

IAEA-NDS Nuclear Reaction Databases and Services

Viktor Zerkin

International Atomic Energy Agency, Nuclear Data Section

Topics:

1. Nuclear reaction databases and software system.
Overview
2. Introduction to EXFOR-ENDF Web database retrieval system
3. Flexible ENDF database explorer
4. IBANDL Web system
5. EXFOR data re-normalization system
6. Inverse reactions and inverse kinematics in EXFOR and IBANDL
7. Uploading your experimental data
8. Plotting on Web with Web-ZVView
9. Not covered topics

Nuclear Reaction Database and Software Systems Overview



International Atomic Energy Agency

Nuclear Data Services

Provided by the Nuclear Data Section

Our Internet Address

<http://www-nds.iaea.org>

Our Postal Address:

Nuclear Data Section,
International Atomic Energy Agency
Vienna International Centre,
P.O. Box 100, A-1400 Vienna,
Austria

Nuclear Reaction Databases

Database	Contents	Size (2003)	Size (2018)
EXFOR	contains experimental nuclear reaction data for incident neutrons, charged particles and photons	13,500 Entries 97,000 Data sets 400 Mb ASCII-text	22,294 Entries 169,989 Data sets 752 Mb ASCII-text
ENDF	collection of evaluated data libraries containing cross sections, spectra, angular distributions, fission product yields, photo-atomic and thermal scattering law data	~300 Mb ASCII 5 basic libraries	>250 Gb ASCII 58 libraries
CINDA	contains bibliographical references to experimental and evaluated nuclear reaction data, and to calculations, reviews, compilations of nuclear data.	266,000 Lines 40,500 publications 32,500 Blocks 37 Mb ASCII-text	577,219 Lines 94,100 publications 294,302 Blocks 112 Mb ASCII-text
IBANDL	Ion Beam Analysis Nuclear Data Library of experimental differential cross-sections	615 Datasets 1.9 Mb	3,690 Datasets 16 Mb ASCII-text

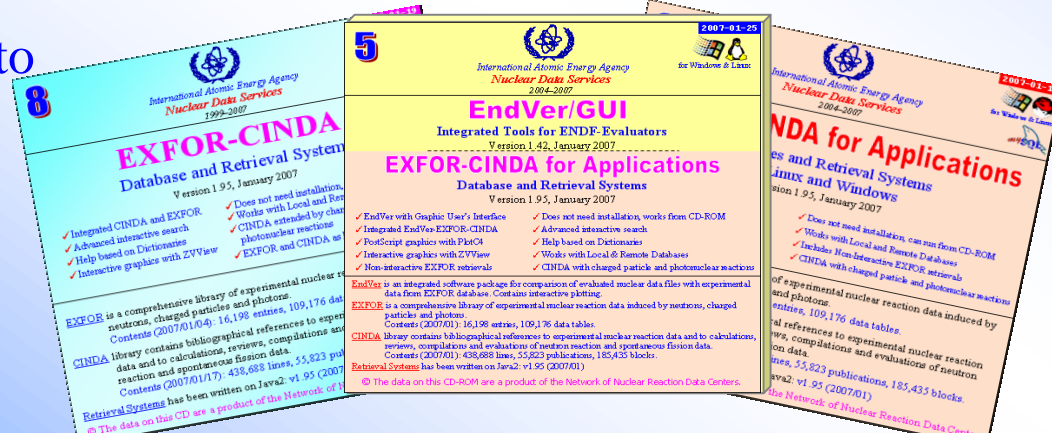
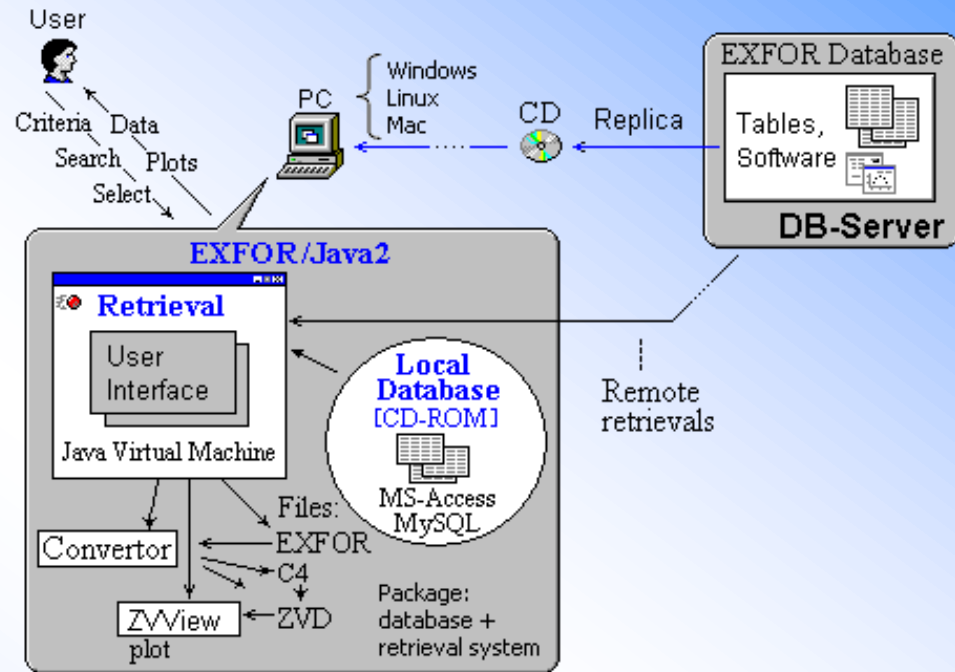
Basic principals of the IAEA-NDS nuclear databases and software systems

- **Maximum of platform independency**
 - operating systems: Linux, Windows, Mac
 - relational databases (MySQL, Access, SyBase, etc.)
 - programming languages: Java, SQL, Javascript, C, Fortran
- **Free of charge system components**
 - Linux, Apache, Tomcat, MariaDB
- **Full integration of components**
 - no installation (CD-ROM, Web, individual programs)
 - automatic configuration of Web-Servlets and scripts
 - encapsulated graphics

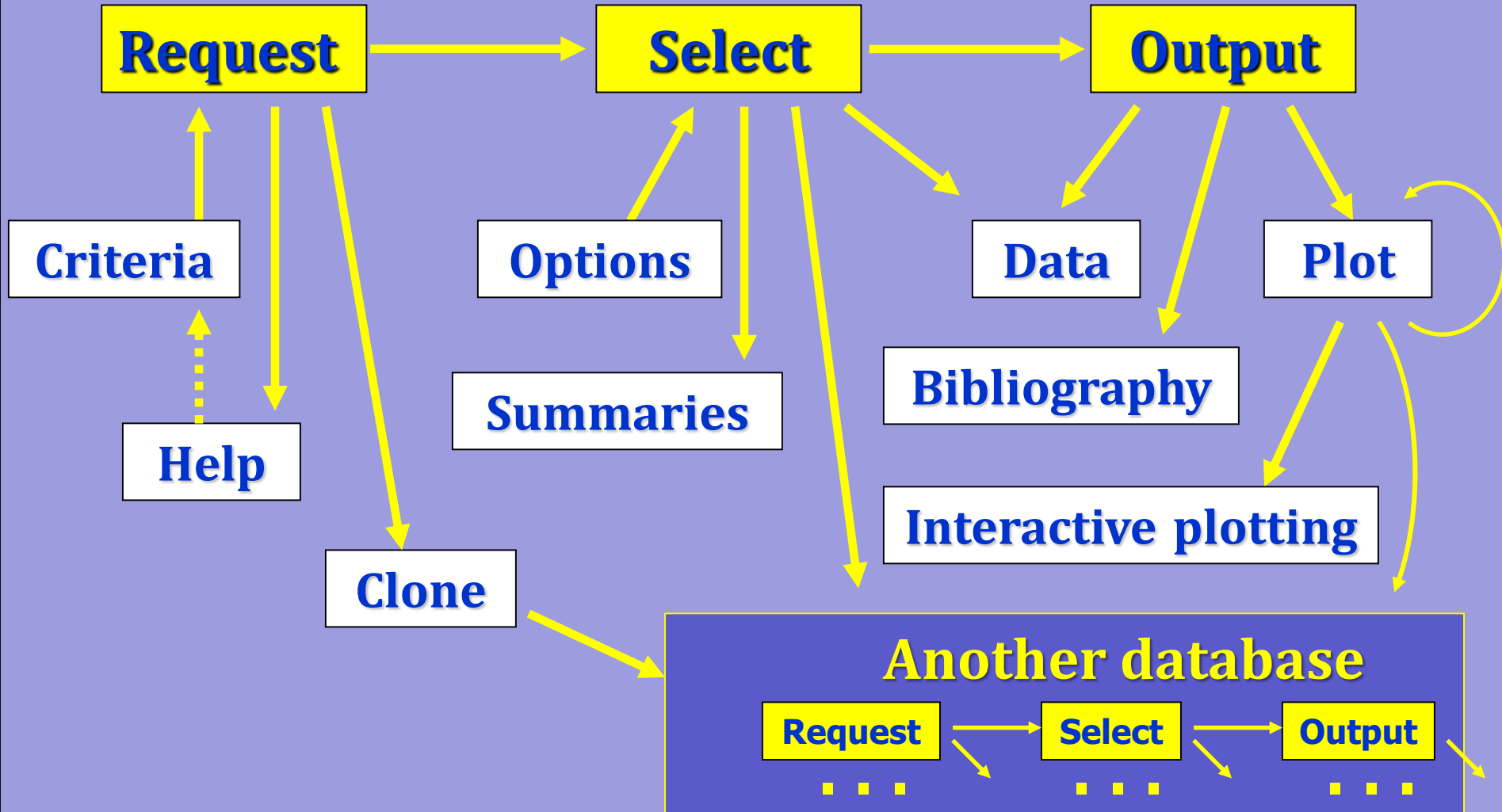
NDS CD-ROM Database Retrieval Systems

/since 2003/

- Full database on your PC
- For Windows, Linux and Mac
- Does not need installation
- Can run from CD-ROM (database server and Java JVM running from CD)
- Can work with remote databases
- Integrated EXFOR and CINDA
- Help with Dictionaries
- Advanced search (+users' SQL)
- Interactive plotting with ZVView
- EndVer/GUI with integrated PrePro and EXFOR
- Includes non-interactive retrievals to build new user's applications
- Used by Applications: Empire, EndVer, GANDR, expandable...
- Nowadays updated once per year



Retrieval system: main stream of users' interactions



Web interface

1. Intuitive

2. Suitable for beginners and ND professionals

3. Alternative interfaces

4. Non-trivial operations are described in:

- a) Documentation

- b) Examples

- c) News, software history, how-to, FAQ pages

- d) Video-Guides

Introduction to EXFOR-ENDF Web database retrieval system

EXFOR: library, database, retrieval systems

Experimental data in exchange format

- **1970** agreed format and established exchange between USA, NEA, IAEA, USSR
- contains data from **~22,300** experiments
- **NRDC**: 13 nuclear data centres compile ~500 new Entries every year
- since 2005: global library with central maintenance in the IAEA (NDS)
- Master File (750Mb), 52 Dictionaries, 2 Manuals (400 pages)
- Distribution to users: EXFOR, X4+, C4, XML, Html, plots
- Assess via: Web, CD/DVD ROM, FTP
- Databases DBMS: MySQL, MS-Access, SyBase
- Software: C, Java (GUI-Applications, Web-Servlets), Fortran
- Connection to other databases ENDF, CINDA, NSR, IBANDL: import-export data, common plotting, links, cross-search

```

ENTRY          41323    20050902
SUBENT         41323001  20050902
BIB            7        12
INSTITUTE      (4RUSMIF)
REFERENCE      (J,AE,50,(5),350,198105) M
               (J,SJA,50,325,1981) ENGLI
AUTHOR         (V.E.ZHITAREV,A.M.MOTORIN,
TITLE          .INTERACTION CROSS SECTION
               WITH COLD NEUTRONS
FACILITY       (REAC)
ERR-ANALYS    (EN-ERR)  WAVE-LENGTH RES
               TIMES 100 (IN P
HISTORY        (19981121C) + + COMPILED
               (20050902A) . . Correcte
               Data-heading
ENDBIB         12
COMMON         3        3
EN-ERR         TEMP      TEMP-ERR
PER-CENT       DEG-C     DEG-C
               3.        3.
ENDCOMMON      3
ENDSUBENT      19
SUBENT         41323002  20050902
BIB            5        8
REACTION       (13-AL-27(N,TOT),,SIG)
SAMPLE         .ALUMINIUM MONOCRYSTAL, PU
               96 MM, DENSITY 2.70 GRAM/
               MACROCRISTALLINE ALUMINIU
               THICKNESS 50 MM, DENSITY
ERR-ANALYS    (DATA-ERR) NO INFORMATION
STATUS         (TABLE)  DATA ARE TAKEN FR
HISTORY        (19981121T) + + CONVERTED
ENDBIB         8
NOCOMMON       0        0
DATA           3        8
WVE-LN        DATA     DATA-ERR
ANGSTROM      B         B
1.3000E+01  1.9300E+00  1.3000E-01
1.4000E+01  2.1200E+00  9.0000E-02
1.5000E+01  2.2500E+00  8.0000E-02
1.6000E+01  2.3800E+00  7.0000E-02
1.7000E+01  2.5400E+00  6.0000E-02
1.8000E+01  2.6100E+00  6.0000E-02
1.9000E+01  2.8200E+00  8.0000E-02
2.0000E+01  3.1500E+00  6.0000E-02
ENDDATA       10
ENDSUBENT     23
ENDENTRY      2

```

```

ENTRY          41323    20050902
SUBENT         41323001  20050902
BIB            7        12
INSTITUTE      (4RUSMIF)
REFERENCE      (J,AE,50,(5),350,198105) MAIN REFERENCE, DATA ARE GIVEN
               (J,SJA,50,325,1981) ENGLISH TRANSLATION
AUTHOR         (V.E.ZHITAREV,A.M.MOTORIN,S.B.STEPANOV)
TITLE          .INTERACTION CROSS SECTIONS OF CERTAIN METALS
               WITH COLD NEUTRONS
FACILITY       (REAC)
ERR-ANALYS    (EN-ERR)  WAVE-LENGTH RESOLUTION DELTA-LAMBDA/LAMBDA
               TIMES 100 (IN PERCENT)
HISTORY        (19981121C) + + COMPILED AT THE CJD + +
               (20050902A) . . Corrected at the CJD + +
               Data-heading "EN" changed to "WVE-LN"
ENDBIB         12
COMMON         3        3
EN-ERR         TEMP      TEMP-ERR
PER-CENT       DEG-C     DEG-C
               3.        3.
ENDCOMMON      3
ENDSUBENT      19
SUBENT         41323002  20050902
BIB            5        8
REACTION       (13-AL-27(N,TOT),,SIG)
SAMPLE         .ALUMINIUM MONOCRYSTAL, PURITY 99.99 PC, THICKNESS
               96 MM, DENSITY 2.70 GRAM/CM3 AND
               MACROCRISTALLINE ALUMINIUM, PURITY 99.99 PC,
               THICKNESS 50 MM, DENSITY 2.70 GRAM/CM3
ERR-ANALYS    (DATA-ERR) NO INFORMATION GIVEN
STATUS         (TABLE)  DATA ARE TAKEN FROM TABLE 1 OF MAIN REF.
HISTORY        (19981121T) + + CONVERTED FROM SUBENT 88023002
ENDBIB         8
NOCOMMON       0        0
DATA           3        8
WVE-LN        DATA     DATA-ERR
ANGSTROM      B         B
1.3000E+01  1.9300E+00  1.3000E-01
1.4000E+01  2.1200E+00  9.0000E-02
1.5000E+01  2.2500E+00  8.0000E-02
1.6000E+01  2.3800E+00  7.0000E-02
1.7000E+01  2.5400E+00  6.0000E-02
1.8000E+01  2.6100E+00  6.0000E-02
1.9000E+01  2.8200E+00  8.0000E-02
2.0000E+01  3.1500E+00  6.0000E-02
ENDDATA       10
ENDSUBENT     23
ENDENTRY      2

```


EXFOR Request Form

Help » Manual PDF Lexfor NNDC-Help Output Plot+ R33 Databases » ENDF CINDA IBANDL CD-ROM » EXFOR-CINDA CD-Catalog



Experimental Nuclear Reaction Data (EXFOR) Database Version of 2018-10-12



Software Version of 2018-10-12

The EXFOR library contains an extensive compilation of experimental nuclear reaction data. Neutron reactions have been compiled systematically since the discovery of the neutron, while charged particle and photon reactions have been covered less extensively. The EXFOR library contains data from 22294 experiments (see [statistics](#) and recent database [updates](#)).

EXFOR Reference Paper: Nucl. Data Sheets 120(2014)272

EXFOR Web Database & Tools Paper: NIM A 888 (2018) 31. Mirror-sites

Examples, Help,
Dynamic sections

Search: Go ?

Examples of requests: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#)...

[1](#) Cross section $\sigma(E)$ /updates/ More examples...

Go to: [\[upload your data\]](#)

Options

- ☒ Exclude superseded data
- ☐ No reaction combinations (ratios,...)
- ☐ Exclude evaluated data
- ☐ Enhanced search of Products
- ☐ retrieve listing only
- ☐ disable Prompt-Help
- by: ☐ reaction ☐ publication
- W: ☐ basic ☒ extended

Plotting. See also: [\[video-guide\]](#)

Text search
(~google)

Request

Submit

Reset

Help

Target ☒ Al-27

Reaction ☒ n,tot

Quantity ☒ CS

Product ☐ Na-2

Energy from ☐

Author(s) ☐ Gree

Publication year ☐ 1970

Last modified ☐ 2 year

Accession # ☐ 1050

13-Aluminum ☒ Element → Isotope [\[Disable me\]](#)

1 H	2 He	3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	19 K	20 Ca
21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn
31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	37 Rb	38 Sr	39 Y	40 Zr
41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn
51 Sb	52 Te	53 I	54 Xe	55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd
61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg
81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	87 Fr	88 Ra	89 Ac	90 Th
91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm
101 Md	102 No	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds
111 Rg	112 Uu	113 Uut	114 Uuq	115 Uup	116 Uub	117 Uuh	118 Uuo	119 Uut	120 Uuq

Extended

Keywords

Expert

Submit

Reset

CINDA

ENDF

More Web Tools

Important:

- More examples,
- Software/History

Note:

- all criteria are optional (selected by checking ☒)
- selected criteria are combined for search with logical AND
- criteria separated in a field by ";" are combined with logical OR
- criteria starting with "^" will be used as logical NOT
- wildcards (*) and intervals (..) are available

EXFOR Request Form. Examples

⤴ Examples of requests: [1](#)[2](#)[3](#)[4](#)[5](#)[6](#)[7](#)...

[Less examples...](#)

- [1](#) Cross section $\sigma(E)$ [/updates/](#)
- [2](#) Angular distributions $d\sigma/d\Omega$
- [3](#) Emission spectra $d\sigma/dE_{out}$
- [4](#) Double differential cross section $d^2\sigma/d\Omega/dE_{out}$
- [5](#) Corrections data from EXFOR [Ex.1](#) [ZK1](#) [ZK2](#) [AT1](#) [RC1](#)
- [6](#) Search by outgoing particles: [\[\$\alpha+\gamma\$ \]](#) [P,XG](#) [\(P,XG\),DA](#)
- [6+](#) Search data for IBANDL: $^{12}\text{C}(\alpha,\alpha)^{12}\text{C}$, $\theta=167^\circ$
- [7](#) Enhanced search by product with filtering product coded as ELEM/MASS for quick plot
- [8](#) Search by wildcards in full reaction code
- [9](#) Ratios converted to cross sections (C4)
- [10](#) NUBAR: average number of neutrons per fission [PR](#) [DL](#) [^DL](#)
- [11](#) Constructing a covariance matrix from EXFOR uncertainties
- [12](#) Extended listing of references (authors, title, DOI, NSR, Web)
- [13](#) EXFOR - CINDA sequential search [N,F](#)
- [14](#) Automatic re-normalization (output data and plots); [\$^{55}\text{Mn}\(n,g\)\$](#)
- [15](#) Find data: [digitized] [from plots](#), [not digitized], [from table]
[experimental data only] [not empty datasets] [empty]
- [16](#) Search by authors using aliases [Ex.2](#)
- [17](#) Fission spectra [b](#) Thick target neutron spectra
[c](#) Delayed neutrons [d](#) Kerma factor
- [18](#) Invert reaction using detailed balance $^{13}\text{C}(\alpha,n)^{16}\text{O} \rightarrow ^{16}\text{O}(n,\alpha)^{13}\text{C}$: [\$\sigma\$](#) [d \$\sigma\$ /d \$\Omega\$](#)
[Ex.2](#): $^3\text{He}(d,p)^4\text{He} \rightarrow ^4\text{He}(p,d)^3\text{He}$ [d \$\sigma\$ /d \$\Omega\$](#) [plot]
- [19](#) Various fission quantities: [a](#) Yield (chain, primary FF, secondary FF)
[b](#) Cumulative yield of ^{147}Nd [c](#) Total kinetic energy
[d](#) Multiplicity of prompt fission neutrons
- [20](#) Plotting cross section coded with SF8=DAM; [all](#)

EXFOR Request Form. News & History

Software Version of 2018-10-12

News

2017/01 **New.** Web-ZVView plots: affine transformations (PS/EPS) [how-to], distortion picture using 2D-calibration [how-to]
2016/11 Plotting without grouping by reaction-codes (+ calculating CS ratios between diff. datasets on the fly) [example]
2016/11 Plotting cross section coded with SF8=DAM (CS divided by atomic mass of target) [example] #Adv.plot using C5
2016/11 Recalculation of angular distributions to inverse kinematics (when converting EXFOR→R33) [example] [how-to]

[History]

2016/09 **New.** Mirror-site in Russia: <http://www.nds.atomstandard.ru/exfor/>
2016/03 **New.** Upload your data for constructing covariance matrix, calculating inverse reaction cross sections, etc. [page]
2016/02 Output links to NSR and Web publication for secondary references of an Entry
2016/01 **New.** Display original publication of the IAEA INDC Reports (in PDF format)
2015/03 **New.** Inverting reaction data using detailed balance. Example: $^{13}\text{C}(\alpha,n)^{16}\text{O} \rightarrow ^{16}\text{O}(n,\alpha)^{13}\text{C}$ See: [how-to]
2014/12 **New.** Text search in extended EXFOR [instructions/examples] See: [concept], [how-to]
2014/07 **New.** Database of expert's corrections to EXFOR data on Web. Examples: Fe-54(n,p); Mn-55(n,2n), (n,g)
2014/02 Universal X4Plot with arbitrary selection and grouping columns (use: "Sort by: reaction" and "View: extended") [how-to]
2014/02 New version (v2) of XML output format [about]
2013/05 **EXFOR Milestone:** 20,000 experimental works are now in the database!
2013/01 Collection of video-guides to EXFOR-ENDF database Web retrieval system: [page]
2012/11 Searching data compiled: [digitizing] plots, [not digitized], given [in tables]
2012/10 New plotting regime: switch display of data to display of ratios on the fly [video]
2012/07 Sort by publications with extended view [example]
2012/07 Searching reactions: n,xp; p,xg, etc. [example]
2012/02 Improvements and extensions:
 1) Automatic data re-normalization (optional: for plots and output data only) [video]
 2) Web-ZVView plotting: clipboard copy/paste
2011/12 Search in CINDA (+NSR) if data not found in EXFOR
2011/10 Web-ZVView plotting: output PS and PDF files
2011/09 EXFOR to XML; interpretation EXFOR-XML to HTML using XLS [xml] [html] [example]
2011/06 Software development:
 1) Interactive Web-constructing a covariance matrix from EXFOR uncertainties [doc]
 2) Output to C5 computational format (C5 = C4 + statistical and systematic uncertainties)
2011/05 Improvements and extensions:
 1) Search by DOI and NSR-KeyNo (Extended mode)
 2) Search by Keyword MONITOR
 3) Search by DatasetID (SubentPointer)
2011/01 Improvements and extensions:
 1) Search for recently updated data (Extended mode: Last modified)
 2) Display titles of original articles (imported from NSR) when data "Sorted by Publications"

News/history with:
examples, how-to
instructions,
documentation

2010/08 Improvements and extensions:
1) Display range of products when coded as ELEM/MASS [\[example\]](#)
2) Display range of angles and secondary-energies on the "Data Selection" page

2010/02 Improvements and extensions:
1) Production of isotopes coded as ELEM/MASS: filtering and quick [\[plot\]](#) , sorting T4 [\[t4\]](#) [\[t4x\]](#)
2) Users' definition of ENDF:MF/MT for conversion EXFOR data to format C4 and advanced plotting
3) Search by compiling Center-ID (expert mode)
4) Search by outgoing particle coded in SF3,4,7 (expert mode)

2009/12 Improvements and extensions:
1) Correction of experimental data in computational formats [\[doc\]](#)

2009/07 Improvements and extensions:
1) Extended using plotting program ZVView via Web [\[about\]](#)

2009/02 Improvements and extensions:
1) New output format X4±: EXFOR interpreted-interactive-tree [\[about\]](#) [\[example\]](#)

2008/12 Improvements and extensions:
1) Advanced plot: ratios, ratios converted to cross sections using [\[IAEA-2006 Standards\]](#) [\[test\]](#)
2) Dynamic request page combining Standard, Extended and Advanced requests in one page
3) Prompt-Help system [\[page\]](#)
4) Extensions on Selection-page and EXFOR+: search by Author, Reaction, ENTRY
5) Search by full reaction code and Trans-ID (for experts only)
6) Video guide (test): how to plot EXFOR-ENDF double differential cross-sections [\[page\]](#)

2008/10 **Common NRDC EXFOR Web Service:** [\[IAEA-NDS\]](#) (conclusion of NRDC-2008 meeting)

2008/06 Improvements and extensions:
1) Search by data heading, units, points (in Advanced mode only)
2) New type of request: listing of experimental works

2008/04 Search by Title (in Extended and Advanced modes only)

2008/01 Software development:
1) Handling "Large" requests [\[about\]](#)
2) Conversion: EXFOR -> R33/IBANDL (β-version); [\[about\]](#)[\[algorithm\]](#)

2007/11 Improvements/extensions:
1) General EXFOR Statistics [\[example\]](#)
2) Bibliography (Html and BibTeX) is improved; use link to NSR and Web journals; [\[example\]](#)
3) Output in R33/IBANDL format: version-1

2007/05 Output in R33/IBANDL format: angular distributions; includes plotting; version-0

2007/03 Interactive **Web plotting: zoom by mouse**, actions by one click, more functions...

2007/01 Improved request page of Web interface (dark non-active criteria, move focus...)

2006/10 **EXFOR+**: Extended EXFOR [\[example\]](#)[\[about\]](#)

2006/10 **BibTeX** output: Bibliography for LaTeX [\[example\]](#)[\[about\]](#)

2006/08 **Extended plotting**: experimental vs. evaluated data [\[example\]](#)[\[how-to\]](#)
1. Cross sections with errors of evaluated data CS => MF3+MF33
2. Differential cross section with respect to angle DA => MF4
3. Energy spectrum of outgoing particles DE => MF5
4. Double differential cross section DAE => MF6
5. Average number of neutrons per fission (nubar) MFQ => MF1

2005/11 Submit your data for compilation to the database [\[here\]](#)

2005/06 **Global EXFOR Master File !**

2005/03 Direct link to Web-Journals

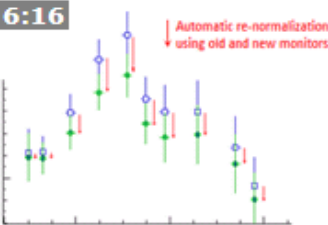
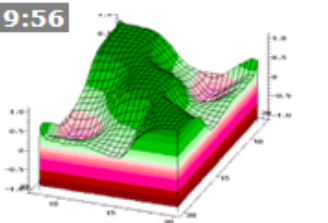
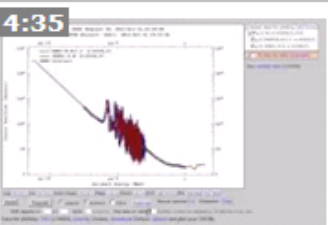
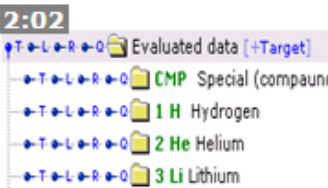
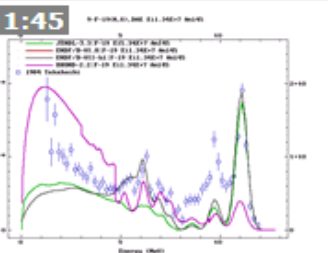
2004/06 Clone your EXFOR request to CINDA and ENDF

News/history with:
examples, how-to
instructions,
documentation

Video-guide

by V.Zerkin, IAEA-NDS, 29-Jan-2013

How-to for EXFOR-ENDF Database Web Retrieval System

2013.01.28	[Page] [MP4] [YouTube]		Automatic re-normalization of EXFOR data under Web retrieval system by V.Zerkin <i>How to renormalize experimental nuclear data from EXFOR database using NDS Web retrieval system.</i>
2013.01.25	[Page] [MP4] [YouTube]		Display covariance data from ENDF libraries with Web-ZVView by V.Zerkin <i>How to plot and compare covariances of evaluated nuclear data using ENDF Web database retrieval system with plotting package Web-ZVView</i>
2012.10.31	[Page] [MP4] [YouTube]		Plot and compare nuclear data using normalization regime of Web-ZVView plotting package by V.Zerkin <i>How to plot and compare experimental and evaluated nuclear data using normalization regime of Web-ZVView plotting package.</i>
2008.09.10	[Page]		Using Flexible ENDF-database Explorer by V.Zerkin <i>How to search, retrieve and plot ENDF-EXFOR cross-sections data using Flexible ENDF Explorer.</i> <i>See also: [help-page]</i>
2008.08.09	[Page]		Plot EXFOR-ENDF double differential cross-sections by V.Zerkin <i>How to retrieve and plot comparable EXFOR-ENDF double differential cross-sections using Web-ZVView plotting package.</i>

Submit

Activates search and display

EXFOR Select Form

Retrieve: go to the next step

Output options

Go to NSR

Select Datasets

Search by Reaction

Search by Author

Go to Web - journal

Get data in various formats

Request #56068
Results: Reactions: 9 Datasets: 144

Data Selection

☒ Selected ☐ Unselected ☐ All

Output: ☒ EXFOR ☐ EXFOR+ ☒ Bibliography ☐ TAB ☒ C4 ☐ PlotC4

Plot: ☒ Quick-plot (cross-sections only) ☐ Advanced plot [how-to]

Narrow Energy (optional), eV: Min: Max:

☒ Advanced

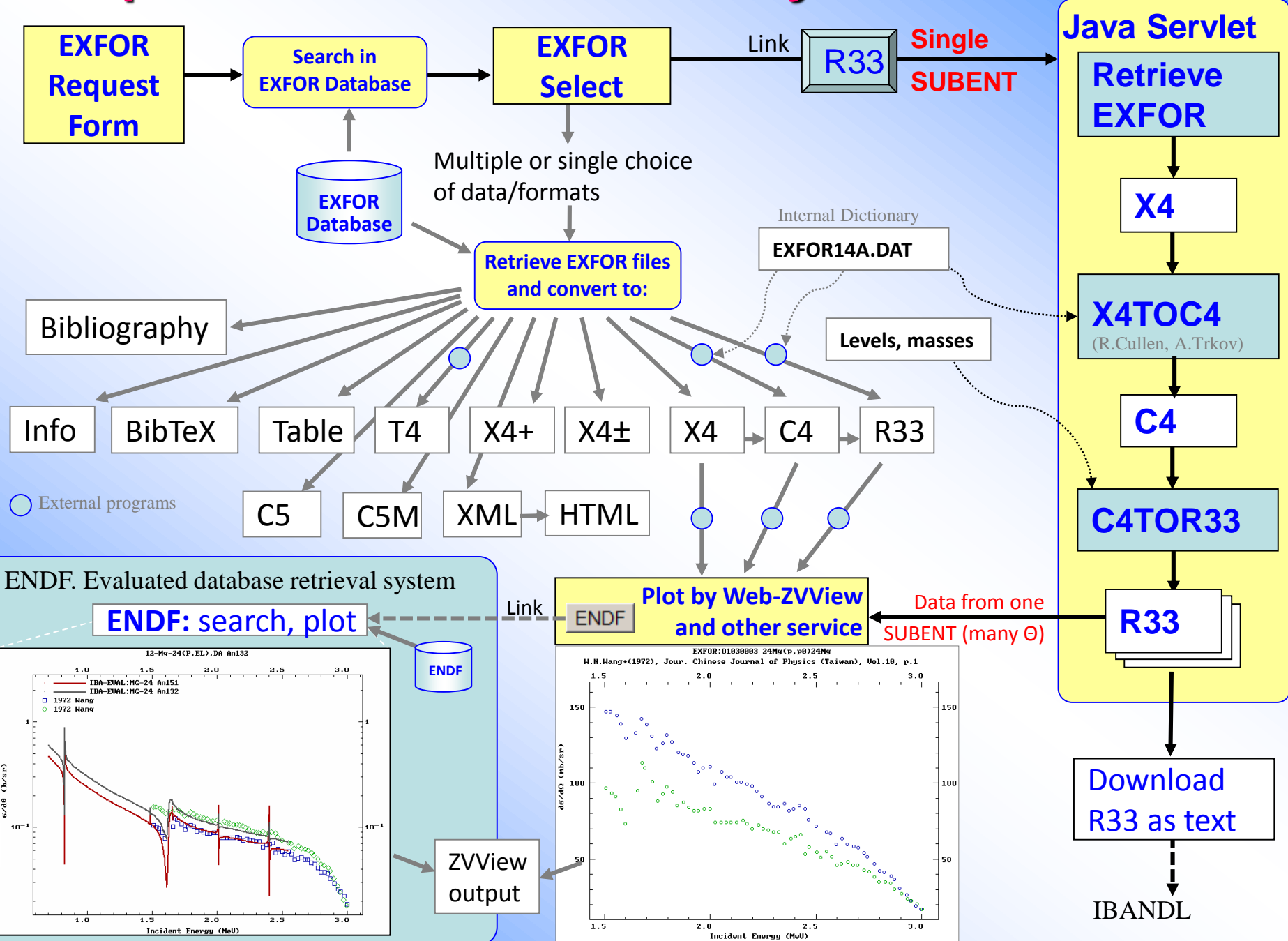
n	Display	Year	Author-1	Energy range,eV	Points	Reference	Accession#P	NSR-Key
1)	Info	13-AL-27(N,TOT),,SIG	C4: MF3 MT1					
Quantity: [CS] Cross section								
1	<input type="checkbox"/>	Info	X4 X4+ X4± T4	2009	F.Atchison+	J,NIM/A,608,144,2009	23102002	
2	<input checked="" type="checkbox"/>	Info	X4 X4+ X4± T4	2008	M.Mazari+		30037003	
3	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1994	G.Rohr+	C,94GATLIN,,215,199405	22331004	
4	<input checked="" type="checkbox"/>	Info	X4 X4+ X4± T4	1993	R.W.Finlay+	J,PR/C,47,237,9301	13569008	1993FI01
5	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1991	J.R.Morales+	J,NIM/A,300,312,1991	30764004	1991MO09
6	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1990	L.Koester+	J,ZP/A,337,341,1990	22217010	1990KO34
7	<input checked="" type="checkbox"/>	Info	X4 X4+ X4± T4	1988	J.Franz+	J,NP/A,490,667,88	22117005	1988FR23
8	<input checked="" type="checkbox"/>	Info	X4 X4+ X4± T4	1984	M.Ohkubo	W,OHKUBO,8412	21926003	
9	<input checked="" type="checkbox"/>	Info	X4 X4+ X4± T4				004	
10	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1983	M.S.Gordon+	P,NPL-951,40,8304	12839004	
11	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1981	V.E.Zhitarev+	J,AE,50,(5),350,198105	41323002	
12	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1980	D.C.Larson+	C,80BNL,,277,8007	12882005	
13	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1979	L.Koester+	J,ZP/A,292,(1),95,1979	21660015	1979KO26
14	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1977	R.B.Royer+	J,NIM,145,245,1977	12661004	
15	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1976	D.R.Waymire+	W,WAYMIRE,19761108	20671002	
16	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1975	P.V.R.Murthy+	J,NP/B,92,269,197506	10403005	
17	<input type="checkbox"/>	Info	X4 X4+ X4± T4	1975	G.N.Singh+	J,PR/C,11,1117,197504	10515004	1975SI05

Types of plotting on our Web

- **Quick** plot: EXFOR-ENDF, cross sections (XS) only; XS filtered by product ELEM/MASS in EXFOR
- **Advanced** (Universal) plot: EXFOR-ENDF, MF1,3,4,5,6, using EndVer (A.Trkov); ratios, ratios converted to cross sections, $XS \pm \Delta XS$
- **Native** EXFOR plot: EXFOR only, any quantities
- **Special** ENDF plotting: MF3*MF6:Low=0 by products, MF10, relative uncertainties, XS with uncertainties (MF3+MF33)
- **R33** plot: EXFOR-IBANDL, Web intrerface to IBANDL-SigmaCalc (A.Gurbich, IPPE) data
- **PlotC4** (D.E. Cullen): C4 to PS and PS to PDF
- **Z(X,Y)**: MF33, MF35, MF40; correlation matrix constructed on EXFOR uncertainties
- **MyPlot**: uploaded user's data (input: text columns, arrays, ENDF sections: MF33, MF3+MF33)

Output from EXFOR retrieval system

How it works



EXFOR Output Form

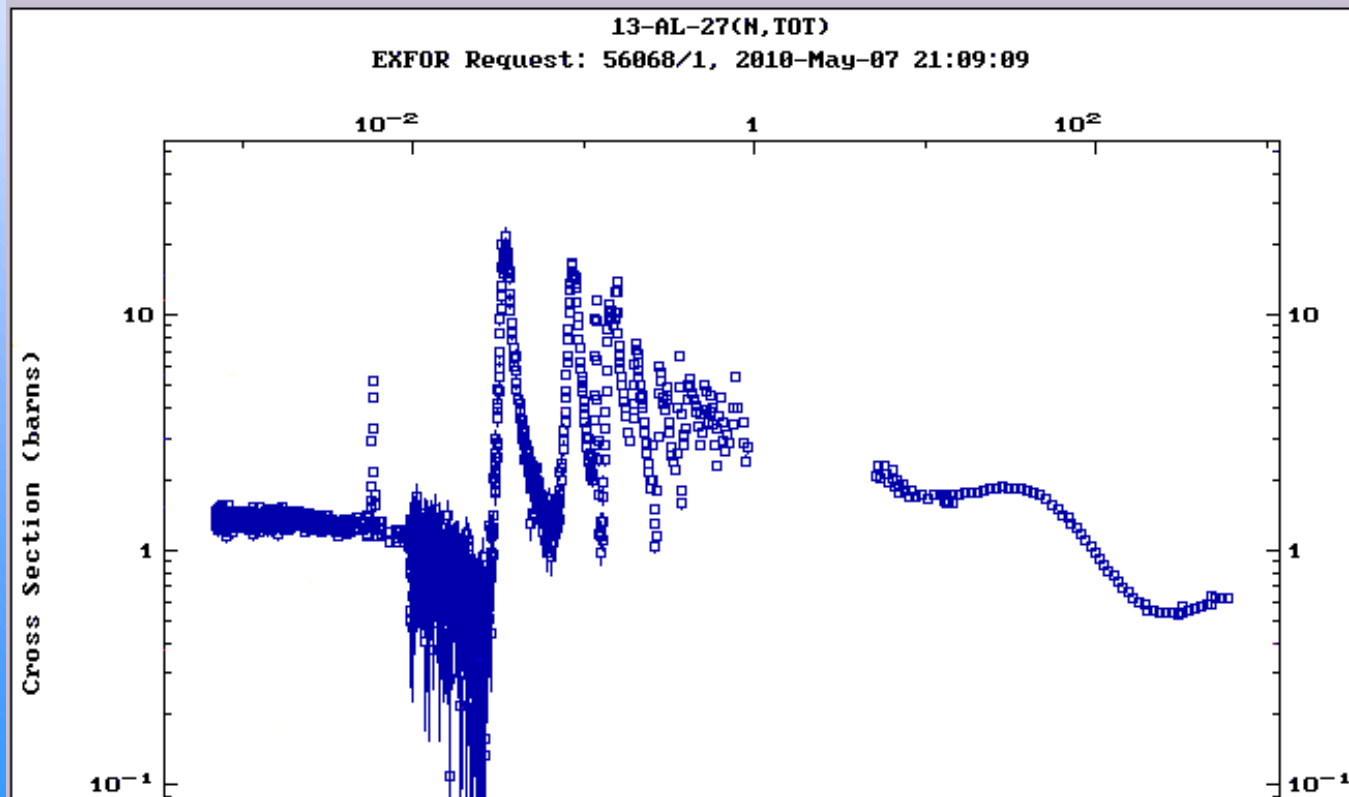
EXFOR Request #56068/1816

Output Data

Format	<u>Data</u> (Size)
EXFOR	Text (212Kb) ZIP (34Kb) Generate: X4±
Bibliography	html (15Kb) BibTeX (5Kb)
Computational	
C4	C4 (315Kb) C4.ZIP (23Kb) LST (99Kb)

Output data

Search similar
evaluated data



ENDF Find and add to the plot
evaluated data

- ☒ 1) 13-AL-27(N,TOT),,SIG
- ☐ 2) Use my data [\[example\]](#)

See: [plotted data](#) (194Kb)

Get plotted
data

ENDF Select Form

Request #102

Plot data

ENDF Data Selection (Plot for EXFOR Request #171)

Retrieve ☒ Plot ☐ Selected ☐ Unselected ☐ All

Plotting options: ☐ Quick plot (cross-sections only: σ)



Sorted by: [Reactions] Reorder by: [Libraries] View: ☒ basic ☐ extended: get MAT, PEN, GND, run Inter. resonance integrals, etc.



1) AL-27(N,TOT),SIG MT=1 MF=3 NSUB=10

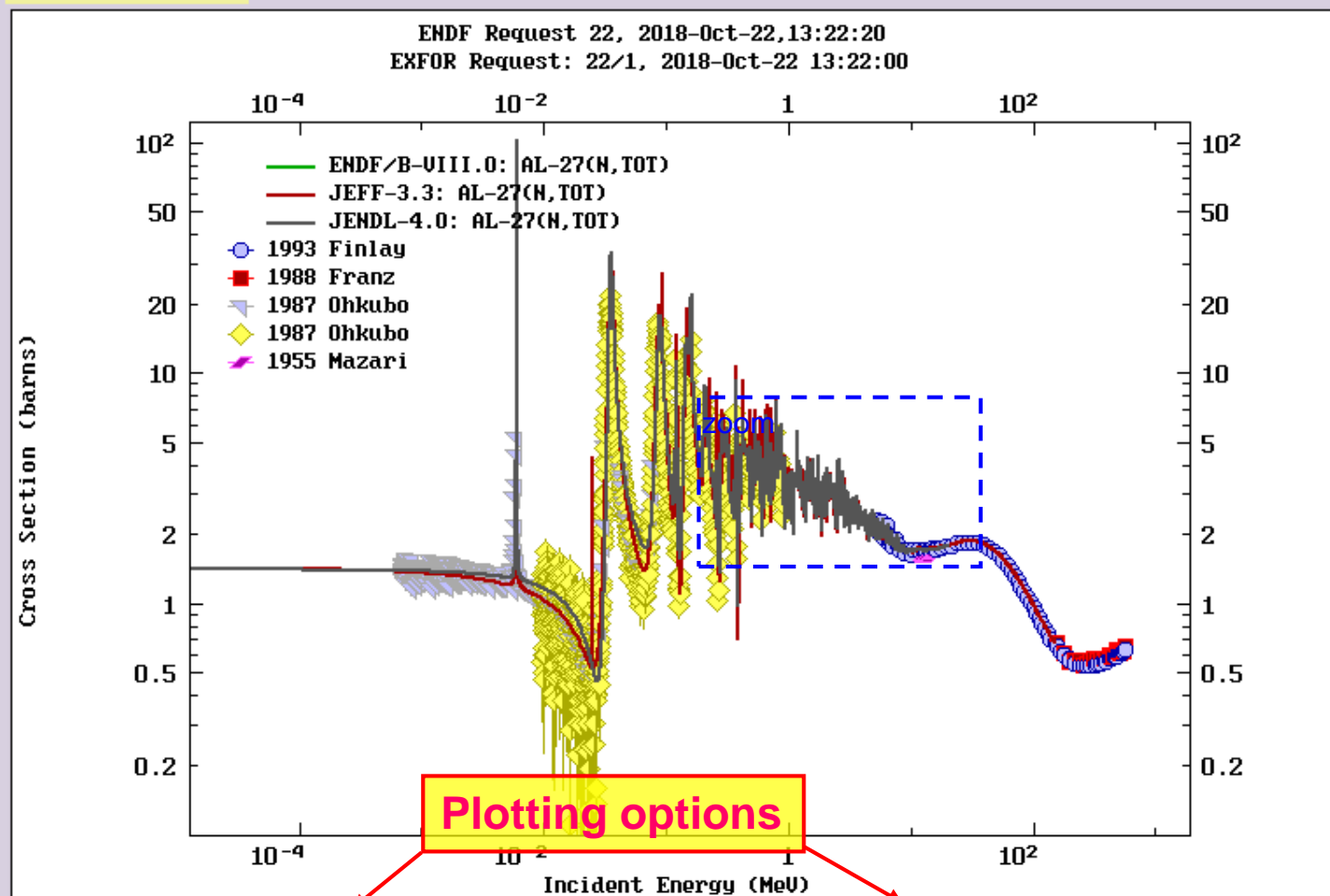
MF3: [SIG] Cross sections MT1: [N,TOT] Neutron total cross sections.

1	<input checked="" type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ENDF/B-VIII.0	E=150MeV Lab=LANL,ORNL Date=20111222	M.B.Chadwick+,Derrien+
2	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ENDF/B-VII.1	E=150MeV Lab=LANL,ORNL Date=20111222	M.B.Chadwick+,Derrien+
3	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ENDF/B-VII.0	E=150MeV Lab=LANL,ORNL Date=DIST-DEC06	M.B.Chadwick+,Derrien+
4	<input checked="" type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEFF-3.3	E=150MeV Lab=LANL Date=20171231	M.B.CHADWICK & P.G.YOUNG
5	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEFF-3.2	E=150MeV Lab=LANL Date=090105	M.B.CHADWICK & P.G.YOUNG
6	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEFF-3.1.2	E=150MeV Lab=LANL Date=090105	M.B.CHADWICK & P.G.YOUNG
7	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEFF-3.1	E=150MeV Lab=LANL Date=090105	M.B.CHADWICK & P.G.YOUNG
8	<input checked="" type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JENDL-4.0	E=20MeV Lab=TIT,JAERI Date=20090828	Y.HARIMA,H.KITAZAWA,T.FUKAHORI
9	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JENDL-3.3	E=20MeV Lab=TIT,JAERI Date=20010713	Y.HARIMA,H.KITAZAWA,T.FUKAHORI
10	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JENDL-3.3	E=20MeV Lab=TIT,JAERI Date=20010713 T=300	Y.HARIMA,H.KITAZAWA,T.FUKAHORI
11	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ENDF/B-VI	E=150MeV Lab=LANL Date=20011108	M.B.CHADWICK & P.G.YOUNG
12	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ENDF/B-VI	E=150MeV Lab=LANL Date=20010926 T=300	M.B.CHADWICK & P.G.YOUNG
13	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	BROND-3.1	E=150MeV Lab=LANL,ORNL Date=DIST-DEC06	M.B.Chadwick+,Derrien+
14	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ROSFOND-2010	E=150MeV Lab=IPPE Date=DIST-DEC07	IGNATYUK A.V.
15	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	ROSFOND-2008	E=150MeV Lab=IPPE Date=DIST-DEC07	IGNATYUK A.V.
16	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	CENDL-3.1	E=20MeV Lab=CNDC,JNDC Date=DIST-DEC09	B.S.YU, S.CHIBA, Y.HARIMA
17	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEFF-3.0	E=150MeV Lab=LANL Date=DIST-APR02	M.B.CHADWICK & P.G.YOUNG
18	<input type="checkbox"/>	ENDF-6	Interpreted	σ	Plot	JEF-2.2	Lab=ECN Date=920101	EC BLANKET TECHNOLOGY, TASK B2

ENDF Output Form with interactive Web ZVView plotting

Select data for plotting

Cross Section



Select data for plotting [all] [none]

- ☒ 1) 13-AL-27(N,TOT),,SIG
 - ☒ 1993 R.W.Finlay, 13569008
 - ☒ 1988 J.Franz, 22117005
 - ☒ 1987 M.Ohkubo 21926004
 - ☒ 1987 M.Ohkubo 21926003
 - ☒ 1955 M.Mazari, 30037003
- ☒ 2) ENDF/B-VIII.0: AL-27(N,TOT)
- ☒ 3) JEFF-3.3: AL-27(N,TOT)
- ☒ 4) JENDL-4.0: AL-27(N,TOT)

☐ 5) Use my data [example]

Columns: x y [dy [dx]]

1.5	2.336	0.384
2	2.788	0.268
2.33	2.96	0.4
2.5	2.399	0.283
3	2.424	0.197
4.04	2.496	0.065
5.06	2.222	0.065
5.5	2.304	0.1659
5.6	2.091	0.055

Type: ☒ Curve ☐ Points

Title: My data

Default: basic units! (eV, barn, etc.)

Multiply by: X: 1e6 Y: 1e-3

☒ Use my control file [init] [help]

See: plotted data (835Kb)

Add your data to the plot

Copy/Paste

Log: XY X Y Lin: XY X Y Auto-range: XY X Y Page: >> << Zoom: <> >> Grid: VH 0 V H Pts: Txt Box PL Print

Reset Repaint ☒ Legend ☒ Authors ☐ Info+ PostScript Plotting options: [+] Clipboard: Copy Paste

Shift legend: x=10 y=10 Split: 0 1:xy;2:y Marker: Plot data or ratio: 0 0:data; 1:ratio to dataset-1; 2:ratio to 2-nd, etc.

Data for plotting: ZVD (783Kb), send to ZVView; download ZVView; upload and plot your ZVD file

Flexible ENDF Database Explorer

Sequential search in ENDF database

Direct data search: fill in a form and submit request


Sequential data search: travel on a database tree /ENDF-Explorer/

ENDF Request Form → ENDF-Explorer

Help » ENDF Format Manual | Plot+ | Databases » Medical | NGAtlas | RIPL | FENDL | IRDF-2002 | IRDFF | EXFOR | CINDA

Evaluated Nuclear Data File (ENDF)

Database Version of March 14, 2014
Software Version of 2014.07.03 Old interface is [\[here\]](#)



News & History

2014/05 New feature of software:
1) Plotting MF35 & MF5: energy distributions of secondary particles with uncertainties and covariances [\[example\]](#) [\[img\]](#)
2014/03 Updated library:
1) [JEFF-3.2](#) Evaluated data library (neutron data), OECD Nuclear Energy Agency, 2014 [\[page\]](#)
2) [IRDFF v-1.03](#) International Reactor Dosimetry and Fusion File (update-2014) [\[page\]](#)

Core nuclear reaction database contain recommended, evaluated cross sections, spectra, angular distributions, fission product yields, photo-atomic and thermal scattering law data, with emphasis on neutron induced reactions. The data were analyzed by experienced nuclear physicists to produce recommended libraries for one of the national nuclear data projects (USA, Europe, Japan, Russia and China). All data are stored in the internationally-adopted ENDF-6 format maintained by CSEWG. See database summary [\[here\]](#).

Standard Request

Examples: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#) [27](#) [28](#) [29](#) [30](#) [31](#) [32](#) [33](#) [34](#) [35](#) [36](#) [37](#) [38](#) [39](#) [40](#) [41](#) [42](#) [43](#) [44](#) [45](#) [46](#) [47](#) [48](#) [49](#) [50](#) [51](#) [52](#) [53](#) [54](#) [55](#) [56](#) [57](#) [58](#) [59](#) [60](#) [61](#) [62](#) [63](#) [64](#) [65](#) [66](#) [67](#) [68](#) [69](#) [70](#) [71](#) [72](#) [73](#) [74](#) [75](#) [76](#) [77](#) [78](#) [79](#) [80](#) [81](#) [82](#) [83](#) [84](#) [85](#) [86](#) [87](#) [88](#) [89](#) [90](#) [91](#) [92](#) [93](#) [94](#) [95](#) [96](#) [97](#) [98](#) [99](#) [100](#) [101](#) [102](#) [103](#) [104](#) [105](#) [106](#) [107](#) [108](#) [109](#) [110](#) [111](#) [112](#) [113](#) [114](#) [115](#) [116](#) [117](#) [118](#) [119](#) [120](#) [121](#) [122](#) [123](#) [124](#) [125](#) [126](#) [127](#) [128](#) [129](#) [130](#) [131](#) [132](#) [133](#) [134](#) [135](#) [136](#) [137](#) [138](#) [139](#) [140](#) [141](#) [142](#) [143](#) [144](#) [145](#) [146](#) [147](#) [148](#) [149](#) [150](#) [151](#) [152](#) [153](#) [154](#) [155](#) [156](#) [157](#) [158](#) [159](#) [160](#) [161](#) [162](#) [163](#) [164](#) [165](#) [166](#) [167](#) [168](#) [169](#) [170](#) [171](#) [172](#) [173](#) [174](#) [175](#) [176](#) [177](#) [178](#) [179](#) [180](#) [181](#) [182](#) [183](#) [184](#) [185](#) [186](#) [187](#) [188](#) [189](#) [190](#) [191](#) [192](#) [193](#) [194](#) [195](#) [196](#) [197](#) [198](#) [199](#) [200](#) [201](#) [202](#) [203](#) [204](#) [205](#) [206](#) [207](#) [208](#) [209](#) [210](#) [211](#) [212](#) [213](#) [214](#) [215](#) [216](#) [217](#) [218](#) [219](#) [220](#) [221](#) [222](#) [223](#) [224](#) [225](#) [226](#) [227](#) [228](#) [229](#) [230](#) [231](#) [232](#) [233](#) [234](#) [235](#) [236](#) [237](#) [238](#) [239](#) [240](#) [241](#) [242](#) [243](#) [244](#) [245](#) [246](#) [247](#) [248](#) [249](#) [250](#) [251](#) [252](#) [253](#) [254](#) [255](#) [256](#) [257](#) [258](#) [259](#) [260](#) [261](#) [262](#) [263](#) [264](#) [265](#) [266](#) [267](#) [268](#) [269](#) [270](#) [271](#) [272](#) [273](#) [274](#) [275](#) [276](#) [277](#) [278](#) [279](#) [280](#) [281](#) [282](#) [283](#) [284](#) [285](#) [286](#) [287](#) [288](#) [289](#) [290](#) [291](#) [292](#) [293](#) [294](#) [295](#) [296](#) [297](#) [298](#) [299](#) [300](#) [301](#) [302](#) [303](#) [304](#) [305](#) [306](#) [307](#) [308](#) [309](#) [310](#) [311](#) [312](#) [313](#) [314](#) [315](#) [316](#) [317](#) [318](#) [319](#) [320](#) [321](#) [322](#) [323](#) [324](#) [325](#) [326](#) [327](#) [328](#) [329](#) [330](#) [331](#) [332](#) [333](#) [334](#) [335](#) [336](#) [337](#) [338](#) [339](#) [340](#) [341](#) [342](#) [343](#) [344](#) [345](#) [346](#) [347](#) [348](#) [349](#) [350](#) [351](#) [352](#) [353](#) [354](#) [355](#) [356](#) [357](#) [358](#) [359](#) [360](#) [361](#) [362](#) [363](#) [364](#) [365](#) [366](#) [367](#) [368](#) [369](#) [370](#) [371](#) [372](#) [373](#) [374](#) [375](#) [376](#) [377](#) [378](#) [379](#) [380](#) [381](#) [382](#) [383](#) [384](#) [385](#) [386](#) [387](#) [388](#) [389](#) [390](#) [391](#) [392](#) [393](#) [394](#) [395](#) [396](#) [397](#) [398](#) [399](#) [400](#) [401](#) [402](#) [403](#) [404](#) [405](#) [406](#) [407](#) [408](#) [409](#) [410](#) [411](#) [412](#) [413](#) [414](#) [415](#) [416](#) [417](#) [418](#) [419](#) [420](#) [421](#) [422](#) [423](#) [424](#) [425](#) [426](#) [427](#) [428](#) [429](#) [430](#) [431](#) [432](#) [433](#) [434](#) [435](#) [436](#) [437](#) [438](#) [439](#) [440](#) [441](#) [442](#) [443](#) [444](#) [445](#) [446](#) [447](#) [448](#) [449](#) [450](#) [451](#) [452](#) [453](#) [454](#) [455](#) [456](#) [457](#) [458](#) [459](#) [460](#) [461](#) [462](#) [463](#) [464](#) [465](#) [466](#) [467](#) [468](#) [469](#) [470](#) [471](#) [472](#) [473](#) [474](#) [475](#) [476](#) [477](#) [478](#) [479](#) [480](#) [481](#) [482](#) [483](#) [484](#) [485](#) [486](#) [487](#) [488](#) [489](#) [490](#) [491](#) [492](#) [493](#) [494](#) [495](#) [496](#) [497](#) [498](#) [499](#) [500](#) [501](#) [502](#) [503](#) [504](#) [505](#) [506](#) [507](#) [508](#) [509](#) [510](#) [511](#) [512](#) [513](#) [514](#) [515](#) [516](#) [517](#) [518](#) [519](#) [520](#) [521](#) [522](#) [523](#) [524](#) [525](#) [526](#) [527](#) [528](#) [529](#) [530](#) [531](#) [532](#) [533](#) [534](#) [535](#) [536](#) [537](#) [538](#) [539](#) [540](#) [541](#) [542](#) [543](#) [544](#) [545](#) [546](#) [547](#) [548](#) [549](#) [550](#) [551](#) [552](#) [553](#) [554](#) [555](#) [556](#) [557](#) [558](#) [559](#) [560](#) [561](#) [562](#) [563](#) [564](#) [565](#) [566](#) [567](#) [568](#) [569](#) [570](#) [571](#) [572](#) [573](#) [574](#) [575](#) [576](#) [577](#) [578](#) [579](#) [580](#) [581](#) [582](#) [583](#) [584](#) [585](#) [586](#) [587](#) [588](#) [589](#) [590](#) [591](#) [592](#) [593](#) [594](#) [595](#) [596](#) [597](#) [598](#) [599](#) [600](#) [601](#) [602](#) [603](#) [604](#) [605](#) [606](#) [607](#) [608](#) [609](#) [610](#) [611](#) [612](#) [613](#) [614](#) [615](#) [616](#) [617](#) [618](#) [619](#) [620](#) [621](#) [622](#) [623](#) [624](#) [625](#) [626](#) [627](#) [628](#) [629](#) [630](#) [631](#) [632](#) [633](#) [634](#) [635](#) [636](#) [637](#) [638](#) [639](#) [640](#) [641](#) [642](#) [643](#) [644](#) [645](#) [646](#) [647](#) [648](#) [649](#) [650](#) [651](#) [652](#) [653](#) [654](#) [655](#) [656](#) [657](#) [658](#) [659](#) [660](#) [661](#) [662](#) [663](#) [664](#) [665](#) [666](#) [667](#) [668](#) [669](#) [670](#) [671](#) [672](#) [673](#) [674](#) [675](#) [676](#) [677](#) [678](#) [679](#) [680](#) [681](#) [682](#) [683](#) [684](#) [685](#) [686](#) [687](#) [688](#) [689](#) [690](#) [691](#) [692](#) [693](#) [694](#) [695](#) [696](#) [697](#) [698](#) [699](#) [700](#) [701](#) [702](#) [703](#) [704](#) [705](#) [706](#) [707](#) [708](#) [709](#) [710](#) [711](#) [712](#) [713](#) [714](#) [715](#) [716](#) [717](#) [718](#) [719](#) [720](#) [721](#) [722](#) [723](#) [724](#) [725](#) [726](#) [727](#) [728](#) [729](#) [730](#) [731](#) [732](#) [733](#) [734](#) [735](#) [736](#) [737](#) [738](#) [739](#) [740](#) [741](#) [742](#) [743](#) [744](#) [745](#) [746](#) [747](#) [748](#) [749](#) [750](#) [751](#) [752](#) [753](#) [754](#) [755](#) [756](#) [757](#) [758](#) [759](#) [760](#) [761](#) [762](#) [763](#) [764](#) [765](#) [766](#) [767](#) [768](#) [769](#) [770](#) [771](#) [772](#) [773](#) [774](#) [775](#) [776](#) [777](#) [778](#) [779](#) [780](#) [781](#) [782](#) [783](#) [784](#) [785](#) [786](#) [787](#) [788](#) [789](#) [790](#) [791](#) [792](#) [793](#) [794](#) [795](#) [796](#) [797](#) [798](#) [799](#) [800](#) [801](#) [802](#) [803](#) [804](#) [805](#) [806](#) [807](#) [808](#) [809](#) [810](#) [811](#) [812](#) [813](#) [814](#) [815](#) [816](#) [817](#) [818](#) [819](#) [820](#) [821](#) [822](#) [823](#) [824](#) [825](#) [826](#) [827](#) [828](#) [829](#) [830](#) [831](#) [832](#) [833](#) [834](#) [835](#) [836](#) [837](#) [838](#) [839](#) [840](#) [841](#) [842](#) [843](#) [844](#) [845](#) [846](#) [847](#) [848](#) [849](#) [850](#) [851](#) [852](#) [853](#) [854](#) [855](#) [856](#) [857](#) [858](#) [859](#) [860](#) [861](#) [862](#) [863](#) [864](#) [865](#) [866](#) [867](#) [868](#) [869](#) [870](#) [871](#) [872](#) [873](#) [874](#) [875](#) [876](#) [877](#) [878](#) [879](#) [880](#) [881](#) [882](#) [883](#) [884](#) [885](#) [886](#) [887](#) [888](#) [889](#) [890](#) [891](#) [892](#) [893](#) [894](#) [895](#) [896](#) [897](#) [898](#) [899](#) [900](#) [901](#) [902](#) [903](#) [904](#) [905](#) [906](#) [907](#) [908](#) [909](#) [910](#) [911](#) [912](#) [913](#) [914](#) [915](#) [916](#) [917](#) [918](#) [919](#) [920](#) [921](#) [922](#) [923](#) [924](#) [925](#) [926](#) [927](#) [928](#) [929](#) [930](#) [931](#) [932](#) [933](#) [934](#) [935](#) [936](#) [937](#) [938](#) [939](#) [940](#) [941](#) [942](#) [943](#) [944](#) [945](#) [946](#) [947](#) [948](#) [949](#) [950](#) [951](#) [952](#) [953](#) [954](#) [955](#) [956](#) [957](#) [958](#) [959](#) [960](#) [961](#) [962](#) [963](#) [964](#) [965](#) [966](#) [967](#) [968](#) [969](#) [970](#) [971](#) [972](#) [973](#) [974](#) [975](#) [976](#) [977](#) [978](#) [979](#) [980](#) [981](#) [982](#) [983](#) [984](#) [985](#) [986](#) [987](#) [988](#) [989](#) [990](#) [991](#) [992](#) [993](#) [994](#) [995](#) [996](#) [997](#) [998](#) [999](#) [1000](#) [1001](#) [1002](#) [1003](#) [1004](#) [1005](#) [1006](#) [1007](#) [1008](#) [1009](#) [1010](#) [1011](#) [1012](#) [1013](#) [1014](#) [1015](#) [1016](#) [1017](#) [1018](#) [1019](#) [1020](#) [1021](#) [1022](#) [1023](#) [1024](#) [1025](#) [1026](#) [1027](#) [1028](#) [1029](#) [1030](#) [1031](#) [1032](#) [1033](#) [1034](#) [1035](#) [1036](#) [1037](#) [1038](#) [1039](#) [1040](#) [1041](#) [1042](#) [1043](#) [1044](#) [1045](#) [1046](#) [1047](#) [1048](#) [1049](#) [1050](#) [1051](#) [1052](#) [1053](#) [1054](#) [1055](#) [1056](#) [1057](#) [1058](#) [1059](#) [1060](#) [1061](#) [1062](#) [1063](#) [1064](#) [1065](#) [1066](#) [1067](#) [1068](#) [1069](#) [1070](#) [1071](#) [1072](#) [1073](#) [1074](#) [1075](#) [1076](#) [1077](#) [1078](#) [1079](#) [1080](#) [1081](#) [1082](#) [1083](#) [1084](#) [1085](#) [1086](#) [1087](#) [1088](#) [1089](#) [1090](#) [1091](#) [1092](#) [1093](#) [1094](#) [1095](#) [1096](#) [1097](#) [1098](#) [1099](#) [1100](#) [1101](#) [1102](#) [1103](#) [1104](#) [1105](#) [1106](#) [1107](#) [1108](#) [1109](#) [1110](#) [1111](#) [1112](#) [1113](#) [1114](#) [1115](#) [1116](#) [1117](#) [1118](#) [1119](#) [1120](#) [1121](#) [1122](#) [1123](#) [1124](#) [1125](#) [1126](#) [1127](#) [1128](#) [1129](#) [1130](#) [1131](#) [1132](#) [1133](#) [1134](#) [1135](#) [1136](#) [1137](#) [1138](#) [1139](#) [1140](#) [1141](#) [1142](#) [1143](#) [1144](#) [1145](#) [1146](#) [1147](#) [1148](#) [1149](#) [1150](#) [1151](#) [1152](#) [1153](#) [1154](#) [1155](#) [1156](#) [1157](#) [1158](#) [1159](#) [1160](#) [1161](#) [1162](#) [1163](#) [1164](#) [1165](#) [1166](#) [1167](#) [1168](#) [11](#)

ENDF Flexible Database Explorer

ENDF-Flexible Database Explorer, V.Zerkin, IAEA-NDS...

Flexible Database Explorer
Restart Close Config Selection Help About

Evaluated data [+Reaction]
G Photo-Nuclear Data
PHOTO Photo-Atomic Interac
DECAY Radioactive Decay Da
S/FPY Spontaneous Fission F
N Incident-Neutron Data
N/FPY Neutron-Induced Fissi
TSL Thermal Neutron Scatter
Std Neutron Cross Section S
E Electro-Atomic Interaction
P Incident-Proton Data
P/FPY Proton-Induced Fission
D Incident-Deuteron Data
D/FPY Deuteron-Induced Fis
T Incident-Triton Data
T/FPY Triton-Induced Fission
HE3 Incident-He3 data
HE3/FP He3-Induced Fission
HE4 Incident-Alpha data
HE4/FP Alpha-Induced Fission

Configuration: [Show]
Video demo: [show]
How-to slides: [hide]

Slide-show: 1 3 23

Switches: open/close tree-node
Closed
Opened

T:target R:reaction L:library Q:quantity

Target Materials

Isotopes of 1-Hydrogen

H-1
H-2
H-3

Periodic table showing elements 1 to 118. The table is color-coded: yellow for Lanthanides and Actinides, and blue for other elements. The Lanthanides and Actinides are shown as separate rows below the main table.

Summary:
Elements: 110
Nuclides: 2450

Selected:
> 0) Evaluated data
* 1) Incident-Particle: [N] Incident-Neutron Data

Nuclides: [List] [Chart-txt]

Chart showing the distribution of nuclides across the periodic table. The chart is a grid with the x-axis representing the atomic number (Z) and the y-axis representing the mass number (A). The nuclides are represented by colored dots (blue and yellow) indicating different data sets. The chart shows a clear trend of increasing nuclide density as the atomic number increases, particularly for the Lanthanide and Actinide series.

ENDF Explorer: data found

The screenshot displays the ENDF-Flexible Database Explorer application. The left pane shows a hierarchical tree of nuclear data categories. The right pane shows the 'Select and retrieve data from database...' interface with a list of selected data items.

Flexible Database Explorer
Restart Close Config Selection Help About

Tree View:

- Evaluated data [+Reaction]
 - G Photo-Nuclear Data
 - PHOTO Photo-Atomic Interaction Data
 - DECAY Radioactive Decay Data
 - S/FPY Spontaneous Fission Product Y
 - N Incident-Neutron Data [+Quantity]
 - COV/ACT Covariances for production
 - COV/DA Covariances for angular distr
 - COV/DE Covariances for energy distri
 - COV/NU Covariances of the average r
 - COV/RES Covariances of resonance p
 - COV/SIG Covariances of neutron cross
 - 77 Ir Iridium [+Target]
 - IR-193 Iridium [+Reaction]
 - N,2N Production of two neutrons and a residual
 - ENDF/B-VII.0 U.S. Evaluated Nuclear Data
 - TENDL-2008 TALYS-based Evaluated Nuclear Data
 - TENDL-2009 TALYS-based Evaluated Nuclear Data
 - N,2N+A Production of two neutrons and an alpha particle
 - N,2N+P Production of 2 neutrons and a proton
 - N,3N Production of three neutrons and a residual
 - N,A Production of an alpha particle, plus a residual
 - N,D Production of a deuteron, plus a residual
 - N,EL Elastic scattering cross section for neutrons
 - N,G Radiative capture.
 - N,HE3 Production of a 3He particle plus a residual
 - N,INL Production of one neutron in the incident neutron
 - N,N+A Production of a neutron and an alpha particle
 - N,N+D Production of a neutron and a deuteron

Select and retrieve data from database...

Clean Selection

Selected:

- 1) ☒ ☐ 1) Incident-Particle: Incident-Neutron Data
- 2) Quantity: Covariances of neutron cross sections
- 3) Element: Iridium
- 4) Isotope: IR-193
- 5) Reaction: Production of two neutrons and a residual.

3 datasets (0%)

Retrieve Reset ☐ Retrieve in new Window

☐ Retrieve listing of evaluations only

FDDE - Flexible Database Explorer, v-1.0, 2006/01/20
Created by V.Zerkin, IAEA, 2005-2008

Standard ENDF Select Form

Flexible Database Explorer, V.Zerkin, IAEA-ND5...

Flexible Database Explorer

Restart Close Config Selection Help About

Evaluated data [+Reaction]
G Photo-Nuclear Data
PHOTO Photo-Atomic I
DECAY Radioactive De
S/FPY Spontaneous Fi
N Incident-Neutron D
COV/ACT Covariances
COV/DA Covariances fo
COV/DE Covariances fo
COV/NU Covariances o
COV/RES Covariances
COV/SIG Covariances
77 Ir Iridium [+Targ
IR-193 Iridium [+Rea
N,2N Production of two
ENDF/B-VII.0 U.S. Eval
TENDL-2008 TALYS-bas
TENDL-2009 TALYS-bas
N,2N+A Production of t
N,2N+P Production of 2
N,3N Production of thre
N,A Production of an a
N,D Production of a de
N,EL Elastic scattering
N,G Radiative capture.
N,HE3 Production of a
N,INL Production of one
N,N+A Production of a
N,N+D Production of a

Request #2777

ENDF Data Selection

Retrieve ☒ Selected ☐ Unselected ☐ All Reset

Sorted by: [Reactions] Reorder by: [Libraries] View: ☒ basic ☐ extended

1) IR-193 (N,2N) IR-192, COV/SIG MT=16 MF=33 NSUB=10
MF33: [COV/SIG] Covariances of neutron cross sections MT16: [N,2N] Production of two neutrons and a residual.

1	<input type="checkbox"/>	ENDF-6	Interpreted	MF33-Plot	ENDF/B-VII.0	E=20MeV Lab=LANL,BNL Date=DIST-DEC06
2	<input type="checkbox"/>	ENDF-6	Interpreted	MF33-Plot	TENDL-2008	E=20MeV Lab=NRG Date=REV1-
3	<input type="checkbox"/>	ENDF-6	Interpreted	MF33-Plot	TENDL-2009	E=200MeV Lab=NRG Date=REV1-

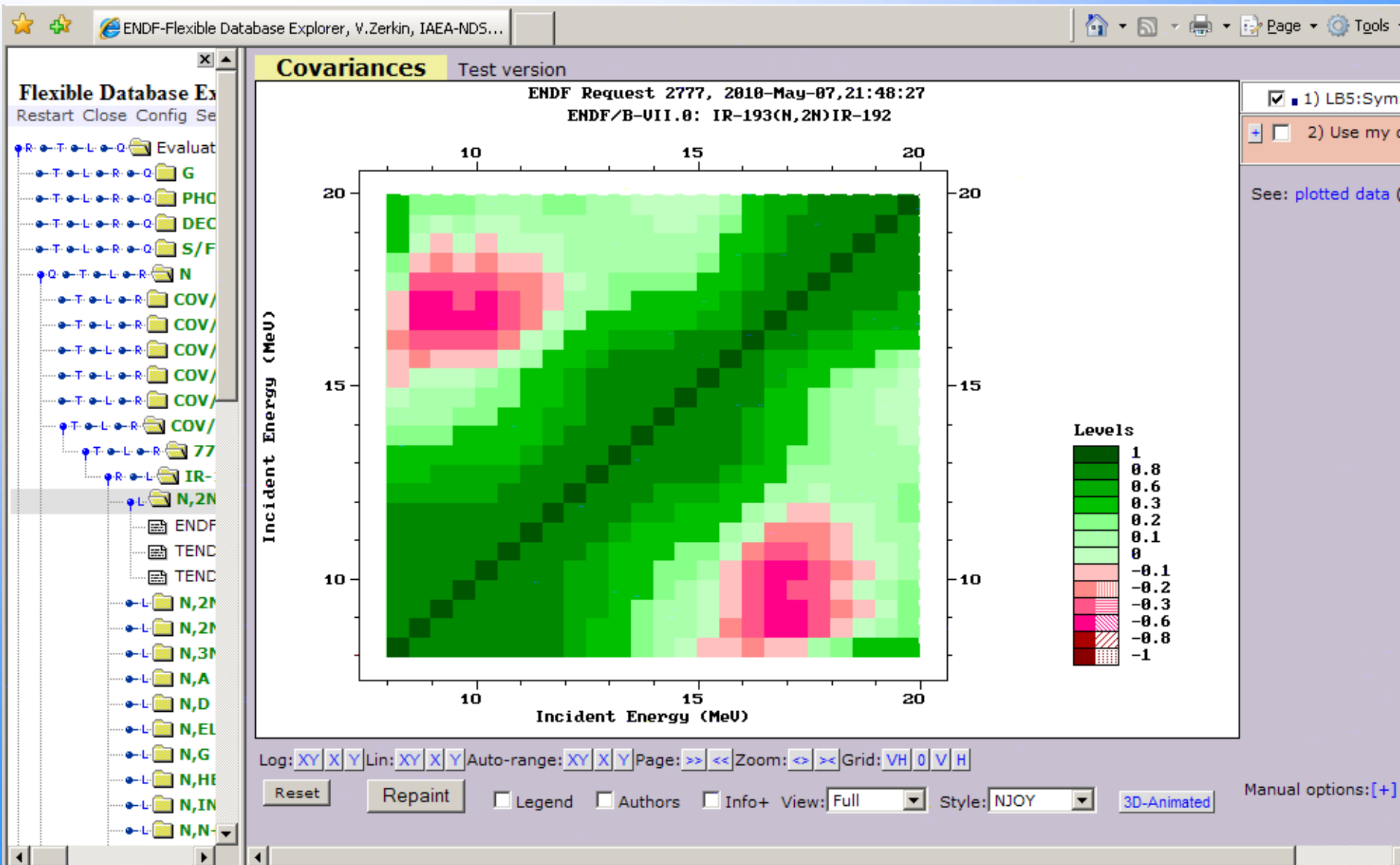
*Plotting options:
Plot cross sections with reconstructed resonances and applied Doppler broadening at the temperature 293°K =20°C

Other plots $d\sigma/d\Omega$ - angular distributions,
 $d\sigma/dE$ - energy distributions,
 $d^2\sigma/dE/d\Omega$ - double differential cross sections,
 $\sigma \pm \Delta\sigma$ - cross sections with uncertainties (if given)

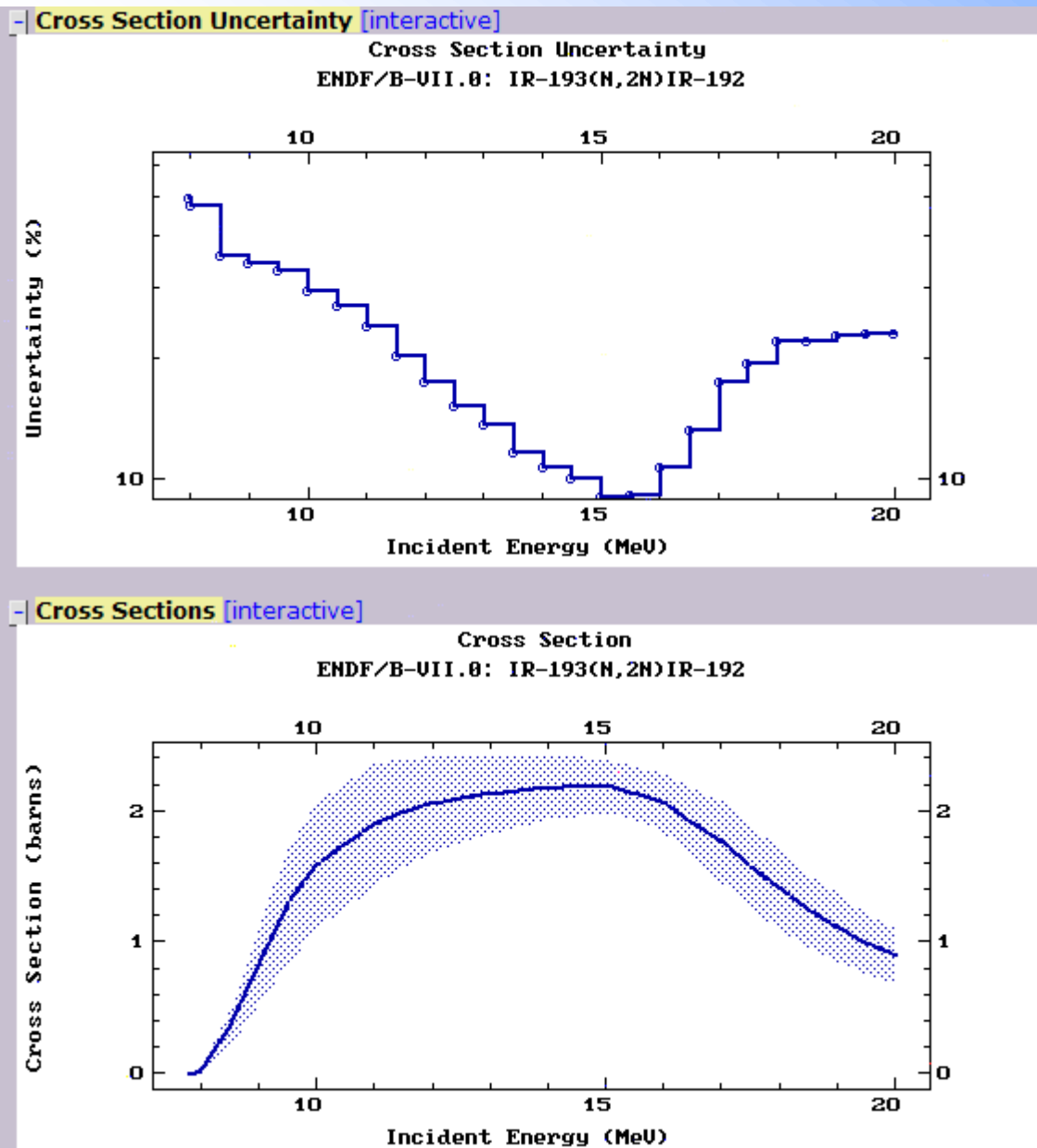
[Glossary]: meaning of abbreviations and variables
[About]: a few words on ENDF-6 format

Page generated: 2010/05/07,21:46:11 by E4-Servlet on www.nds.iaea.org
Project: "Multi-platform EXFOR-CINDA-ENDF", V.Zerkin, IAEA-ND5, 1999-2010
Request from: iaea.org (161.5.149.203)

Again ENDF Output Form with interactive ZVView plotting



Display Cross Section and Uncertainty



Correlation matrix

#ZVView-data-copy: 7-May-2010 22:13:17

#

#LB5:Symmetric Matrix

Z(26x26): $Z_{i,j} = \text{Cor}(\sigma_{X_i}, \sigma_{Y_j}) * 1000$

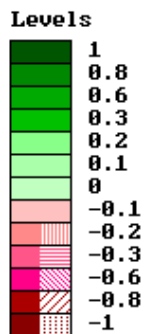
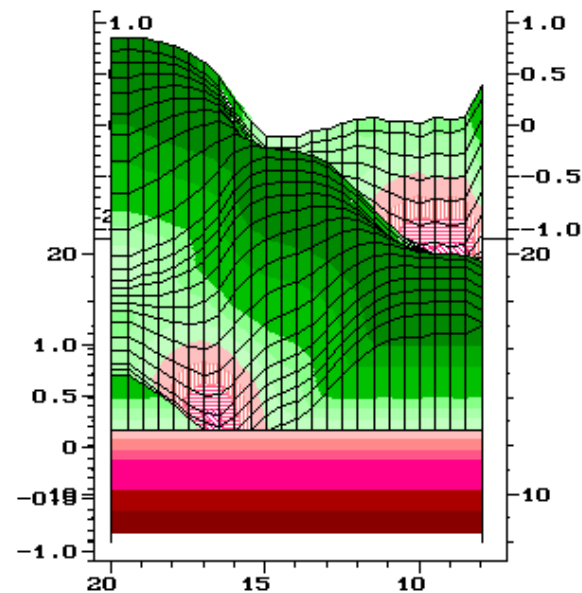
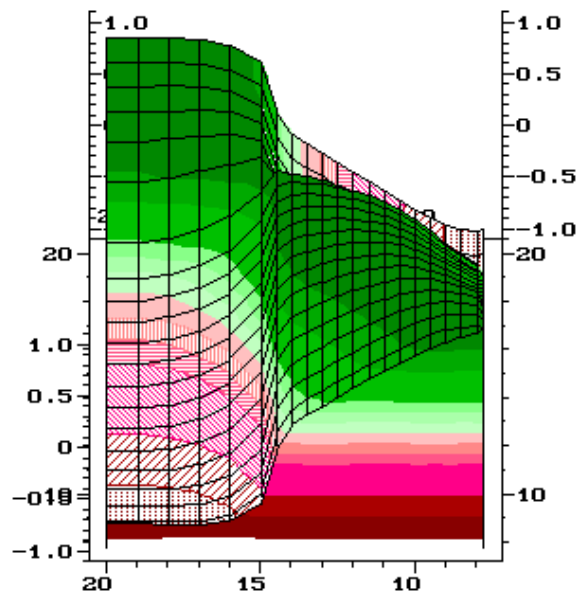
	X (MeV)																				
Y (MeV)	7.992	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16	16.5	17	17.5
7.992	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	1000	930.6	920.5	926.4	898.3	895.5	866.7	805.2	679.6	529.7	352.7	210.1	101.7	52	-17.93	-85.39	-125.4	-97.66	-12.27	102.2
8.5	0	930.6	1000	999.4	998.7	992	980.3	943.8	866.1	730	583.1	404.7	257.4	156.3	107.4	27.05	-112	-269.4	-344.3	-309.5	-211.1
9	0	920.5	999.4	1000	999.4	995.4	984.9	950.7	875.7	743.4	600.1	424.6	278.7	179	130.3	49.66	-93.97	-260.9	-346.6	-318.8	-231.1
9.5	0	926.4	998.7	999.4	1000	996.5	989	959.1	889.9	763.2	623.2	450.2	305.7	205.7	156.7	76.36	-64.34	-228.8	-315.5	-289.6	-202.2
10	0	898.3	992	995.4	996.5	1000	996	973.3	912.2	796.1	666	500.7	360	263.3	214.3	133.4	-17.89	-205.1	-318.8	-310.8	-231.1
10.5	0	895.5	980.3	984.9	989	996	1000	989.8	944.9	846.1	727.6	571.9	436.3	340.7	291.4	211.4	64.16	-124.1	-248.4	-251.3	-181.1
11	0	866.7	943.8	950.7	959.1	973.3	989.8	1000	981.8	912.9	816.6	679.8	555.3	464.3	415.4	338.2	196.2	2.736	-143.1	-167.2	-121.1
11.5	0	805.2	866.1	875.7	889.9	912.2	944.9	981.8	1000	973.5	909.6	802.9	697.6	615.5	569.6	498.9	370.6	179.7	12.5	-37.4	-151.1
12	0	679.6	730	743.4	763.2	796.1	846.1	912.9	973.5	1000	980	916.6	840.9	775.5	736.4	677	566.6	378.6	184.9	101.2	89.1
12.5	0	529.7	583.1	600.1	623.2	666	727.6	816.6	909.6	980	1000	977.7	931.2	884.7	854	806.6	710	521.5	303.1	188.5	145.1
13	0	352.7	404.7	424.6	450.2	500.7	571.9	679.8	802.9	916.6	977.7	1000	986.9	962.5	942.9	910.7	834.6	656.1	423	282.1	209.1
13.5	0	210.1	257.4	278.7	305.7	360	436.3	555.3	697.6	840.9	931.2	986.9	1000	993.3	983.2	964.1	907.5	744	508.5	352.6	260.1
14	0	101.7	156.3	179	205.7	263.3	340.7	464.3	615.5	775.5	884.7	962.5	993.3	1000	997.2	987.1	939.2	779.5	538.1	370.7	269.1
14.5	0	52	107.4	130.3	156.7	214.3	291.4	415.4	569.6	736.4	854	942.9	983.2	997.2	1000	995.7	955.3	801.6	561.7	391.1	280.1
15	0	-17.93	27.05	49.66	76.36	133.4	211.4	338.2	498.9	677	806.6	910.7	964.1	987.1	995.7	1000	974.7	838.5	608.2	436.4	320.1
15.5	0	-85.39	-112	-93.97	-64.34	-17.89	64.16	196.2	370.6	566.6	710	834.6	907.5	939.2	955.3	974.7	1000	938.2	766.4	616.6	504.1
16	0	-125.4	-269.4	-260.9	-228.8	-205.1	-124.1	2.736	179.7	378.6	521.5	656.1	744	779.5	801.6	838.5	938.2	1000	940.4	846	757.1
16.5	0	-97.66	-344.3	-346.6	-315.5	-318.8	-248.4	-143.1	12.5	184.9	303.1	423	508.5	538.1	561.7	608.2	766.4	940.4	1000	975.3	925.1
17	0	-12.27	-309.5	-318.8	-289.6	-310.8	-251.3	-167.2	-37.4	101.2	188.5	282.1	352.6	370.7	391.1	436.4	616.6	846	975.3	1000	985.1
17.5	0	102.2	-218.3	-231.9	-204.5	-237.7	-187.3	-121.3	-15.88	89.5	145.9	209.9	260.8	265	280.8	320.3	504	757	925.6	985	1000
18	0	232.8	-97.99	-115	-89.67	-132.7	-91.32	-43.15	37.07	107.8	132.1	163.8	192	180.9	191.1	221.6	399.2	660.3	855	943.2	985
18.5	0	340.4	11.1	-7.856	15.59	-33.54	0.5162	34.56	94.08	136.6	134.9	139.9	148.8	125.4	130.9	153.2	320.2	577.8	784.5	891.4	954.1
19	0	437.7	118.1	98.15	119.9	67.18	95.14	117.5	159.2	177.2	153.3	134.5	125.5	91.08	92.11	106.2	258.6	504.7	713.4	832.6	912.1
19.5	0	531.8	225.4	204.6	224.2	168.1	189.1	198.8	221.2	213.4	166.6	123.4	96.14	50.83	47.22	52.25	188	419.2	628.5	759.1	854.1
20	0	531.8	225.4	204.6	224.2	168.1	189.1	198.8	221.2	213.4	166.6	123.4	96.14	50.83	47.22	52.25	188	419.2	628.5	759.1	854.1
i	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

IR-193(n,2n)IR-192

TENDL-2008 vs. ENDF-B/VII.0

ENDF Request 2777, 2010-May-07, 21:48:27

ENDF/B-VII.0: IR-193(N,2N)IR-192



IBANDL Web system

IBANDL Web system

<http://www-nds.iaea.org/ibandl>

IBANDL

Ion Beam Analysis
Nuclear Data Library



Nuclear
Data
Service



IBANDL

Nucleus

H-1 ▼

Projectile

- ☐ p
- ☐ d
- ☒ ^3He
- ☐ α
- ☐ ^6Li
- ☐ ^7Li

Type of data

- ☐ EBS
- ☐ NRA
- ☐ PIGE
- ☒ All

IBANDL

[Summary]

EXFOR

Home

CD version

Updates

Nuclear Data
Services

This is the **Ion Beam Analysis Nuclear Data Library** developed and formerly maintained by [A.Gurbich](#) under the IAEA auspices. It contains available **experimental** nuclear cross-sections relevant to Ion Beam Analysis. Differential cross sections are presented both as graphs and data files. The numerical data are in the [R33](#) format. Currently, most of the data are being extracted from EXFOR using an automatic conversion procedure available in [EXFOR retrieval system](#) (see details of the algorithm [here](#)).

Two Coordinated Research Projects (CRP) have catered to the data needs of the IBA community: the CRP on [Reference Database for Ion Beam Analysis](#) (2005-2010, see: [IAEA-TECDOC-1780](#)), and the CRP on [Development of a Reference Database for Particle-Induced Gamma Ray Emission \(PIGE\) Spectroscopy](#) (2011-2015, see: [IAEA-TECDOC-1822](#)) both of which resulted in new measurements and the bulk of the relevant nuclear data made available in IBANDL. The activity has been further supported by the IAEA through the Technical Meeting on [Benchmarking Experiments for Ion Beam Analysis](#), and the nuclear data evaluation project [R-matrix Codes for Charged-particle reactions in the Resolved-Resonance Region](#).

Members of the IBA community are invited to submit new experimental data to IBANDL. Numerical data (in R33 or any other format) including references should be sent to: nds.contact-point@iaea.org (IAEA-NDS).

The IBANDL Web interface also provides evaluated (recommended) cross sections obtained with the SigmaCalc calculator developed by A. Gurbich. Evaluated cross-section data produced by SigmaCalc up to October 2013 are available for easier access and plotting. In addition, the user is offered the option to obtain SigmaCalc files on-the-fly, through remote access to the [SigmaCalc](#) calculator. R33 files can be also downloaded from SigmaCalc and imported into IBANDL. Users are cautioned however, that the 'on-the-fly' calculations can experience significant delays due to problems related with the connection to the external Web server. The IAEA therefore accepts no responsibility for usage of this option.

New

- Total cross sections (mb) can be converted to differential cross sections (mb/sr) in cases where the angular distributions are known to be isotropic. Differential cross sections (mb/sr) can be converted to Ratio-to-Rutherford (rr) and vice versa. Press 'Convert units for plotting' button on the data table header.
- Conversion to inverse kinematics is possible. Press 'inverted' button on the data table header.
- User can upload own data files to compare with existing data. See 'Add your dataset in R33 format for plotting' on the bottom of the data table.
- Search data by first author and reference: [\[Summary\]](#) → [\[+\]References](#) → click on ».

IBANDL Web system

IBANDL - Mozilla Firefox

File Edit View History Bookmarks Tools Help

← →

nds121.iaea.org/exfor2/ibandl.htm

☆ ▼ ↻

Google

🔍

⬇

🏠

🌐

▼

X4/Servlet: Select

EXFOR: Experimental Nucl...

X4/Servlet: Select

IBANDL

IBANDL

IBANDL

Ion Beam Analysis

Nuclear Data Library

Nucleus

C-13

Projectile

☒ p
☐ d
☐ ³He
☐ α
☐ ⁶Li
☐ ⁷Li

Type of data

☐ EBS
☐ NRA
☐ PIGE
☒ All

IBANDL

[Summary]

EXFOR

Home

CD version

Updates

Nuclear Data Services

¹³C + p

Type of data: ALL

View: ☒ extended

Convert units for plotting: ☐ no ☒ rr->mb/sr ☐ mb/sr->rr

Plots: [reset]

No.	Reaction	Angle	Energy(keV)	Pts	Update	X4	Reference	File	Plot
1	¹³ C(p,p ₀) ¹³ C	160	700-2500	451	2013-08-15		SigmaCalc 2.0. File created 21-6-2013	View Save	<input checked="" type="checkbox"/> mb
2	¹³ C(p,p ₀) ¹³ C	163.8°	2600-4990	169	2006-06-23		E. Kashy et al., Phys. Rev. 122(3) (1961) 884 »	View Save	<input type="checkbox"/> mb
3	¹³ C(p,p ₀) ¹³ C	160°	780-2430	96	2013-05-27		N.P.Barradas et al., to be published »	View Save	<input checked="" type="checkbox"/> rr
4	¹³ C(p,p ₀) ¹³ C	158.4°	450-1620	90	2011-11-22		E.Milne, Phys. Rev. 93 (1954) 762 »	View Save	<input checked="" type="checkbox"/> mb
5	¹³ C(p,p ₀) ¹³ C	146.5°	1630-3310	80	2011-11-22		D.Zipoy et al., Phys. Rev. 106 (1957) 793 »	View Save	<input type="checkbox"/> mb
6	¹³ C(p,p ₀) ¹³ C	140°	780-2430	97	2013-09-18		N.P.Barradas et al., Nucl. Instr. and Meth. B 316 (2013) 81 »	View Save	<input type="checkbox"/> rr
7	¹³ C(p,p ₀) ¹³ C	137°	450-1600	93	2011-11-22		E.Milne, Phys. Rev. 93 (1954) 762 »	View Save	<input type="checkbox"/> mb
8	¹³ C(p,p ₀) ¹³ C	124.1°	1620-3340	97	2011-11-22		D.Zipoy et al., Phys. Rev. 106 (1957) 793 »	View Save	<input type="checkbox"/> mb
9	¹³ C(p,p ₀) ¹³ C	121.5°	1000-2580	279	2011-08-29	X4	V.A.Latorre+(1966), Jour. Physical Review, Vol.144, p.891 »	View Save	<input type="checkbox"/> mb
10	¹³ C(p,p ₀) ¹³ C	116°	410-1600	88	2011-11-22		E.Milne, Phys. Rev. 93 (1954) 762 »	View Save	<input type="checkbox"/> mb
11	¹³ C(p,p ₀) ¹³ C	102.1°	1600-3340	82	2011-11-22		D.Zipoy et al., Phys. Rev. 106 (1957) 793 »	View Save	<input type="checkbox"/> mb
12	¹³ C(p,p ₀) ¹³ C	85.6°	1610-3340	85	2011-11-22		D.Zipoy et al., Phys. Rev. 106 (1957) 793 »	View Save	<input type="checkbox"/> mb
13	¹³ C(p,p ₀) ¹³ C	85.6°	1580-4380	75	2011-11-22		H.J.Kim, W.T.Milner and F.K.McGowan Nuclear Data Tables v.A2 (1966) 353 »	View Save	<input type="checkbox"/> mb
14	¹³ C(p,p ₀) ¹³ C	85.6°	430-1590	92	2011-11-22		E.Milne, Phys. Rev. 93 (1954) 762 »	View Save	<input type="checkbox"/> mb

Datasets: 13 Reactions: 1 Points: 1423 References: 7

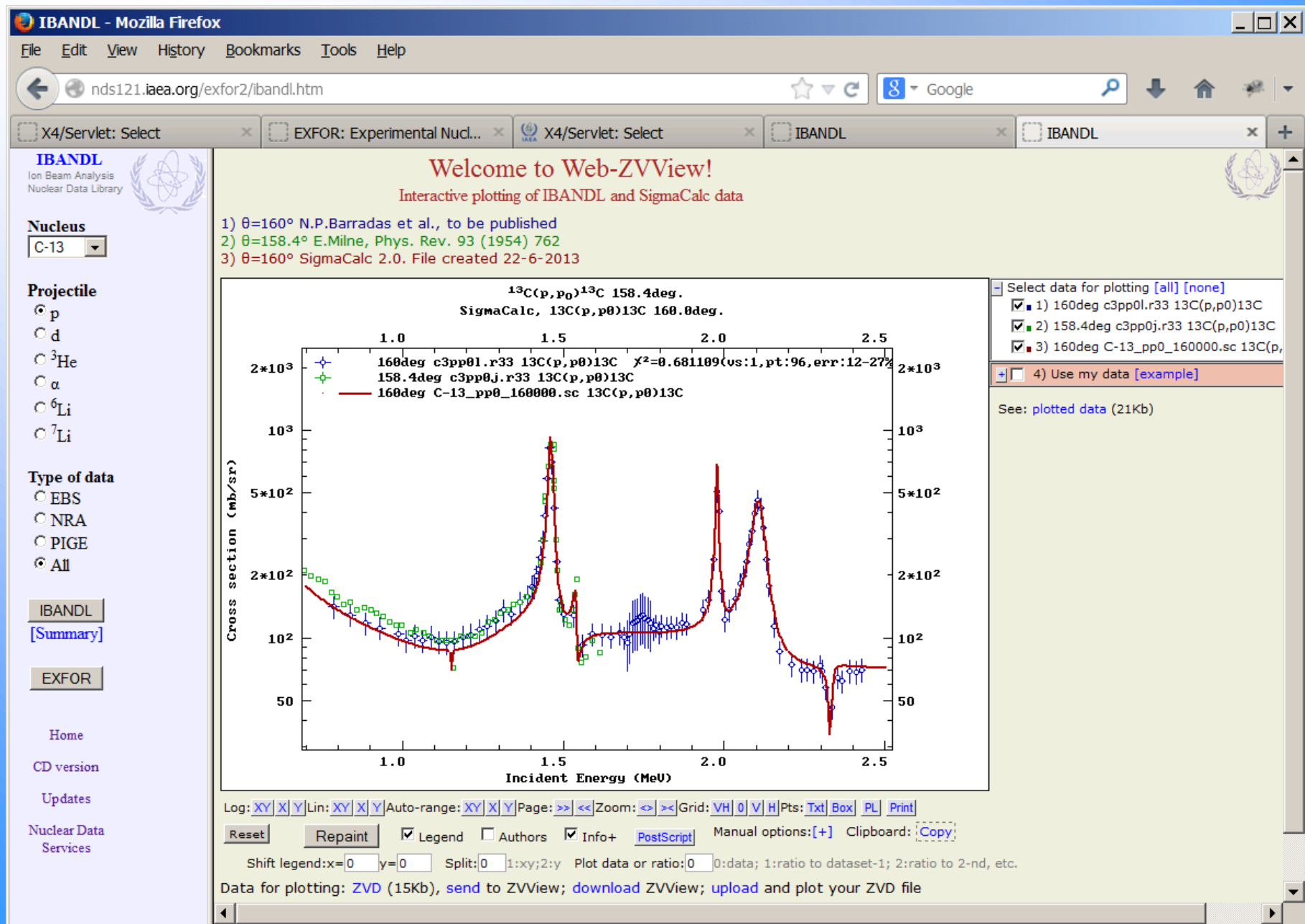
[+](#) Add your dataset in R33 format for plotting

[+](#) References.

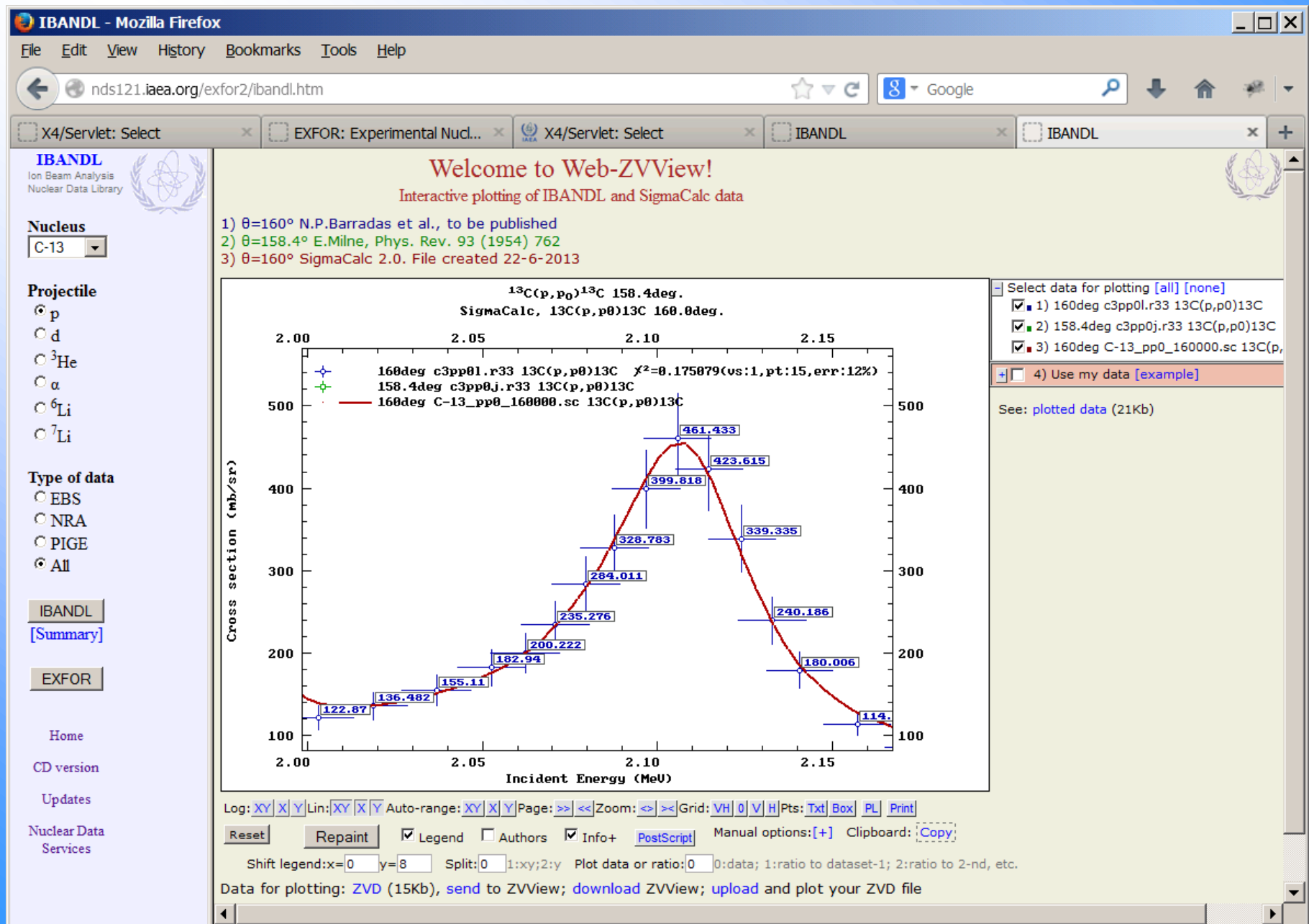
Legend:

X4 link to the dataset in EXFOR database retrieval system

Web IBANDL calling Web-ZVView



Web IBANDL calling Web-ZVView



EXFOR data re-normalization system

Example 14

14 Automatic re-normalization (output data and plots); $^{55}\text{Mn}(n,g)$

EXFOR data re-normalization system (correction system)

Main ideas:

- 1) to re-normalize data using old monitors and new standards
- 2) to re-normalize data using decay data
- 3) to create a convenient tool for data modifications: multiply data to a factor, correct wrong units, set up uncertainties, delete part of a data set, recalculate data using isotope abundances, etc.

We DO NOT change EXFOR data - we re-normalize output from EXFOR system

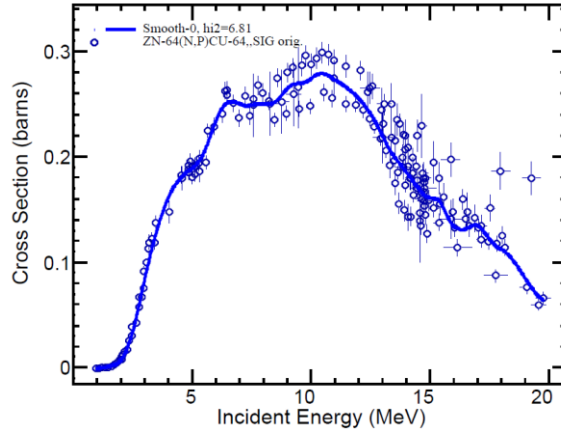
Final goals:

- 1) to implement possibility of corrections
- 2) to re-normalize data from EXFOR automatically (using EXFOR information)
- 3) to collect experts' corrections to a database
- 4) to re-normalize data using experts' corrections database
- 5) to have Web system offering and implementing automatic, experts' and user's corrections in optional, semi-automatic and interactive modes
- 6) to generate and distribute renormalized data of whole EXFOR database

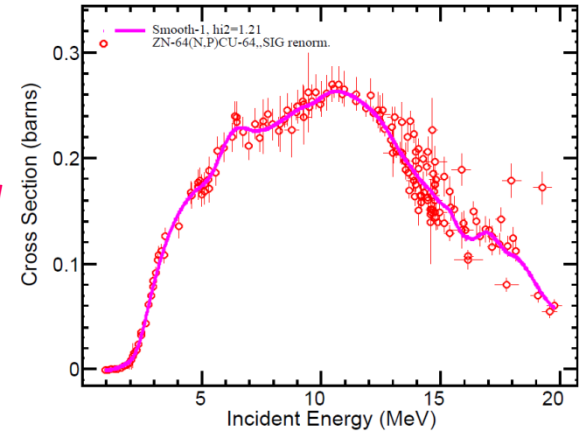
Example of expert's corrections results

by K.Zolotarev, 2011

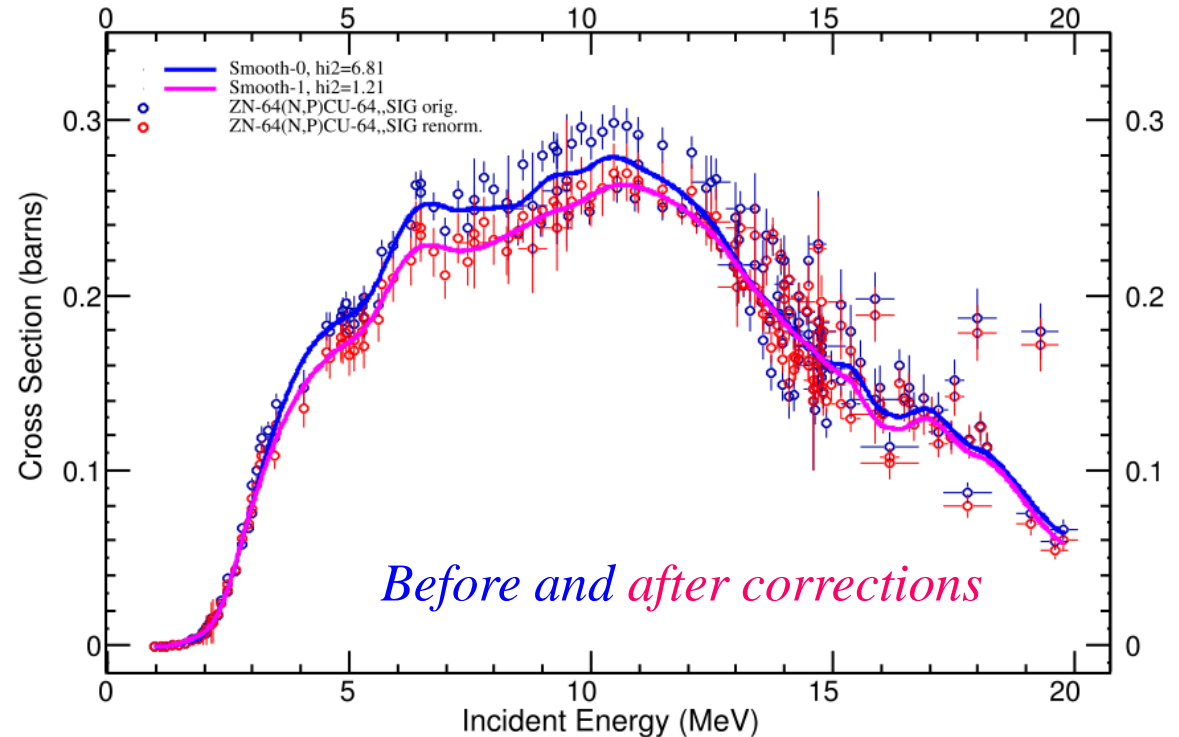
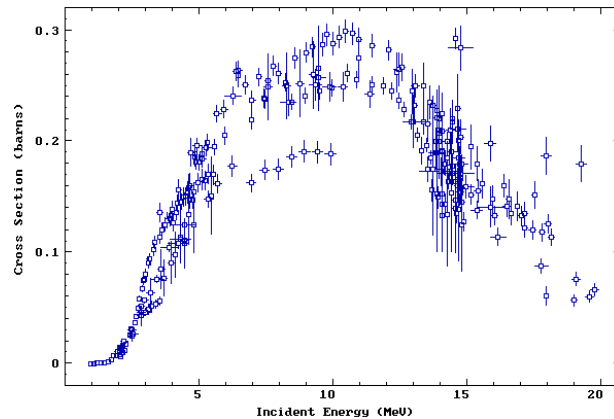
Data selected



Data corrected



30-ZN-64(N,P)29-CU-64,,SIG



Before and after corrections

Applying automatic data re-normalization

X4/Servlet: Select - Mozilla Firefox

File Edit View History Bookmarks Tools Help

www.nds.iaea.org/exfor/servlet/X4sSearch5

X4/Servlet: Select +

Request #862
Access-Level=2
Results: Reactions: 2 Dataset

Data Selection

Retrieve ☒ Selected ☐ Unselected ☐ All

Output: ☒ EXFOR ☐ EXFOR ☒ Bibliography ☐ TAB ☐ C4 ☐ PlotC4

Plot: ☒ Quick-plot (cross sections only) ☒ Advanced plot [how-to] using ☐ C5 and ☐ converting ratios to cross standards,2006]

Narrow Energy (optional), eV: Min: Max:

☒ Apply(7A) ☒ Data re-normalization (for advanced users, results in: C4, TAB and Plots)

n	Display	Year	Author-1	Energy range,eV	Points	Reference
1)	25-MN-55 (N,A) 23-V-52,,SIG C4: MF3 MT107					
Quantity: [CS] Cross section						
1	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	2000	A.Fessler+	1.61e7 2.03e7	5	[pdf]+ J,NSE,134,(2),171,200
2	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1999	A.A.Filatenkov+	1.35e7 1.48e7	8	+ R,RI-252,199905
3	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1999	A.A.Filatenkov+	1.41e7	1	+ R,RI-252,199905
4	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1994	M.Bostan+	6.33e6 1.20e7	7	[pdf]+ J,PR/C,49,266,1994
5	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1993	A.Grallert+	1.47e7	1	[pdf]+ R,INDC(NDS)-286,131,1
6	<input type="checkbox"/> A Info X4 X4+ X4± T4 Cov	1991	A.Ercan+	1.46e7	1	+ C,91JUELIC,,376,19910
7	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1985	B.M.Bahal+	1.47e7	1	+ R,GKSS-85-E-11,1985
8	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1984	G.Helfer+	2.96e6	1	[pdf]+ J,CZJ/B,34,30,1984
9	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1980	R.Vaenskae+	1.47e7	2	[pdf]+ J,NIM,171,281,80
10	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1980	P.N.Ngoc+	1.46e7	1	+ T,NGOC,1980
11	<input checked="" type="checkbox"/> A Info X4 X4+ X4± T4 Cov	1980	E.Zupranska+	1.30e7 1.78e7	10	[pdf]+ J,APP/B,11,853,198011
12	<input type="checkbox"/> A Info X4 X4+ X4± T4 Cov	1978	U.Garuska+	1.46e7	1	+ P,INR-1773/I/PL/A,16,
13	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1977	G.P.Dolya+	1.47e7	1	+ J,VAT/F,1,(18),15,197
14	<input type="checkbox"/> A Info X4 X4+ X4± T4 Cov	1967	B.Minetti+	1.47e7	1	[pdf]+ J,ZP,199,275,6701
15	<input type="checkbox"/> Info X4 X4+ X4± T4 Cov	1965	F.Freyer+	1.48e7	1	[pdf]+ J,APA,20,304,6508

Apply corrections

Auto corrections is possible

Users' corrections, help, documentation

Automatic re-normalization: simple plot

X4/Servlet: Select - Mozilla Firefox
File Edit View History Bookmarks Tools Help
www-nds.iaea.org/exfor/servlet/X4sMakeX4
X4/Servlet: Select
EXFOR Request #862/276
Output Data

Format	Data (Size)
EXFOR	Text (7Kb) ZIP (3Kb) Generate: X4± Test:
Bibliography	html (4Kb) BibTeX (2Kb)
Computational	
C4	C4 (2Kb) C4.ZIP (1Kb) LST (128Kb)

Advanced Plotting: LST (1Kb)
Select experimental data for plotting...
Go to Quantity type #Plots
 σ (E) SIG Cross section data 1
Go to plot evaluated data...
ENDF Retrieve evaluated data and plot...

```
30581004 x4u:20090506 #1980 Zupranska
#Reaction: 25-MN-55(N,A)23-V-52,,SIG
#Monitor: 26-FE-56(N,P)25-MN-56,,SIG
#m0: {20377002,H.LISKIEN+,J,JNE/AB,19,73,196502} $ fe56np;#old monit-ref
m0: exfor$20377002_fe56np; #old monitor(energy) in EXFOR
m1: recom$fe56np; #new monitor(energy)
dy=dy/y; #to rel. uncertainties----
y=y/m0*m1; #renormalized CS
dy=(dy**2-dm0**2+dm1**2)**0.5;#replace monitor uncertainties
dy=dy*y; #to abs. uncertainties
```

Requested corrections

```
30581004 x4u:20090506 #1980 Zupranska
#Reaction: 25-MN-55(N,A)23-V-52,,SIG
#Monitor: 26-FE-56(N,P)25-MN-56,,SIG
#m0: {20377002,H.LISKIEN+,J,JNE/AB,19,73,196502} $ fe56np;#old monit-ref
m0: exfor$20377002_fe56np; #old monitor(energy) in EXFOR
m1: recom$fe56np; #new monitor(energy)
dy=dy/y; #to rel. uncertainties----
y=y/m0*m1; #renormalized CS
dy=(dy**2-dm0**2+dm1**2)**0.5;#replace monitor uncertainties
dy=dy*y; #to abs. uncertainties
```

Correction protocol

Applied corrections. Datasets: 1
1) EXFOR:#30581004 Ref:E.Zupranska,ET.AL. (80) Corrected_Points:10 Deleted_Points:0
30581004 X4U:20090506; M0:exfor\$20377002_fe56np; M1:recom\$fe56np; dY=dY/Y; Y=Y/M0*M1; tmp0=dy^2-dm0^2+dm1^2; dY=tmp0^0.5; dY=dY*Y;

See used monitors: [plot]

See: [selected] [unselected] datasets [corrections] [data-check]

25-MN-55(N,A)23-U-52
EXFOR Request: 862/1, 2012-Apr-13 17:10:16

ENDF Find and add to the plot evaluated data
+ [x] 1) 25-MN-55(N,A)23-V-52,,SIG
+ [] 2) Use my data [example]
See: plotted data (2Kb)

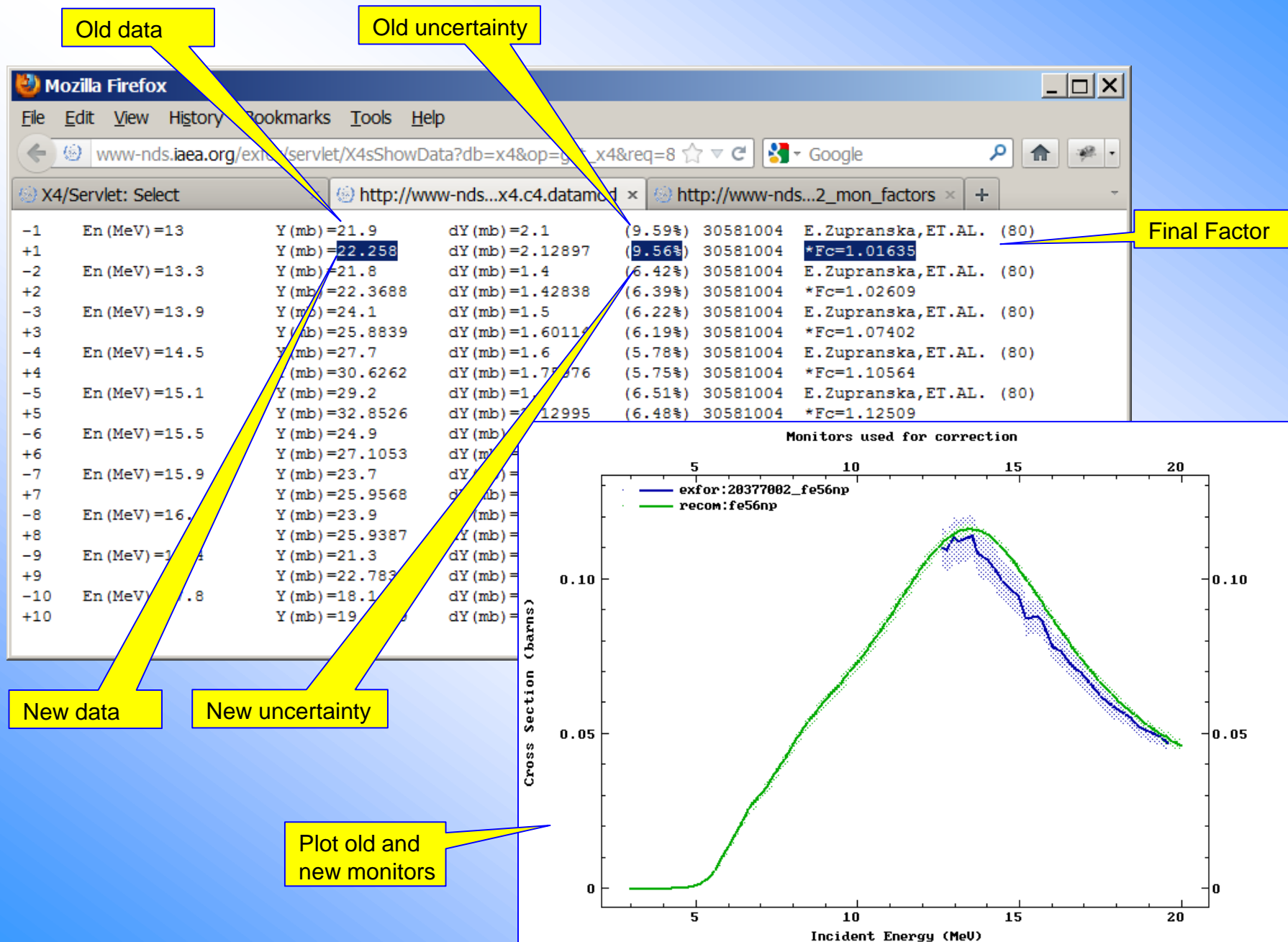
Applied corrections

Check Monitors

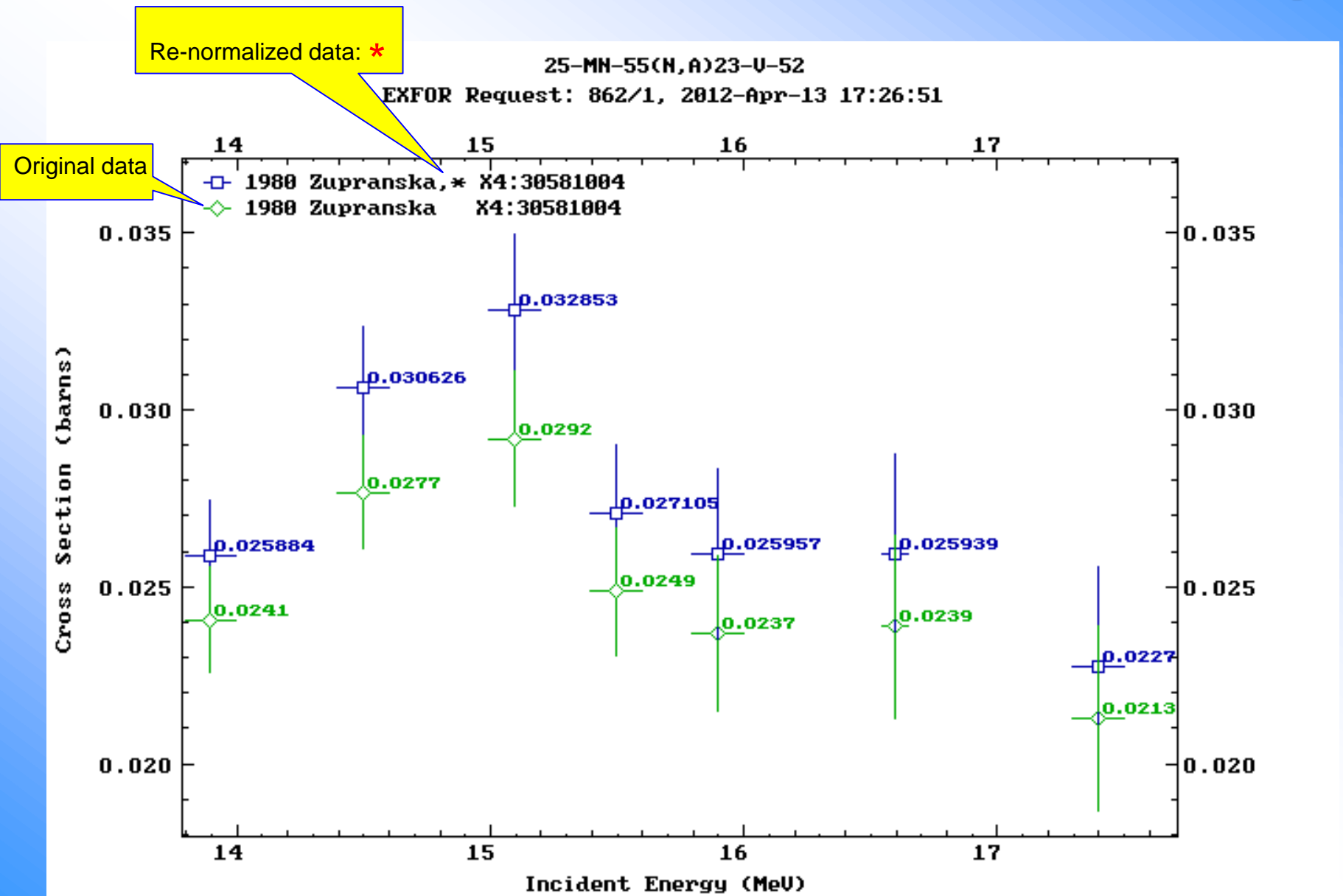
Check data

Plot result of corrections

Automatic re-normalization: data checking



Automatic data re-normalization: common plot



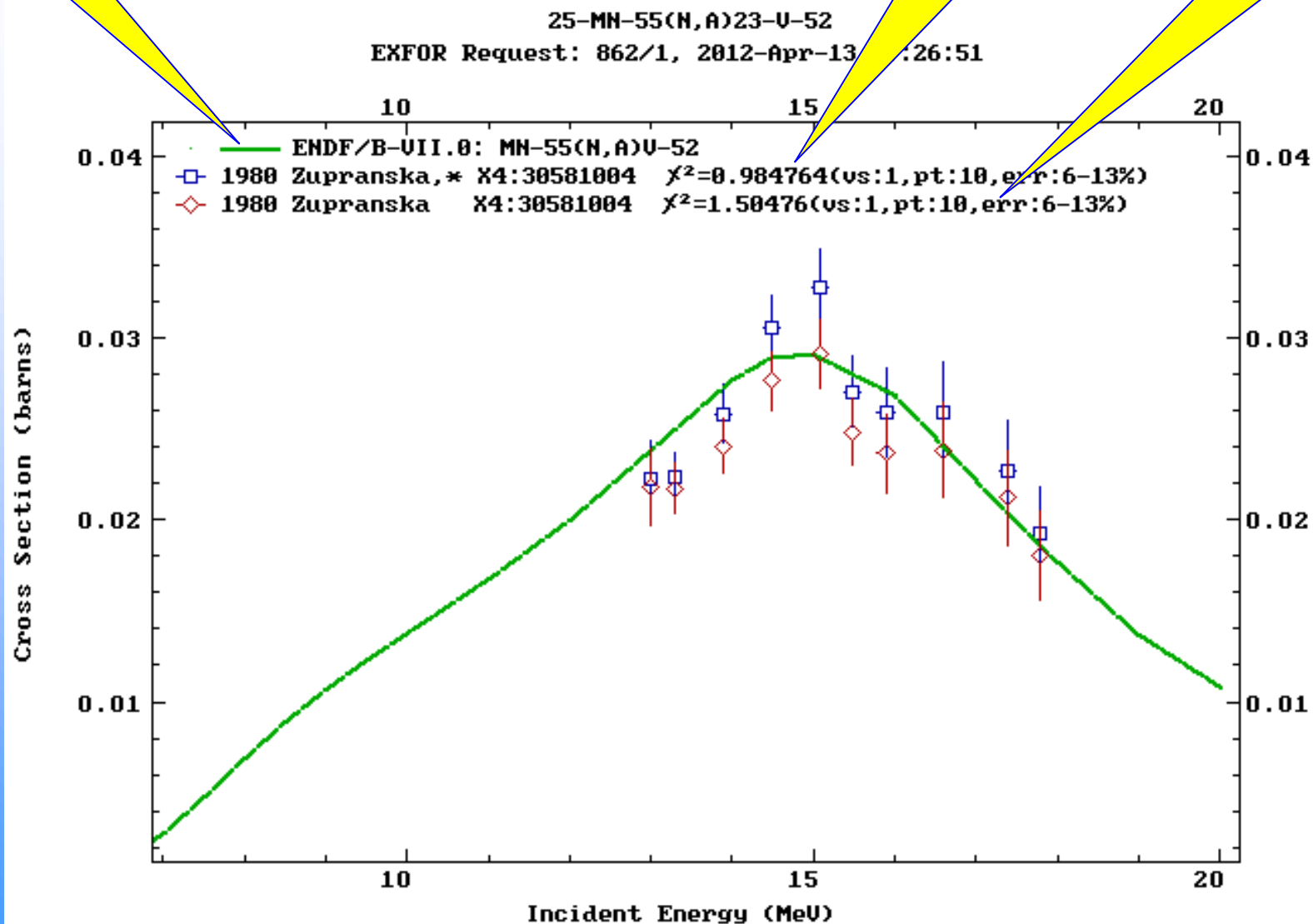
Use Copy/Paste

Comparing to ENDF

Compare with
ENDF-B/VII.0

After re-normalization:
 $\chi^2=0.984764$

Before re-normalization:
 $\chi^2=1.50476$



Inverse reactions and inverse kinematics in EXFOR and IBANDL

Example 18

18 | Invert reaction using detailed balance $^{13}\text{C}(\alpha,n)^{16}\text{O} \rightarrow ^{16}\text{O}(n,\alpha)^{13}\text{C}$: σ $d\sigma/d\Omega$

Ex.2 : $^3\text{He}(d,p)^4\text{He} \rightarrow ^4\text{He}(p,d)^3\text{He}$ $d\sigma/d\Omega$ [plot]

EXFOR. Recalculation of cross sections to inverse reactions using detailed balance relation

View: extended → “Invert data” → Advanced plot via C5

Data Selection

Retrieve ☒ Selected ☐ Unselected ☐ All

Output: ☒ X4+ ☒ EXFOR ☒ Bibliography ☐ TAB ☐ C4 ☐ PlotC4

Plot: ☐ Quick-plot (cross-sections only) ☒ Advanced plot [how-to] using ☒ C5 and ☐ convert ratios to

Narrow incident energy (optional), eV: Min: Max:

☐ Apply(4A) ☒ Data re-normalization (for advanced users, results in: C4, TAB and Plots)

	n	Display	Year	Author-1	Energy range, eV	Points	Reference	Subentry#P	NSR-Key
	1)	6-C-13 (A,N) 8-O-16,,SIG	C4: MF3 MT4	Doing advanced plot via C5: <input checked="" type="checkbox"/> invert data to reaction 8-O-16(N,A)6-C-13,,SIG (PAR,SIG:LVL=0)					
Quantity: [CS] Cross section									
*	1	<input type="checkbox"/> + X4+ X4± T4 Cov	2005	S.Harissopulos+	7.67e5	7.96e6	679	[pdf]+ J,PR/C,72,062801,2005	F0786004 [2] 2005HA69
	2	<input checked="" type="checkbox"/> + X4+ X4± T4 Cov	1993	H.W.Drotleff+	2.79e5	1.06e6	55	[pdf]+ J,AJ,414,735,1993	A0613003 [6] 1993DR08
	3	<input type="checkbox"/> + X4+ X4± T4 Cov	1989	S.E.Kellogg+	4.50e5	1.04e6	13	[pdf]+ J,BAP,34,1192 (E10.5),198904	C0517002 [4]
*	4	<input checked="" type="checkbox"/> + X4+ X4± T4 Cov	1973	J.K.Bair+	9.97e5	5.40e6	855	[pdf]+ J,PR/C,7,1356,1973	C0489002 [3] 1973BA10
g*	5	<input type="checkbox"/> + X4+ X4± T4 Cov	1967	K.K.Sekheran+	1.94e6	5.53e6	290	[pdf]+ J,PR,156,(4),1187,1967	D6089002 [1] 1967SE07
	2)	6-C-13 (A,N) 8-O-16,,SIG,,EXP	C4: MF3 MT4	Doing advanced plot via C5: <input type="checkbox"/> invert data to reaction 8-O-16(N,A)6-C-13,,SIG (PAR,SIG:LVL=0)					
Quantity: [CS] Cross section									
	6	<input type="checkbox"/> + X4+ X4± T4 Cov	1968	C.N.Davids	4.75e5	7.00e5	10	[pdf]+ J,NP/A,110,619,196803	F0304004 [4] 1968DA05
	3)	8-O-16 (N,A) 6-C-13,,SIG	C4: MF3 MT107	Doing advanced plot via C5: <input type="checkbox"/> invert data to reaction 6-C-13(A,N)8-O-16,,SIG (PAR,SIG:LVL=0)					
Quantity: [CS] Cross section									
	7	<input type="checkbox"/> + X4+ X4± T4 Cov	1968	B.Leroux+	1.49e7		1	[pdf]+ J,NP/A,116,(1),196,196807	21461002 [6] 1968LE11
*	8	<input type="checkbox"/> + X4+ X4± T4 Cov	1968	D.Dandy+	7.14e6	1.20e7	11	+ R,AWRE-O-60/68,,6810	21474003 [5]
	9	<input checked="" type="checkbox"/> + X4+ X4± T4 Cov	1966	A.S.Divatia+	3.92e6	6.49e6	406	[pdf]+ C,66PARIS,1,233,196610	30092002 [6]
	10	<input type="checkbox"/> + X4+ X4± T4 Cov	1963	M.Bormann+	1.48e7		1	[pdf]+ J,ZP,174,1,196302	21343010 [1]
	11	<input type="checkbox"/> + X4+ X4± T4 Cov			1.23e7	1.95e7	7		21343012 [1]
*	12	<input type="checkbox"/> + X4+ X4± T4 Cov	1955	J.Seitz+	3.65e6	4.22e6	26	[pdf]+ J,HPA,28,227,5503	21072002 [5]

Inverse reactions in EXFOR

Output Data

Format	Data (Size)
EXFOR Interpreted	X4+ (74Kb) Generate: X4± XML:: v1: X4.xml X4.html v2: X4.xml X4.html
EXFOR Output	X4Out X4Out.xml X4Comp Test: C5 C5M:see:[doc]
EXFOR Original	EXFOR (122Kb) zip (20Kb)
Bibliography	html (9Kb) BibTeX (3Kb)

Computational

C4

C4(C5) (170Kb) C4.ZIP (21Kb) C5 (175Kb) LST (3Kb)

The cross sections of inverse reaction follow the principle of detailed balance:

$$\sigma_{B(b,a)A} = \sigma_{A(a,b)B} \frac{(2j_a+1)(2j_A+1)}{(2j_b+1)(2j_B+1)} \frac{p_a^2}{p_b^2}$$

where:
 j : spin of a particle;
 p : relative momentum in the center-of-mass system

$$Q = (m_a + m_A) - (m_b + m_B)$$

$$E_b = \left(E_a \frac{m_A}{m_a + m_A} + Q \right) / \left(\frac{m_B}{m_b + m_B} \right)$$

$$\Delta E_b = \Delta E_a \left(\frac{m_A}{m_a + m_A} \right) / \left(\frac{m_B}{m_b + m_B} \right)$$

$$\sigma_{B(b,a)A}(E_b) = \frac{(2j_a+1)(2j_A+1)}{(2j_b+1)(2j_B+1)} \frac{m_a m_A^2}{(m_a + m_A)^2} \frac{(m_b + m_B)^2}{m_b m_B^2} \frac{E_a}{E_b} \cdot \sigma_{A(a,b)B}(E_a)$$

$$\Delta \sigma_{B(b,a)A} = \sigma_{B(b,a)A} \left(\frac{\Delta \sigma_{A(a,b)B}}{\sigma_{A(a,b)B}} \right)$$

Advanced Plotting: LST (1Kb)

Select experimental data for plotting...

Go to	Quantity type	#Plots
<input type="button" value="σ(E)"/>	SIG Cross section data	1

Go to plot evaluated data...

<input type="button" value="ENDF"/>	Retrieve evaluated data and plot...
-------------------------------------	-------------------------------------

Advanced plot via C5

Limitations

```
Convert EXFOR to C5 computational format
Program x4toc5 (version 2015-04-14)
V.Zerkin, IAEA, Vienna, 2010-2015
Running: 2015/04/17:17:03:48 on nds121.iaea.org
-i: # inverse selected reactions
-cm2lab # Try to convert all C.M. to Lab.
```

Translation Log

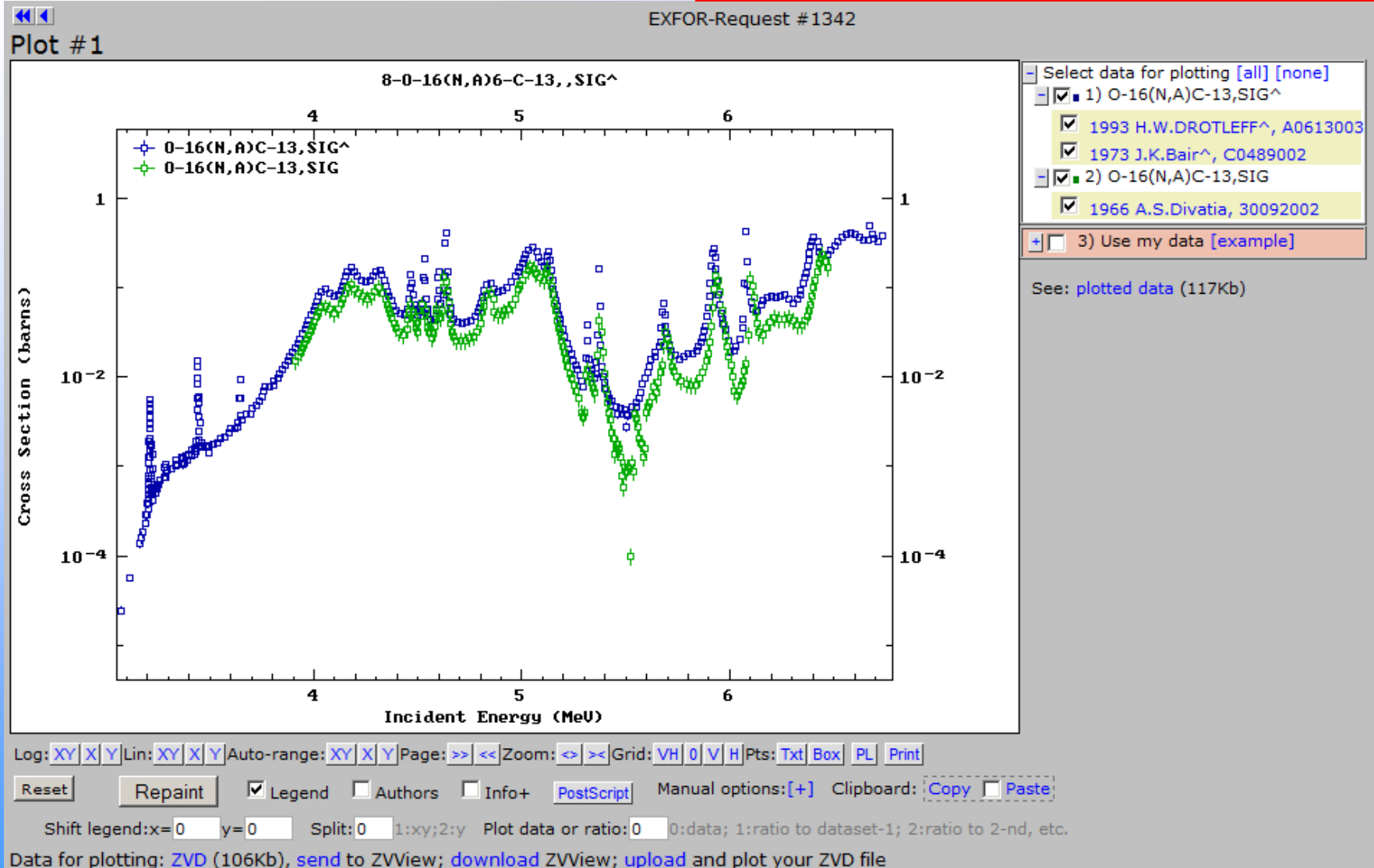
DATASET	MF	MT	REFERENCE	REACTION
30092002	3	107	A.S.Divatia,ET.AL.	(66) 8-O-16(N,A)6-C-13,,SIG
A0613003	3	4	H.W.DROTLEFF,ET.AL.	(93) 6-C-13(A,N)8-O-16,,SIG
CONVERT INC-ENERGY: C.M. TO LAB K=1.3078132				
DATA CONVERTED TO INVERSE REACTION MFMT=3:107 8-O-16(N,A)6-C-13,,SIG				
E1=(E0*0.76463526 + 2.2153838)/0.94067925 MeV				
SIG1=SIG0*E0/E1*8.457255				
Product:8-O-16 : Level1(MeV)=6.049				
Q(MeV)=2.2153838 Level1-Q=3.833616				
E0_threshold for Level1 (MeV)=5.0136533				
E1(E0_threshold),MeV=6.4304595				
Product:6-C-13 : Level1(MeV)=3.089				
Q(MeV)=-2.2153838 Level1-Q=5.3043838				
E1_threshold for Level1 (MeV)=5.638887				
Reaction inversion is correct up to E1=5.638887				
C0489002	3	4	J.K.Bair,ET.AL.	(73) 6-C-13(A,N)8-O-16,,SIG
DATA CONVERTED TO INVERSE REACTION MFMT=3:107 8-O-16(N,A)6-C-13,,SIG				
E1=(E0*0.76463526 + 2.2153838)/0.94067925 MeV				
SIG1=SIG0*E0/E1*8.457255				
Product:8-O-16 : Level1(MeV)=6.049				
Q(MeV)=2.2153838 Level1-Q=3.833616				
E0_threshold for Level1 (MeV)=5.0136533				
E1(E0_threshold),MeV=6.4304595				
Product:6-C-13 : Level1(MeV)=3.089				
Q(MeV)=-2.2153838 Level1-Q=5.3043838				
E1_threshold for Level1 (MeV)=5.638887				
Reaction inversion is correct up to E1=5.638887				

Translation Summary

ENTRY	3
SUBENT	3
DATASETS	3
TRANSLATED DATASETS	3
TRANSLATED DATA POINTS	1316

Inverse reactions in EXFOR

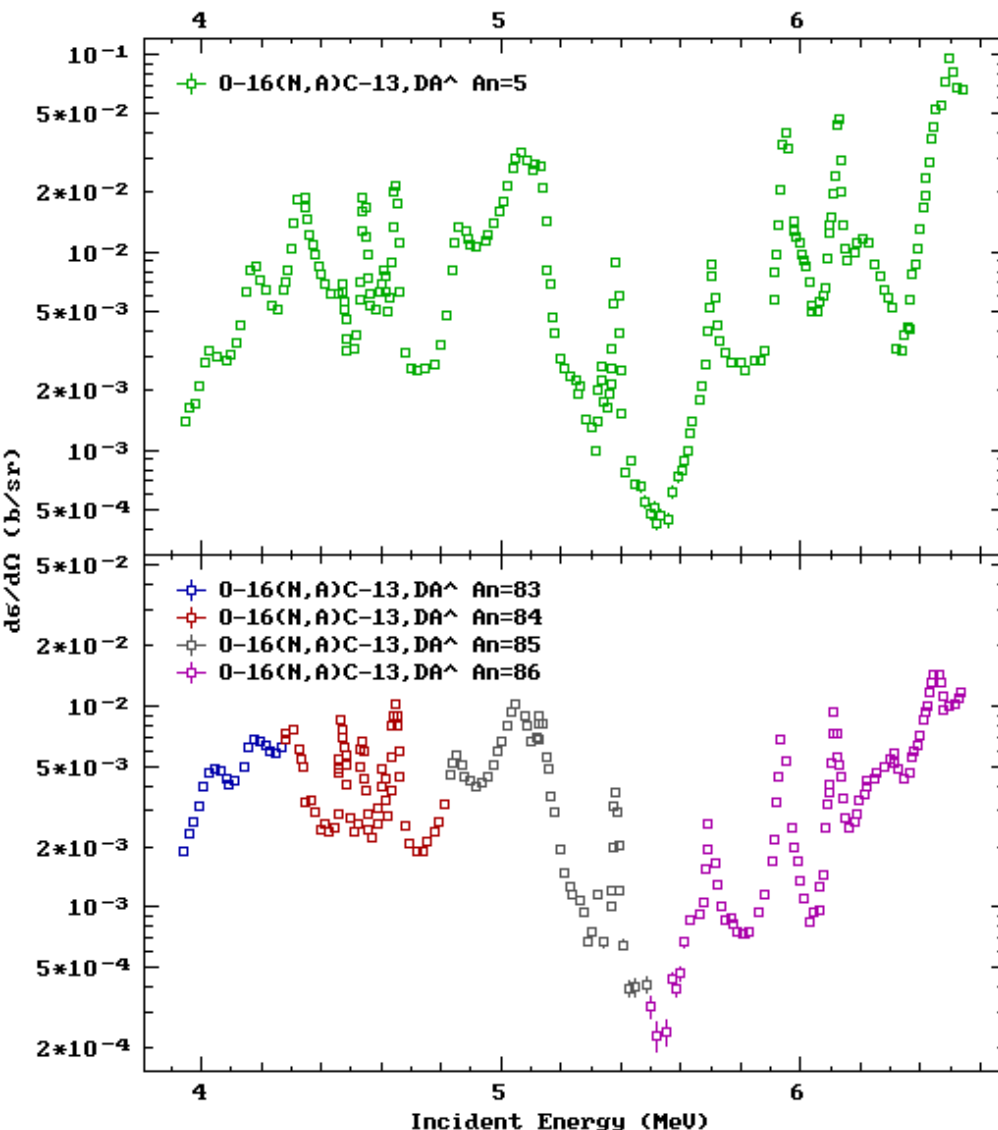
^ flag : inverted (for reactions and authors)



EXFOR. Recalculation of differential cross sections to inverse reactions using detailed balance relation

Example: $^{13}\text{C}(\alpha, n)^{16}\text{O} \rightarrow ^{16}\text{O}(n, \alpha)^{13}\text{C}$: $d\sigma/d\Omega$

1956 T.W.Bonner F0464007 C-13(A,N)O-16, DA An=5-90° Ei=1.9-5.2MeV



Protocol; limitations

Convert EXFOR to C5 computational format

Program x4toc5 (version 2018-04-18)

V.Zerkin, IAEA, Vienna, 2010-2018

Running: 2018-04-26, 18:34:41 on nds121

-i: # inverse selected reactions

-cm2lab # convert C.M. to Lab.

Translation Log

DATASET	MF	MT	REFERENCE	REACTION
F0464007	4	50	T.W.BONNER, ET.AL.	(56) 6-C-13(A,N)8-O-16,,DA

DATA CONVERTED TO INVERSE REACTION MFMT=4:107 8-O-16(N,A)6-C-13

E1=(E0*0.76463526 + 2.2156098)/0.94067925 MeV

A1:(A0->A0CM)->(A1CM=A0CM)->(A1CM->A1)

SIG1=SIG0*E0/E1*8.457256

CALC.ENE. 1:(FROM 1.958 TO 3.9469) 533:(FROM 5.166 TO 6.409)

CALC.ANG. 1:(FROM 90. TO 82.5) 533:(FROM 5. TO 4.7)

CALC.SIG. 1:(FROM 0.001461 TO 1.9003-3) 533:(FROM 0.03 TO 0.001461)

Product:8-O-16 : Level1(MeV)=6.049

Q(MeV)=2.2156098 Level1-Q=3.83339

E0_threshold for Level1 (MeV)=5.0133576

E1(E0_threshold),MeV=6.430459

Product:6-C-13 : Level1(MeV)=3.089

Q(MeV)=-2.2156098 Level1-Q=5.30461

E1_threshold for Level1 (MeV)=5.6391273

Reaction inversion is correct up to E1=5.63913(MeV)

Translation Summary

ENTRY	1
SUBENT	1
DATASETS	1
TRANSLATED DATASETS	1
TRANSLATED DATA POINTS	533

Inverse kinematics in IBANDL Web interface

Flag to transform data to invert kinematics

when presenting data

IBANDL
Ion Beam Analysis
Nuclear Data Library

Nucleus
H-1

Projectile
☐ p
☐ d
☒ ³He
☐ α
☐ ⁶Li
☐ ⁷Li

Type of data
☐ EBS
☐ NRA
☐ PIGE
☒ All

IBANDL
[Summary]

EXFOR

Home

¹H + ⁷Li

Type of data: ALL View: ☒ extended ☐ inverted Convert units for plotting: ☐ no ☒ rr->mb/sr ☐ mb/sr->rr Plots: [reset]

No.	Reaction	Angle	Energy(keV)	Pts	Update	X4	Reference	File	Plot
1	¹ H(⁷ Li, ¹ H) ⁷ Li	45°	2280-5700	29	2006-06-23	-	Z. Siketic et al., Nucl. Instr. and Meth. B 229 (2005) 180 »	View Save	<input checked="" type="checkbox"/> mb
2	¹ H(⁷ Li, ¹ H) ⁷ Li	30°	2280-5700	29	2006-06-23	-	Z. Siketic et al., Nucl. Instr. and Meth. B 229 (2005) 180 »	View Save	<input type="checkbox"/> mb

Datasets: 2 Reactions: 1 Points: 58 References: 1

☐ Add your dataset in R33 format for plotting

1 Comment: Automatically converted from EXFOR by the IAEA-NDS EXFOR Web-Retrieval System program version-2015/02/20, by V.Zerkin.
 "The elastic scattering of protons by lithium"
 W.D.Warters, W.A.Fowler, C.C.Lauritsen
 EXFOR: A1401003 Created: 1980-07-28 Updated: 2014-11-13
 X4Reaction: 3-LI-7 (P,EL) 3-LI-7,,DA,,EXP; X4Points: 295
 Converted from C.M. to Lab.: Data (assumed DATA-CM), Theta
 DataLab= DataCM/0.9664059
 ThetaCM: 89.2

☒ plot
 Transform:
☒ invert kinematics
 Convert units:
☒ no
☐ rr->mb/sr
☐ mb/sr->rr
[View](#)
 Example: [1] [2]

Legend:
 X4 link to the dataset in EXFOR database retrieval system
 + search in EXFOR database the data of given reaction published by given author
 mb Cross section, mb/sr
 rr Ratio to Rutherford
 ru Cross section, Relative Units
 tot Cross section, mb
 yield Yield, Ngamma/sr/uC

IBANDL contains angular distributions $d\sigma/d\Omega(\theta, E)$ for incident charged particle reactions

Inverse kinematics in IBANDL Web interface

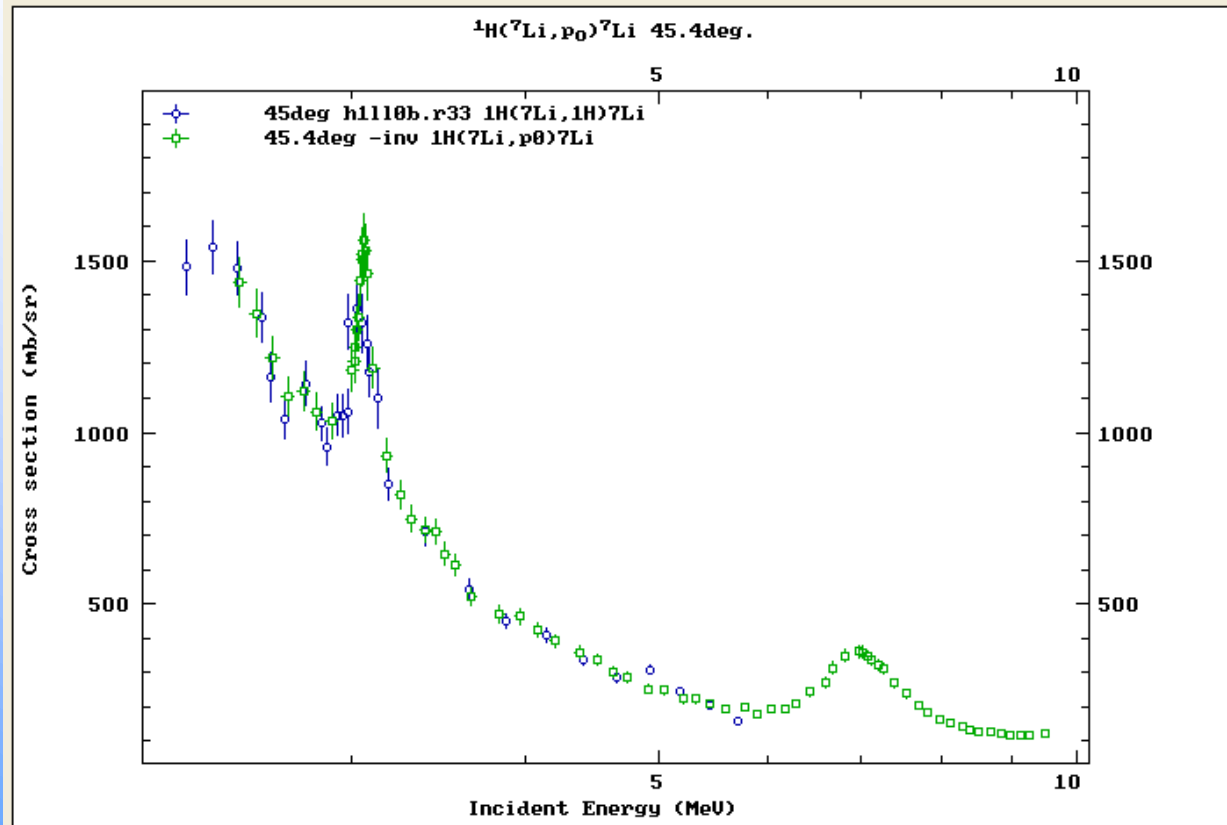
Welcome to Web-ZVView!

Interactive plotting of IBANDL and SigmaCalc data



1) $\theta=45^\circ$ $E_1=2.3-5.7\text{MeV}$ Source: Z. Siketic et al., Nucl. Instr. and Meth. B 229 (2005) 180 [+](#)

2) $\theta=45.4^\circ$ $E_1=2.5-9.5\text{MeV}$ Source: W.D.Warters+(1953), Jour. Physical Review, Vol.91, Issue.4, p.917 [\[inv\]](#) Original: ${}^7\text{Li}(p,p_0){}^7\text{Li}$ $E_1=0.4-1.4\text{MeV}$ $\phi=45.4^\circ$ $\theta=81.1^\circ$ [+](#)



Select data for plotting [\[all\]](#) [\[none\]](#)

☒ 1) 45deg h1110b.r33 1H(7Li,1H)7Li

☒ 2) 45.4deg -inv 1H(7Li,p0)7Li

[+](#) ☐ 3) Use my data [\[example\]](#)

See: [plotted data](#) (6Kb)

Details of
calculations

Log: [XY](#) [X](#) [Y](#) Lin: [XY](#) [X](#) [Y](#) Auto-range: [XY](#) [X](#) [Y](#) Page: [>>](#) [<<](#) Zoom: [<>](#) [>>](#) Grid: [VH](#) [0](#) [V](#) [H](#) Pts: [Txt](#) [Box](#) [PL](#) [Print](#)

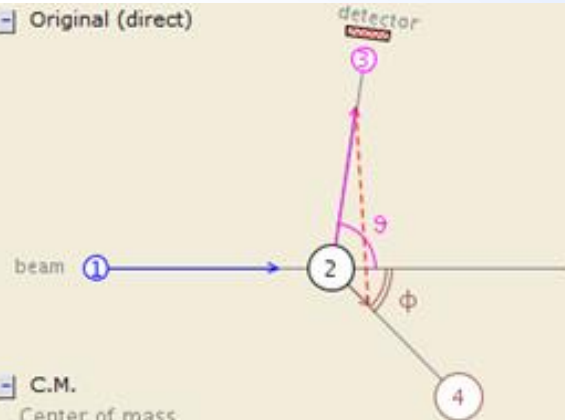
[Reset](#) [Repaint](#) ☒ Legend ☐ Authors ☐ Info+ [PostScript](#) Manual options: [\[+\]](#) Clipboard: [Copy](#) ☐ Paste

Shift legend: x= y= Split: 1:xy;2:y Plot data or ratio: 0:data; 1:ratio to dataset-1; 2:ratio to 2-nd, etc.

Data for plotting: [ZVD](#) (4Kb), [send](#) to ZVView; [download](#) ZVView; [upload](#) and plot your ZVD file

Inverse kinematics in IBANDL Web interface

Original (direct)



Original (direct)

Reaction: ${}^7\text{Li}(p,p_0){}^7\text{Li}$ Qvalue=0 nPoint:71

M1: Incident p $M_1=1.007825$ $E_1=1367.0\text{keV}$

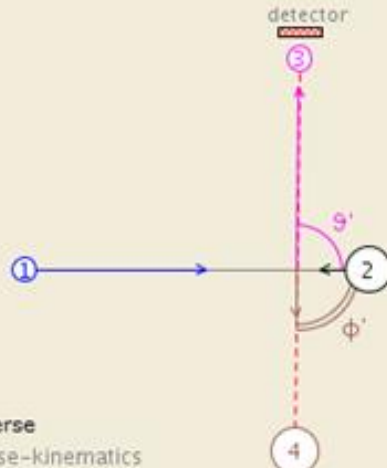
M2: Target ${}^7\text{Li}$ $M_2=7.0160046$

M3: Scattered p $M_3=1.007825$ $E_3=1070.6\text{keV}$ $\theta=81.1^\circ$ $\sigma(\theta)=45.1053\text{mb/sr}\pm 5.0\%$

M4: Recoil ${}^7\text{Li}$ $M_4=7.0160046$ $E_4=296.4\text{keV}$ $\phi=45.4^\circ$

C.M.

Center of mass



C.M.

Reaction: ${}^7\text{Li}(p,p_0){}^7\text{Li}$ Qvalue=0 nPoint:71

$E'_{\text{cm}}=1195.3\text{keV}$

M1: Incident p $M_1=1.007825$ $E_1'=1045.2\text{keV}$

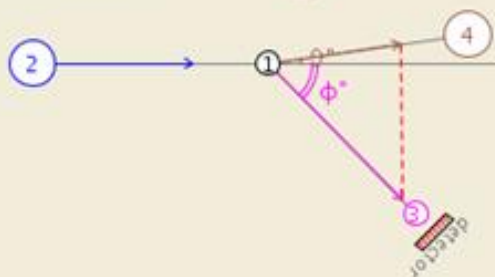
M2: Target ${}^7\text{Li}$ $M_2=7.0160046$ $E_2'=150.1\text{keV}$

M3: Scattered p $M_3=1.007825$ $E_3'=1045.2\text{keV}$ $\theta'=89.3^\circ$ $\sigma'(\theta')=43.5874\text{mb/sr}\pm 5.0\%$

M4: Recoil ${}^7\text{Li}$ $M_4=7.0160046$ $E_4'=150.1\text{keV}$ $\phi'=90.7^\circ$

Inverse

Inverse-kinematics



Inverse

Reaction: ${}^7\text{Li}(p,p_0){}^7\text{Li}$ Qvalue=0 nPoint:71

M2: Incident ${}^7\text{Li}$ $M_2=7.0160046$ $E_2'=9516.4\text{keV}$

M1: Target p $M_1=1.007825$

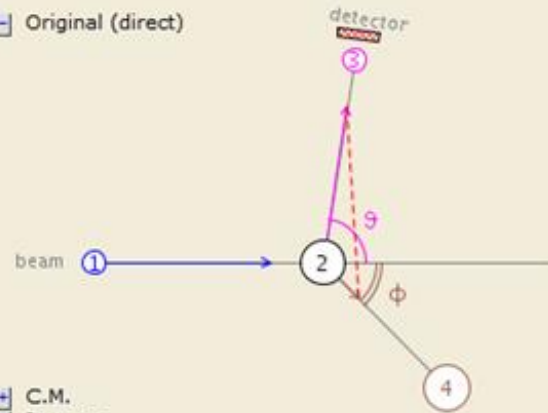
M3: Recoil p $M_3=1.007825$ $E_3''=2063.3\text{keV}$ $\phi''=45.4^\circ$ $\sigma''(\phi'')=122.484\text{mb/sr}\pm 5.0\%$

M4: Scattered ${}^7\text{Li}$ $M_4=7.0160046$ $E_4''=7453.1\text{keV}$ $\theta''=8.2^\circ$

Equivalent to elastic scattering of p on ${}^7\text{Li}$ measurements of recoil nucleus ${}^7\text{Li}$

Inverse kinematics in IBANDL Web interface

Original (direct)



Original (direct)

Reaction: ${}^7\text{Li}(p,p_0){}^7\text{Li}$ Qvalue=0 nPoint:71

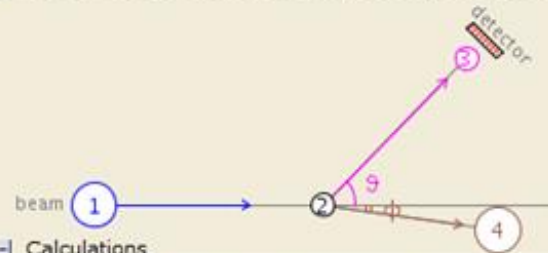
M1: Incident p $M_1=1.007825$ $E_1=1367.0\text{keV}$

M2: Target ${}^7\text{Li}$ $M_2=7.0160046$

M3: Scattered p $M_3=1.007825$ $E_3=1070.6\text{keV}$ $\theta=81.1^\circ$ $\sigma(\theta)=45.1053\text{mb/sr}\pm 5.0\%$

M4: Recoil ${}^7\text{Li}$ $M_4=7.0160046$ $E_4=296.4\text{keV}$ $\varphi=45.4^\circ$

+ C.M.
+ Inverse
- Result: inverse-kinematics data presented in R33 format



Result: inverse-kinematics data presented in R33 format

Reaction: ${}^1\text{H}({}^7\text{Li},p_0){}^7\text{Li}$ Qvalue=0 nPoint:71

M1: Incident ${}^7\text{Li}$ $M_1=7.0160046$ $E_1=9516.4\text{keV}$

M2: Target ${}^1\text{H}$ $M_2=1.007825$

M3: Ejectile p $M_3=1.007825$ $E_3=2061.1\text{keV}$ $\theta=45.4^\circ$ $\sigma(\theta)=122.484\text{mb/sr}\pm 5.0\%$

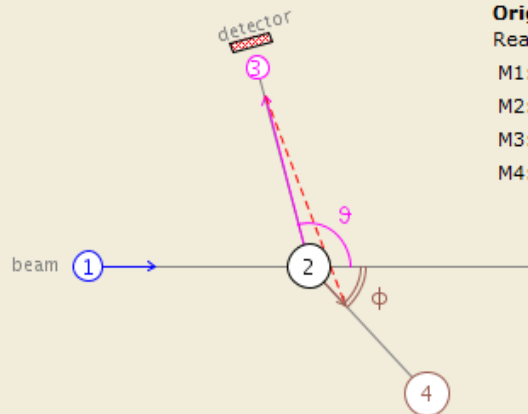
M4: Residual ${}^7\text{Li}$ $M_4=7.0160046$ $E_4=7455.3\text{keV}$ $\varphi=8.2^\circ$

Calculations

	Original (lab.): ${}^7\text{Li}(p,p_0){}^7\text{Li}$ Q=0							Center of mass								Inverse kinematics							
#	E_1 , keV	θ°	$\sigma(\theta)$, mb/sr	φ	$\sigma(\varphi)$	E_3	E_4	E'_{cm}	θ'	φ'	$\sigma'(\theta')$	E'_1	E'_2	E'_3	E'_4	E_2''	φ''	$\sigma''(\varphi'')$	θ''	$\sigma''(\theta'')$	E_3''	E_4''	
1	358.6	81.1	529.741	45.4	4.35366e6	280.851	77.7494	313.558	89.3	90.7	511.914	274.174	39.3842	274.174	39.3842	2496.4	45.4	1438.52	8.2	164261.	541.3	1955.2	
2	368.3	81.1	497.427	45.4	4.08809e6	288.447	79.8525	322.04	89.3	90.7	480.687	281.591	40.4495	281.591	40.4495	2563.9	45.4	1350.77	8.2	154241.	555.9	2008	
3	378.5	81.1	450.076	45.4	3.69894e6	296.436	82.064	330.959	89.3	90.7	434.93	289.389	41.5698	289.389	41.5698	2634.9	45.4	1222.18	8.2	139559.	571.3	2063.6	
4	388.2	81.1	407.779	45.4	3.35132e6	304.033	84.1671	339.441	89.3	90.7	394.056	296.805	42.6351	296.805	42.6351	2702.5	45.4	1107.33	8.2	126444.	585.9	2116.5	
5	398.4	81.1	413.26	45.4	3.39637e6	312.021	86.3786	348.359	89.3	90.7	399.353	304.604	43.7553	304.604	43.7553	2773.5	45.4	1122.21	8.2	128143.	601.3	2172.1	
6	407.1	81.1	391.875	45.4	3.22062e6	318.835	88.2649	355.967	89.3	90.7	378.687	311.256	44.7108	311.256	44.7108	2834	45.4	1064.14	8.2	121512.	614.5	2219.6	
7	417.8	81.1	382.085	45.4	3.14016e6	327.215	90.5848	365.323	89.3	90.7	369.227	319.437	45.886	319.437	45.886	2908.5	45.4	1037.55	8.2	118476.	630.6	2277.9	
8	432.2	81.1	435.468	45.4	3.57888e6	338.493	93.7069	377.914	89.3	90.7	420.813	330.446	47.4675	330.446	47.4675	3008.8	45.4	1182.52	8.2	135029.	652.3	2356.4	
9	433.7	81.1	445.21	45.4	3.65895e6	339.668	94.0321	379.226	89.3	90.7	430.227	331.593	47.6322	331.593	47.6322	3019.2	45.4	1208.97	8.2	138050.	654.6	2364.6	
10	434.2	81.1	461.032	45.4	3.78898e6	340.059	94.1405	379.663	89.3	90.7	445.517	331.976	47.6872	331.976	47.6872	3022.7	45.4	1251.94	8.2	142956.	655.4	2367.3	
11	435.1	81.1	480.354	45.4	3.94778e6	340.764	94.3357	380.45	89.3	90.7	464.189	332.664	47.786	332.664	47.786	3029	45.4	1304.4	8.2	148948.	656.7	2372.2	
12	437	81.1	493.156	45.4	4.05299e6	342.252	94.7476	382.111	89.3	90.7	476.56	334.116	47.9947	334.116	47.9947	3042.2	45.4	1339.17	8.2	152917.	659.6	2382.6	

1) $\theta=63.1^\circ$ $E_1=0.4\text{--}2.9\text{MeV}$ Source: A.J.Elwyn+(1977), Jour. Physical Review, Part C, Nuclear Physics, Vol.16, p.1744 [inv] Original: ${}^6\text{Li}(d,p_1){}^7\text{Li}$ $E_1=0.1\text{--}1\text{MeV}$ $\varphi=61.3^\circ\text{--}46.3^\circ$ $\theta=105^\circ$

Original (direct)



Original (direct)

Reaction: ${}^6\text{Li}(d,p_1){}^7\text{Li}$ $Q\text{value}=4547.4\text{keV}$ $n\text{Point}:11$

M1: Incident d $M_1=2.0141017$ $E_1=975.0\text{keV}$

M2: Target ${}^6\text{Li}$ $M_2=6.015123$

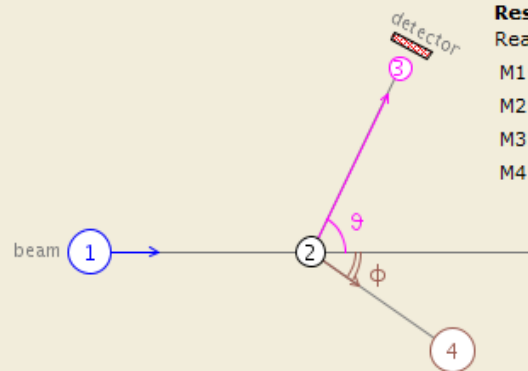
M3: Ejectile p $M_3=1.007825$ $E_3=4394.0\text{keV}$ $\theta=105.0^\circ$ $\sigma(\theta)=2.65000$

M4: Residual ${}^7\text{Li}$ $M_4=7.0160046$ $E_4=1128.4\text{keV}$ $\varphi=46.3^\circ$

${}^6\text{Li}(d,p_1){}^7\text{Li}$

C.M.
 Inverse

Result: inverse-kinematics data presented in R33 format



Result: inverse-kinematics data presented in R33 format

Reaction: $2\text{H}({}^6\text{Li},p_1){}^7\text{Li}$ $Q\text{value}=4547.4\text{keV}$ $n\text{Point}:11$

M1: Incident ${}^6\text{Li}$ $M_1=6.015123$ $E_1=2911.8\text{keV}$

M2: Target 2H $M_2=2.0141017$

M3: Ejectile p $M_3=1.007825$ $E_3=5446.3\text{keV}$ $\theta=63.1^\circ$ $\sigma(\theta)=3.46672$

M4: Residual ${}^7\text{Li}$ $M_4=7.0160046$ $E_4=2013.0\text{keV}$ $\varphi=33.8^\circ$

Comment: Automatically converted from EXFOR
by IAEA-NDS EXFOR Web-Retrieval System (v-2008/11/03)
"Absolute cross sections for deuteron-induced reactions
on ${}^6\text{Li}$ at energies below 1 MeV."
A.J.Elwyn, R.E.Holland, C.N.Davids, L.Meyer-Schuetzmeister,
J.E.Monahan, F.P.Mooring, W.Ray Jr
EXFOR: T0134004 Created: 2000-11-21 Updated: 2001-03-30
X4Reaction: 3-LI-6(D,P)3-LI-7,PAR,DA; X4Points:370
LevelEnergy: 478.00
Theta grouping interval=3.0 deg.

```
## Transformed to inverse kinematics: 2015-04-17,19:24:38
## Orig.File: 1i6dp1$9.r33 (direct kinematics)
## Orig.Reaction: 6Li(d,p1)7Li
## Orig.Masses_amu: 2.0141017, 6.015123, 1.007825, 7.0160046
## Orig.Theta: 105.0
## Orig.En: 145.0 .. 975.0
## Orig.Phi: 61.3 .. 46.3
## Calculated: inverse kinematics
## Calc.Reaction: 2H(6Li,p1)7Li
## Calc.Theta: 67.8 .. 58.5 (Recoil)
## Program-version: 2015/03/17
```

Version: R33
X4Number: T0134004
Source: A.J.Elwyn+(1977), Jour. Physical Review, Part C, Nuclear Physics
Reaction: $2\text{H}({}^6\text{Li},p_1){}^7\text{Li}$
Distribution: Energy
Sigfactors: 1.0, 0.0
Enfactors: 1.0, 0.0, 0.0, 0.0
Units: mb
Composition:
Masses: 6.0, 2.0, 1.0, 7.0
Zeds: 3.0, 1.0, 1.0, 3.0
Qvalue: 4547.4, 0.00, 0.00, 0.00, 0.00
Theta: 63.1

Data:

433.043	0.00000	0.0633396	0.00000
543.544	0.00000	0.0995302	0.00000
785.451	0.00000	0.351321	0.00000
794.410	0.00000	0.362960	0.00000
1093.06	0.00000	0.698637	0.00000
1102.02	0.00000	0.710805	0.00000
1702.31	0.00000	1.66925	0.00000
2009.92	0.00000	2.11322	0.00000
2308.57	0.00000	2.29090	0.00000
2613.19	0.00000	2.17612	0.00000
2911.84	0.00000	3.46672	0.00000

EndData:

Calculations

	Original (lab.): ${}^6\text{Li}(d,p_1){}^7\text{Li}$ $Q=4547.4\text{keV}$							Center of mass								Inverse kinematics							
#	E_1 , keV	θ°	$\sigma(\theta)$, mb/sr	φ	$\sigma(\varphi)$	E_3	E_4	E'_{cm}	θ'	φ'	$\sigma'(\theta')$	E'_1	E'_2	E'_3	E'_4	E_2''	φ''	$\sigma''(\varphi'')$	θ''	$\sigma''(\theta'')$	E_3''	E_4''	
1	145	105	0.058	61.3	0.657303	3996.7	695.703	108.627	106.9	73.1	0.0590504	81.3785	27.2488	4071.21	584.816	433	67.8	0.0633396	67	0.0831837	4348.1	632.3	
2	182	105	0.09	59.9	0.99946	4011.21	718.192	136.346	107.1	72.9	0.0918301	102.144	34.2019	4095.45	588.297	543.5	67	0.0995302	63.1	0.146473	4415.3	675.6	
3	263	105	0.31	57.3	3.32075	4045.45	764.953	197.027	107.5	72.5	0.317601	147.604	49.4236	4148.51	595.919	785.5	65.5	0.351321	56.6	0.656984	4555	777.9	
4	266	105	0.32	57.3	3.42385	4046.76	766.637	199.275	107.5	72.5	0.327892	149.287	49.9874	4150.47	596.201	794.4	65.5	0.36296	56.4	0.684576	4560	781.8	
5	366	105	0.6	54.8	6.20191	4092.	821.397	274.19	107.9	72.1	0.617389	205.411	68.7796	4215.98	605.611	1093.1	64	0.698637	50.7	1.72735	4723.5	916.9	
6	369	105	0.61	54.7	6.29947	4093.39	823.006	276.438	107.9	72.1	0.627752	207.094	69.3434	4217.94	605.893	1102	64	0.710805	50.5	1.77102	4728.3	921.1	
7	570	105	1.37	51.1	13.434	4189.66	927.739	427.018	108.6	71.4	1.41956	319.902	107.116	4349.61	624.807	1702.3	61.7	1.66925	43	6.64402	5041.1	1208.6	
8	673	105	1.7	49.6	16.3212	4240.65	979.746	504.18	108.8	71.2	1.76676	377.709	126.472	4417.08	634.499	2009.9	60.8	2.11322	40.3	10.3753	5196.4	1360.9	
9	773	105	1.81	48.4	17.0642	4290.89	1029.51	579.096	109.1	70.9	1.88606	433.832	145.264	4482.59	643.908	2308.6	59.9	2.2909	38.1	13.5864	5345	1510.9	
10	875	105	1.69	47.2	15.6695	4342.73	1079.67	655.509	109.3	70.7	1.76542	491.077	164.432	4549.4	653.506	2613.2	59.2	2.17612	36.2	15.4581	5494.9	1665.7	
11	975	105	2.65	46.3	24.2084	4394.01	1128.39	730.425	109.5	70.5	2.77457	547.2	183.224	4614.91	662.916	2911.8	58.5	3.46672	34.7	29.1078	5640.4	1818.9	

Recalculation of angular distributions from EXFOR to inverse kinematics and integration with Web-IBANDL

Data Selection

Retrieve ☒ Selected ☐ Unselected ☐ All Reset

Output: ☒ X4+ ☒ EXFOR ☒ Bibliography ☐ TAB ☐ C4 ☐ PlotC4

Plot: ☐ Quick-plot (cross-sections) ☐ ungroup ☐ Advanced plot [how-to] using ☐ C5 and ☐ convert ratios to σ

Narrow incident energy (optional), eV: Min: Max:

☐ Apply ☒ Data re-normalization (for advanced users, results in: C4, TAB and Plots)

	n	Display	Year	Author-1	Energy range, eV	Points	Reference	Subentry#P	NSR-Key
1)	1	3-LI-6 (HE3, P) 4-BE-8, PAR, DA	C4: MF4	MT601					
Quantity: [DAP] Partial differential cross section d/dA									
g*	1	<input type="checkbox"/> + <input type="checkbox"/> i <input type="checkbox"/> X4 <input type="checkbox"/> X4+ <input type="checkbox"/> X4± <input type="checkbox"/> T4	1956	J.P.Schiffer+	8.98e5	5.08e6	201	[pdf]+ J, PR, 104, 1064, 1956	A1495002 [9] R33 1956S
g	2	<input type="checkbox"/> + <input type="checkbox"/> i <input type="checkbox"/> X4 <input type="checkbox"/> X4+ <input type="checkbox"/> X4± <input type="checkbox"/> T4			8.99e5	5.08e6	191		A1495003 [9] R33 1956S

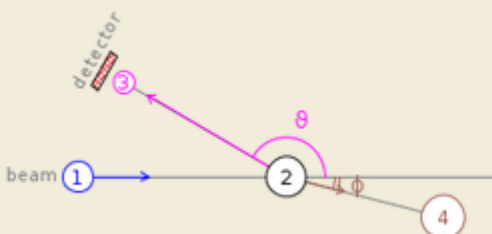
Convert to R33 format

Note. This is β -version of X4R33 conversion software. Please report any problems to V.Zerkin@iaea.org

Plots: $d\sigma/d\Omega(E)$:2/2 $d\sigma/d\Omega(\theta)$:16/189 See: [doc] x4: $\sigma_{CM}(E, \theta)$ Try: $\theta_{CM} \rightarrow$ Lab

1) 0°:2900 Plot R33 [IBA] [Inv] 2) 150°:2900 Plot R33 [IBA] [Inv]

EXFOR:A1495003 ${}^6\text{Li}({}^3\text{He}, p_1){}^8\text{Be}$ $\theta=150^\circ$ E_{in} :890-5080keV Source: J.P.Schiffer+(1956), Jour. Physical Review, Vol.104, p.1064



Reaction: ${}^6\text{Li}({}^3\text{He}, p_1){}^8\text{Be}$ Qvalue=13887.36keV nPoint:99

M1: Incident ${}^3\text{He}$ $M_1=3.0160294$ $E_1=5081.0\text{keV}$

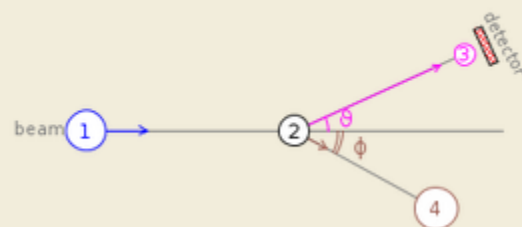
M2: Target ${}^6\text{Li}$ $M_2=6.015123$

M3: Ejectile p $M_3=1.007825$ $E_3=12484.7\text{keV}$ $\theta=150.0^\circ$ $\sigma(\theta)=4.35210\text{mb/sr}\pm 20.0\%$

M4: Residual ${}^8\text{Be}$ $M_4=8.005305$ $E_4=6483.6\text{keV}$ $\phi=14.3^\circ$

Recalculated to inverse kinematics.

EXFOR:A1495003 ${}^3\text{He}({}^6\text{Li}, p_1){}^8\text{Be}$ $\theta=23.8^\circ$ E_{in} :1790-10130keV Source: J.P.Schiffer+(1956), Jour. Physical Review, Vol.104, p.1064



Reaction: ${}^3\text{He}({}^6\text{Li}, p_1){}^8\text{Be}$ Qvalue=13887.36keV nPoint:99

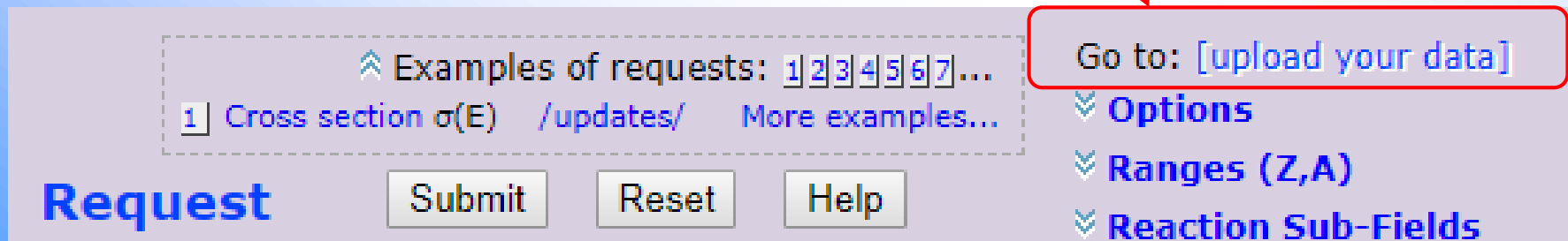
M1: Incident ${}^6\text{Li}$ $M_1=6.015123$ $E_1=10133.5\text{keV}$

M2: Target ${}^3\text{He}$ $M_2=3.0160294$

M3: Ejectile p $M_3=1.007825$ $E_3=22050.5\text{keV}$ $\theta=23.8^\circ$ $\sigma(\theta)=7.74266\text{mb/sr}\pm 20.0\%$

M4: Residual ${}^8\text{Be}$ $M_4=8.005305$ $E_4=1970.3\text{keV}$ $\phi=28.6^\circ$

Uploading your experimental data



Examples of requests: [1](#)[2](#)[3](#)[4](#)[5](#)[6](#)[7](#)...

[1](#) Cross section $\sigma(E)$ /updates/ More examples...

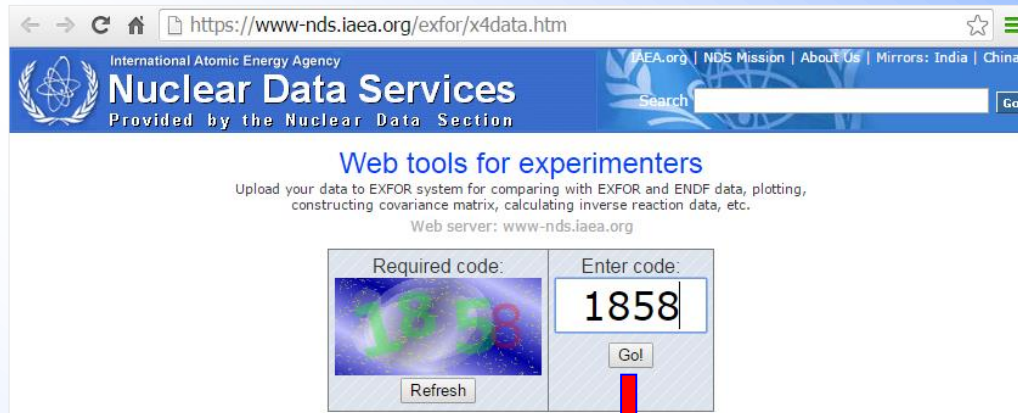
Request

Go to: [\[upload your data\]](#)

- Options
- Ranges (Z,A)
- Reaction Sub-Fields

Uploading your experimental data

<https://www-nds.iaea.org/exfor/x4data.htm>



The screenshot shows the Nuclear Data Services website. The header includes the IAEA logo and navigation links. The main content area is titled "Web tools for experimenters" and describes the EXFOR system. A login section is visible with a "Required code" image showing the number 1858 and an "Enter code" field with the number 1858. A red arrow points from the "Go!" button to the "Input data to Web EXFOR system" section below.

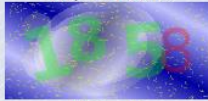
International Atomic Energy Agency
Nuclear Data Services
Provided by the Nuclear Data Section

IAEA.org | NDS Mission | About Us | Mirrors: India | China

Search Go

Web tools for experimenters

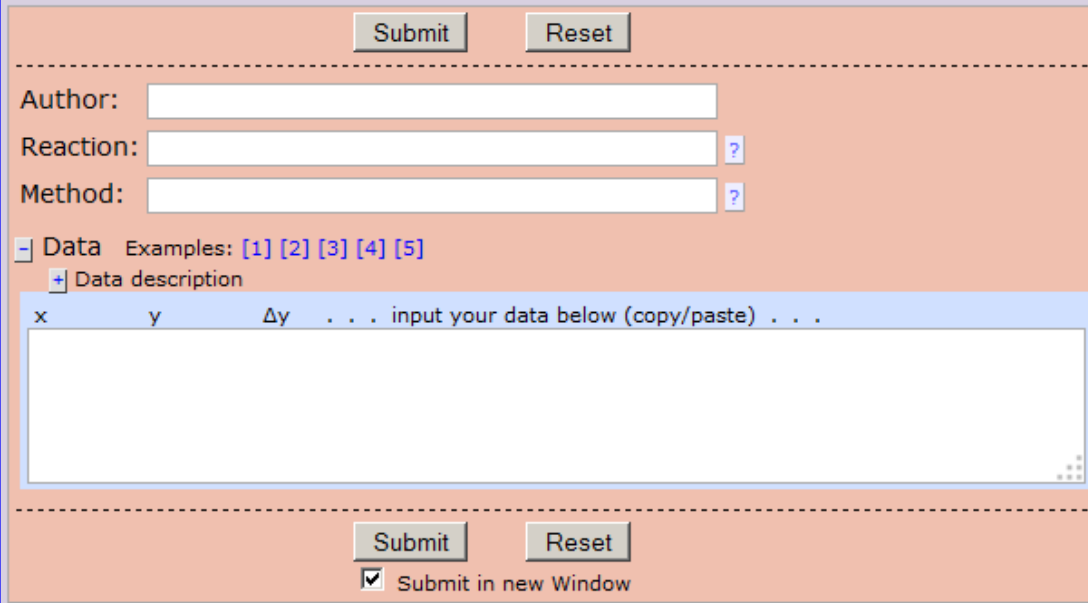
Upload your data to EXFOR system for comparing with EXFOR and ENDF data, plotting, constructing covariance matrix, calculating inverse reaction data, etc.
Web server: www-nds.iaea.org

Required code:  Refresh

Enter code: Go!

Input data to Web EXFOR system

Uploading experimental data for interactive construction of covariance matrix
by V.Zerkin, IAEA-NDS, 2015, ver-2015-10-23



The screenshot shows the "Input data to Web EXFOR system" form. It includes fields for Author, Reaction, and Method, each with a help icon. A "Data" section is expanded, showing a table header with columns x, y, and Δy, followed by a large text area for inputting data. The form has "Submit" and "Reset" buttons at the top and bottom. A checkbox for "Submit in new Window" is checked at the bottom.

Submit Reset

Author:

Reaction: ?

Method: ?

☒ Data Examples: [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#) [\[5\]](#)

☐ Data description

x y Δy . . . input your data below (copy/paste) . . .

Submit Reset

☒ Submit in new Window

Uploading your experimental data

Author:

Reaction: ?

Method: ?

☐ Data Examples: [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#) [\[5\]](#)


☐ Data description

Uncertainties Δy : | ; nn=7

Var: {X}	{Y}	{ ΔY }1	{ ΔY }2	{ ΔY }3	{ ΔY }4	{ ΔY }5	{ ΔY }6	{ ΔY }7
Header: EN	DATA	ERR-TOT	MONIT-ERR	ERR-1	ERR-2	ERR-7	ERR-8	ERR-3
Units: MeV	mb	per-cent	per-cent	per-cent	per-cent	per-cent	per-cent	per-cent
Type: Table	Table	Table	Table	Table	Table	Table	Table	Const
Value:								1.2

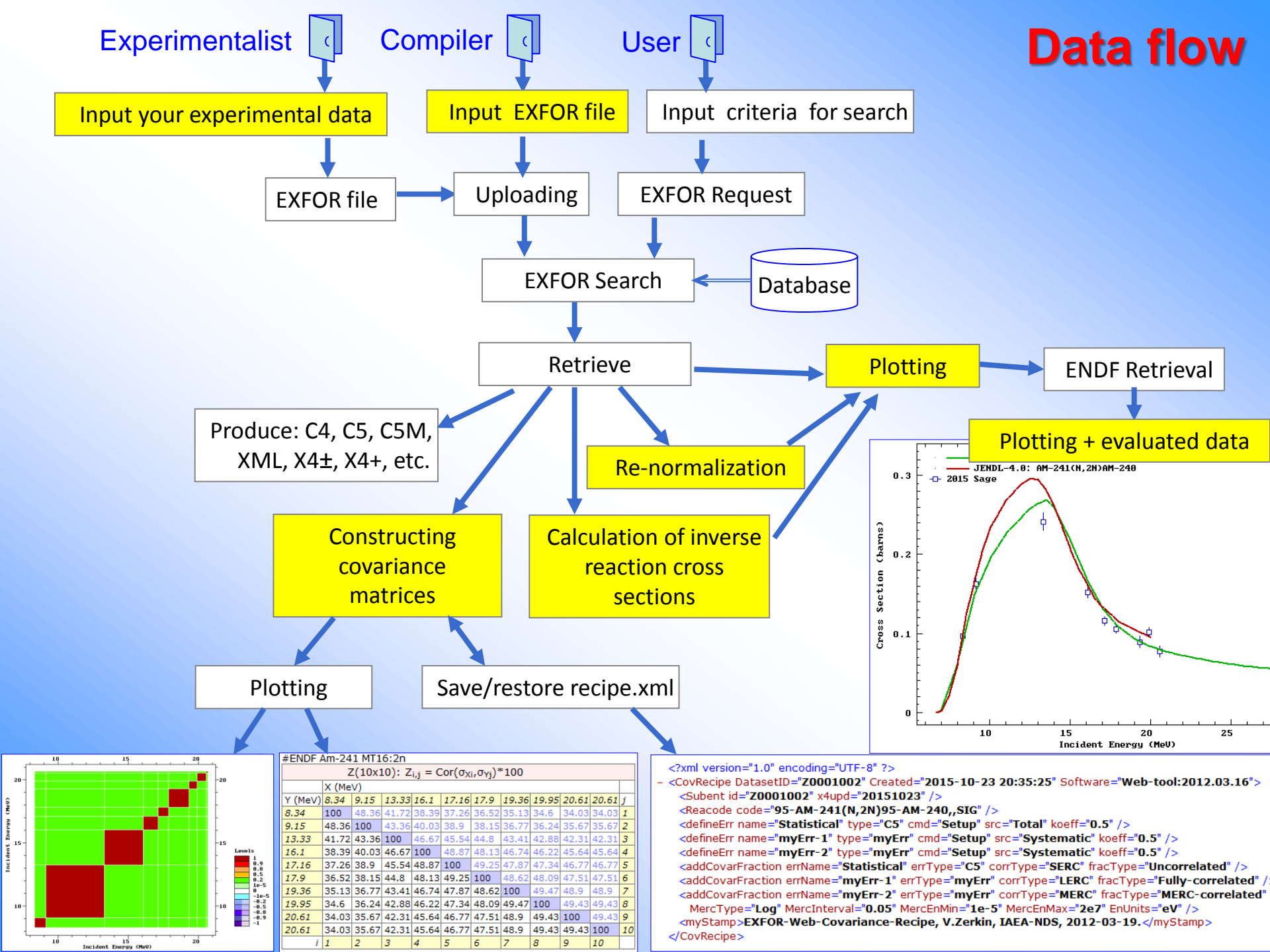
x	y	Δy	. . . input your data below (copy/paste) . . .					
8.34	96.8	6.5	1.9	5	1	.9	.3	
9.15	162.9	5.7	1.9	4	1	.6	.3	
13.33	241.8	4.6	1.6	2.5	1	.4	.3	
16.1	152.4	4.6	2	2.1	1	.6	.3	
17.16	116.1	4.4	2	1.5	1	.6	.3	
17.9	105.7	4.4	2.2	1.3	.7	.7	.3	
19.36	89.5	8.2	3.1	6.3	2	.6	1.3	
19.95	102.1	5.8	4.1	1.4	1	.6	1.4	
20.61	77.9	8.8	5.4	5.7	1.6	.6	1.4	

☒ Submit in new Window



n	Display	Year	Author-1	Energy range,eV	Points	Reference
1)	95-AM-241 (N,2N) 95-AM-240,,SIG	C4:	MF3 MT16			
Quantity: [CS] Cross section						
1	+ uploaded	2016	C.Sage+	8.34e6 2.061e7	9	+ W,SAGE,20160622
2	+	2016	A.Kalamara+	1.00e7 1.71e7	4	[pdf]+ J,PR/C,93,014610,2016

Data flow

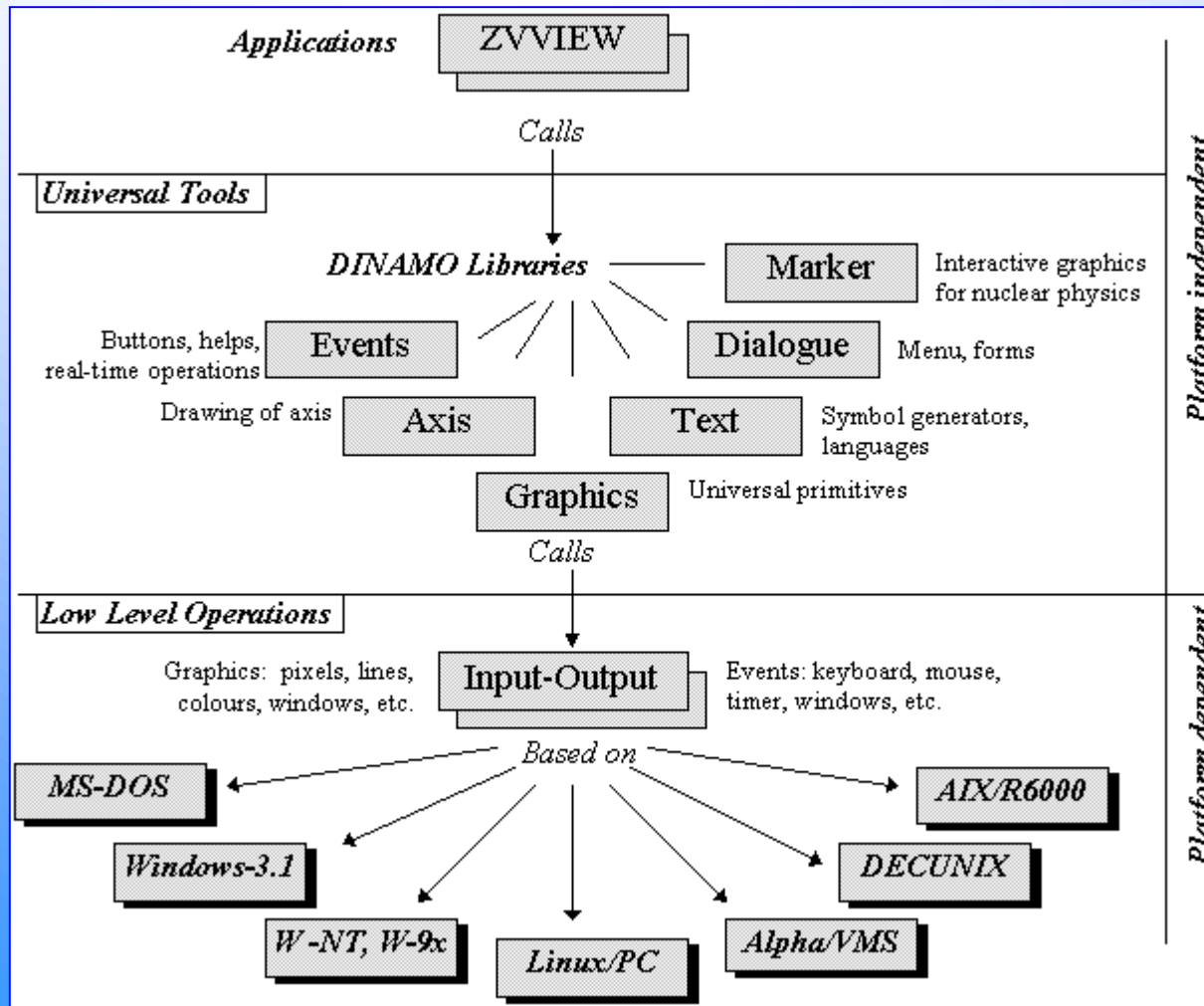


Plotting on Web with Web-ZVView

ZVView/DINAMO: interactive plotting system

ZVView is a multi-platform program designed for nuclear reactions data evaluators to perform efficient interactive visual analysis of cross section data retrieved from EXFOR and ENDF libraries. Kiev-Vienna, 1993-2018

<http://www-nds.iaea.org/public/zvview/>



Platforms:

1. MS-Windows
2. Linux (X-Windows)
3. Mac OSX (X11)

Old platforms:

4. Alpha/VMS
5. DEC Unix
6. AIX/R6000
7. Windows-3.1
8. MS-DOS

Output:

1. Screen (Windows)
2. PostScript (PS, EPS)
3. Enhanced Metafile (EMF)
4. PCX, GIF, Animated-GIF

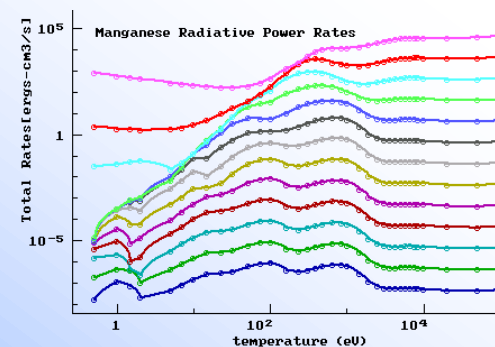
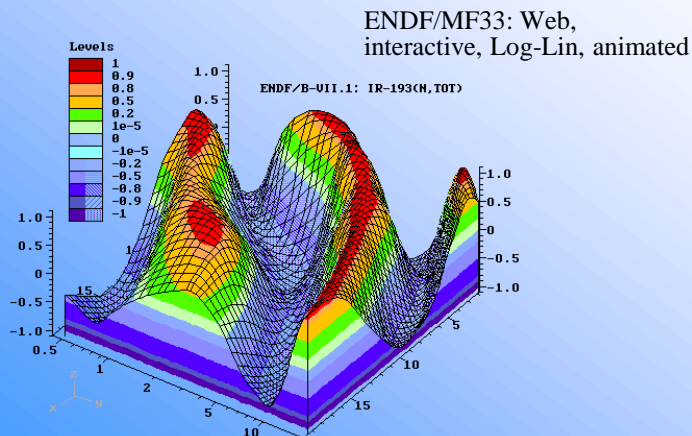
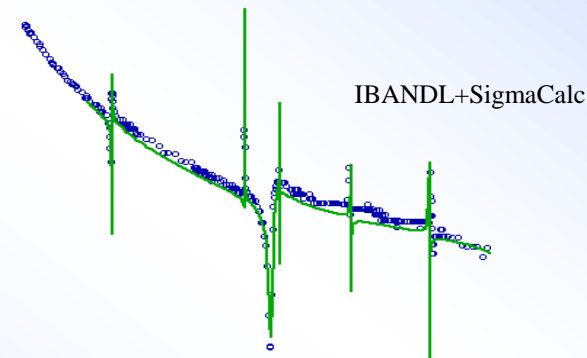
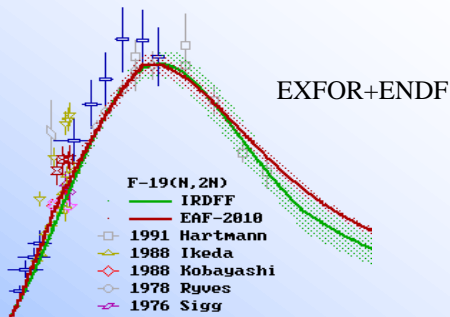
Basic ideas:

1. Language: C
2. Self-made GUI, PS, PCX, GIF
3. Low level API's (MS-Win, X11)
4. Max platform-independency
5. Minimalistic approach

ZVView: interactive plotting program for display and analysis of nuclear data

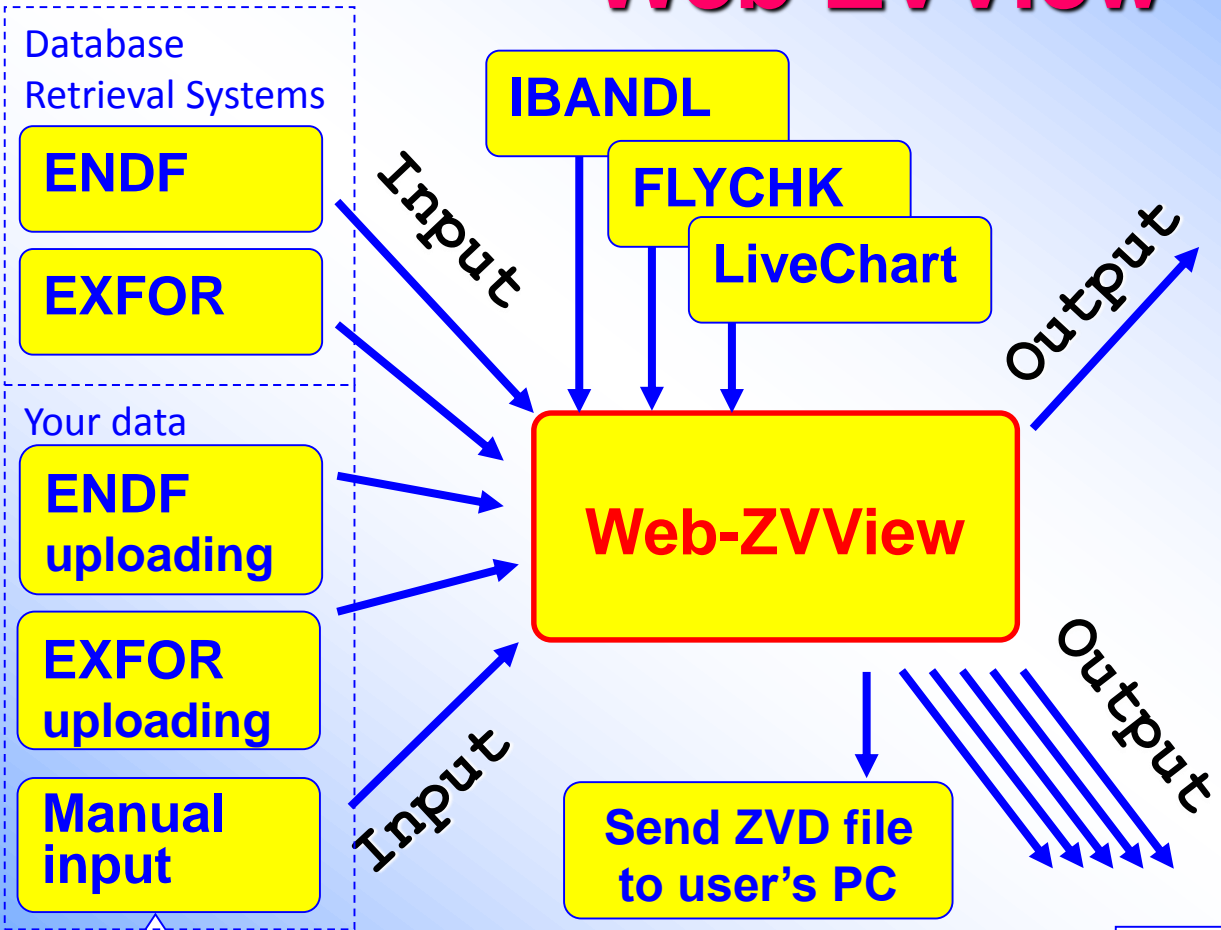
Features:

- All features inherited from DINAMO;
- Integrated with Empire, EndVer, EXFOR CD-ROMs.
- Works on Web: integrated with EXFOR-ENDF database retrieval systems, IBANDL, SigmaCals, LiveChart: can read data from remote archives, can be called as part of external Web service, etc.
- Reads nuclear data formats: TABLE/XREF, ENDF-MF3/MF40/MF33(Law5);
- Can read data from text files(columns): {y}; {x y}; {x y dy}; {x y dy dx}; {x y +dy -dy +dx -dx}; {x} {y} z{};
- Understands ENDF interpolation laws, can display ratios to selected curve
- Can do some least squared fitting, displays χ^2 (EXFOR-ENDF)
- Can work with authors: filter data, select, legend etc.

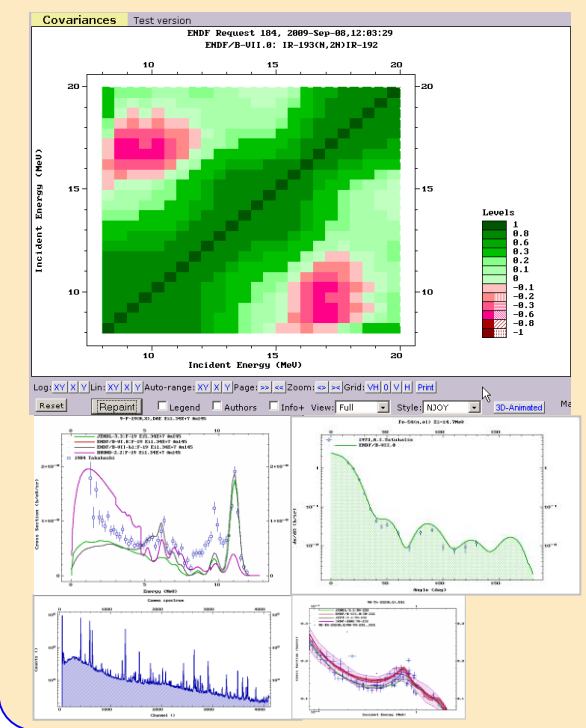


FLYCHK (A+M):
Web-Web communication

Web-ZVView



Plots + interactions /Web



Input formats:

- Data by columns (X : Y : ΔY)
- Text (matrix, triangle)
- Link to Web-data (archives)
- ENDF file (or MF3/33 Sections)
- ZVD file(s)

*Draft for EXFOR
compilation*

*Data for
FORTRAN users*

Output formats:

- GIF, EPS, PS, PDF, SVG
- Html (Table)
- Text (columns, triangle)
- EXFOR draft (COVARIANCE)
- ENDF like (MF33 Section, LB5)
- Input for Fortran (+ reading code)

Useful features of Web-ZVView

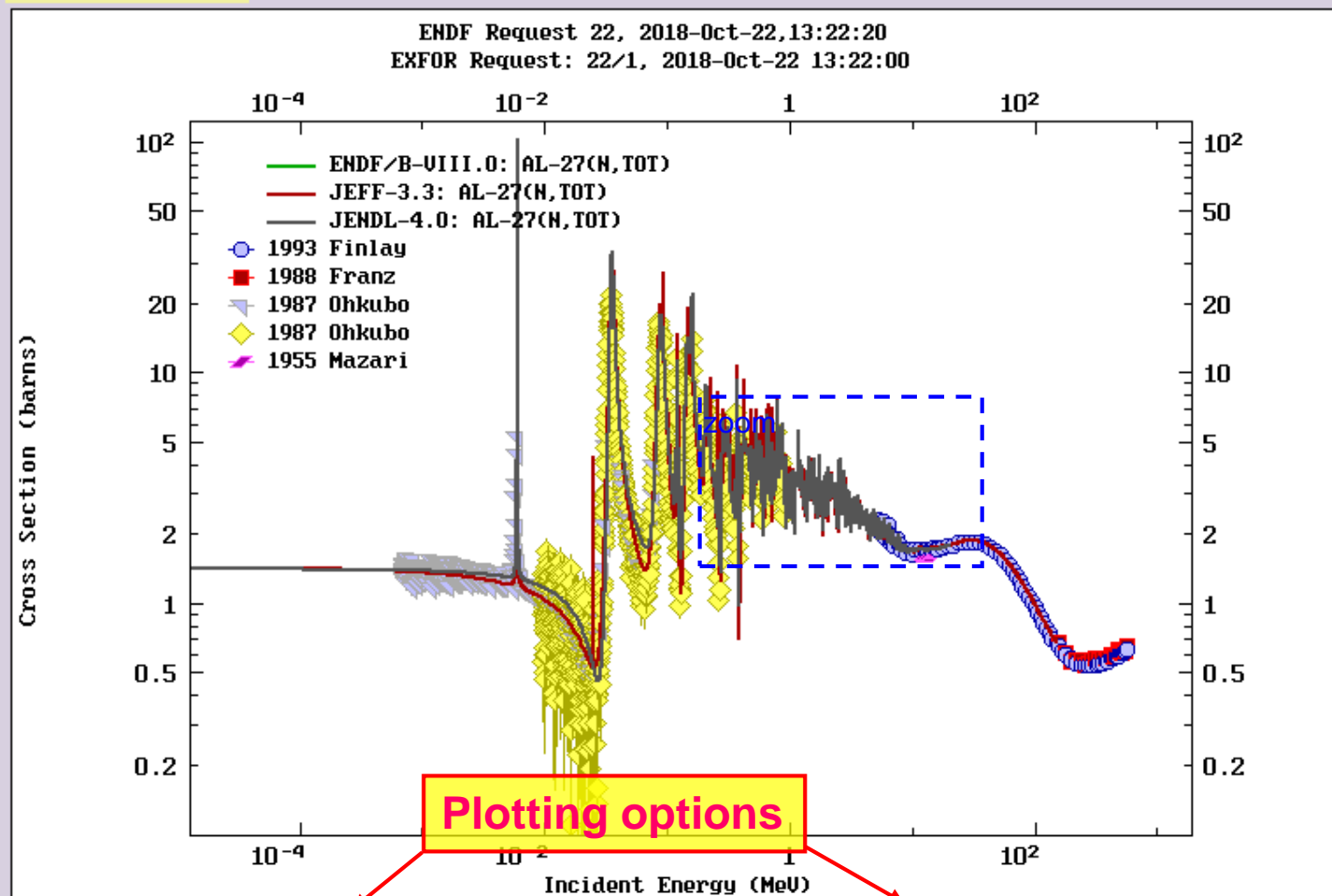
Useful features of Web-ZVView:

- copy/paste data to plots (inside Web session) between: EXFOR-ENDF-IBANDL-MyPlot-etc.
- insert text of ZVD file to the form as “my data” to compare them to data from databases
- output of plotted data in several formats (can be used for re-formatting data, e.g. free-text matrix to EXFOR and ENDF)
- “manual” options: dimensions, distortions, image corrections
- generates output: PS, EPS, PDF
- etc.

Example of interactive Web ZVView plotting

Select data for plotting

Cross Section



Plotting options

Select data for plotting [all] [none]

- ☒ 1) 13-AL-27(N,TOT),,SIG
 - ☒ 1993 R.W.Finlay, 13569008
 - ☒ 1988 J.Franz, 22117005
 - ☒ 1987 M.Ohkubo 21926004
 - ☒ 1987 M.Ohkubo 21926003
 - ☒ 1955 M.Mazari, 30037003
- ☒ 2) ENDF/B-VIII.0: AL-27(N,TOT)
- ☒ 3) JEFF-3.3: AL-27(N,TOT)
- ☒ 4) JENDL-4.0: AL-27(N,TOT)

☐ 5) Use my data [example]

Columns: x y [dy [dx]]

1.5	2.336	0.384
2	2.788	0.268
2.33	2.96	0.4
2.5	2.399	0.283
3	2.424	0.197
4.04	2.496	0.065
5.06	2.222	0.065
5.5	2.304	0.1659
5.6	2.091	0.055

Type: ☒ Curve ☐ Points

Title: My data

Default: basic units! (eV, barn, etc.)

Multiply by: X: 1e6 Y: 1e-3

☒ Use my control file [init] [help]

See: plotted data (835Kb)

Add your data to the plot

Copy/Paste

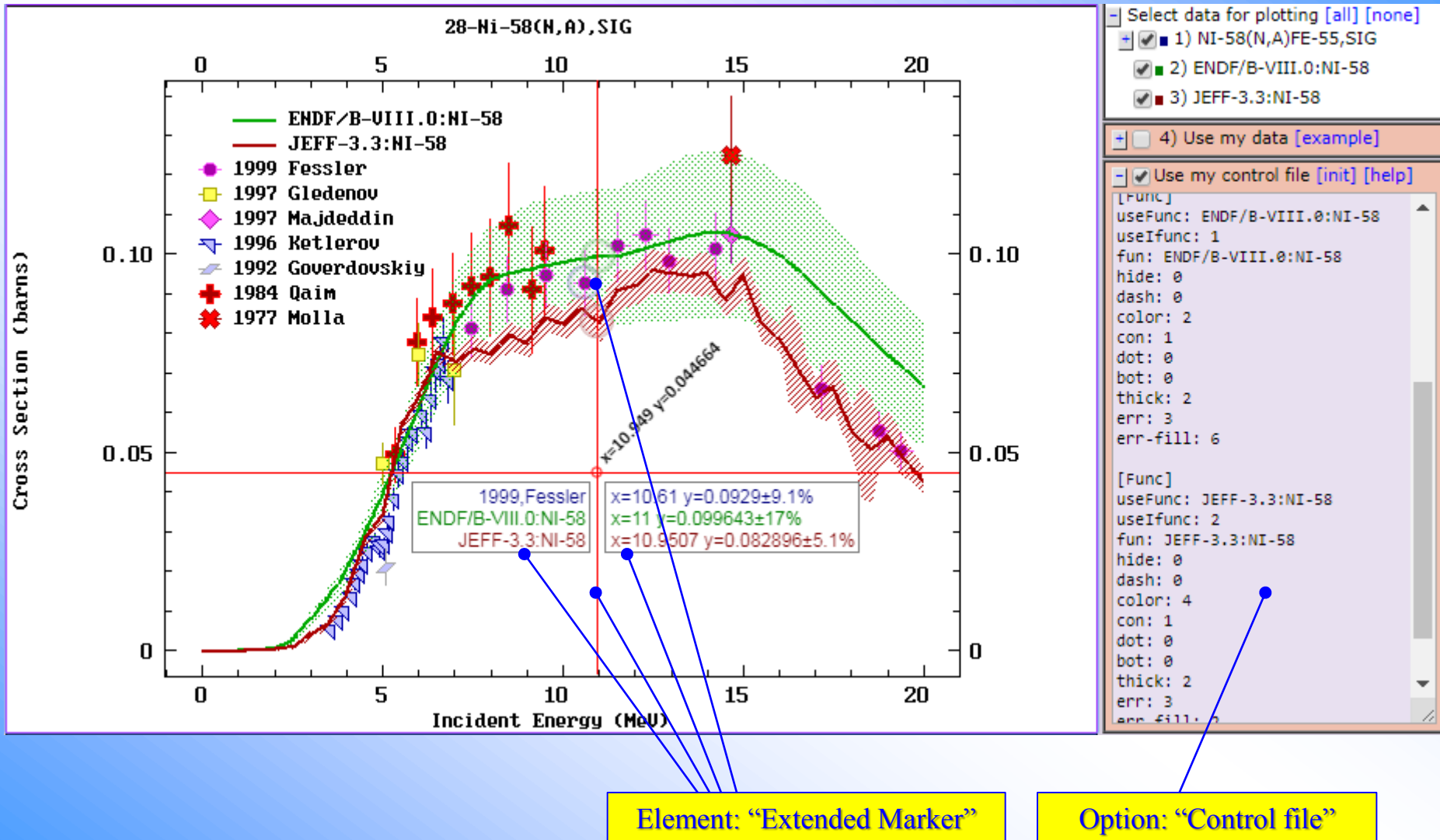
Log: XY X Y Lin: XY X Y Auto-range: XY X Y Page: >> << Zoom: <> >> Grid: VH 0 V H Pts: Txt Box PL Print

Reset Repaint ☒ Legend ☒ Authors ☐ Info+ PostScript Plotting options:[+] Clipboard: Copy Paste

Shift legend:x=10 y=10 Split:0 1:xy;2:y Marker: Plot data or ratio:0 0:data; 1:ratio to dataset-1; 2:ratio to 2-nd, etc.

Data for plotting: ZVD (783Kb), send to ZVView; download ZVView; upload and plot your ZVD file

Recent news in Web-ZVView plotting



Implementation: ZVView → JSON → AJAX → HTML5

Plot your data: MyPlot

<http://www-nds.iaea.org/exfor/myplot.htm>

Plot my data on Web

Uploading data for interactive plotting by Web-ZVView
by V.Zerkin, IAEA-NDS, 2009-2018, ver-2018-10-19

Submit

Reset

☐ 1) ZVD file: No file chosen

☐ 2) ZVD file: No file chosen

[+ Examples/Help](#)

☒ 3) Array Y(X) [\[example\]](#) [\[example\]](#)

X	Y	ΔY	ΔX
15	1.39	0.096	
20	0.982	0.068	
25	0.506	0.037	
30	0.223	0.013	

Graph Parameters

Drawing: Fill:
Symbol: Color:
Line: Thickness:
Errors: Error-Fill:
Multiply X: Y:
Label:

☒ 4) Array Y(X)

X	Y	ΔY	ΔX
180	0.0019079		
175.647	0.0036046		
173.94	0.0050829		
173.549	0.0054489		

Graph Parameters

Drawing: Fill:
Symbol: Color:
Line: Thickness:
Errors: Error-Fill:
Multiply X: Y:
Label:

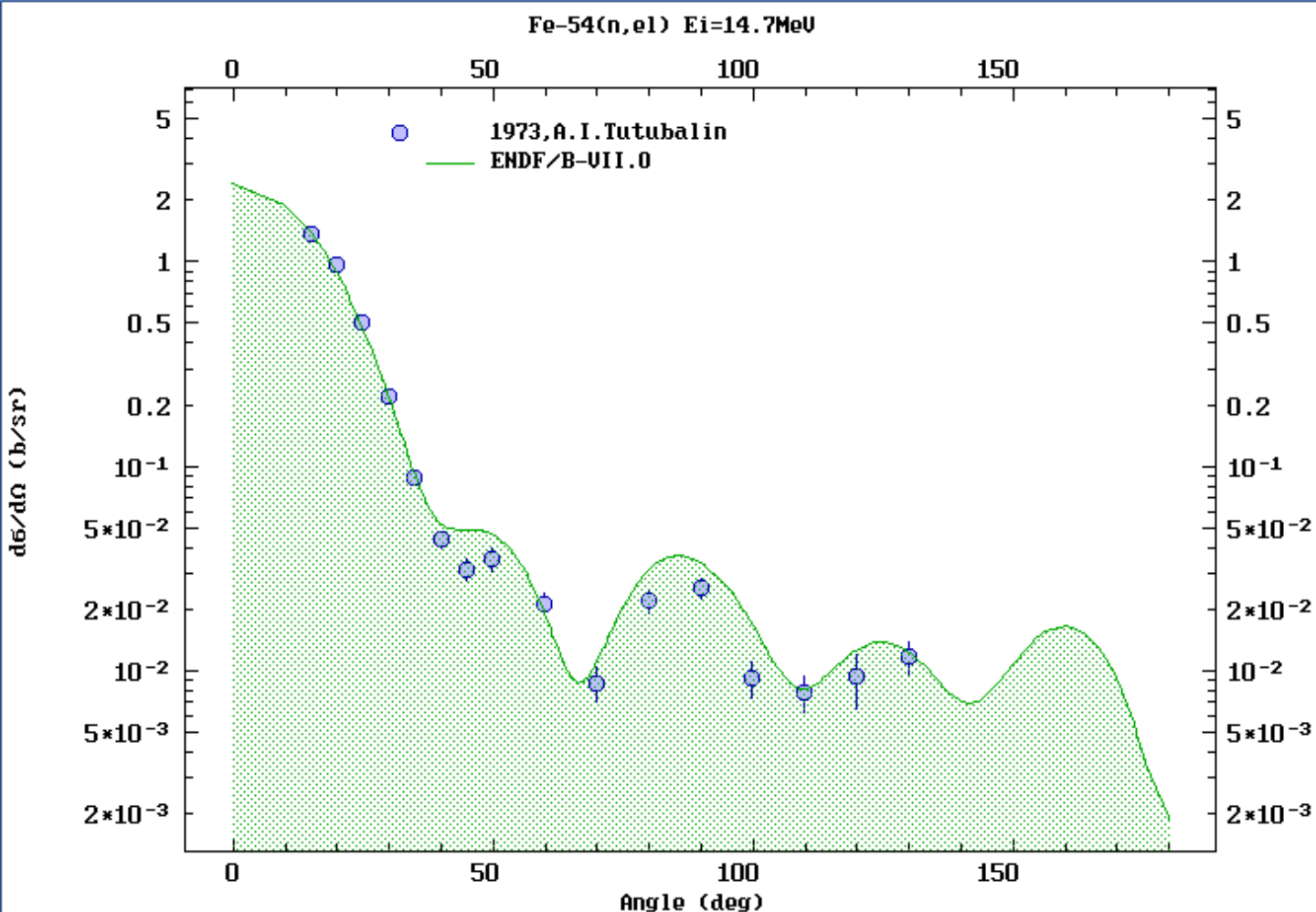
Submit

Sends data to Web-ZVView

Web-ZVView

Welcome to Web-ZVView!

#33



Select data for plotting [all] [none]

☒ 1) 1973,A.I.Tutubalin

☒ 2) ENDF/B-VII.0

☐ 3) Use my data [example]

☒ Use my control file [init] [help]

See: [plotted data](#) (6Kb)

Log: [XY](#) [X](#) [Y](#) Lin: [XY](#) [X](#) [Y](#) Auto-range: [XY](#) [X](#) [Y](#) Page: [>>](#) [<<](#) Zoom: [<>](#) [>>](#) Grid: [VH](#) [0](#) [V](#) [H](#) Pts: [Txt](#) [Box](#) [PL](#) [Print](#)

[Reset](#)

[Repaint](#)

☒ Legend

☒ Authors

☐ Info+

[PostScript](#)

Plotting options: [\[+\]](#)

Clipboard: [Copy](#)

Shift legend: x=[100](#) y=[10](#) Split: [0](#) 1:xy;2:y Marker: ☐ Plot data or ratio: [0](#) 0:data; 1:ratio to dataset-1; 2:ratio to 2-nd, etc.

Input ENDF section of MF33

☐ 1) ZVD file: No file selected.

☐ 2) ZVD file: No file selected.

[Examples/Help](#)

☐ [+ 3\) Array Y\(X\) \[example\]](#)

☐ [+ 4\) Array Y\(X\)](#)

☐ [+ 5\) Array Y\(X\)](#)

☐ [+ 6\) Matrix Z\(X,Y\) Dimension: X:13 Y:13 Z:169 \[example\]](#)

☐ [+ 7\) Matrix Z\(X,Y\) Dimension: X:31 Y:31 Z:496 \[example\]](#)

☒ [+ 8\) Matrix from ENDF/MF33 \[example\]](#)

3.307400+4	7.328890+1	0	0	0	1332233	2	1
0.000000+0	0.000000+0	0	2	0	1332233	2	2
0.000000+0	0.000000+0	1	5	496	31332233	2	3
1.000000-5	5.000000+3	7.000000+3	1.000000+4	2.000000+4	4.000000+4332233	2	4
7.000000+4	1.000000+5	2.000000+5	4.000000+5	6.000000+5	8.000000+5332233	2	5
1.000000+6	1.200000+6	1.500000+6	1.700000+6	2.000000+6	2.500000+6332233	2	6
3.000000+6	4.000000+6	5.000000+6	6.000000+6	7.000000+6	8.000000+6332233	2	7
9.000000+6	1.000000+7	1.200000+7	1.400000+7	1.600000+7	1.800000+7332233	2	8

[- Graph Parameters](#)

View: [Full](#)

Color: [Brown](#)

Label:

MT: [all](#)

☐ [+ 9\) Matrix from ENDF/MF33 \[example\] \[example\] \[example\]](#)

☐ [+ 10\) Matrix from ENDF/MF33: upload your local ENDF file](#)

Set default plotting parameters: $y(x)$: [CS](#) [DA](#) [DE](#) [DAE](#) $z(x,y)$: [COV](#)/[SIG](#)

[- Common Plotting Parameters](#)

Title [Correlations of Neutron Cross Sections](#)

X-axis [Incident Energy](#) » Scale: [Auto](#)

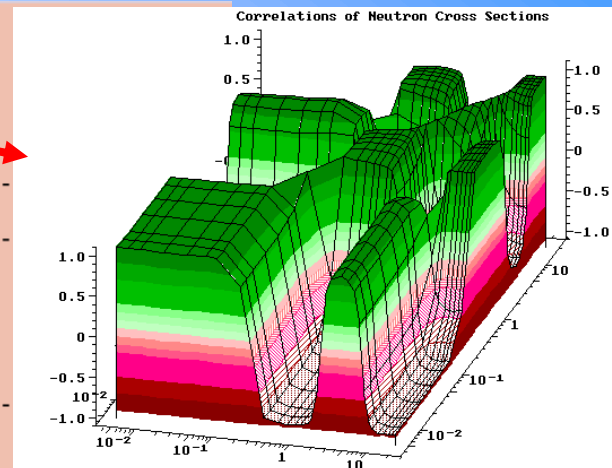
Y-axis [Incident Energy](#) » Scale: [Auto](#)

X-units [1e6, \(MeV\)](#) »

Y-units [1e6, \(MeV\)](#) »

View [3D-0](#)

Style [NJOY](#)



Input link to Web address



9) Matrix from ENDF/MF33 [\[example\]](#) [\[example\]](#) [\[example\]](#)

<http://t2.lanl.gov/nis/data/data/ENDFB-VII.1-neutron/Gd/152>

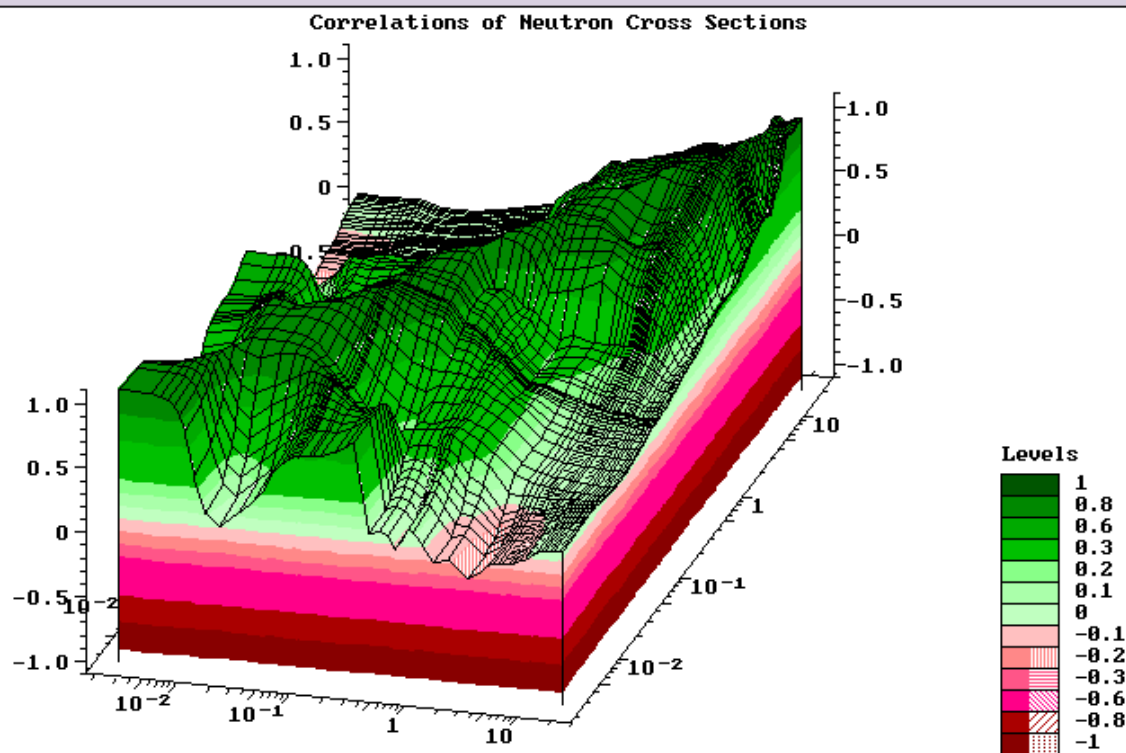
Remote file: <http://t2.lanl.gov/nis/data/data/ENDFB-VII.1-neutron/Gd/152> filter MT=102

Additional plot: [Uncertainties](#)

Additional plot: [Cross Sections](#)

Welcome to Web-ZVView!

#128



☐ Select data for plotting [\[all\]](#) [\[none\]](#)

☒ 1) Gd-152 MT102:gamma

☐ 2) Use my data [\[example\]](#)

See: [plotted data](#) (92Kb) out:x4,T,F,e6

Not covered topics

1. Text search in EXFOR (~Google)
2. Native EXFOR plotting
3. Calculating CS ratios between different EXFOR datasets
4. Constructing covariance matrix from EXFOR uncertainties on Web
5. Reconstruction of ENDF elemental reaction data in EXFOR-ENDF Web system
6. MyEndf system for ENDF evaluators

Thank you.