

## NNDC Staff Changes

- Reaction data
  - Marco Pigni (covariances, ENDF evaluation) joined in January 2007 as a postdoc
  - Dimitri Rochman (EXFOR compilation, covariances, ENDF evaluations) left NNDC in August 2007
  - Stanislav Hlavac & Otto Schwerer joined EXFOR compilation effort as external contractors
  - Caleb Mattoon (covariances, ENDF evaluation) joined in August 2008 as a postdoc
- Structure data
  - David Winchell (NSR, ENSDF database) left NNDC in May 2007
  - Manojeet Bhattacharya (NSR) joined NNDC in April 2007
  - Thomas Burrows (ENSDF evaluation) passed away on July 1, 2008 (replacement in progress)
  - New postdoc (ENSDF evaluation) expected in January 2008



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# ENDF/B-VII.0 Library

**Major contributors**

- LANL (actinides, light nuclei, thermal neutron scattering)
- BNL (fission products resonances & fast, decay data)
- ORNL (resonances)

44 citations (SCOPUS)

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## ENDF/B-VII.0 Contents

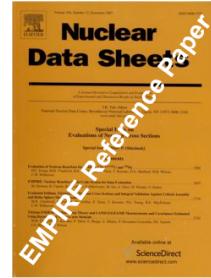
No.	Sublibrary	Materials in B-VII	Materials in B-VI	Comment
1	Photonuclear reactions	<b>163</b>	-	<b>New sublibrary</b>
2	Photo-atomic	<b>100</b>	100	Taken from VI.8
3	Radioactive decay	<b>3830</b>	979	<b>New evaluations</b>
4	Spontaneous fission yields	<b>9</b>	9	Taken from VI.8
5	Atomic relaxation	<b>100</b>	100	Taken from VI.8
6	<b>Neutron reactions</b>	<b>387</b>	<b>328</b>	<b>Many new evaluations</b>
7	Neutron fission yields	<b>31</b>	31	Taken from VI.8
8	Thermal neutron scattering	<b>20</b>	15	<b>Some new evaluations</b>
9	Standards	<b>8</b>	8	<b>New evaluations</b>
10	Electro-atomic	<b>100</b>	100	Taken from VI.8
11	Proton reactions	<b>48</b>	35	Some new evaluations
12	Deuteron reactions	<b>5</b>	2	Some new evaluations
13	Triton reactions	<b>3</b>	1	Some new evaluations
14	He-3 reactions	<b>2</b>	1	Some new evaluations
	<b>Full library</b>	<b>4812</b>	1709	



# EMPIRE Code

(extensive changes in EMPIRE-3.0)

- new model for multi-modal fission through multi-hump barrier
- new parameterization of EMPIRE-specific level densities (RIPL-3)
- parity dependent microscopic HFB level densities (RIPL-3)
- deformed Multistep Direct
- prompt fission neutron spectra
- optical model database updated (RIPL-3)
- discrete level database updated (RIPL-3)
- ECIS updated to the 2006 version
- **KALMAN and Monte Carlo methods for covariances in fast neutron range**
- **resonance module including covariances (Atlas => MF2, MF32)**
- ENDF-6 formating of radionuclide production
- publication quality ZVView plots



Nucl. Data Sheets  
Vol. 108, p. 2665 (2007)  
8 citations (SCOPUS)

Next release:  
**EMPIRE-3.0 (Arcola)**



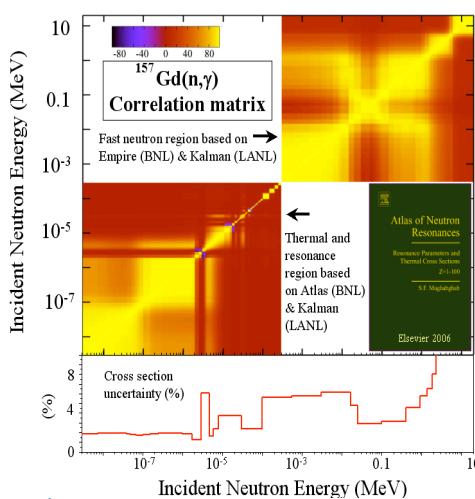
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## Covariances: full energy range capacity of EMPIRE



### BNL methodology

- Resonance region
  - Atlas of Neutron Resonances - parameters and uncertainties for 381 isotopes
  - Adjustment to thermal uncertainties with Kalman filter
  - Resonance module to produces MF32
- Fast neutron region
  - RIPL library of model parameters
  - EMPIRE code calculates sensitivity of cross sections to the parameters
  - KALMAN code propagates parameter uncertainties onto cross sections and combines them with the experiment
  - MF33 is produced



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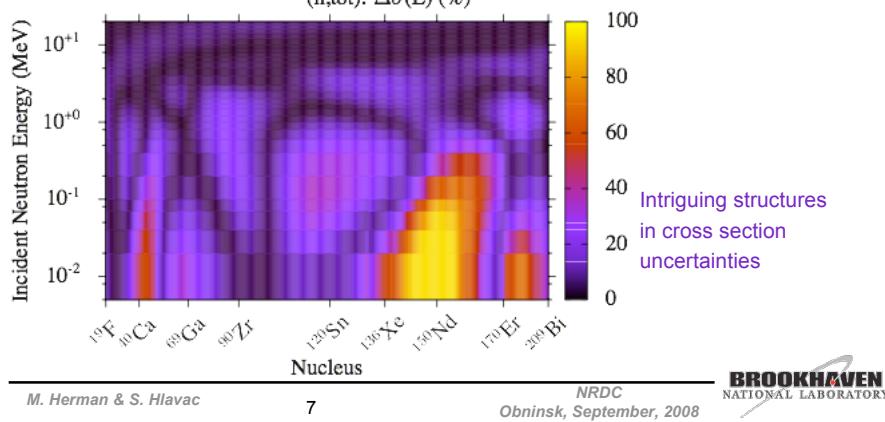
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## Covariances: 'low-fidelity' project

- Simple estimates of cross section covariance data generated at NNDC and LANL for **all materials** in the neutron sublibrary of ENDF/B-VII.0
- Energy range of 5 keV - 20 MeV (M. Williams, ORNL, estimates below)



Organized by NNDC (Oblozinsky, Songzoni, Herman)



### Topics

- Covariance evaluation methodology
- Recent covariance evaluations
- User's perspective

### Results

- The strong interaction between data producer and data user communities
- Great progress in developing and applying new evaluation methodologies
- Newer evaluations are including covariances

Proceedings to be published in Nucl. Data Sheets, December 2008 (35 papers, about 200 pages)

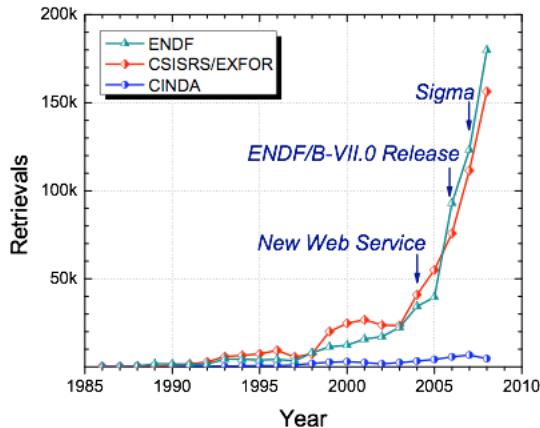
Oral talks: 35 Posters: 8



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# NNDC reaction data services

## Nuclear Reaction Web Services at NNDC



- Strong increase for ENDF and CSISRS/EXFOR (~35% in FY2008)
- CINDA is marginal
- Comparable number of retrievals for ENDF and EXFOR
- New products boost retrievals
- Total number of retrievals from NNDC databases = 1.8M in FY2008



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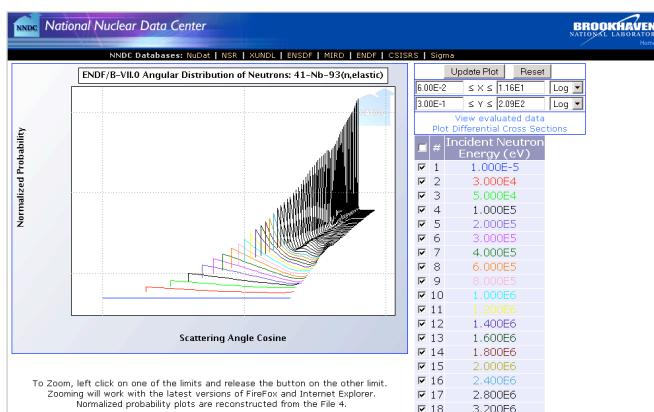
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## SIGMA: new ENDF retrieval & plotting system

Developed by A. Songzoni and B. Pritychenko (NNDC)



Recent release April 2008

- Plots of angular distributions



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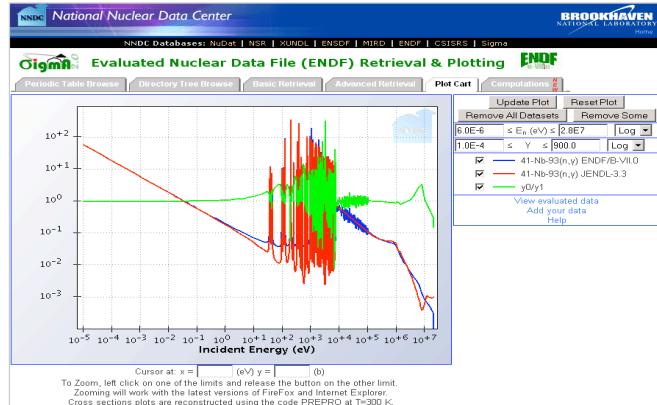
Recent release April 2008

- Plots of angular distributions
- Plots of neutron and photon spectra (ENDVER package)



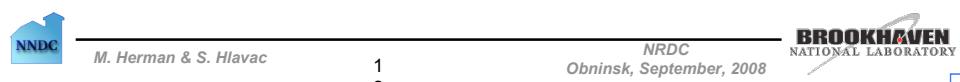
# SIGMA: new ENDF retrieval & plotting system

Developed by A. Songzoni and B. Pritychenko (NNDC)



Recent release April 2008

- Plots of angular distributions
- Plots of neutron and photon spectra (ENDVER package)
- Mathematical operations on MF3



## EXFOR compilation at NNDC

- NNDC EXFOR compiler has not been replaced with a permanent staff member
- Compilation effort outsourced
  - Stanislav Hlavac (Institute of Physics, Slovak Academy of Sciences, Bratislava, Slovakia) compiles EXFOR entries since Nov. 1, 2007
  - Otto Schwerer, (retired from NDS, IAEA, Vienna, Austria) reviews new entries since April 1, 2008
- NNDC is planning to follow this arrangement for the next few years



## CSISRS/EXFOR data compilation at NNDC 2007/2008

- Staff
  - S. Hlavac from Nov. 1 2007 (compilation)
  - O. Schwerer from April 1, 2008 (checking, consulting)
  - Additional help from NNDC, IAEA NDS
- Compilation
  - EXFOR editor, standard editor for editing entries
  - Gsys2.2 used for digitalization of data in figures
- Papers compiled
  - Recent publications
  - Old publications



## Number of compilations

Incident participant	TRANS/PRELIM	No. of Entries	No. of Subentries
N	Trans.1345	4	38
N	Trans.1346	6	138
N	Trans.1346	3	41
N	Trans.1346	5	27
N	Prelim.1349	4	23
N	(Prelim.1350)	9	49
<b>N</b>	<b>Subtotal</b>	<b>31</b>	<b>316</b>
CP	Trans.c082	5	15
CP	Trans.c083	6	37
CP	Trans.c084	10	72
CP	Trans.c085	6	68
CP	Trans.c086	11	156
CP	Trans.c087	8	109
CP	Prelim.c088	17	160
CP	(Prelim.c089)	7	105
<b>CP</b>	<b>Subtotal</b>	<b>70</b>	<b>722</b>
G	Prelim.L011	2	6
G	(Prelim.L012)	1	12
<b>G</b>	<b>Subtotal</b>	<b>3</b>	<b>18</b>
	<b>TOTAL</b>	<b>104</b>	<b>1056</b>

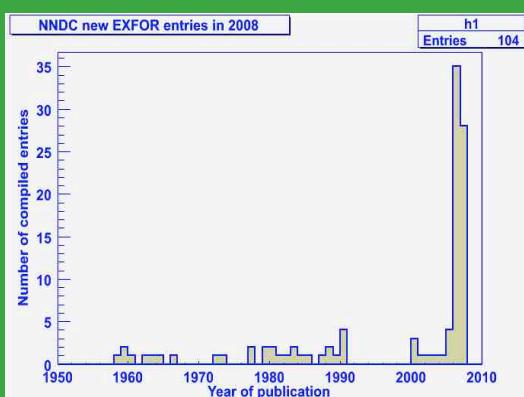


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## Year of experimental data publication



Approximately 1/3 of compiled entries were published before 2007



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## Comparison with previous period

Reaction	2006/7	2007/8
(*,*)	145	104
(n,*)	36	31
(p,*)	30	18
(d,*)	23	7
(a,*)	13	9
(He3,*)	7	10
(t,*)	4	2
(H1,*)	32	24
(g,*)	0	3
No of subentries	638	1056
No of digitized subs		621



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