

# Recent development of EXFOR-ENDF-CINDA, X4-NSR PDF databases, Web tools and software.

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Technical Meeting NRDC-2018 of the International Network of Nuclear Reaction Data Centres,  
Global Centre for Nuclear Energy Partnership (GCNEP), Bahadurgarh, Haryana, India, 1-4 May, 2018

# Topics:

## I. New in NDS Web systems

1. New features of EXFOR-ENDF-CINDA Web databases and retrieval systems
2. Mirror-sites
3. News in “CDROM” distributions

## II. EXFOR-NSR PDF database

1. Status of EXFOR-NSR PDF database
2. Merging PDF collections to X4-NSR PDF database

## III. Other news for compilers

1. Development of interactive 2D-calibration for Web-ZVView picture transformation
2. EXFOR database Update-page, Error-report, ZCHEX.
3. Personal contributions to EXFOR

# **Part I.**

## **News in NDS Web systems**

# News in EXFOR-ENDF-CINDA. Summary.

## 1. EXFOR:

- 1) recalculation of angular distributions to inverse reactions in C5 and on Web;
- 2) Reference table extended by external DOI's from "cross-ref" service;
- 3) 2D-calibration development for Web-ZVView: {Y} interactive calibration; interpolation {X},{Y} to grid {X,Y}

## 2. ENDF:

- 1) new and updated evaluated libraries in the ENDF database:
  - ENDF/B-VIII.0, U.S. Evaluated Nuclear Data Library, 2018
  - TENDL-2015: TALYS-based Evaluated Nuclear Data Library
  - BROND-3.1 Russian evaluated neutron data library, 2016
  - JEFF-3.3, Evaluated nuclear data library, OECD Nuclear Energy Agency, 2017
  - JENDL/PD-2016, JENDL Photonuclear Data File 2016
  - FENDL-3.1c Fusion Evaluated Nuclear Data Library, 2017
- 2) software news: plotting MF8/MT454 /MT459 (fission product yield)
- 3) reconstruction of ENDF elemental reaction data in EXFOR-ENDF Web system

## 3. CINDA:

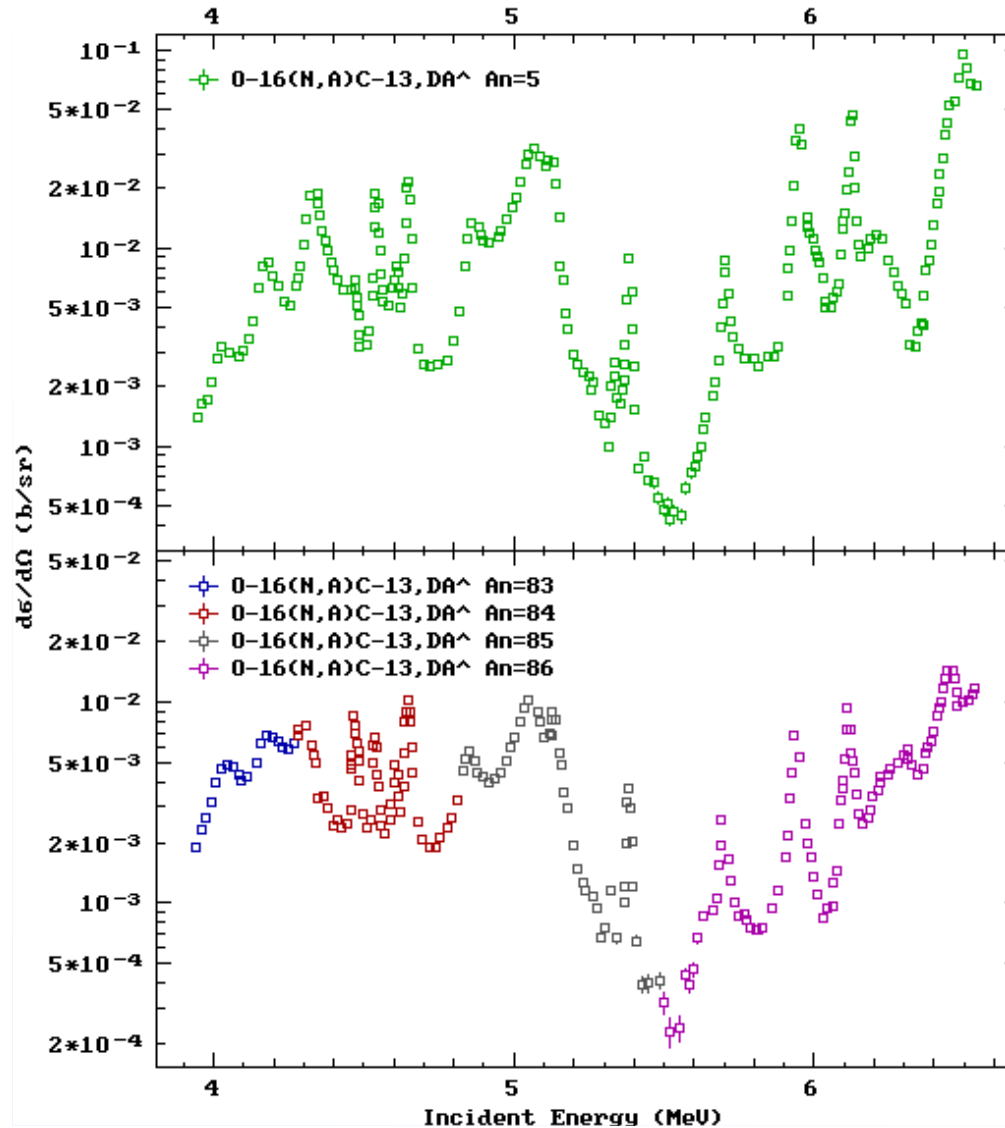
- 1) search by DOI and NSR-KeyNo
- 2) compact list of References for preparing candidates for EXFOR compilation (+link to NSR and PDF databases)

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

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

Protocol; limitations

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



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				
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 5.2156)				
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				

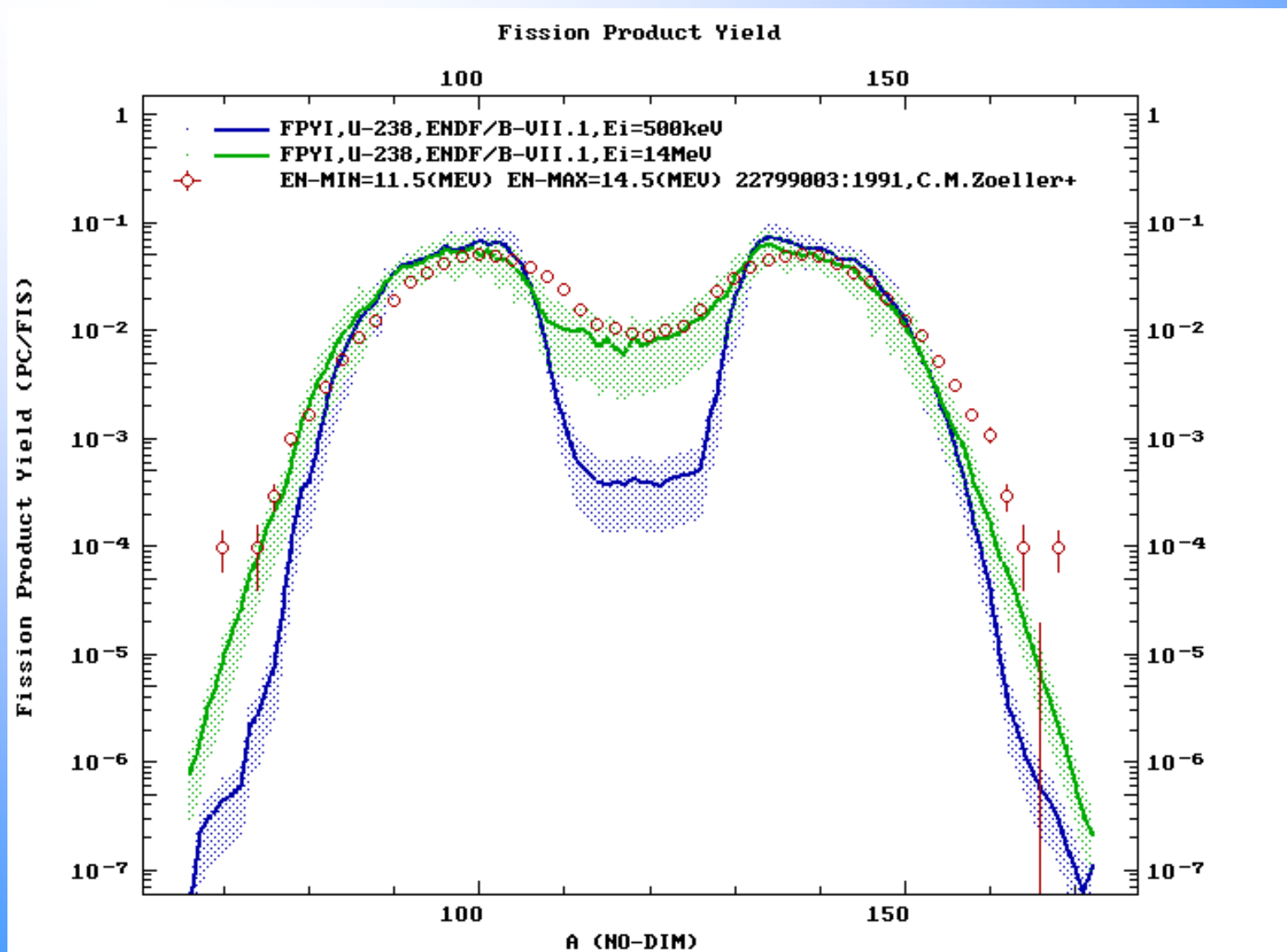
Product:8-O-16 : Level1(MeV)=6.049  
 Q(MeV)=2.2156098 Level1-Q=3.83339  
 E0\_threshold for Level1 (MeV)=5.0133576  
 E1(E0\_threshold),MeV=6.430459  
 Product:6-C-13 : Level1(MeV)=3.089  
 Q(MeV)=-2.2156098 Level1-Q=5.30461  
 E1\_threshold for Level1 (MeV)=5.6391273  
 Reaction inversion is correct up to E1=5.63913(MeV)

=====  
Translation Summary  
=====

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

=====

# ENDF. Fission Product Yield. MF8: MT454, MT459 plotting vs. EXFOR data /under development/



# Reconstruction of ENDF elemental reaction data in EXFOR-ENDF Web system

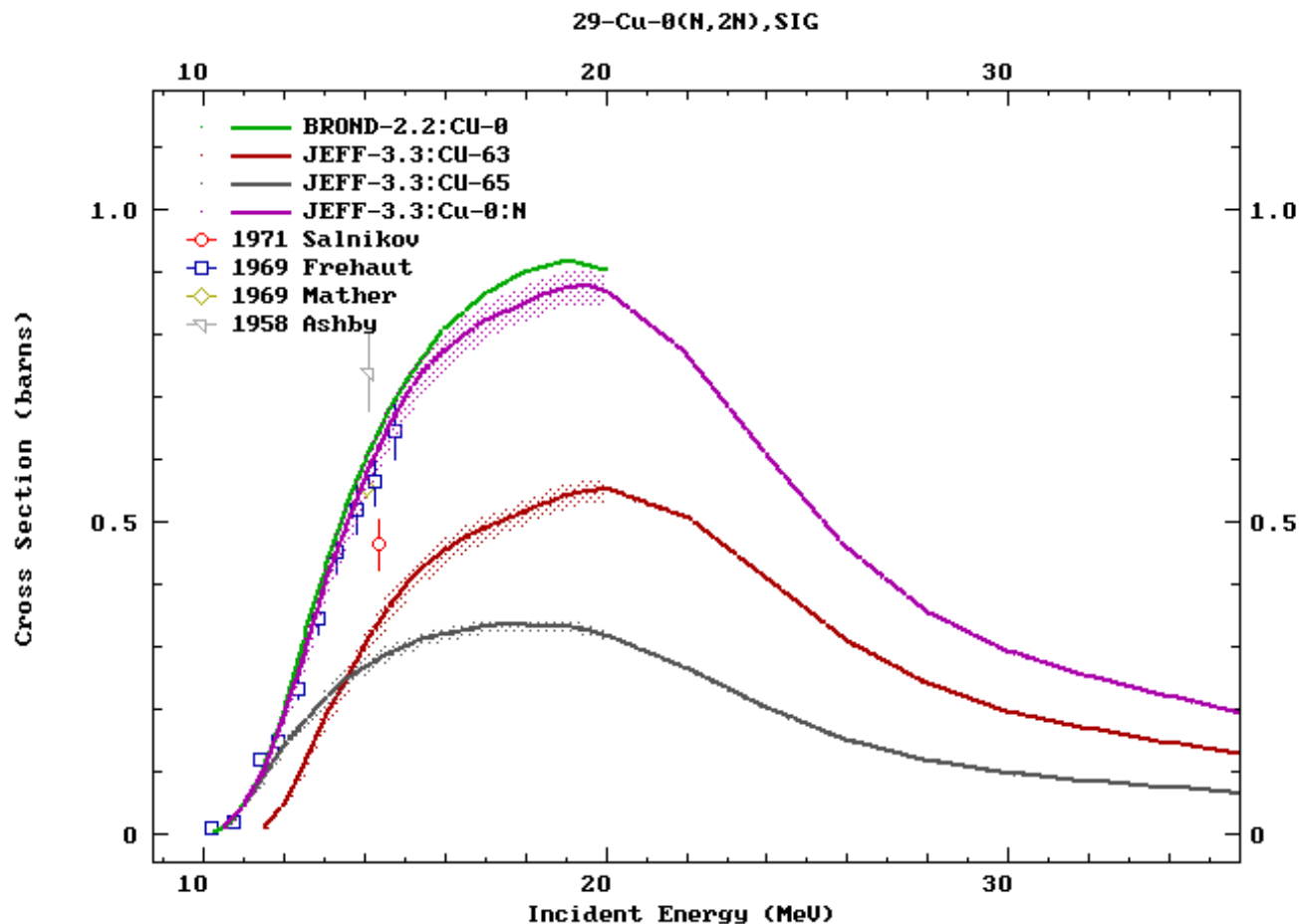
Example: Reaction 29-CU-0(N,2N),,SIG.

Most of evaluated libraries have Cu-63 and Cu-65, but not Cu-0 evaluations. Now EXFOR-ENDF system allows to reconstruct\* data for Cu-0(n,2n) reaction using Cu-63 and Cu-65 using natural isotopic abundancy.

Finally user can get and plot selected data:

- EXFOR data
- ENDF data (JEFF-3.3:Cu-63 and Cu-65, BROND-2.2:Cu-0)
- Elemental data reconstructed on the fly from ENDF data (JEFF-3.3:Cu-0,N).

*\*Reconstruction is implemented using ENDVER software package (A.Trkov, 2008).*



# CINDA.

**Since 2010 CINDA is integrated  
with EXFOR and NSR.**

Main purpose of recent extensions of CINDA:  
make it more useful for search  
candidates for EXFOR  
compilation.





**CINDA.**

**News & History**

2018/01 Added summary statistics to the list of References [example]  
 2018/01 Search by DOI and NSR-KeyNo; examples: [DOI] [KeyNo]  
 2017/05 Generating list of References (for preparing candidates for EXFOR compilation) [example]  
 2017/01 Since 2017 database is updated automatically after every update of EXFOR and NSR  
 2016/3,4,5,6,7,9 Database updated automatically by import from EXFOR and NSR

New features

**Standard Request** Examples: 1|2|3|4|5|6|7|8|9 ^

Examples of requests:

- 1| Cross section
- 2| Angular distribution
- 3| Emission spectra
- 4| Double differential cross section
- 5| Request for data from NSR missing in EXFOR
- 6| Fission data from NSR missing in EXFOR
- 7| Photonuclear CS data from NSR missing in EXFOR: JWeb All
- 8| Photonuclear data in old CINDA (y,n) (y,f)
- 9| Differential CS data from NSR missing in EXFOR: p|a|d|he3
- 10| Data from NSR/journals missing in EXFOR: n|p|d|he3|a|y

New examples illustrating new features

New Option: generate list of References

Submit    Reset

Target  Al\*

Reaction  a,\*

Product

Quantity  CS; DCS; MFQ; RP

Old Quantity

Energy from  1e-5 to  1e9 eV

Work type

1-st Author

Laboratory

Publication year

Last modified

Area

Country

Short Reference  J,\*

DOI

NSR-KeyNo

**Options**

Sort:  by Reactions  by References

Show full CINDA-blocks  Ref.list

Include lines from old CINDA

Include lines imported from EXFOR

Include lines imported from NSR

Include only lines having Web links

**Ranges**

	Target	Product
Z	<input type="checkbox"/>	<input type="checkbox"/>
A	<input type="checkbox"/>	<input type="checkbox"/>

**Clone Request:**

EXFOR    ENDF

New Search: by DOI, by NSR-KeyNo

# CINDA Reference list

Request #1417

Access-Level=2

CINDA Data Search Results: References: 644 Lines: 1868

Links to NSR, PDF, DOI, etc. NSR Reference, search by authors, etc.

Reference list. More info:  projectile  target  quantity  authors  title  nsrref

#	Reference-code	Author-1	Lab	db	Exfor	pdf	NSR	pdf	DOI	NsrRef
1	J,AAB,43,571,1971	O.Y.Mafra		xpl	L0074	pdf	1971MA72	pdf		An.Acad.Brasil.Cienc. 43, 571 (1971)
2	J,AE,32,496,1972	V.P.Kovalev					1972KO48	pdf		At.Energ. 32, 496 (1972); Sov.At.Energy 32, 588 (1972)
3	J,AHP,28,419,1970	A.Veres					1970VE04	pdf		Acta Phys. 28, 419 (1970)
4	J,AHP,69,169,1991	L.Lakosi					1991LA14	pdf		Acta Phys.Acad.Sci.Hung. 69, 169 (1991)
5	J,AJ,522,419,1999	I.Bikit					1999BI21	pdf	10.1086/307607	Astrophys.J. 522, 419 (1999)
6	J,ANE,32,1008,2005	R.Dewan				pdf	2005DE19	pdf	10.1016/j.anucene.2005.02.001	Ann.Nucl.Energy 32, 1008 (2005)
7	J,AP,47,481,1968	P.R.De Kock					1968DE10	pdf	10.1016/0003-4916(68)90211-X	Ann.Phys.(N.Y.) 47, 481(1968)
8	J,APH,15,95,1990	H.S.Caplan					1990CA24			Ann.Phys.(Paris) 15, 95 (1990)
9	J,ARI,32,13,1981	G.A.Brinkman					1981BR04	pdf	10.1016/0020-708X(81)90171-X	Int.J.Appl.Radiat.Isotop. 32, 13 (1981)

## Summary by publishers

### Summary statistics

#### Publications by types

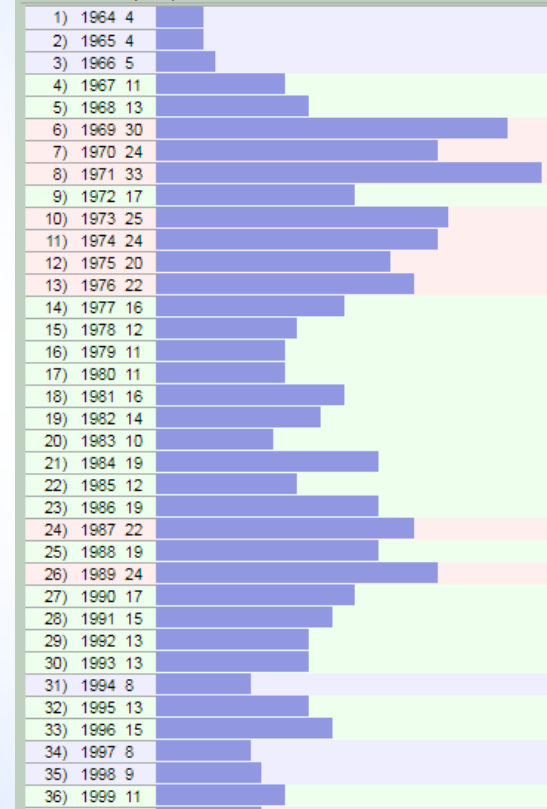
1) Journal 643

#### Publications by publishers

1)	J,NP/A	96	Nuclear Physics, Section A
2)	J,PR/C	81	Physical Review, Part C, Nuclear Physics
3)	J,BAP	55	Bulletin of the American Physical Society
4)	J,PL/B	45	Physics Letters, Section B
5)	J,PRL	38	Physical Review Letters
6)	J,YF	36	Yadernaya Fizika
7)	J,NIMA	17	Nuclear Instruments and Methods in Physics Research A. Accelerators, Spectrometers, Detectors and
8)	J,EPJ/A	14	European Physical Journal A: Hadrons and Nuclei
9)	J,PR/A	14	Physical Review, Part A, General Physics
10)	J,ZEP	14	Zhurnal Eksper. i Teoret. Fiz., Pisma v Redakt.
11)	J,IZV	13	Izv. Rossiiskoi Akademii Nauk, Ser.Fiz.
12)	J,NIM	13	Nuclear Instrum.and Methods in Physics Res.
13)	J,NIMB	13	Nuclear Instruments and Methods in Physics Research B. Beam interactions with Materials and Atom
14)	J,PR/B	13	Physical Review, Part B, Condensed Matter
15)	J,JPJ	12	Journal of the Physical Society of Japan
16)	J,NCL	11	Lettere al Nuovo Cimento
17)	J,PC	11	Physics in Canada
18)	J,[KKYHB]	11	Res.Rep.Lab.Nucl.Sci., Tohoku Univ.
19)	J,NP	10	Nuclear Physics
20)	J,ZP	10	Zeitschrift fuer Physik
21)	J,JP/B	8	Journal of Physics B. Atomic and Molecular Physics.

## Summary by years

### Publications per year



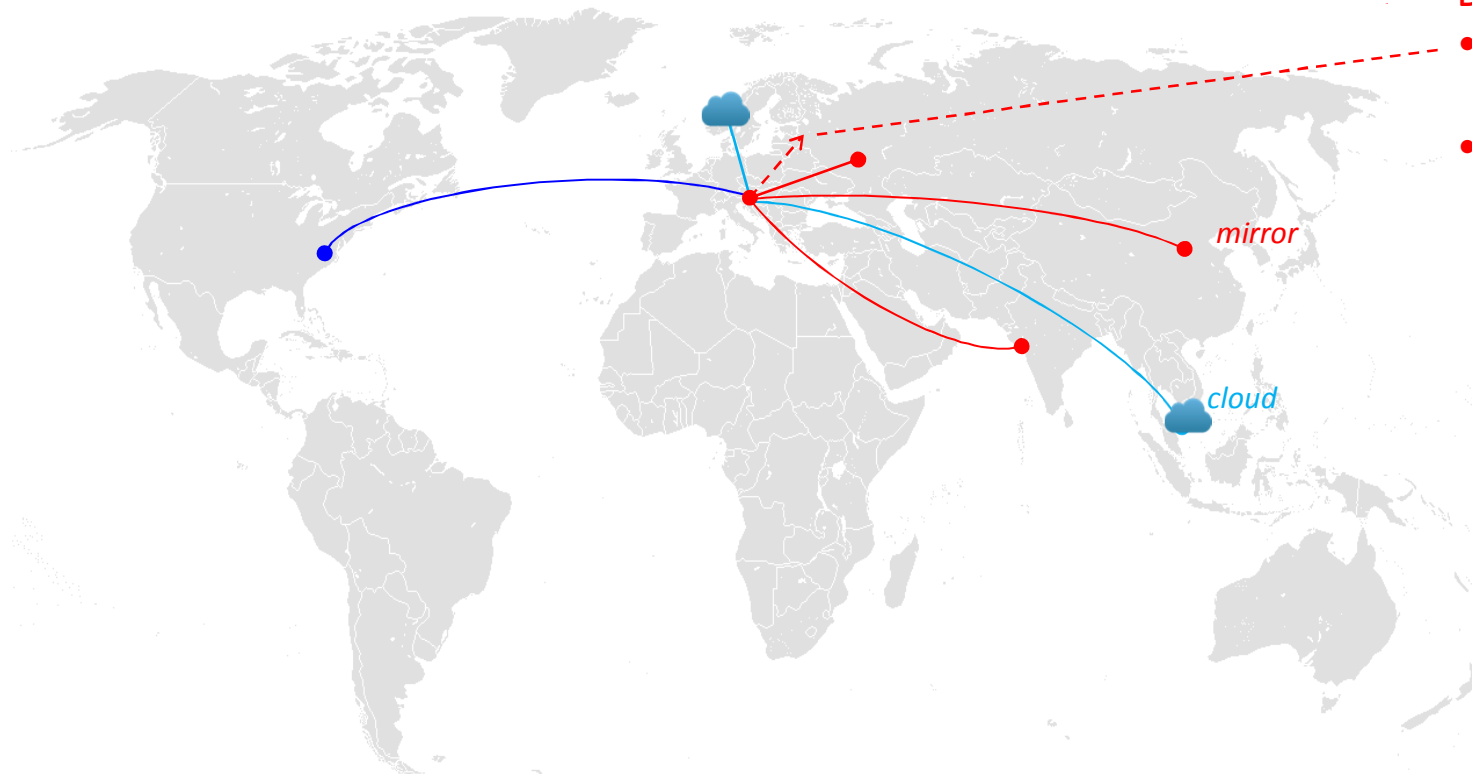
# News in Web Mirror-sites

Now EXFOR Web system is functioning with regular update on:

- IAEA-NDS <https://www-nds.iaea.org/exfor/>
- NNDC, USA <http://www.nndc.bnl.gov/exfor/>
- BARC, India <http://www-nds.indcentre.org.in/exfor/>
- CNDC, China <http://www-nds.ciae.ac.cn/exfor/>
- “Atomstandart”, Russia <http://www-nds.atomstandard.ru/exfor/>

Development/plans:

- Local Mirror-site (for organization only)
- Automatic updates



# News in CDROM distribution

<https://www-nds.iaea.org/cdroms/>

## EMPIRE distribution:

- Created own binary Tcl/Tk package for Portable Empire on Linux and MacOSX
- Portable Empire-3.2.3 for Windows-64, **Linux (new)** and **MacOSX (new)**:  
does not require installation; includes full EXFOR in C4 format

## EXFOR database retrieval systems:

- New version of “EXFOR-CINDA for Application with ENDVER/GUI for Windows/Linux/Mac” (January 2018)

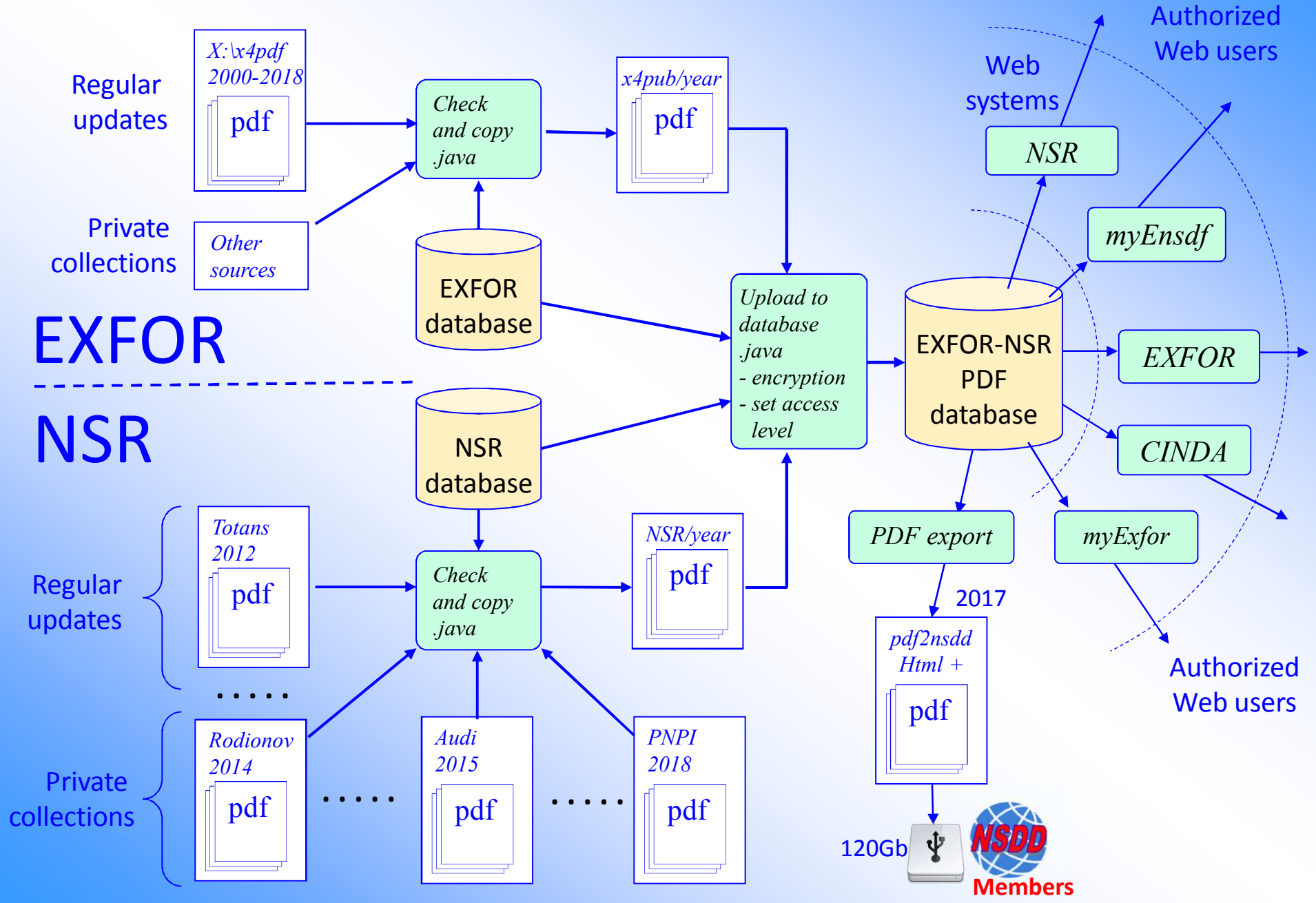
## GRUCON:

- New version of December 2017

# **Part II.**

**EXFOR-NSR PDF database**

# Functioning of EXFOR-NSR PDF database



# Access to full EXFOR-NSR PDF database

Request #149  
Access-Level=2 /pdf/  
Results: Reactions: 10 Datasets: 143  
Data Selection

## EXFOR-NSR PDF database.



Database updated: 2018-04-26. Files: 169182 from 2000-04-19 to 2018-04-25.

-	-	-	-	-	-	1896:3	-	1898:4	1899:1	[1890-1899]:8
-	1901:1	1902:1	1903:4	1904:3	1905:2	1906:2	1907:3	1908:2	1909:1	[1900-1909]:10
1910:3	1911:2	1912:1	1913:2	-	-	-	1917:4	1918:2	1919:3	[1910-1919]:17
1920:3	1921:3	1922:4	1923:3	1924:5	1925:2	-	1927:3	1928:11	1929:8	[1920-1929]:42
1930:10	1931:18	1932:22	1933:26	1934:41	1935:46	1936:34	1937:47	1938:44	1939:71	[1930-1939]:350
1940:63	1941:49	1942:23	1943:25	1944:26	1945:25	1946:83	1947:168	1948:178	1949:333	[1940-1949]:973
1950:458	1951:479	1952:451	1953:559	1954:640	1955:748	1956:786	1957:793	1958:1116	1959:1058	[1950-1959]:7086
1960:1251	1961:1256	1962:1380	1963:1777	1964:1564	1965:1802	1966:1964	1967:2188	1968:2374	1969:2579	[1960-1969]:18135
1970:3121	1971:3444	1972:3785	1973:3873	1974:3397	1975:3003	1976:3029	1977:2886	1978:2857	1979:3052	[1970-1979]:32447
1980:2828	1981:2814	1982:2941	1983:2868	1984:2951	1985:2823	1986:2842	1987:2943	1988:2752	1989:2867	[1980-1989]:28629
1990:2528	1991:2128	1992:2034	1993:2352	1994:3125	1995:2955	1996:3017	1997:2812	1998:2943	1999:3097	[1990-1999]:26991
2000:3175	2001:3540	2002:3414	2003:3407	2004:3719	2005:3794	2006:3117	2007:3545	2008:2865	2009:2425	[2000-2009]:33001
2010:2220	2011:2687	2012:2556	2013:2386	2014:2649	2015:2750	2016:2885	2017:3122	2018:220		[2010-2018]:21475

Years: 117 Publications: 169182

Full volumes: [Conf.proc. & Books] [Theses] [Reports]

Checking mode //contributions to NSR-PDF

PDF Statistics:

DB	#PDF/#References	#PDF+	Total #PDF	Todo #PDF
NSR:	139856/225841 ~62%	+2452 from EXFOR	142308	83533
EXFOR:	22568/31319 ~73%	+738 from NSR	23306	8013

Contributions to NSR-PDFs

Database updated: 2018-04-26.

PDF files: 169,182 from 2000-04-19 to 2018-04-25

# Contributions to NSR PDF database as of 2017-04-26

## Contributions:

1) 201200_Totans /3557/	19) 201709_Pritychenko /1205/
2) 201300_Totans /985/	20) 201711_Zerkin /958/
3) 201400_Totans /537/	21) 201801_PNPI /8975/
4) 201500_Totans /612/	22) 201801_Zerkin /100/
5) 201504_Dimitriou /12/	23) 201802_PNPI /4490/
6) 201510_Balraj /257/	24) 201802_Totans /194/
7) 201510_Rodionov /2299/	25) 201803_Balraj /1/
8) 201512_Audi /2602/	26) 201803_PNPI /5108/
9) 201600_Totans /2028/	27) 201803_Pritychenko /60/
10) 201603_Rodionov /238/	28) 201803_Pritychenko_RD /532/
11) 201603_Shulyak /13174/	29) 201803_Zerkin /11/
12) 201604_Kondev /1085/	30) 20180403_PNPI /1437/
13) 201611_PNPI /31575/	31) 20180404_Zerkin /51/
14) 201700_PNPI /50721/	32) 20180417_PNPI /2897/
15) 201700_Totans /2339/	33) 20180425_Totans /276/
16) 201700_Zerkin /633/	34) 201804_Zerkin_JINR /603/
17) 201703_Shulyak /302/	35) 201804_Zerkin_ORNL /11/
18) 201705_Kondev /44/	
Sum: /139909/	

## Contributors:

1	PNPI	105203	75.2%
2	Shulyak	13476	9.63%
3	Totans	10528	7.52%
4	Audi	2602	1.86%
5	Rodionov	2537	1.81%
6	Zerkin	2367	1.69%
7	Pritychenko	1797	1.28%
8	Kondev	1129	0.81%
9	Balraj	258	0.18%
10	Dimitriou	12	0.01%
	Total	139909	

**Thanks to external  
contributors!!!**

## PDF Statistics:

DB	#PDF/#References	#PDF+	Total #PDF	Todo #PDF
NSR:	139856/225841 ~62%	+2452 from EXFOR	142308	83533
EXFOR:	22568/31319 ~73%	+738 from NSR	23306	8013



# **Part III.**

**Other news for compilers**

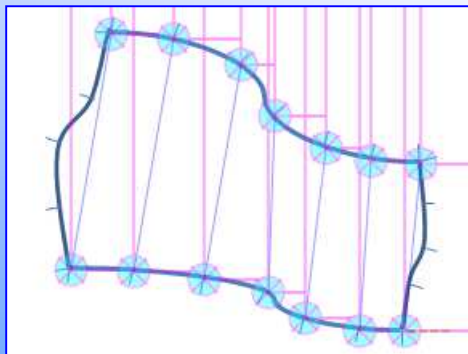
# Interactive 2D-calibration for Web-ZVView picture deformation

A94 Zerkin  
Pikulina  
Chen  
JCPRG

Study problems in 2D calibration of original pictures, and process of approval of results of digitizing using plotting facilities.

## 2DX-calibration:

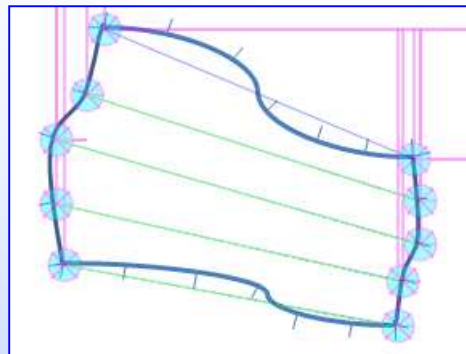
X-Axes bottom-top are marked by user;  $X\{n\}$  sent to ZVView which produces transformed picture. Implemented in 2015-2016.



×

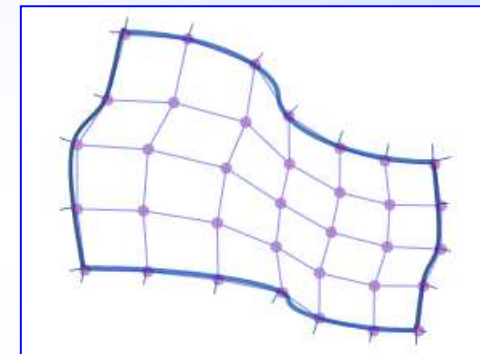
## 2DY-calibration:

Y-Axes left-right are marked by user;  $Y\{m\}$  sent to JServlet to produce 2DXY calibration points. Done in 2017.



## 2DXY-calibration:

$X\{n\}$  and  $Y\{m\}$  calibration points are processed to produce grid of  $XY\{n \times m\}$  calibration points. Done in 2017.



## Todo:

Extend ZVView to transform output picture according to 2DXY calibration grid:  $XY\{n \times m\}$  calibration points.

Extend 2D calibration tool to deal with more difficult cases, e.g. missing points, missing top and right axes, etc.

# News in EXFOR database update page

[https://www-nds.iaea.org/exfor/x4stat/exfor\\_upd.htm](https://www-nds.iaea.org/exfor/x4stat/exfor_upd.htm)

All Centers produced this TRANS

15) 2018-03-16 TRANS.D114

/NDS/ IAEA Nuclear Data Section, Vienna, Austria  
/ATOMKI/ ATOMKI Nuclear Reaction Data Group, Debrecen, Hungary  
/UkrNDC/ Ukrainian Nuclear Data Center, Institute for Nuclear Research, Kyiv, Ukraine

- ▶ 1) D5101 2013 O.O.Beliuskina Jour: Bull.Russian Academy of Sciences - Physics, Vol.77, p.893 (2013) NSR:2013BE32 DOI: 10.3103/S1062873813070034  
Energy and angular distributions of deuterons from the  $D + D \rightarrow p + n + d$  reaction  
Subent:old:6 2013 Pnt:0
- ▶ 2) D5091 2012 O.O.Beliuskina Jour: Bull.Russian Academy of Sciences - Physics, Vol.76, p.928 (2012) NSR:2012BE36 DOI: 10.3103/S1062873812080047  
Diffraction nature of elastic dd and dt scattering at average energies  
Subent:old:1 2012 Pnt:0
- ▶ 3) D5074 2009 A.N.Vodin Jour: Vopr.Atomn.Nauki i Tekhn.,Ser.Yad.Fiz.Issledo., Issue.5/52, p.12 (2009) J,VAT\_1,,12,2009.pdf  
Investigation of the astrophysical  $36S(p,g)37Cl$  reaction at  $E_p=1975...2190$  keV  
Subent:old:1 2010 Pnt:0

PDF is missing in X4-NSR PDF database

27) 2018-01-29 TRANS.2265

/NEA-DB/ OECD/NEA Nuclear Data Bank, Issy Les-Moulineaux, France

- ▶ 1) 22958 2017 G.S.Simpson [ ]: ?, .pdf  
Subent:old:1 2007 Pnt:0

[ ]: ? .pdf Missing REFERENCE  
(see next page: ENTRY 22958)

# New items in EXFOR database update Error-report

[/exfor-master/backup/Errors-2018-04-25\\_10\\_06.htm](/exfor-master/backup/Errors-2018-04-25_10_06.htm)

ENTRY 22958: REFERENCE deleted

Mistakes recently introduced

## No REFERENCE in ENTRY

n	ENTRY	Created	TRANS	1st Author	TITLE
1	20664 + ±	1976-10-19	2261 20180123	L.Drigo	Small-angle scattering of fast neutrons by Bi and Pb
2	22958 + ±	2007-06-02	2265 20180126	G.S.Simpson	High-spin MICRO-second isomer in 98-M-Zr
3	32504 + ±	1990-10-24	3147 20110213	Xia Yijun	Measurement of the neutron capture cross section of Nb-93 and Tm-169

## Obsolete code EXF in REACTION:SF9 in recent updates

n	ENTRY	Created	TRANS
1	41240 + ±	1997-05-28	4174 20170119
2	B0021 + ±	1975-03-02	B026 20170712
3	B0077 + ±	1978-08-04	B026 20170712
4	B0132 + ±	1980-04-09	B026 20170712
5	F0378 + ±	1998-09-12	F067 20180409
6	O0106 + ±	1995-04-28	O061 20170603

Project: EXFOR-Relational, V.Zerkin, IAEA, 1999-2018

New category SF9=EXF was introduced after strict checking in ZCHEX

# Development of ZCHEX in 2017-2018

A76 Zerkin (Continuing action) Update ZCHEX based on comments from compilers (e.g., WP2011-36).

Latest version

## Feedback to ZCHEX

The sample input may be simplified from the original one to clarify the problem.

From	Keyword	Comment	I/O	Registered	Done
N.Otsuka	ERR-ANALYS	Four-th field (correlation property) is recognized as a heading field.	[I][O]	2018-04-11	
N.Otsuka	REACTION	Obsolete code EXP is not detected.	[I][O]	2018-04-11	2018-04-20
N.Otsuka	LEVEL-PROP	IAS-NUMB is not accepted as a level identifier.	[I][O]	2017-10-31	2017-11-16
S.Badwar	ERR-ANALYS	Free text is not recognized when a uncertainty range is given.	[I][O]	2017-02-28	2017-05-11
N.Otsuka	REACTION	No error message for existence of E-LVL without REACTION SF5=PAR. (It is solved if E-LVL is moved to 002.)	[I][O]	2015-11-16	
N.Otsuka	REACTION	Nuclide code in SF4 is not accepted when (SF2,SF3)=(0,B-)	[I][O]	2015-05-29	2017-05-18

# Personal contributions to EXFOR

</exfor-master/x4compil/x4person.htm>

## Personal Contributions to EXFOR

//based on Free-text of SUBENT-1 HISTORY Code=(\*C)

Information updated: 27-Apr-2018, 11:48:48 //by V.Zerkin, IAEA-NDS

#	Initials	Name	Center	#Entries	Area:Entries // Year:Entry
0	[?]	[?]		11849	NNDC:4095, NEA-DB:2805, CNPD:1419, CJD:1215, CAJaD:644, CDFE:628, 2018:9, 2017:36, 2016:30, 2015:38, 2014:63, 2013:39, 2012:51, 2011:75, 2010:89, 2009:96:266, 95:203, etc.
1	SB	S.Babykina	CAJaD	978	NEA-DB:810, CAJaD:148, NDS:10, CNPD:10 2017:11, 2016:32, 2015:36, 2014:63, 2013:69, 2012:206, 2011:101, 2010:87, 2009:1
2	VM	V.McLane	NNDC	885	NNDC:847, CNPD:34, NEA-DB:3, CAJaD:1 2005:11, 2004:119, 2003:45, 2002:51, 2001:85, 2000:147, 99:98, 98:4, 90:45, 89:27
3	DR	D.Rochman	NNDC	812	NNDC:805, NDPCI:7 2017:1, 2014:1, 2013:1, 2009:4, 2007:102, 2006:157, 2005:459, 2004:52, 2000:1, 76
4	SH	S.Hlavach	NNDC	733	NNDC:733 2018:2, 2017:40, 2016:47, 2015:53, 2014:55, 2013:88, 2012:88, 2011:75, 2010:73, 2
5	SD	S.Dunaeva	NDS	660	NDS:579, CNPD:50, NNDC:14, NEA-DB:11, NDPCI:3, CJD:2, CAJaD:1 2014:1, 2012:2, 2010:46, 2009:56, 2008:62, 2007:19, 2006:88, 2005:121, 2004:188,
6	ARZAMAS	VNIIEF, Sarov	CNPD	508	CNPD:501, NNDC:7 2003:10, 2001:4, 2000:7, 99:17, 97:7, 96:8, 95:2, 94:1, 93:2, 92:2, 91:4, 90:9, 89:5, 8
7	SM	S.Maev	CJD	404	NEA-DB:399, CJD:5 2012:1, 2011:7, 2010:8, 2009:30, 2008:40, 2007:35, 2006:39, 2005:23, 2004:8, 2003
8	MM	M.Mikhailyukova	CJD	368	NEA-DB:259, CJD:109 2018:4, 2017:39, 2016:28, 2015:29, 2014:32, 2013:31, 2012:31, 2011:37, 2010:37, 2
9	ON	N.Otsuka	NDS	328	NDS:167, JCPRG:98, NEA-DB:48, NNDC:11, CJD:2, CNPD:2 2018:3, 2017:19, 2016:31, 2015:37, 2014:32, 2013:20, 2012:28, 2011:45, 2010:12, 2
10	BP	B.Pritychenko	NNDC	284	NNDC:282, NDS:2 2017:72, 2016:70, 2015:40, 2014:32, 2013:31, 2012:39
11	CJD	Obninsk		280	CJD:278, NDS:2 2013:2, 2012:1, 2011:3, 2010:1, 2009:5, 2008:11, 2007:19, 2006:25, 2005:8, 2004:4,
12	VV	V.Varlamov	CDFE	276	CDFE:246, NNDC:29, NEA-DB:1 2017:28, 20
13	KO	Okamoto		272	NDS:272 84:16, 83:12
14	NO	[?]		236	NEA-DB:23 2003:1, 96:1
15	UKRNDC	KINR, Kiev	UkrNDC	196	UkrNDC:19 2018:2, 2017:10, 2016:14, 2015:12, 2014:14, 2013:15, 2012:9, 2011:13, 2010:9, 200
16	TS	S.Takacs	ATOMKI	189	ATOMKI:183, NNDC:6 2017:18, 2016:14, 2015:11, 2014:6, 2013:4, 2012:21, 2011:12, 2010:4, 2009:16, 200

1. Based on Free-text of SUBENT-1 Code=(\*C).  
Information is not consistent  
2. Question: Is it interesting for NRDC?

Compiler's Initials

Name

Total Entries

Contributions to Area:Entries // Year:Entries

# Some concluding remarks

1. Our Web system is improving through years.  
All your comments and suggestions to our Web system are very welcome. (+Feedback from your colleagues!)
2. CINDA extended by the contents of EXFOR and NSR can be used as an instrument for search for data missing in EXFOR.
3. You are welcome to contribute your private PDF collections to EXFOR-NSR PDF database. Being available via Web for authorized compilers and evaluators it can be very useful in daily work.

**Thank you.**