

# **SG23: Library of Cross Section Evaluations for Fission Products**

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**Pavel Oblozinsky**

**National Nuclear Data Center  
Brookhaven National Laboratory, Upton, NY 11973**

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# SG23 Membership, Goals

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- SG23 established in May 2004
- Membership (5 projects, 14 members)
  - Chairman P. Oblozinsky, ENDF project
  - Monitor R. Jacqmin, JEFF project
  - ENDF C. Dunford, M. Herman and S. Mughabghab (all BNL), M. Dunn (ORNL)
  - JEFF C. Dean (Winfrith), A. Trkov (IAEA)
  - JENDL T. Nakagawa and K. Shibata (JAERI)
  - BROND A.V. Ignatyuk and V. Pronyaev (IPPE)
  - CENDL Ge Zhigang and Chen Guochang (CNDC)
- Goals
  - Create library based on SG21 recommendations for 218 FP materials
  - Perform partial validation of the library

# Summary of SG21 Recommendations

Library (Data Source)	Full File	Resonance Region	Fast Region	Comment
ENDF/B-VI	1	18	13	
ENDF/B-VII	27	-	2	Includes 5 isotopes of Ge
JEFF-3.0	1	-	-	
JENDL-3.3	44	7	66	
CENDL-3	10	-	27	
BROND-2	1	1	1	
New BNL-325	-	109	-	Evaluations fully completed
EMPIRE	-	-	25	Preliminary calculations done
<b>Total</b>	<b>84</b>	<b>134</b>	<b>134</b>	<b>211 existing + 7 new</b>

# SG23 Activities in June 2004 – March 2005

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- SG21 final report
  - Submitted to NEA in March 2005
- SG23 preparatory work
  - SG23 meeting held, Santa Fe, October 2004
  - SG23 webpage created, [www.nndc.bnl.gov/sg23](http://www.nndc.bnl.gov/sg23)
  - Evaluations for **Atlas of Neutron Resonances** completed
- SG23 library
  - Converted full files into SG23 style 84 materials
  - Created files by merging 80 materials  
**164 materials**
  
  - Available in Preliminary ENDF/B-VII 29 materials
  - Evaluations to be done by Empire 25 materials  
54 materials

# S. Mughabghab: Atlas of Neutron Resonances

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5-th issue of BNL-325  
Neutron resonance parameters  
Thermal cross-sections  
Average resonance parameters  
 $Z = 1 - 100$

Contract with Elsevier signed  
Submit by June 15, 2005  
Publish early 2006

FP region: 177 materials ok,  
41 materials no resonance data

ENDF-6 files given to SG23  
URR in selected cases only

## Atlas of Neutron Resonances

Resonance Parameters and  
Thermal Cross Sections  
Part A:  $Z=1-60$

## Atlas of Neutron Resonances

Resonance Parameters and  
Thermal Cross Sections  
Part B:  $Z=61-100$

S.F. Mughabghab

# SG23 Fission Product Library: Procedure

- Convert files recommended for fast region into SG23 style
  - Marked as ENDF/B-VII, to be changed once NLIB for SG23 Library is provided
  - Standard SG23 text added
  - Comments on fixes added
- Insert resonance parameters
  - None – if full file was recommended
  - Take from specific file – if it was recommended
  - Take from Atlas of Neutron Resonances – if new BNL-325 was recommended
  - URR taken from the file recommended for the fast region
- Perform data verification
  - Correct all errors detected by CHEKCR and FIZCON, **all SG23 files (164) are clean!**
  - Run NJOY (ok for 136 materials), followed by simple MCNP run (underway)

# SG23 Webpage: Documents, Library

## [www.nndc.bnl.gov/sg23](http://www.nndc.bnl.gov/sg23)



National Nuclear Data Center



NNDC Databases: ENDF | CSISRS | CINDA | NuDat | NSR | XUNDL | ENSDF | MIRD

## SG23 Fission Product Library

Projectile	MAT	Nuclide	E <sub>max</sub>	Date	Labs	Authors
n	3125	<a href="#">31-Ga-69</a>	20.0	EVAL-JAN05	KHI,BNL	T.WATANABE, Mughabghab
n	3131	<a href="#">31-Ga-71</a>	20.0	EVAL-OCT98	CNDC	SONG-BAI ZHANG, B. S. YU, Z. J. ZHANG
n	3425	<a href="#">34-Se-74</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3325	<a href="#">33-As-75</a>	20.0	EVAL-JAN05	JNDC,BNL	JNDC FPND W.G., Mughabghab
n	3431	<a href="#">34-Se-76</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3434	<a href="#">34-Se-77</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3625	<a href="#">36-Kr-78</a>	20.0	EVAL-FEB05	JNDC,BNL	JNDC FPND W.G., Mughabghab
n	3437	<a href="#">34-Se-78</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3525	<a href="#">35-Br-79</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3440	<a href="#">34-Se-79</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3631	<a href="#">36-Kr-80</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3443	<a href="#">34-Se-80</a>	20.0	EVAL-MAR90	JNDC	JNDC FP NUCLEAR DATA W.G.
n	3531	<a href="#">35-Br-81</a>	20.0	EVAL-JAN05	JNDC,BNL	JNDC FPND W.G., Mughabghab
n	3637	<a href="#">36-Kr-82</a>	20.0	EVAL-FEB05	JNDC,BNL	JNDC FPND W.G., Mughabghab
n	3449	<a href="#">34-Se-82</a>	20.0	EVAL-JAN05	JNDC,BNL	JNDC FPND W.G., Mughabghab
n	3640	<a href="#">36-Kr-83</a>	20.0	EVAL-JUN99	CNDC	YOU-XIANG ZHUANG, CHONG-HAI CAI
n	3643	<a href="#">36-Kr-84</a>	20.0	EVAL-JAN05	JNDC,BNL	JNDC FPND W.G., Mughabghab

# SG23 Fission Product Library: 102Ru



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NNDc Databases: ENDF | CSISRS | CINDA | NuDat | NSR | XUNDL | ENSDF | MIRD

## n-102Ru

### SG23 fission product library

[SG23-file](#)   [Description](#)   [EXFOR-data](#)

Incident particle: n

Target: 102-Ru

MAT: 4443

Date: EVAL-FEB05

Authors: QI-CHANG LIANG+, Mughabghab

Lab: CNDC, BNL

Maximum incident energy: 20.0 MeV

### Outputs of checking codes

[CHECKR](#)   [FIZCON](#)   [PSYCHE](#)

### Log-outputs of pre-processing codes

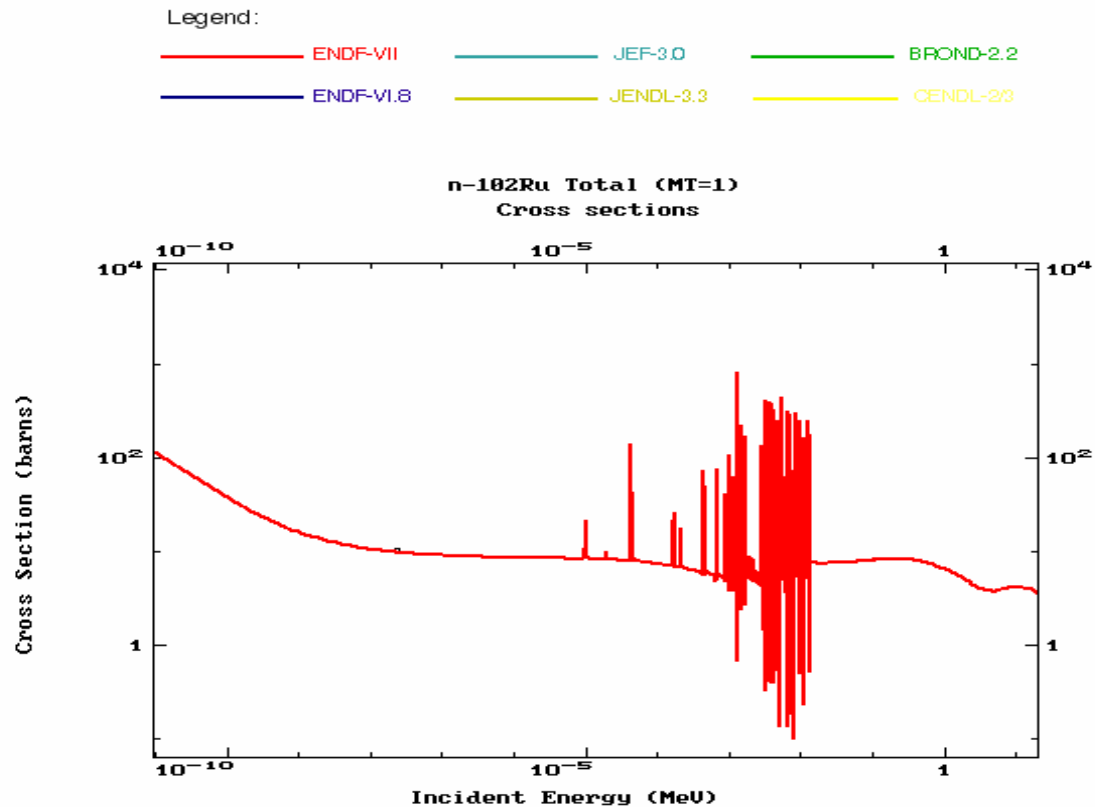
[LINEAR](#) => [RECENT](#) => [SIGMA1](#) => [FIXUP](#) => [LEGEND](#)

### Comments



# SG23 Fission Product Library: Plots for $^{102}\text{Ru}$

Comparison of SG23 against experimental data and evaluations. This is a standard set of plots produced regardless of experimental data. Depending on availability of experimental data in EXFOR the PLOT4 set (see above) may contain more or fewer plots. Click on the pictures below to enter interactive ZVView plotting ( [ZVView](#) package needs to be installed. Click [here](#) for a short ZVView manual.) NOTE: SG23 files are denoted ENDF/B-VII below.



# SG23: Future work

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- Complete SG23 library by adding remaining 54 materials
  - 29 materials from ENDF/B-VII (updates expected)
  - 25 materials to be done by Empire (preliminary calculations done)
  
- Perform data verification for a complete set of 218 materials
  - Run checking codes, run NJOY and simple MCNP
  - Perform graphical inspection of all files and identify deficiencies
  
- Solve problems
  - Address deficiencies identified above
  - Address complex merging (URR region)
  
- Compare with data for natural elements
  
- Perform data validation for selected materials