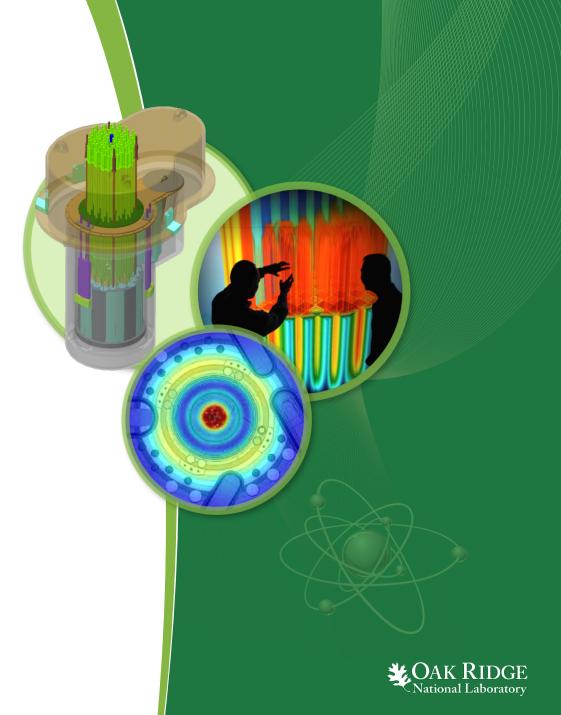
Introduction to AMPX

- D. Wiarda
- C. Cihangir
- M. L. Williams
- A. Holcomb



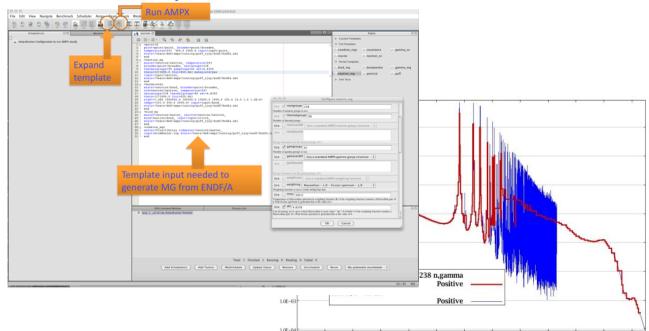


- Introduction to AMPX
- Content of ENDF files
- Brief overview of AMPX modules
- Overview of ExSite



AMPX processing capabilities vital for SCALE

- SCALE relies upon AMPX for continuous energy (CE), multigroup (MG), and covariance data libraries
 - MG and CE cross section data
 - Cross section uncertainty data to support sensitivity/uncertainty (S/U) methods in SCALE
- AMPX processes ENDF/B-formatted nuclear data evaluations to produce cross section libraries



1.0E-05

1.0E=04 1.0E=03 1.0E=02

1 OF=01

1.0E05

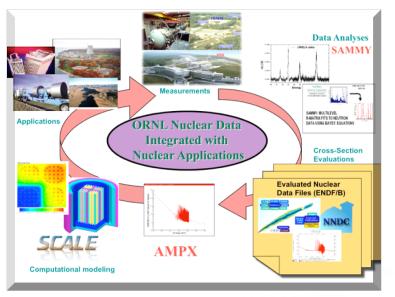
1.0E04

1.0E03

Energy (eV)

1.0E06

AMPX Graphical User Interface



Data libraries released with SCALE 6.2:

- CE ENDF/B-VII.0 and ENDF/B-VII.1
- 238-group ENDF/B-VII.0
- 252-group ENDF/B-VII.1
- 200n47g ENDF/B-VII.0 and B-VII.1
- 27n19g ENDF/B-VII.0 and B-VII.1
- Recommended covariance data library
 - Evaluated and approximate covariance data
 - Covariance data for all ENDF/B nuclides (neutron)



AMPX nuclear data processing history

- AMPX processes data in evaluated nuclear data files (ENDFs) to provide CE, MG, Covariance, and ORIGEN Data Libraries for SCALE
- AMPX developed and maintained at ORNL for over 40 years
- 1990: ENDF Formats changed significantly with ENDF/B-VI release in 1990—AMPX could no longer process latest ENDF files for SCALE
- 1995—2002: Extensive AMPX upgrade to update AMPX to process latest ENDF/B data
- 2008-2012: AMPX upgrades for generation of continuous-energy shielding libraries
- 2002—2012: AMPX routinely processes latest ENDF/B Formats (e.g., ENDF/B-VI & –VII.0 data libraries in SCALE)
- 2012 Present: Modernization effort to implement SQA and modern software design/development practices
- Last formal release as stand-alone in 1977
- Current version available with SCALE 6.2

Version	Year	Time between Releases
ENDF/B-I	1968	-
ENDF/B-II	1970	2 years
ENDF/B-III	1972	2 years
ENDF/B-IV	1974	2 years
ENDF/B-V	1978	4 years
ENDF/B-VI	1990	12 years
ENDF/B-VII	2006	16 years
ENDF/B-VII.1	Dec 2011	5 years
ENDF/B-VII.2 or ENDF/B-VIII	TBD	



ENDF structure

File 1: General information

File 2: Resonance parameters

File 3: Point-wise reaction cross sections

Files 4 and 5: Kinematic data for incident neutron.

File 6: Kinematic data. Angular and exit energy correlated

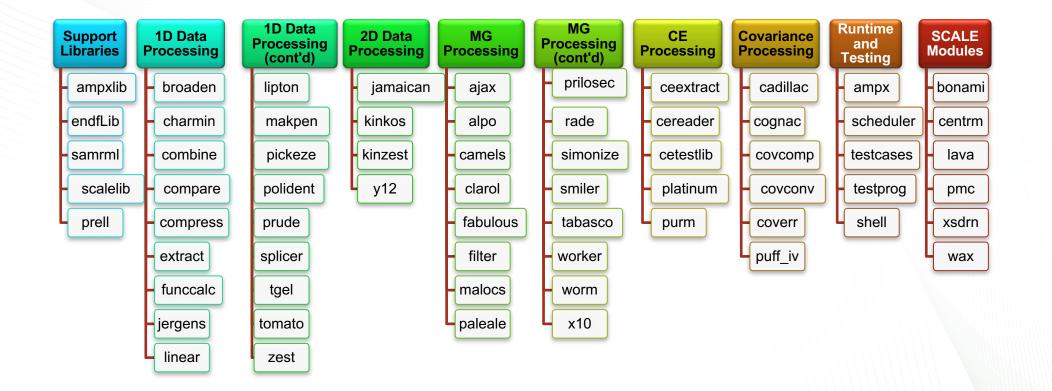
Files 12, 13, 14 and 15: Gamma yield kinematics

 Other information exists in ENDF containing covariance and decay information

 The information listed here is used to generated MG and CE libraries



AMPX modular code system



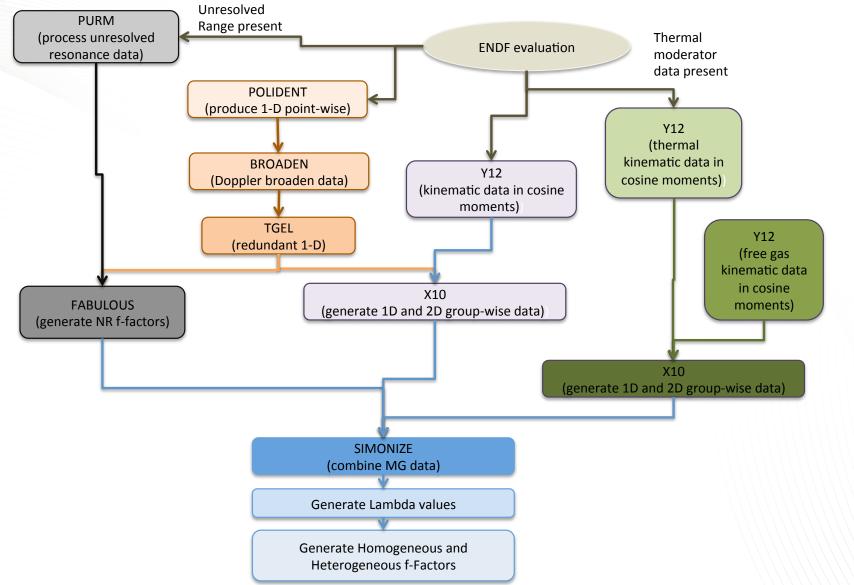


The most important AMPX modules

- Polident:
 - Reads the point-wise data from the ENDF library
 - Reconstruct point-wise cross section data from resonance parameters
- broaden: Doppler broadens the point-wise data
- y12: reads the kinematic data from the ENDF file
- x10: groups average point-wise data and kinematic data
- jamaican and platinum: combine point-wise data and kinematic data into continuous energy libraries
- puff_iv: processes covariance data

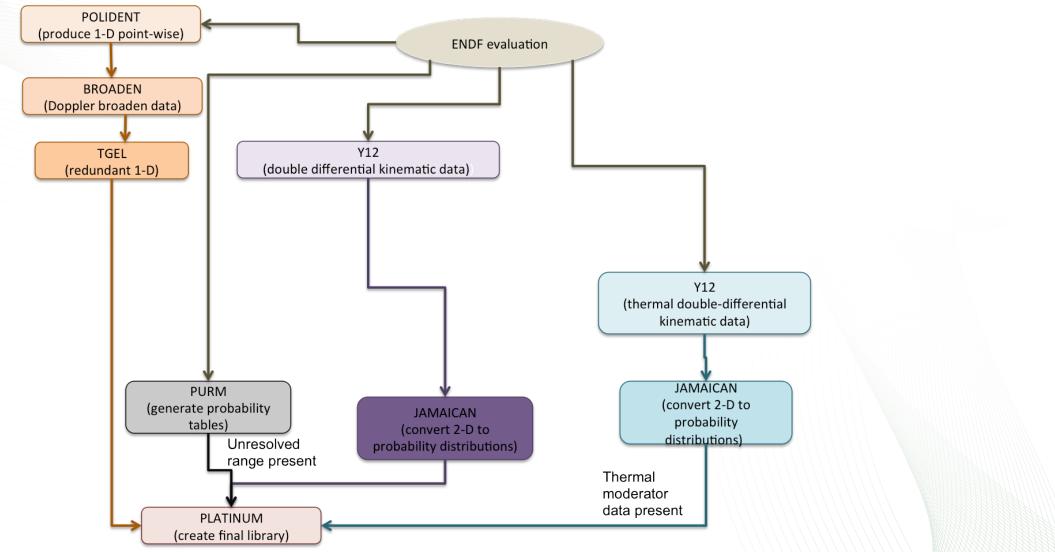


Processing MG libraries





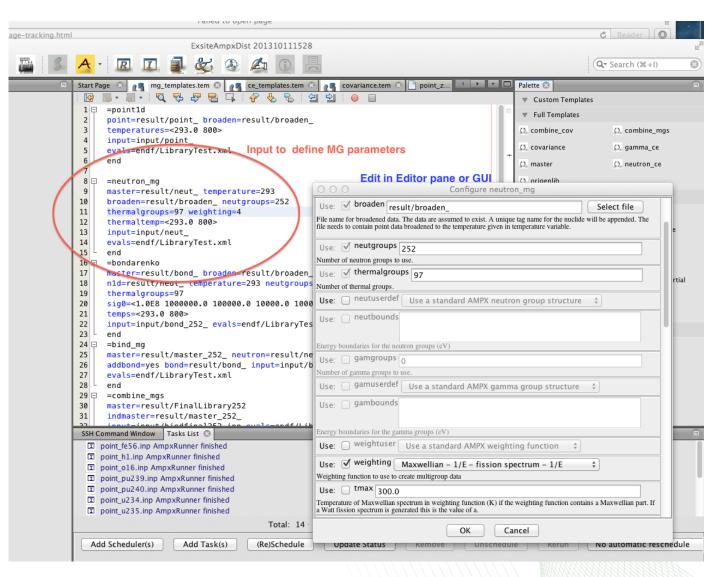
Processing CE libraries





Processing libraries

- Edit templates with relevant parameters
- Expand to generate input files for AMPX
- Available for MG, CE, and covariance library production





Processing CE libraries (continued)

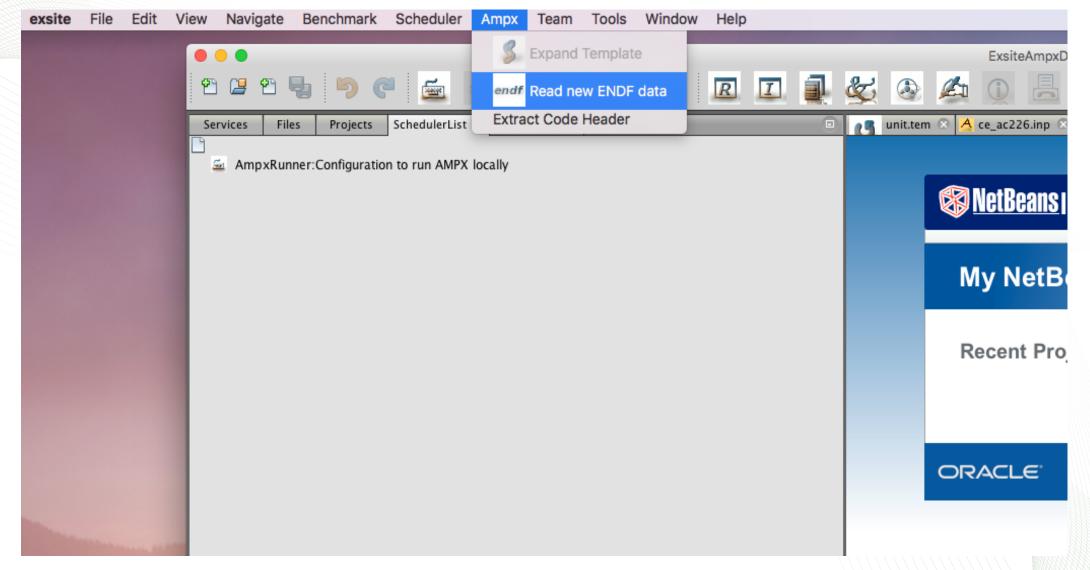
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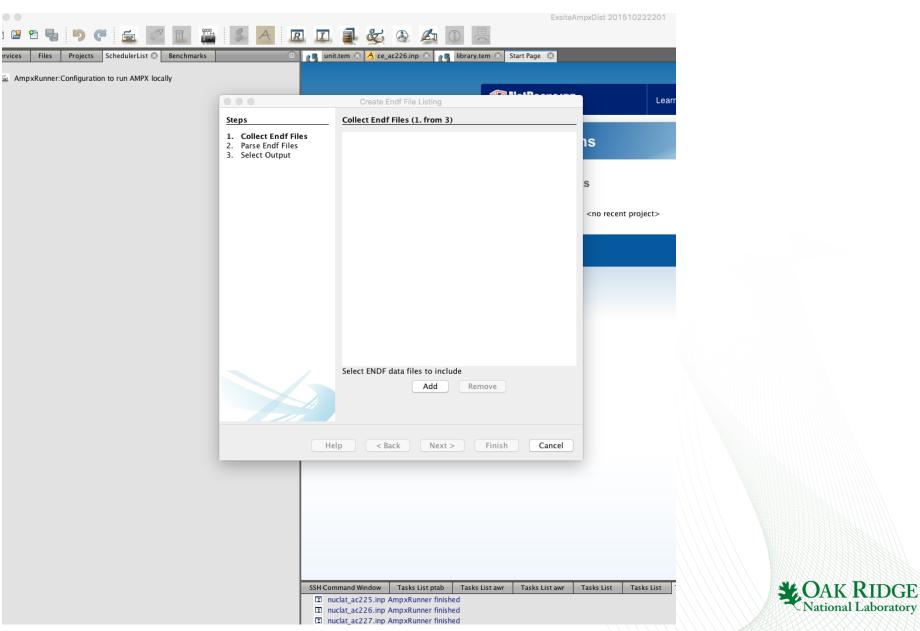
Generating a SCALE cross section library

- Example files template and input files are located in the Ampx/examples directory in SCALE installation
- ExSite is located in Ampx/exsite/bin/exsite in SCALE installation
- AMPX only runs on Linux and Darwin
- If needed ExSite can be used on a Windows platform to prepare the input files provided, then the absolute pathname option is used in the template files





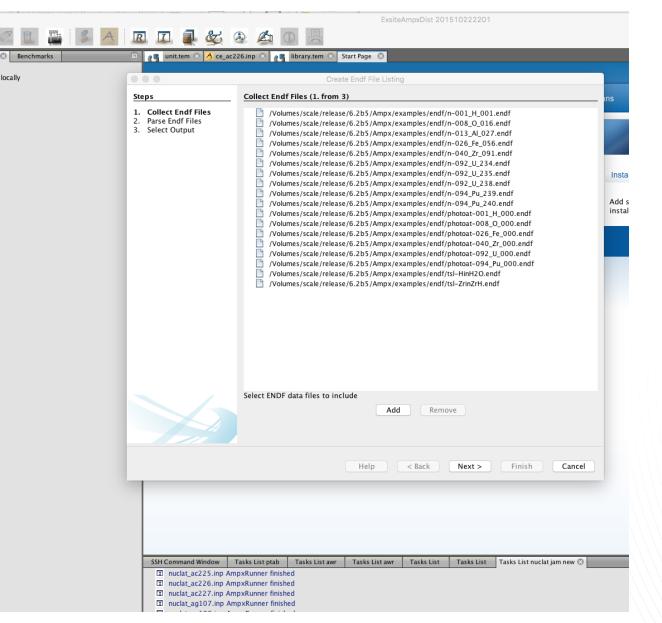




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		08_O_016.endf	Friday, October 2, 2015 10:32 AM		
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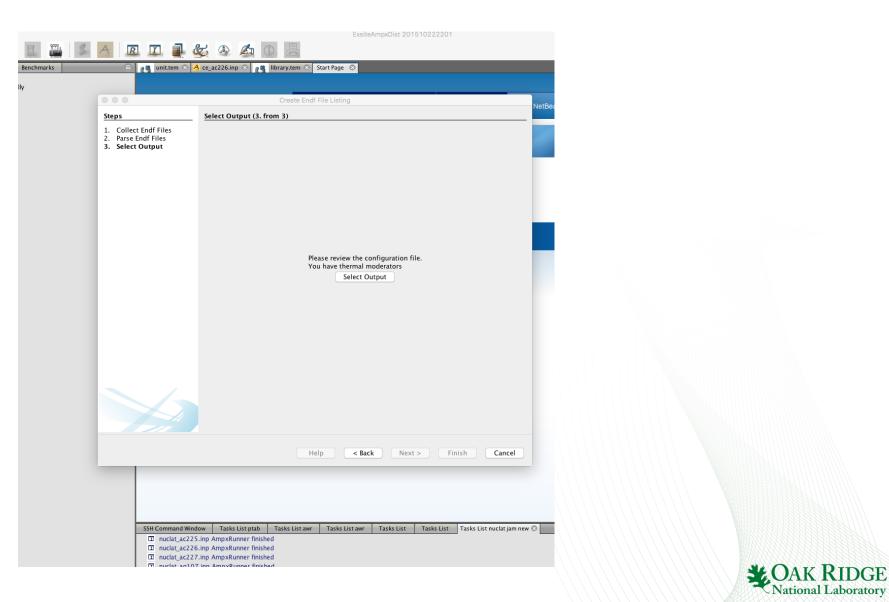


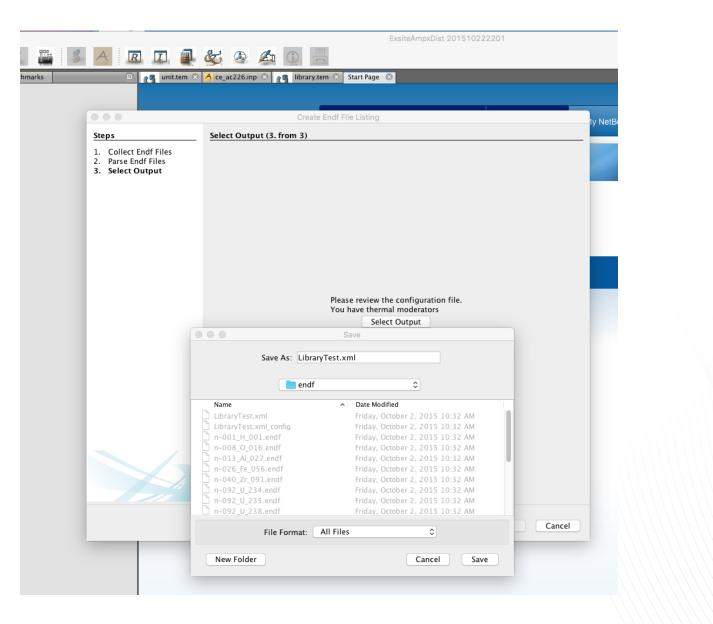


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		Read Endf information Parsing: /Volumes/scale/release/6.2b5/Ampx/examples/endf/tsI-ZrinZrH.endf	
		Help < Back Next > Finish Cancel	

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Editing the generated configuration file

- Unfortunately, the configuration file may need some hand editing for the thermal moderators
- ENDF does not always use the same material number as stated in the file
- The ZA given for the thermal moderator is not always correct

```
<ConfigFile>
     <!-- metastable nuclei for which the scale id is different from the real za value -->
     <metastable>
     </metastable>
     <!-- nuclei for which the scale id is different from the real za value -->
     <specialNuclei>
        <nuclei endf="125" realza="1001" scaleza="8001001" name="hfreegas" /> <!-- for h1 SCALE uses ID=8001001 -->
        <nuclei endf="128" realza="1002" scaleza="8001002" name="dfreegas" />
     </specialNuclei>
     <!-- thermal nuclei -->
     <thermal>
        <nuclei endf="1" realza="101" > <!-- thermal evaluation h_h2o -->
              <fastMat endf="125" scaleza="1001" name="h-1" /> <!-- bound with fast evaluation h1 uses SCALE ID=1001 -->
        </nuclei>
        <nuclei endf="58" realza="158" > <!-- thermal evaluation zr zrh -->
              <fastMat endf="4028" scaleza="1040091" name="zr91-zr5h8" /> <!-- bound with fast evaluation zr91 uses SCALE ID=1040091 -->
        </nuclei>
     </thermal>
     </ConfigEile>
20 Introduction to AMPX
```

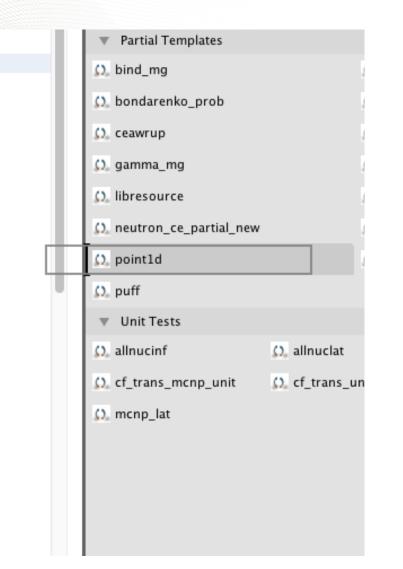


Editing the generated configuration file (continued)

es Files Projects SchedulerList 🗵 Benchmarks	💿 👩 unit.tem 🛛 🔥 ce_ac226.inp 🏹 👔 library.tem 🌣 Start Page 🗵 🗋 LibraryTest.xml_config 🎗 👩 mg_templates.tem 📀	A D Palette 🛇
	· · · · · · · · · · · · · · · · · · ·	Custom Templates
AmpxRunner:Configuration to run AMPX locally		() test
	2 'Generate 1d broadened cross section data. 3 'Desired temperatures are given in temperatures	Full Templates
	4	+ $\Omega_{\rm c}$ combine_cov $\Omega_{\rm c}$ combine_mgs $\Omega_{\rm c}$ covariance $\Omega_{\rm c}$ gamma_ce
	5 = =pointid	
	<pre>6 point=result/point_ broaden=result/broaden_ 7 temperatures=<293.0 800></pre>	Ω_{-} master Ω_{-} neutron_ce Ω_{-} origenlib
	8 input=input/point_	Partial Templates
	9 evals=endf/LibraryTest.xml 10 end	Ω bind_mg Ω bondarenko
	11	Ω_bondarenko_prob Ω_ce_library_table
	12 ' 13 ' Generate a MG library for incident neutrons containing	Ω ceawrup Ω ffactors
	13 Generate a MG Llorary for incident neutrons containing 14 I d and 2d neutron data	Ω. gamma_mg Ω. libraryhtml
	15	
	16 ⊟ =neutron_mg 17 master=result/neut_ temperature=293	Ω libresource Ω neutron_ce_partial
	18 broaden=result/broaden_neutgroups=252	Ω_neutron_ce_partial_new Ω_neutron_mg
	19 thermalgroups=97 weighting=4	Ω point1d Ω ptable
	20 thermaltemp=<293.0 800> 21 input=input/neut_	D. puff
	22 evals=endf/LibraryTest.xml	W Unit Tests
	23 ^L end 24	$\Omega_{\rm c}$ all nuclei $\Omega_{\rm c}$ cf_leak_unit
	25	
	26 ' Generate NR bondarenko data. A neutron library generated	Ω_{c} cf_trans_mcnp_unit Ω_{c} cf_trans_unit Ω_{c} mcnp_inf
	 27 ' by neutron_mg is needed. The desired background values are 28 ' given in sig0 and the desired temperature are in 	Ω, mcnp_lat
	29 ' temps.	
	30	
	31 ' Please note, that AMPX can also generate NR f-factos using data 32 ' from the probablity table in the URR region. Use	
	33 ' template to generate probability tables	
	34 ' (see ce_templates.tem for an example) and the use	
	35 ' template bondarenko_urr 36 '	
	37 ⊡ =bondarenko	
	38 master=result/bond_ broaden=result/broaden_	
	<pre>39 n1d=result/neut_ temperature=293 neutgroups=252 40 thermalgroups=97</pre>	
	41 sig=<1.0E 1000000.0 100000.0 10000.0 1000.0 10.0 1.0 1	
	42 temps=<293.0 800>	
	43 input=input/bond_252_ evals=endf/LibraryTest.xml 44 end	
	44 - end 45	
	46	
	 47 ' Combine the libraries generated by neutron_mg and bondarenko 48 ' into one MG library. Also sets a title and parameters 	
	49 ' needed if using the CENTRM option in SCALE.	
	50	
	51 - Please note that you must use oldza=ves if you intend to use SSH Command Window Tasks List ptab Tasks List awr Tasks List wr Tasks List Tasks List Tasks List Tasks List nuclat jam new 🕄	
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	I nuclat_ac226.inp AmpxRunner finished	
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	Total. 1125 Thisted. 705 Kunning. 22 Felding	g
	Add Scheduler(s) Add Task(s) (Re)Schedule Update Status Remove	Unschedule Rerun No automatic reschedule



Editing the generated configuration file (continued)



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	15	unit.tem 🛛 🛕 ce_ac226.inp 🛇 💦 library.tem 🏵 Start Page 🗭 🗋 LibraryTest.x
		III - IIII - III - IIII - III
	1	
	2	' Generate 1d broadened cross section data.
	3	' Desired temperatures are given in temperatures
	4	
	5	
	6	<pre>point=result/point_ broaden=result/broaden_</pre>
	7	temperatures=<293.0p800€1d
	8	<pre>input=input/pdint</pre>
	9	evals=endf/LibraryTest.xml
	10	L end
	11 12	
	12	L Congrato a MC library for incident neutrons containing
	14	' Generate a MG library for incident neutrons containing ' 1d and 2d neutron data
	14	
	16	🛱 =neutron_mg
	17	master=result/neut_ temperature=293
	18	broaden=result/broaden_ neutgroups=252
	19	thermalgroups=97 weighting=4
	20	thermaltemp=<293.0 800>
	21	<pre>input=input/neut_</pre>
	22	evals=endf/LibraryTest.xml
	23	end
		CAK RIDGE National Laboratory



Editing the generated configuration file (continued)

	Configure point1d	
Use:	point result/point_	Select file
Output f	ile name for point data. A unique tag name for the nuclide will be apper	nded.
Use:	eps 0.001	
Precisio	n to which to create the grid in the resolved resonance range.	
Use:	/ broaden result/broaden_	Select file
Output	ile name for broadened data. A unique tag name for the nuclide will be	appended.
Use:	/ temperatures 293.0 800.0	
List of te	mperatures to broaden the data to (K).	
	Ts to broaden. By default 1 (total), 2 (elastic), 18,19,20,21 and 38 (fiss	sion) and 102
) are broadened The mone	
	ditional reaction values to be broadened	
	input input/point_	Select file
	f the AMPX input files to create. Tag name will be appended	
Use:	evals endf/LibraryTest.xml	Select file
Pick End	If xml summary listing or an endf file	
Use: (Should f	absolute iles names in the input file appear as typed	
	OK Cancel	



MG library templates

- For multigroup libraries, the following templates are needed
 - point1d
 - neutron_mg
 - bondarenko_prob or bondarenko
 - bind_mg
 - combine_mgs
- If there are no thermal moderators, Template Master combines all the above steps into one template
- Thermal moderators are more complicated, as thermal evaluations from one ENDF file must be combined with one or more fast evaluations from a different ENDF file



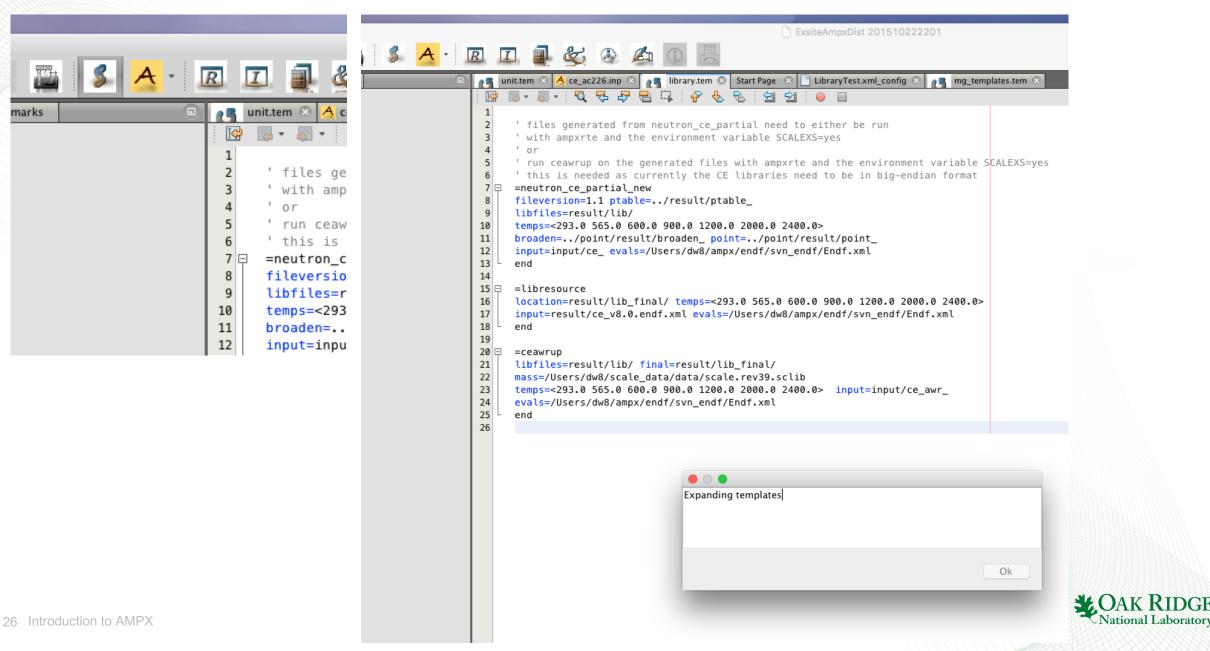
MG library templates (continued)

```
' Generate a MG library for incident neutrons containing
' 1d and 2d neutron data
```

```
=neutron_mg
master=result/neut_ temperature=293
broaden=result/broaden___neutgroups=252
thermalgroups=97 weighting=4
thermaltemp=<293.0 800>
input=input/neut_
evals=endf/LibraryTest.xml
end
' Generate NR bondarenko data. A neutron library generated
' by neutron mg is needed. The desired background values are
 given in sig0 and the desired temperature are in
 temps.
=bondarenko
master=result/bond_ broaden=result/broaden_
n1d=result/neut_ temperature=293 neutgroups=252
thermalgroups=97
temps=<293.0 800>
input=input/bond_252_ evals=endf/LibraryTest.xml
end
```



MG library templates (continued)



This will generate input files that can be viewed in ExSite

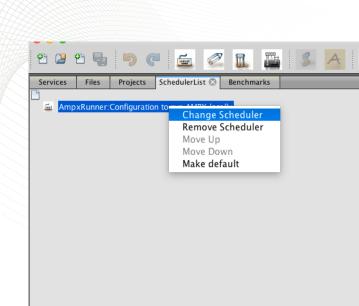
<pre>1 = sshell 1 n -sf /Uers/dwd/aps/exsite/AmpxExamples/endf/n-092_U_235.endf ft11f001 1 n -sf f(NDEX)/result/broaden_u235 ft34f001 end 3 n -sf (KNDEX)/result/broaden_u235 ft34f001 end 4 = 300.0 4.8356 12330000 e 1 = 455 all 300000 e 1 = 455 all 30000 e 1 = 455 all 300000 e 1 = 455 all 30000 e 1 = 455 all 300000 e 1 = 455 all 30000 e 1 = 455 all 3000 e 1 = 455 all 300 e 1 = 455 all 300</pre>	💦 unit.tem 🛛 🐴 ce_ac226.inp 🎗 👔 li		<u>т</u> 🗆 Ра	Palett
1 1+f //Users/udw/amp/exsite/ampRes/empf/n=092_U_235.endf ft11f01 1 1+f S(RNDUR)/result/broaden_u235 ft34f001 4 end 5 -155 a10 6 6.55 43 43 6 6.55 43 43 7 6.55 43 43 6 6.55 43 43 7 6.55 a10 7 7.55 a11 300000 e 6 6.56 80 18 185 1 e 7 -155 a11 300000 e 6 6.56 80 18 185 1 e 7 -55 a11 300000 e 15 -156 a11 300000 e 16 -56 a11 300000 e 17 -66 18 -712 19 -712 11 Logical unit of ENDF file to process 11 Logical unit of output kinematic file 11 Logical unit of output kinematic file 11 Logical unit of output kinematic file 12 -712 13 -715 61 19722.7 14 -716 15 -712 16 -716 11 17 Logical unit of output kinematic file				₩ A
3 Ln -sf \$(RTNDR)//result/broaden_u235 ft34f001 4 end 5 = pickere 6 -155 300000 7 055 34 35 64 -108 300000 7 055 34 35 64 -108 300000 7 055 34 35 64 -108 300000 7 055 04 30 18 155 1 7 -55 a11 3000000 e 15 -155 a11 3000000 e 15 -155 a11 3000000 e 15 -155 a11 3000000 e 16 055 0 30 18 155 1 e 17 -156 a11 3000000 e 16 055 0 30 18 155 1 e 17 256 10-25 2.0ET e t 35 2090 0 4 16 056 0 30 18 155 1 e 17 256 173000.0 18 17 29 172 20 12 21 10 te: (mat 9228 228 12 239 150 terg228 24 150 terg228 1000 terg28 25 150 terg228 1000 te 26 16		te/exsite/AmnxExamnles/endf/n=092 U 235.endf ft11f001		aj
S = pickeze e 0 = 055 30 800000 e 1 = 55 1.5 4 1 e t 255 9228 1 = 55 1.5 4 1 e t 255 9228 1 = 6 0 = 055 0.3 18 3000000 e 0 = 055 0.3 18 13 50 1 0 = 0 1 = 6 0 = 0.5 2.0 e T 2 = 0.6 - 3.0 e T = 0.5 2.0 e T 0 = 0 2 = 0.6 - 3.2 e 0 T = 0.5 1.0 e T 0 = 0 2 = 0.6 - 3.2 e 0 T = 0.5 1.0 e T 0 = 0 2 = 0.6 - 3.2 e 0 T = 0.5 1.0 e T 0 = 0 2 = 0.6 - 3.2 e 0 T = 0.5 1.0 e T 0 = 0 2 = 0.7 2 ex 1.0 e 0.4 2835 1273000.0 Usc: // mail 9228 0 usc: // mail 9228 2 = 0.7 2 ex 1.0 e 0.4 2835 127300.0 Usc: // mail 9228 0 usc: // mail 9228 2 = 0.7 2 ex 1.0 e 0.4 2835 10 e 0.4 10			111	ca
a -iss inaccose a -iss inaccose b iss in is 41 et b iss in is 41 et iss in iss inaccose iss inaccose iss inaccose			111	
7 ess 34 35 9 155 13 4 1 e t 9 155 13 4 1 e t 9 156 101 -1002 -1018 -1102 11 5** 233 t 12 end 13 = jergens -155 3 11 300.0000 e E 15 -155 31 300.0000 e 15 -155 31 300.0000 e 16 65 0 30 18 15 1 e 17 2** 1.0E-5 2.0E7 e t 18 configure y12 19 4** 300.0 4.8356 1273000.0 10 Use: Infi 11 11 cycl 11 configure y12 12 end 12 eps=1e-3 and+11 kin=32 anst 13 end 14 eps=1e-3 ind+11 kin=32 anst 15 if upt=32 16 for=cols 17 practal sature 18 kin=32 19 title=u235 2.0E7 10 title=u235 2.0E7 11 title=u235 2.0E7 12 title=u235 2.0E7 13 eshell 14			111	
9 255 9228 11 5** 233 t 12 end 13 -155 atl 3000000 e 15 -155 atl 3000000 e 16 055 03 18 155 1 e 17 2** 1.0E-5 2.0E7 e t 18 configure y12 19 daw 300.0 4.8356 127300.0 10 t 11 configure y12 12 end 13 end 14 end 15 -155 atl 300000 e 16 configure y12 19 daw 300.0 4.8356 127300.0 10 togkal unt of EADF file to process 11 togkal unt of output kinematic file 110 togkal unt of output kinematic file 111 togkal unt of output kinematic file 112 title=u235 9228 end f RELI 113 cp ft21f001 s(RtNDIR)/-//F 114 wat=92235 kin-42 point=45 115 cp ft21f001 s(RtNDIR)/-//F 116 cp ft21f001 s(RtNDIR)/-//F 116 cond 117 end 118 cond 20 </td <td></td> <td></td> <td>111</td> <td>c</td>			111	c
10 455 - 1001 - 1002 - 1018 - 1102 11 55 - 293 t 12 end 13			111	fi
11 5%= 233 t 20 end 33 - jergens 15 -135 all 380000 e 16 055 03 0 18 155 1 e 2*= 1.0E-5 2.0E7 e t Configure y12 19 4*= 300.0 4.8356 127300.0 Use: v ind[11 tick tick tick 12 end 24 epsile-3 ndf=11 kin=32 mat 25 rap=1 awp=1.0 for=log nl= 44 egsile 26 end 27 = xil0 28 type=neutron igm=252 igm=0 11ftg=156 id=9228 togical unt of output kinematic file 29 title=u235 9228 endf REL1 126 cr pf21f001 ft18f001 31 kin=32 tabl=35 pot=1.15000 136 cp ff21f001 ft18f001 37 = shell 38 rc pf21f001 ft18f001 39 end 40 = y12 mat=32235 kin=42 point=45 61 files or equal to 0, the will be the same as the mat number on the ENDF file 9 155 1 1 5 1 2 e t 95 1 5 se			111	ir
12 end 13			111	k
14 = jergens 15 -155 all 3080000 e 16 055 0 30 18 155 1 e 17 15.52 2059 0 4 18 255 2089 0 4 19 4= 300.0 4.8356 1273000.0 10 Use: I ndf 11 10 Logical unit of ENDF file to process 20 ey12 21 end 22 ep3=10-30 ndf=11 kin-32 aat 23 ey21 24 ep3=10-30 ndf=11 kin-32 aat 25 end 26 end 27 ex18 12 typemoutron 1gm=252 igned 13 katerial number to process 28 end 29 title=u235 2024 endf REL1 20 Logical unit of output kinematic file 21 end 22 table25 pot=1.50001 29 title=u235 2024 endf REL1 20 cp ft21f001 ft10f001 21 end 23 external 24 mat=2233 kin=42 point=45 25 avr=23.05 26 end			111	
15 -155 all 3000000 e 16 055 all 3000000 e 17 24* 1.0E-5 2.0E7 e t 18 355 2009 0 4 19 4* 300.0 4.8356 1273000.0 10 t 19 4* 300.0 4.8356 1273000.0 10 t 11 Left of KDF file to process 12 eps=1e-3 ndf=11 kin=32 mat 15 cap=1 wy=1.0 for=leg nle 16 end 17 = -x10 18 type=neutron igm=252 ipmet 19 iftg=156 id=9223 111 Logical unit of output kinematic file 112 Logical unit of output kinematic file 113 cap=1 kin=32 116 cs requal to 0, the point vise data will not be generated 126 end 137 eshell 138 coft 121f001 s(RTNDIR)//r. 149 mst=22235 kin=42 point=43 15 coft 121f001 s(RTNDIR)//r. 16 end 179 = shell 180 be used on the kinematic and 1d point file 178 ends			*	11
17 2** 1.0E-5 2.0E7 e t 18 352 2.099 0 4 19 4** 300.0 4.8356 1273000.0 10 4** 300.0 4.8356 1273000.0 17 end 12 end 12 cap:1 awp:1.0 for=leg nt= 16 for=leg nt= 17 = x10 18 type=neutron 1gm=252 ipm0 19 ittl=visit 39228 11 Logical unit of cutput kinematic file 111 Logical unit of output kinematic file 112 Logical unit of output kinematic file 115 cap:2 table:3 point=1.15000 116 reshell 18 cp ft21f001 ft0f01 19 end 19 set id 9228 10 b b b used on the kinematic and 1d point file 19 reshell 19 cp ft21f001 ft0f001 19 end 19 set id 9228 10 b b used on the kinematic and 1d point file 11 tfess or equal to 0, this will be the same as the mat number on the ENDF file 19 end 10 b b				m
18 355 2099 0.4 Configure y12 19 4+* 300.0 4.8356 1273000.0 Use: @ ndf 11 20 end Logical unt of ENDF file to process 23 = y12 Use: @ nat 9228 24 eps-1e-3 ndf=11 kin=32 mat Wateral number to process 25 end Use: @ kin 32 27 = x18 Materal number to process 28 type=neutron ign=252 ign=0 Use: @ kin 32 29 type=neutron ign=252 ign=0 Logical unt of output kinematic file 29 type=neutron ign=252 ign=0 Logical unt of output kinematic file 29 type=neutron ign=252 ign=0 Logical unt of file containing 1d point data 31 end Hess or equal to 0, the point wise data will not be generated 32 cp ft21f001 ft10f001 file sor equal to 0, this will be the same as the mat number on the ENDF file 36 end Hession to which to generate the grid 37 = shell Use: @ nli 5 36 end Hession to which to generate the grid 37 = shell Use: @ nli 5 38 ftor=cos ftaving in legendre coefficients of cosine moments the number of mome				р
10 4** 300.0 4.8356 1273000.0 Use: I ndf 11 20 t Logical unit of ENDF file to process 21 end Logical unit of ENDF file to process 22 end Use: I mat g228 23 end Use: I mat g228 24 eps=1e-3 ndf=11 kin=32 mat 25 end Use: I mat g228 26 end Use: I mat g228 27 end Use: I mat g228 28 master=21 logwt=30 matwesp Logical unit of output kinematic file 29 itig=156 id=9228 Use: I point -1 30 end Hess or equal to 0, the point wise data will not be generated 31 c.p ft21f001 s(RTNDIR)//r Use: I di 9228 32 mat=92235 kin=42 point=45 mat=92235 kin=42 point=45 34 end fess or equal to 0, this will be the same as the mat number on the ENDF file 36 end Use: I i 5 37 = spiell G5 36 end Use: I i 5 37 end fessor equal to 0, this will be the same as the mat number on the ENDF file 38 copfiels fisan		Configure y12		р
22 t 23 = sp12 24 eps=1e-3 ndf=11 kin=32 mat zap=1 avp=1.0 for=log nl= 25 zap=1 avp=1.0 for=log nl= 26 end 27 = x10 28 type=neutron igm=252 ipm=0 iftg=156 id=9228 29 ittg=156 id=9228 29 ittg=235 opt=1.15000 21 tiss or equal to 0, the point wise data will not be generated 29 opt 211001 ftl0f01 21 mat=92235 kin=42 point=45 21 ws: @ opt 21.15006t+ 24 awr=233.025 point=1.15006t+ 24 awr=233.025 point=1.15006t+ 24 awr=233.025 point=1.15006t+ 24 awr=234.025 point=45 25 opt 23.05 28 end 29 is = 1		llser ✓ ndf 11	111	
22 Ldgrad unit of ENDF mic to process 23 = y12 24 eps=1e-3 ndf=11 kin=32 mat; 25 zap=1 awp=1.0 26 end 27 = x10 28 type=neutron igm=252 ign=0 29 iftg=156 id=9228 29 iftg=156 id=9228 29 iftg=156 id=9228 29 iftg=156 id=9228 20 end 21 title=u235 9228 endf REL1 21 Use: vid 9228 23 = shell 29 ssc equal to 0, the point wise data will not be generated 31 end 32 end 33 end 34 estol 1 \$(RTNDIR)//r) 35 cp ft21f001 \$(RTNDIR)//r) 36 end 37 = sshell 38 core qual to 0, this will be the same as the mat number on the ENDF file 39 end 31 end 32 end 34 mat=s223 kin=42 point=45 35 tor r=0sos 36	20 t		111	
22 =y12 Use: ✓ mat 9228 24 eps=1-3 ndf=11 kin=32 mat 25 end List in number to process 26 end Use: ✓ kin 32 27 =x10 Use: ✓ kin 32 28 type=neutron igm=252 igm=0 Logical unit of output kinematic file 29 iftg=156 id=9228 Use: ○ point _1 38 master=21 logyt=30 matvt=9 Use: ○ point _1 31 kin=32 tabl=35 pot=1.15000 Logical unit of ile containing 1d point data 33 end if less or equal to 0, the point wise data will not be generated 33 c pft21f001 ft10f001 fless or equal to 0, this will be the same as the mat number on the ENDF file 34 = shell Use: ○ ets i legs 35 end Use: ○ ets i legs 36 end fless or equal to 0, this will be the same as the mat number on the ENDF file 35 end Use: ○ ets i legs 36 end Use: ○ ets i legs 37 =pickeze fs aving in legendre coefficients of cosine moments the number of moments to generate 36 end Use: ○ ets i los 37 =pickeze		Logical unit of ENDF file to process	111	5
25 zap=1 awp=1.0 for=leg nL= Material number to process 26 end Use: kin_32 27 =x10 Use: kin_32 28 type=neutron igm=252 ipm=0 Logical unit of output kinematic file use: point1 29 ift[s=156 id=9228 use: point1 Logical unit of output kinematic file use: point1 31 kin=32 tabl=35 pot=1.15000 Use: point1 Logical unit of output kinematic file use: point1 33 end files or equal to 0, the point wise data will not be generated use: point1 34 = shell files or equal to 0, the point wise data will not be generated use: point intermatic and 1d point file 36 end if less or equal to 0, this will be the same as the mat number on the ENDF file use: use: recision to which to generate the grid 36 end use: nl 5 if saving in legendre coefficients of cosine moments the number of moments to generate use: nl 5 37 =pickeze use: nl 5 use: nl 5 use: nl 5 use: nl		Use: 🖉 mat 9228	111	w
26 end 27 =x10 28 type=neutron igm=252 ipm=0 iftg=156 id=9228 29 iftg=156 id=9228 30 master=21 logwt=30 matwt=9 31 end 34 =shell 35 cp ft21f001 s{RTNDIR}//r 36 end 37 = shell 36 end 37 = shell 36 cp ft21f001 s{RTNDIR}//r 37 = shell 38 cp ft21f001 s{RTNDIR}//r 39 end 40 =y12 38 cp ft21f001 ft10f001 39 end 41 mat=29235 kin=42 point=45 9 iss in=42 point=45 41 mat=29235 kin=42 point=45 42 awr=233.025 pot=1.15000E+ 43 nl=5 emax=5.05 temp=293.0 44 for=cos 45 end 46 for=cos 47 =pickeze 68 cp st 1s 1 2 c t 50 css 923.0 A 51 s		Material number to process		▶ 1
27 =x10 Use: \$\sim M_32 28 type=neutron igm=252 ipm=0 ingical unit of output kinematic file 29 iffy=156 id=9228 ingical unit of output kinematic file 30 master=21 logwt=30 matwt=9 iss kin=32 tabl=35 pot=1.15000 Use: \$\sim M_12 31 kin=32 tabl=35 pot=1.15000 Use: \$\sim M_12 32 end ifless or equal to 0, the point wise data will not be generated 33 cp ft21f001 ft10f01 ifless or equal to 0, the point wise data will not be generated 34 = shell Use: \$\sim id 9228 36 end If less or equal to 0, this will be the same as the mat number on the ENDF file 39 end Use: \$\sim equal to 0, this will be the same as the mat number on the ENDF file 39 end If less or equal to 0, this will be the same as the mat number on the ENDF file 31 mat=92235 kin=42 point=45 Vse: \$\sim 15 32 end Use: \$\sim 15 34 for=cos Vse: \$\sim 15 34 for=cos Vse: \$\sim 15 35 1 s1 1 2 e t Vse: \$\sim 15_5 36 end Vse: \$\sim 5_5 <tr< td=""><td></td><td></td><td></td><td>v 1</td></tr<>				v 1
29 iftg=156 id=9228 master=21 logwt=30 matwt=9 Use:	27 🖂 =×10	Use: V KH 32		
30 master=21 logwt=30 matwt=9 kin=32 tabl=35 pot=1.15000 Use: _ point _1 31 end ugical unit of file containing 1d point data 32 end if less or equal to 0, the point wise data will not be generated 33 end use: _ id g228 34 = shell use: _ of dg228 35 cp ft21f001 s{RTNDR}//r use: _ of dg228 36 end use: _ of dg228 37 = shell use: _ of g228 39 end use: _ of g228 40 = xy12 use: _ of egs 1e-3 41 mat=92235 kin=42 point=45 use: _ of egs 1e-3 42 awr=233.025 pot=1.15000E+ precision to which to generate the grid 42 awr=233.025 pot=1.15000E+ If saving in legendre coefficients of cosine moments the number of moments to generate 43 n1=5 enax=5.05 temp=293.0 use: _ emax 5.05 44 955 34 41 e use: _ emax 5.05 49 155 1 1s 1 2 e t use: _ emax 5.05 50 255 9228 455 2 0K 51 52* 2923 0 OK Cancel		Logical unit of output kinematic file		
31 kin=32 tabl=35 pot=1.15000 32 title=u235 9228 endf REL1 33 end 34 =shell 35 cp ft21f001 s{RTNDIR}//r 36 end 37 =shell 39 end 39 end 40 =y12 mat=92235 kin=42 point=45 41 mat=92235 kin=42 point=45 42 awr=233.025 pot=1.15000E+ 41 mat=92235 kin=42 point=45 42 awr=233.025 pot=1.15000E+ 43 nl=5 emax=5.05 temp=293.0 44 for=cos 45 end 46 end 47 =pickeze 48 055 34 41 e 49 155 1 1s 1 2 e t 50 255 9228 455 2 51 5.ex 293.0 524 60 534 60 541 584 Command Window 584 Command Window Task List ptab	30 master=21 logwt=30 matwt=9!	Use: point _1		
33 □ end 34 □ =shell 35 c pft21f001 \${RTNDIR}//r 36 □ pft21f001 \${RTNDIR}//r 37 □ =shell 38 c pft21f001 ft10f001 39 end 39 end 40 □ 39 end 41 mat=92235 kin=42 point=45 34 awr=233.025 pot=1.15000E+ 41 nl=5 emax=5.05 temp=293.0 42 awr=233.025 pot=1.15000E+ 43 nl=5 emax=5.05 temp=293.0 44 for=cos 45 end 46 H 47 □ 9 1s\$ 1 1 2 e t 50 25\$ 9228 45\$ 2 51 5.4 203 0 54 0K 551 Sex 203 0 544 0K 555 SH Command Window Tasks List ptab OK	31 kin=32 tab1=35 pot=1.15000			
34 =shell if less or equal to 0, the point wise data will not be generated 35 cp ft21f001 \${RTNDIR}//r Use: ☑ id 9228 37 =shell Use: ☑ id 9228 38 cp ft21f001 ft10f001 If less or equal to 0, this will be the same as the mat number on the ENDF file 39 end If less or equal to 0, this will be the same as the mat number on the ENDF file 40 = y12 Use: ☑ eps le-3 41 mat=92235 kin=42 point=45 Vse: ☑ eps le-3 42 awr=233.025 pot=1.15000E+ Precision to which to generate the grid 43 nl=5 emax=5.05 temp=293.0 Precision to which to generate the grid 44 for=cos Use: ☑ en] 5 54 end If saving in legendre coefficients of cosine moments the number of moments to generate 48 095 34 41 e Use: ☑ emax 5.05 51 5.xe 293.0 OK 58H Command Window Task List ptab		Logical unit of file containing 1d point data		
36 L end 37 □ = shell cp ft21f001 ft10f001 g0 □ end ID to be used on the kinematic and 1d point file If less or equal to 0, this will be the same as the mat number on the ENDF file 40 □ = y12 mat=92235 kin=42 point=45 awr=233.025 pot=1.15000E+ 41 = for=cos end Use: ○ eps 1e=3 Precision to which to generate the grid 41 for=cos 45 end Use: ○ nl 5 45 end If saving in legendre coefficients of cosine moments the number of moments to generate 46 47 □ = pickeze 48 055 34 41 e 91 255 9228 455 2 51 55× 293.0 58H Command Window Tasks List ptab	34 🕀 =shell			
37 = shell ID to be used on the kinematic and 1 d point file 38 end If less or equal to 0, this will be the same as the mat number on the ENDF file 40 = sy12 Use: ○ eps le-3 41 mat=92235 kin=42 point=45 Version to which to generate the grid 42 awr=233.025 pot=1.15000E+ Precision to which to generate the grid 43 for=cos Use: ○ nl 5 44 for=cos If saving in legendre coefficients of cosine moments the number of moments to generate 48 095 34 41 e Use: ○ emax 5.05 50 255 9228 455 2 Sof 51 5xe 293.0 OK SHE Command Window Task List ptab	35 cp ft21f001 \${RTNDIR}//r	Use: 🗸 id 9228		
38 cp ft21f001 ft10f001 in to be deed on the kinemate and 10 point me 39 end if less or equal to 0, this will be the same as the mat number on the ENDF file 40 =y12 unt=92325 kin=42 point=45 41 mat=92235 kin=42 point=45 42 awr=233.025 pot=1.1500Et 43 nl=5 emax=5.05 temp=293.0 44 for=cos 45 end 46 47 = pickeze 48 0\$\$ 34 41 e 15\$ 1 15 1 2 e t 50 2\$\$ 2928 4\$\$ 2 51 5.xe 293.0 SH Command Window Tasks List ptab	27 D			
40 □ = y12 mat=92235 kin=42 point=45 2 awr=233.025 pot=1.15000E+ 43 nl=5 emax=5.05 temp=293.0 44 for=cos 45 end 45 end 46 47 □ Use: ○ eps le=3 Precision to which to generate the grid Use: ○ nl 5 48 49 55 245 923.6 50 255 9228 455 2 51 55× 293.0 55H Command Window Tasks List ptab		ID to be used on the kinematic and 1d point file		
41 mat=92235 kin=42 point=45 awr=233.025 pot=1.15000E+ 4 Use: ○ tosi le=3 precision to which to generate the grid 41 for=cos end use: ○ nl 5 45 end 46 tf saving in legendre coefficients of cosine moments the number of moments to generate 48 055 34 41 e 155 115 1 2 e t 50 255 9228 455 2 51 55× 293.0 58H Command Window Task List ptab		If less or equal to 0, this will be the same as the mat number on the ENDF file		
42 awr=233.025 pot=1.15000E+ n1=5 emax=5.05 temp=293.0 Precision to which to generate the grid 43 for=cos Use: ♥ nl 5 44 = pickeze If saving in legendre coefficients of cosine moments the number of moments to generate 46 Use: ● nd 55 34 41 e Use: ● emax 5.05 49 155 1 1s 1 2 e t Use: ● emax 5.05 50 255 9228 455 2 OK 51 5×+ 293.0 OK		Use: ✓ eps 1e-3		
43 fn(-3) elinax-3, 63 (leinp-233, 6) 44 for=cos 45 end 46 Use: ○ n! 5 47 □ = pickeze 48 05\$\$ 34 41 e 49 15\$\$ 11 s 1 2 e t 50 25\$\$ 9228 4\$\$\$ 2 51 5xx 293.0 SSH Command Window Tasks List ptab	42 awr=233.025 pot=1.15000E+			
45 end 46 if saving in legendre coefficients of cosine moments the number of moments to generate 47 = pickeze 48 055 34 41 49 155 115 12 et 50 255 9228 455 2 51 5xx 293.0 OK Cancel	45 ITC-5 emax-5.05 cemp-295.0			
46 If saving in legendre coefficients of cosine moments the number of moments to generate 47 = pickeze 48 05\$ 34 41 49 1\$\$ 1 15 1 2 e t 50 25\$ 9228 45\$ 51 5x 203.0 OK SH Command Window Tasks List ptab		Use: V III 5		
47 = pickeze 48 055 34 41 e 49 155 1 5 2 2 t 50 255 9228 455 2 5 51 55x 293.0 OK Cancel		If saving in legendre coefficients of cosine moments the number of moments to generate		
49 15\$ 1 1\$ 1 2 e t 50 25\$ 928 45\$ 2 51 5×× 293.0 OK Cancel SSH Command Window Tasks List ptab 0	47 🗉 =pickeze			
50 25\$ 9228 4\$\$ 2 51 5** 293.0 SSH Command Window Tasks List ptab		Use: emax 5.05		
SSH Command Window Tasks List ptab	50 2\$\$ 9228 4\$\$ 2			
		OK Cancel		
	Inuclat_ac225.inp AmpxRunner finished			



Input files can be run as follows

- From the command line using the usual SCALE commands (ampxrte is the preferred way)
- From the graphical user interface (GUI) if pressing the Ampx button (if set up correctly - see next slide)
- From the GUI in batch mode, if the system does not have a queuing system





6 7 8 9	-1\$\$ 3 0\$\$ 34 1\$\$ 1 2\$\$ 93	3000000 4 35 1s 4 1 e t 228 1001 -1002 -1018 -1102		
	4	Change Scheduler		
Name:	AmpxRun			
Description:		tion to run AMPX locally		
Type:	local			\$
Host:				
Directory:				Select
Scheduler:	/Users/dv	v8/ampx/ampx_scale/build/install/bin/sched	uler	
RSH command:				
Custom Data				\$
Program:		/Users/dw8/ampx/ampx_scale/build/install/	bin/ampxrte	Select
Switches:				
Output Extension	:	out	✓ Retrieve	Append
Message Extensio	n:	msg	-	✓ Retrieve
			Can	cel OK
44 45 46 47 48 49	0\$\$ 1\$\$			



To test the new libraries, there are a few templates that set up SCALE input files

- Allnucinf: infinite medium cases for all nuclides in the library
- Allnuclat: pincell cases for all nuclides in the library
- cf_leak_unit: ²⁵²Cf source in a sphere for each nuclide
- cf_trans_unit: transmission through a block of material for each nuclide



Intermediate resonance factors

- The templates outlined above generate narrow resonance factors (Bondarenko-factors)
- In conjunction with some SCALE modules, AMPX can also generate intermediate resonance (IR) factors using homogeneous and heterogeneous lattices
- The current SCALE libraries contain homogenous IR factors for Z >40 and heterogeneous IR-factors for some selected nuclides
- The template ffactor generates input files for homogenous IR factors





- AMPX is used to generate MG and CE libraries for SCALE
- Covariance libraries and decay libraries can also be generated
- With the help of ExSite, it is easy to generate SCALE libraries from ENDF data
- Templates in ExSite generate SCALE input files to demonstrate how the MG and CE libraries are to be used

