.0
logpt=33 logdp=34
end
=tgel
input=34 output=35 total
end
=shell
cp ft35f001 broaden_n_092-U-235_u20
end
=purm
logp=51 bond=61
nuc
nbatch=30 iter=2000 mat=9228
temp=293.0 565.0    600.0    900.0    1200.0    2400.0
nband=20
sig0=1.0e8 1000000.0 100000.0 20000.0 10000.0 5000.0 2000.0 1000.0
          640.0 320.0 160.0 120.0 80.0 60.0 40.0 30.0 20.0 15.0 10.0
          8.0 6.0 4.0 2.0 1.0 0.01 1.0e-6
ndfb=11 equi
```

```
enuc
end
=shell
cp ft51f001 ptable_pre_n_092-U-235_u20
cp ft61f001 ptable_pre_n_092-U-235_u20_bond
cp ptable_pre_n_092-U-235_u20 ft21f001
end
=purm_up
in=21 out=22 ndfb=11 matf=9228    matp=92235
end
=shell
cp ft22f001 ptable_n_092-U-235_u20
end
=shell
ln -fs ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
ln -fs point_n_092-U-235_u20_ft32 ft32f001
ln -fs broaden_n_092-U-235_u20    ft29f001
end
=pickeze
0$$ 29 34
1$$ 0 0 4 6 0 e t
4$$ -1001 -1002 -1018 -1102
5** 293.0    565.0    600.0    900.0    1200.0    2400.0
t
end
=shell
ls -altr ft*
end
=pickeze
-1$$ 5000000
0$$ 29 51
1$$ 0 0 1 1 0 e t
4$$ 2
5** 0.0
t
end
=splicer
   in1=51 out=52 el=-1 eh=250.0 option=-1
end
```

```
=shell
cp ft52f001 ${RTNDIR}/../result/dbrc/92235.dbrc
end
=tgel
input=34 output=37
total capture inelastic absorption
end
=y12
eps=1e-3 ndf=11 kin=41 mat=9228 id=92235
zap=1    awp=1.0
end
=y12
eps=1e-3 ndf=11 kin=42 mat=9228 id=92235
zap=0    awp=0.0
end
=kinzest
0$$ 43 2 e t
2$$ 41 0 e t
2$$ 42 0 e t
end
=jamaican
mon=43 out=45 format=native
end
=shell
ln -fs ptable_n_092-U-235_u20      ft46f001
end
=platinum
identifier=05009228 source=02 out=60
title=jendl-5 u20 n_092-U-235_u20
n1d=37             id=9228
info=32           id=9228
n2d_fast=45    id=92235
sigp=11.5860004
vers=50
ptable=46        id=92235
icversion=1.0
filever=1.0
ampxver=6.0
ampxdate=01/16/2024
```

```
scalever=6.2.4
scaledate=future
fileid=922350605000
filedate=05/09/2024
fixnegatives=yes
end
=shell
cp ft60f001 ${RTNDIR}/../result/92235060500_0
cp ft61f001 ${RTNDIR}/../result/92235060500_293.0
cp ft62f001 ${RTNDIR}/../result/92235060500_565.0
cp ft63f001 ${RTNDIR}/../result/92235060500_600.0
cp ft64f001 ${RTNDIR}/../result/92235060500_900.0
cp ft65f001 ${RTNDIR}/../result/92235060500_1200.0
cp ft66f001 ${RTNDIR}/../result/92235060500_2400.0
end
```

10. Appendix 2 Example of input to produce AMP_MG_J50

Input data for U235 are shown below as an example of input data to produce AMP_MG_J50.

```
=shell
ln -sf ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
end
=polident
-1$$ 0
0$$ 31 32 e 1$$ 1 t
2$$ 9228 11 2 6 e
4** a5 0.001 e
6$$    a3 0 15000 t
end
=tgel
input=31 output=32 total
end
=broaden
t= 0.0 293.0 565.0 600.0 900.0 1200.0 2400.0
logpt=32 logdp=33
end
=tgel
input=33 output=34 total
end
=shell
```

```
cp ft34f001 broadenData_n_092-U-235_u20
end
=pickeze
-1$$ 3000000
0$$ 34 35
1$$ 1 1s 4 6    e t
2$$ 9228
4$$ -1001 -1002 -1018 -1102
5** 293.0 565.0 600.0 900.0 1200.0 2400.0 t
end
=jergens
-1$$ a11 3000000 e
0$$ 0 30 18 1$$ 1    e
2** 1.0e-5 2.0e7 e t
3$$ 2099 0 4
4** 300.0 4.8356 1273000.0 820850.0 e
t
end
=y12
eps=1e-3 ndf=11 kin=32 mat=9228 id=9228
zap=1 awp=1.0    for=leg nl=7
end
=x10
type=neutron igm=200 ipm=47
iftg=165 id=9228
master=21 logwt=30 matwt=99 mtwt=2099 nl=7
kin=32 tab1=35 pot=1.15860E+01
title=n_092-U-235_u20 9228
end
=shell
cp ft21f001 neutronMaster_neutron_n_092-U-235_u20
end
=shell
cp ft21f001 ft10f001
end
=y12
mat=92235 kin=42 point=45 id=92235 free
awr=233.024994 pot=1.15860E+01
nl=7 emax=5.0435 temp=293.0 565.0 600.0 900.0 1200.0 2400.0
```

```
for=cos
end
=pickeze
0$$  34  41  e
1$$  1 1s  1  6 e t
2$$ 9228 4$$ 2
5** 293.0 565.0 600.0 900.0 1200.0 2400.0 t
end
=zest
0$$  46  e
1$$  1  e t
2$$  41  1  e t
3$$  9228  e
4$$  2  e
6$$  92235  e
7$$  1007  e t
end
=x10
type=neutron
tab1=46 logwt=30 mtwt=2099 matwt=99 master=41 kin=42
iftg=165 igm=200 id=92235
nl=7
upscatter
end
=shell
cp ft41f001 neutronMaster_freegas_n_092-U-235_u20
end
=filter
in=41 out=44 1dn mt=1007 1008
end
=simonize
Identifier=9228 master=21
title=n_092-U-235_u20 9228
fastid=9228 thermid=0 gamid=0 yieldid=0
neutron=10 id19=9228
2dn=41 id19=92235
1dn=44 id19=92235
end
=shell
```

```
cp ft21f001 ft10f001
end
=y12
eps=1e-3 ndf=11 kin=45 mat=9228 id=9228
zap=0 awp=0.0        for=leg nl=7
end
=x10
type=yield igm=200 ipm=47
iftg=165 id=9228
master=41 logwt=30 matwt=99 mtwt=2099 nl=7
kin=45 tab1=35 pot=1.15860E+01
title=n_092-U-235_u20 9228
end
=shell
cp ft41f001 neutronMaster_yield_n_092-U-235_u20
end
=simonize
Identifier=9228 master=21
title=n_092-U-235_u20 9228
fastid=9228 thermid=0 gamid=0 yieldid=9228
neutron=10 id19=9228
yield=41 id19=9228
end
=rade
1$$ 21 e t
end
=shell
cp ft21f001 neutronMaster_n_092-U-235_u20
end
=shell
ln -sf ${RTNDIR}/../endf/j5pa.dat ft11f001
end
=jergens
-1$$ a11 3000000 e
0$$ 0 30 18 1$$ 1 e
2** 10000.0 2.0e7 e t
3$$ 1599 0 11 e
4** 300.0 4.8356 1273000.0 820850.0 e
t
```

```
end
=y12
ndf=11 kin=32    point=31 mat=9200
awp=0.0 zap=0    nl=7 for=leg
end
=x10
type=gamma
ipm=47 nl=7
master=1      logwt=30 matwt=99 mtwt=1599    id=9200
tab1=31 kin=32
title=n_092-U-235_u20 9228
end
=shell
cp ft01f001 gammaMaster_n_092-U-235_u20
end
=rade
1$$ 1 e t
end
=shell
ln -sf neutronMaster_n_092-U-235_u20 ft19f001
ln -sf ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
ln -sf    broadenData_n_092-U-235_u20 ft31f001
end
=jergens
-1$$ a11 3000000 e
0$$ 0 30 18 1$$ 1
2** 1.0e-5 2.0e7 e t
3$$ 2099 0 4
4** 300.0 4.8356 1273000.0 820850.0 e
  t
end
=purm
logp=51 bond=61
nuc
nbatch=300 iter=600 mat=9228
temp=293.0 565.0 600.0 900.0 1200.0 2400.0
nband=20
sig0=1.0e8 1000000.0 100000.0 20000.0 10000.0 5000.0 2000.0 1000.0
          640.0 320.0 160.0 120.0 80.0 60.0 40.0 30.0 20.0 15.0 10.0
```

```
          8.0 6.0 4.0 2.0 1.0 0.01 1.0e-6
ndfb=11 equi
enuc
end
=purm_up
in=51 out=22 ndfb=11 matf=9228    matp=92235
end
=tomato
0$$    22    36    e
1$$    1    e t
2$$    92235    e
3$$    9228    e t
end
=tgel
input=31 output=32 total
end
=shell
cp ft32f001 ft33f001
end
=zest
0$$    34    e
1$$    2    e t
2$$    33    1    e t
4$$    2    e
7$$    1007    e t
2$$    32    e t
end
=y12
eps=1e-3 ndf=11 kin=41 mat=9228 id=9228
zap=1 awp=1.0      for=leg
end
=fabulous_urr
in=19 out=2
kin=41
idlib=9228 idpoint=9228
resol=34 urrprob=36
flux=30 matwt=99 mtwt=2099
sig0=[1.0e8 1000000.0 100000.0 20000.0 10000.0 5000.0 2000.0 1000.0
          640.0 320.0 160.0 120.0 80.0 60.0 40.0 30.0 20.0 15.0 10.0
```

```
          8.0 6.0 4.0 2.0 1.0 0.01 1.0e-6]
temps=[ 293.0 565.0 600.0 900.0 1200.0 2400.0]
end
=shell
cp ft02f001 bondMaster_n_092-U-235_u20
end
=shell
ln -sf   neutronMaster_neutron_n_092-U-235_u20 ft01f001
ln -sf   neutronMaster_yield_n_092-U-235_u20 ft09f001
ln -sf   neutronMaster_freegas_n_092-U-235_u20 ft04f001
ln -sf   gammaMaster_n_092-U-235_u20 ft55f001
ln -sf bondMaster_n_092-U-235_u20 ft03f001
cp ft03f001 ft33f001
end
=filter
in=4 out=44 1dn mt=1007 1008
end
=simonize
Identifier=92235 master=20
title= jendl-5 u20 n_092-U-235_u20 9228
fastid=5009228 za=922350 source=6 yieldid=5009228 gamid=5009200
neutron=1 id19=9228
2dn=4 id19=92235
1dn=44 id19=92235
yield=9 id19=9228
bondarenko=3 id19=9228
1dn=33 id19=9228
gamma=55 id19=9200
end
=ajax
0$$ 21 e 1$$ 1 t
2$$ 20 0 e t
n_092-U-235_u20 9228
end
=rade
1$$ 21 e t
end
=shell
cp ft21f001 ${RTNDIR}/../result/master_u235
```

```
end
```

11. Appendix 3 Example of input to produce AMP_COV_J50

Input data for U2385 are shown below as an example of input data to produce AMP_COV_J50.

```
=shell
ln -sf ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
end
=polident
-1$$ 0
0$$ 31 32 e 1$$ 1 t
2$$ 9228 11 2 6 e
4** a5 0.001 e
6$$    a3 0 15000 t
end
=shell
cp ft31f001 ${RTNDIR}/../result.252g/point_u235
cp ft32f001 ${RTNDIR}/../result.252g/point_u235_ft32
end
=tgel
input=31 output=33 total
end
=broaden
t= 0.0    293.0
logpt=33 logdp=34
end
=tgel
input=34 output=35 total
end
=shell
cp ft35f001 ${RTNDIR}/../result.252g/broaden_u235
end
=shell
ln -fs ${RTNDIR}/../endf/n_092-U-235_u20.dat ft11f001
ln -fs ${RTNDIR}/../result.252g/broaden_u235 ft32f001
end
=jergens
-1$$ a11 3000000 e
0$$ 0 12 18 1$$ 1    e
2** 1.0E-5 2.0E7 e t
```

```
3$$ 2099 0 4
4** 300.0 4.8356 1273000.0 820800.0 e
t
end
=shell
mv ft32f001 ft31f001
end
=pickeze
-1$$ 3000000
0$$ 31 32
1$$ 1 0 0 1 0 e t
2$$ 9228
5** 293 t
end
=shell
mv ft32f001 ft31f001
end
=tgel
input=31 output=32 total capture absorption inelastic nonelastic
end
=y12
eps=1e-3 ndf=11 kin=35 mat=9228 id=9228
zap=1 awp=1.0    for=leg nl=1
end
=x10
type=neutron igm=252
iftg=0 id=9228
master=21 logwt=12 matwt=99 mtwt=2099 nl=1
kin=35 tab1=32 pot=0.0
title=Library for chi
end
=puff_iv
  point=32 master=21
out=1      uncol=16
mat=9228
ngrp=252
endf=11
flux=12 matwt=99 mtwt=2099
end
```

```
=shell
cp ft01f001 ${RTNDIR}/../result.252g/coverx_u235
cp ft16f001 ${RTNDIR}/../result.252g/coverx_u235_ft16
end
```