



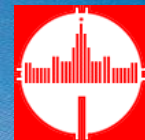
International Atomic Energy Agency

Nuclear Data Services

Provided by the Nuclear Data Section

**Technical Meeting on International
Network of Nuclear Reaction Data
Centres (NRDC)**

**Centre for
Photonuclear
Experiments
Data**



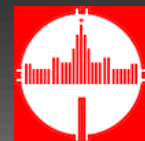
***Lomonosov Moscow State University
Skobeltsyn Institute of Nuclear Physics***

Vladimir Varlamov

4/23/2015

21 - 23 April 2015, IAEA's Headquarters, Vienna, Austria

1
Title



The CDFE 2014 – 2015 period activities in photonuclear data compilations and evaluations.

***V.V.Varlamov, N.E.Gorskikh, A.I.Davydov, S.Yu.Komarov, N.N.Peskov,
M.E.Stepanov***

***Progress Report to the Technical Meeting on International Network of Nuclear Reaction Data
Centres (NRDC)***

21 – 23 April 2015, IAEA's Headquarters, Vienna, Austria

This short report contains review of the main results obtained at the Russia MSU SINP CDFE concern nuclear data compilation and correction, analysis and evaluation for the period of time from the IAEA's Technical Meeting On International Network of Nuclear Reaction Data Centers" (NRDC), 6 – 9 May 2014, Congress Centre Smolenice, Slovakia, till the spring of 2015.



General

The main CDFE nuclear data activities are compilation, verification and dissemination of modern international nuclear data for providing scientific and educational institutes and organizations of Russian Academy of Science with nuclear data for basic research, education and various applications. The CDFE's responsibility in NRDC Network is processing of photonuclear data. CDFE maintains several international and specially developed nuclear databases available through the CDFE Web-site – <http://cdfe.sinp.msu.ru>.

Organization

The CDFE has a status of laboratory within the Russia Lomonosov Moscow State University Skobeltsyn Institute of Nuclear Physics. The CDFE total permanent staff includes five professional, two general service officers and several students of the MSU Physics Faculty.



Main fields of CDFE nuclear data activity

EXFOR Compilations

Nuclear Database Service

Photonuclear Data Evaluations

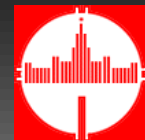


EXFOR Compilations

5 new CDFE EXFOR **TRANS.M073 - 077** and one **PRELIM.M078** transes have been produced and transmitted to the IAEA NDS. All transes prepared in addition to a number of new ENTRYs contain many old ENTRYs corrected in accordance with the NRDC Network experts comments and recommendations.

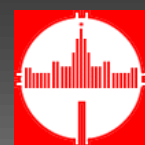
On the whole new CDFE transes have been produced in the reported period contain **48** corrected and **32** new ENTRYs:

TRANS	Old	New	Total
m073	6	2	8
m074	26	3	29
m075	7	5	12
m076	1	4	5
m077	3	10	13
prelim.m078	5	8	13
All	48	32	80

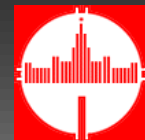


Nuclear Database Service

The main CDFE nuclear database service activities are dissemination of modern international nuclear data for providing Moscow State University staff and students and also scientific and educational institutes and organizations of Russian Academy of Science with nuclear data for basic research, education and various applications.



EXFOR, ENSDF, and NSR databases are based on the international data sources but have original Search Engines.



Other databases are CDFE-produced and maintained:

- **“Chart of Giant Dipole Resonance Main Parameters”** contains data on main parameters (energy position, amplitude, width, integrated cross section) of GDR for many nuclei;
- **“Chart of Nucleus Shape and Size Parameters”** contains data on quadrupole moments, parameters of quadrupole deformation and charge radii for many nuclei;
- **“Nucleus Ground and Isomeric State Parameters”** combines many useful information on the nucleus as whole and its ground and isomeric states properties (masses, binding energy, nucleon separation energy, decay mode, energy of various decays, etc);
- **“Calculator and Graph Engine for Atomic Nuclei Parameters and Nuclear Reactions and Radiative Decays Features** combines many useful data for “Nucleus Binding Energies”, “Nucleons and Nuclei Separation Energies”, “Decays Energies”, “Decays Energies”, “Nuclei fission”.



Photonuclear Data Evaluation

In addition to activity in photonuclear data processing in accordance with NRDC priorities the CDFE continues the program of investigation of reliability of experimental data for photonuclear total and partial reaction cross sections obtained using various methods and of reliable photonuclear data evaluation.

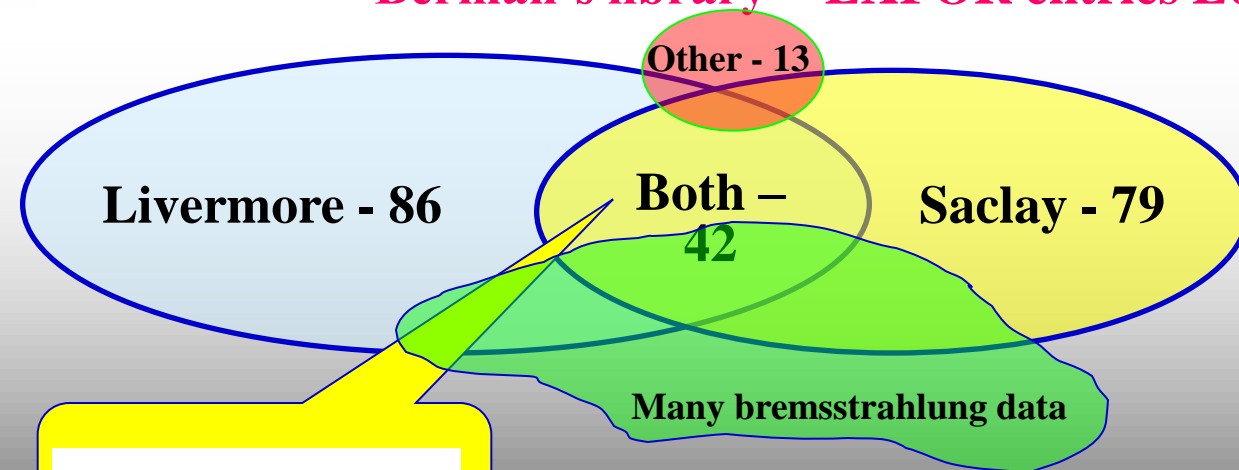
The correspondent analysis and evaluations were carried out for many nuclei in addition to those investigated before.

Main problem:

- many experimental data data for partial photonuclear reaction cross sections are published (majority was obtained at Livermore and Saclay):

Atlas of Photoneutron cross sections obtained with monoenergetic photons
 (S.S.Dietrich, B.L.Berman. *Atom. Data and Nucl. Data Tables*, 38 (1988) 199;

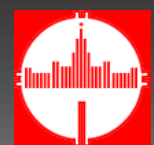
Berman's library - EXFOR entries L0001 – L0059



Main problem

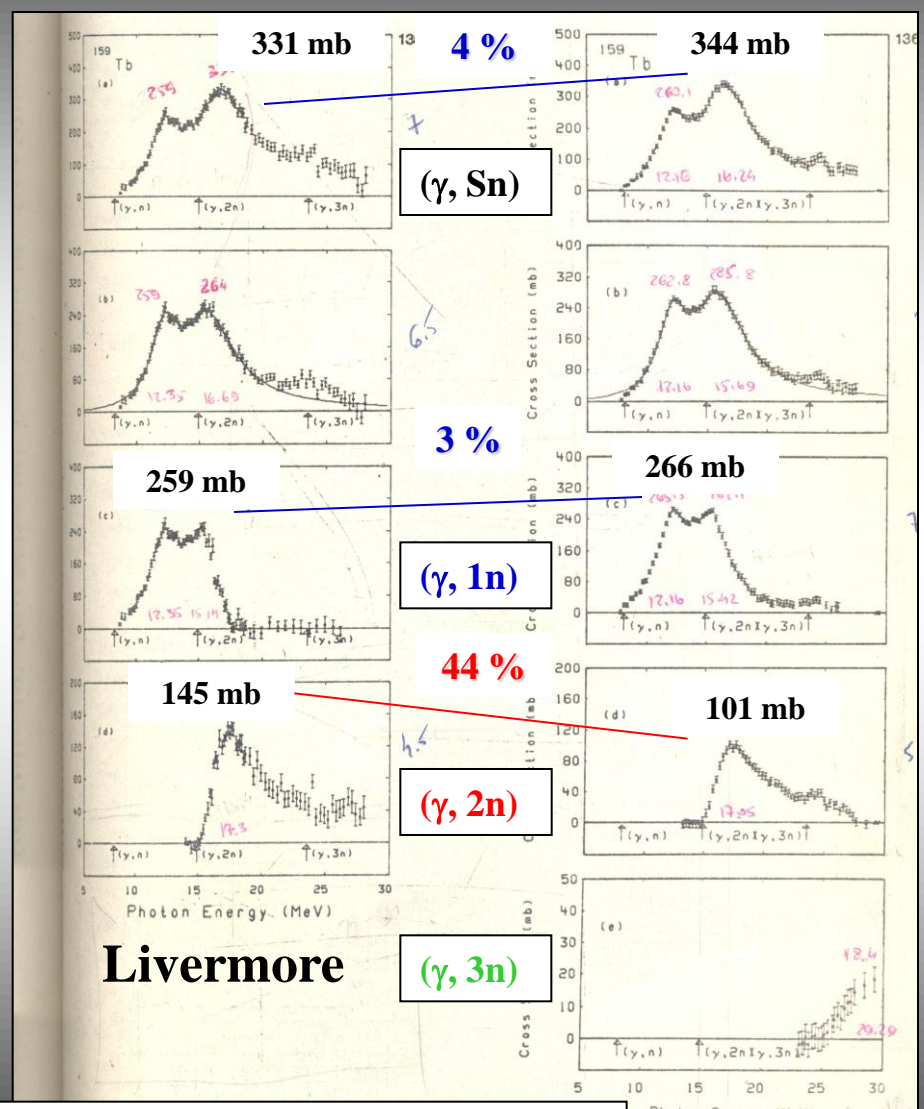
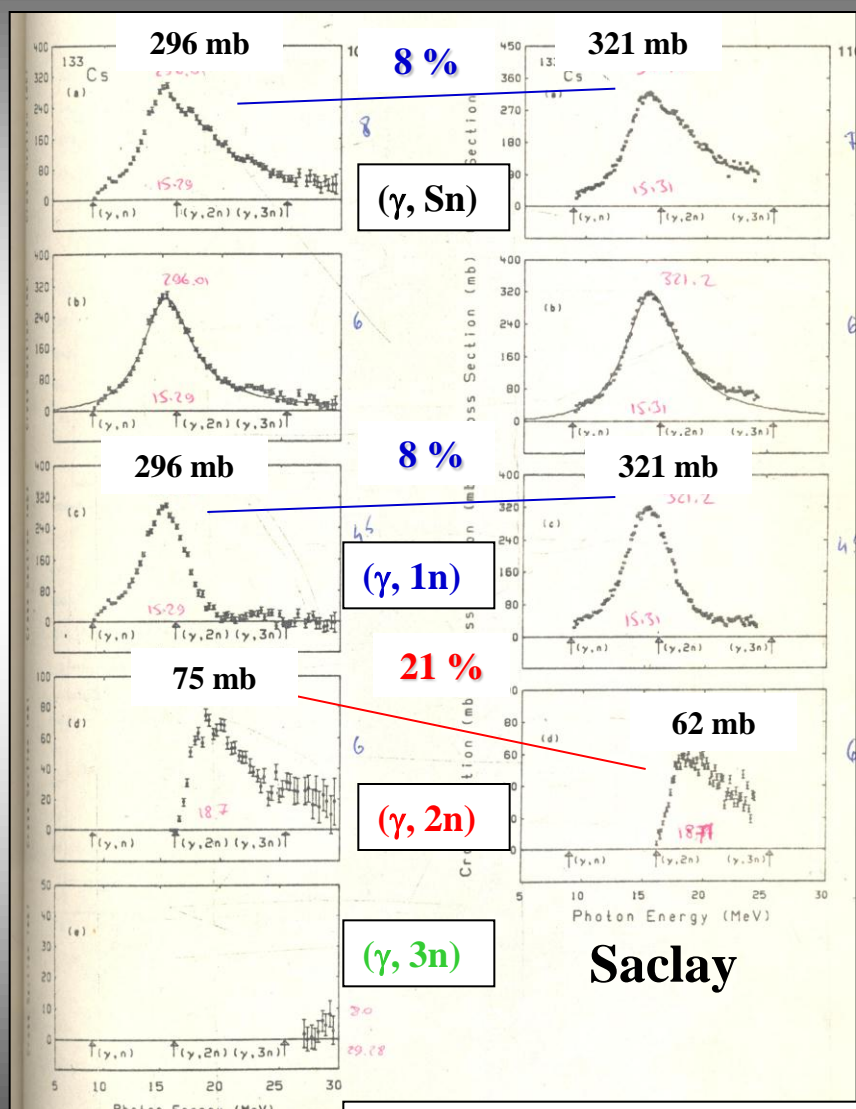
For each nucleus – cross sections:

$(\gamma, 3n)$
 $(\gamma, 2n)$
 $(\gamma, 1n)$
 $(\gamma, \text{tot}) = (\gamma, 1n) + (\gamma, 2n) + (\gamma, 3n)$
 $(\gamma, Sn) = (\gamma, 1n) + 2(\gamma, 2n) + 3(\gamma, 3n)$



¹³³Cs

¹⁵⁹Tb



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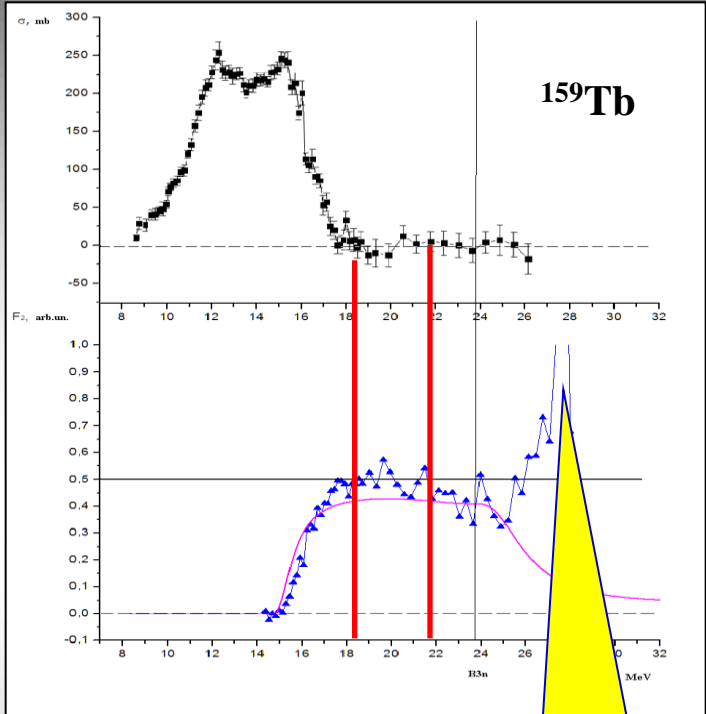
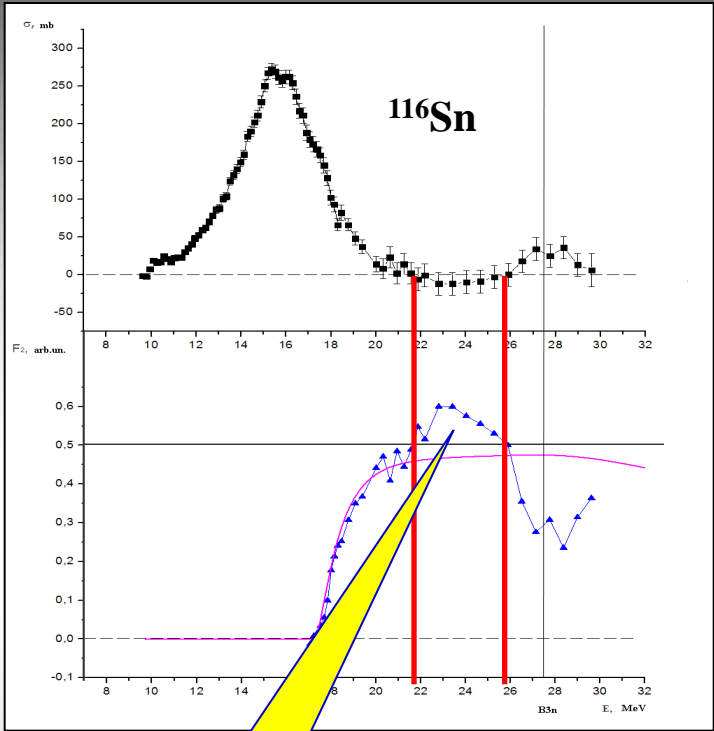
S.S.Dietrich and B.L.Berman. *Atom. Data and Nucl. Data Tables*, 38 (1988) 199

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Some examples of Livermore data

Technical Meeting on International Network of Nuclear Reaction Data Centres (NRDC)



$\sigma(\gamma, 1n)$
 negative values

$F_2 > 0.50$

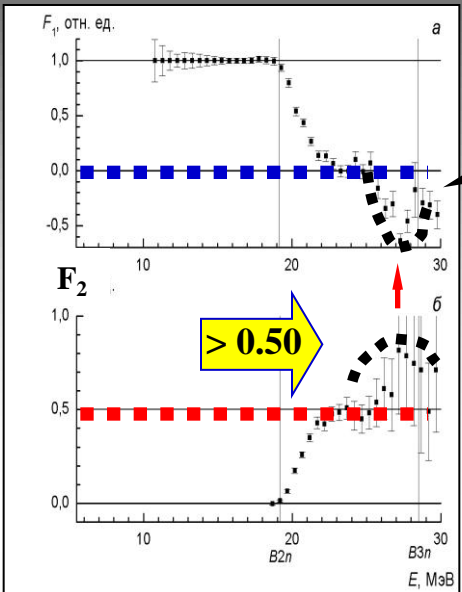
**Dramatic disagreements:
 $F_2 > 0.50!$**

$$F_2 = \frac{\sigma(\gamma, 2n)}{\sigma(\gamma, 1n) + 2\sigma(\gamma, 2n) + 3\sigma(\gamma, 3n) + \dots} < 0.50 (!)$$

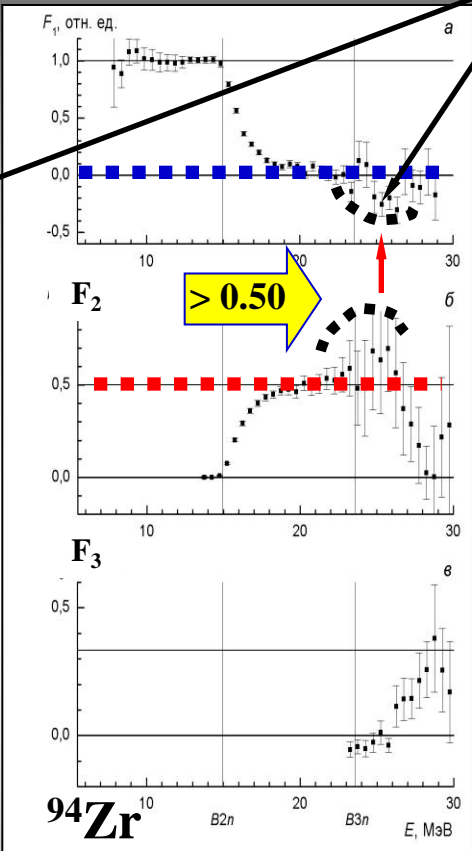
**Dramatic disagreements:
 $F_2 = 1.50 - 2.00!$**

But physically not reliable negative cross section values are correlated with physically forbidden values $F_2 > 0.50$

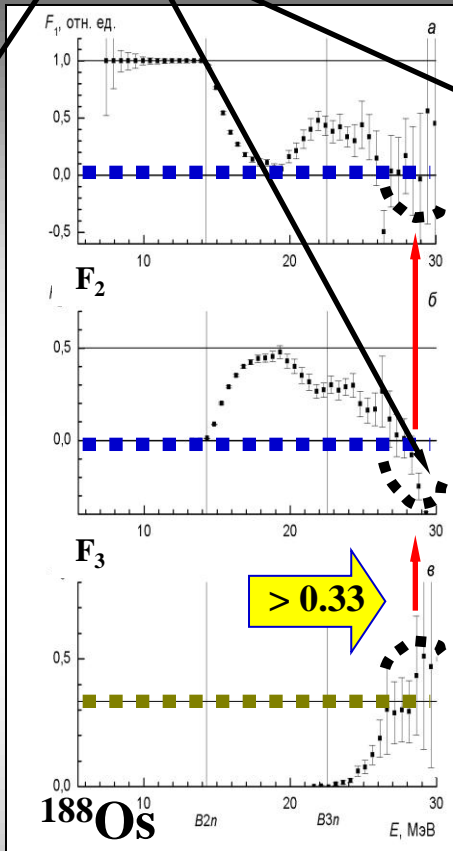
Physically forbidden negative values



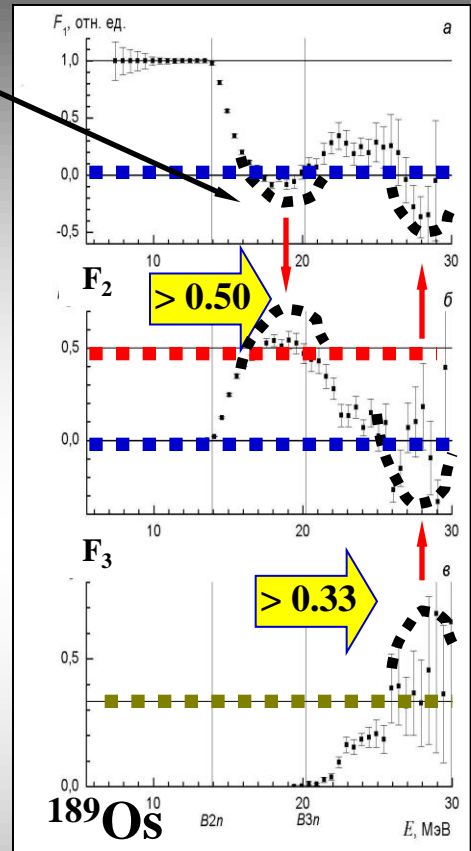
⁹¹Zr



⁹⁴Zr



¹⁸⁸Os



¹⁸⁹Os

The reliability of many data is doubtful.

Many data should be reanalyzed and reevaluated!

There are additional physical criteria:
 $F_1 = \sigma(\gamma, 1n) / \sigma(\gamma, xn) < 1.00$
 $F_3 = \sigma(\gamma, 3n) / \sigma(\gamma, xn) < 0.33$ etc.



New experimentally-theoretical method of evaluation

using modern model of photonuclear reactions:

- initial data – experimental (γ, Sn) reaction cross section;**
- sorting neutrons for multiplicity based on theoretical model.**

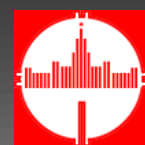
Theoretically calculated transitional multiplicity functions

$$F_i^{\text{theor}} = \sigma^{\text{theor}}(\gamma, \text{in}) / \sigma^{\text{theor}}(\gamma, \text{Sn})$$

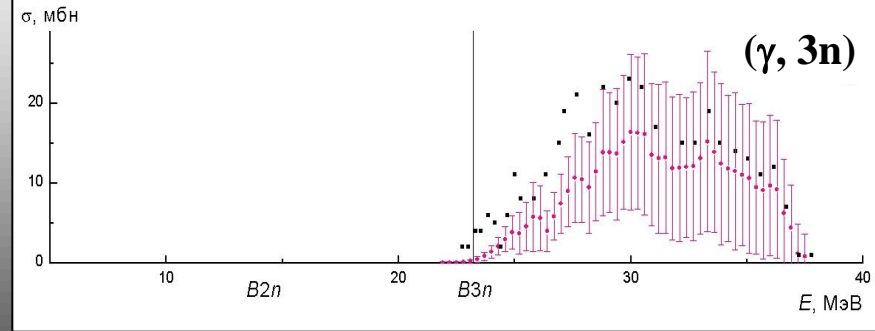
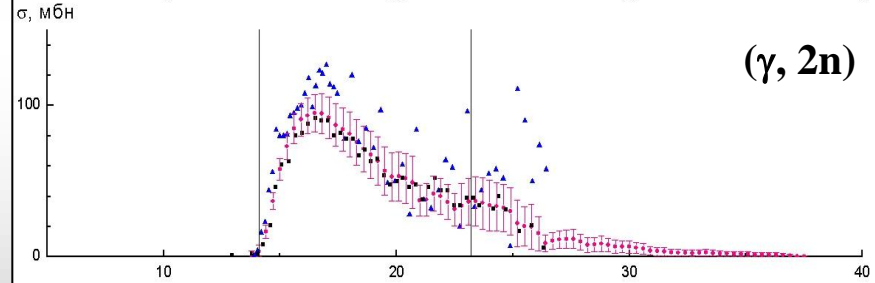
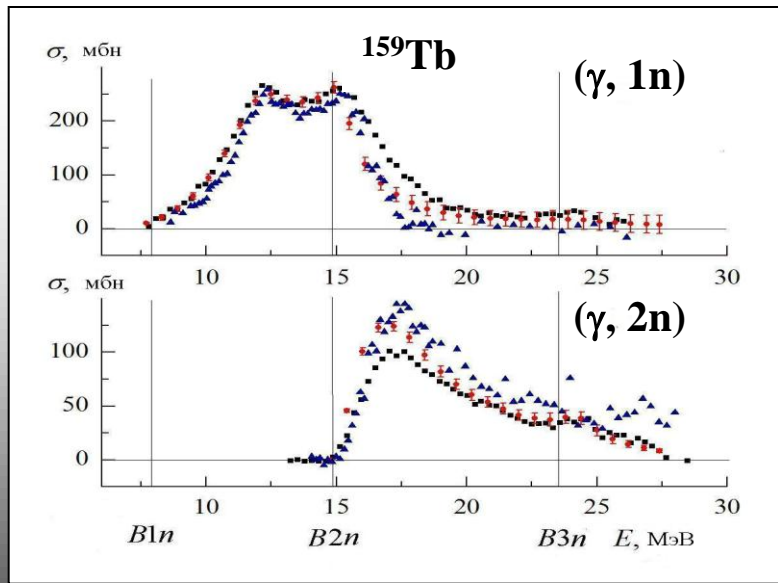
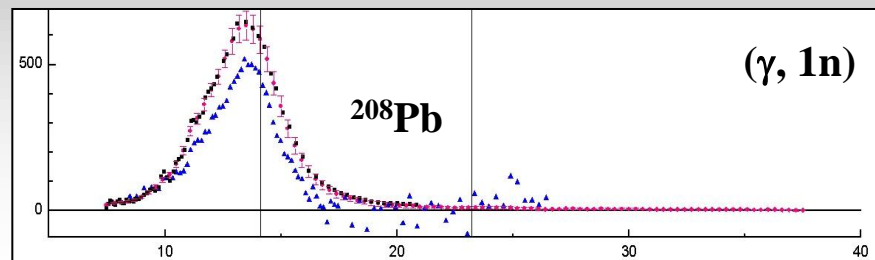
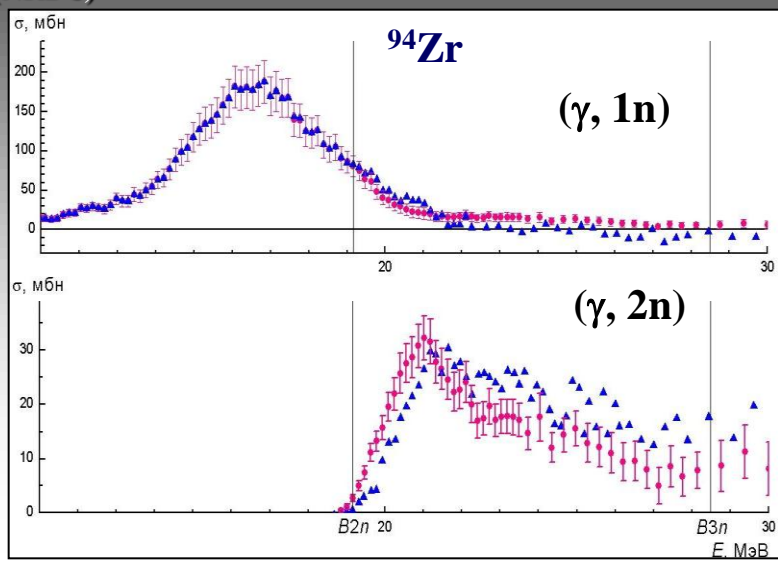
are used for cross section evaluation by following way

$$\sigma^{\text{eval}}(\gamma, \text{in}) = F_i^{\text{theor}}(\gamma, \text{in}) \bullet \sigma^{\text{exp}}(\gamma, \text{Sn}).$$

Such evaluation method means that competition of partial reactions is described by model and their correspondent sum is equal to the experimental (γ, Sn) reaction cross section.

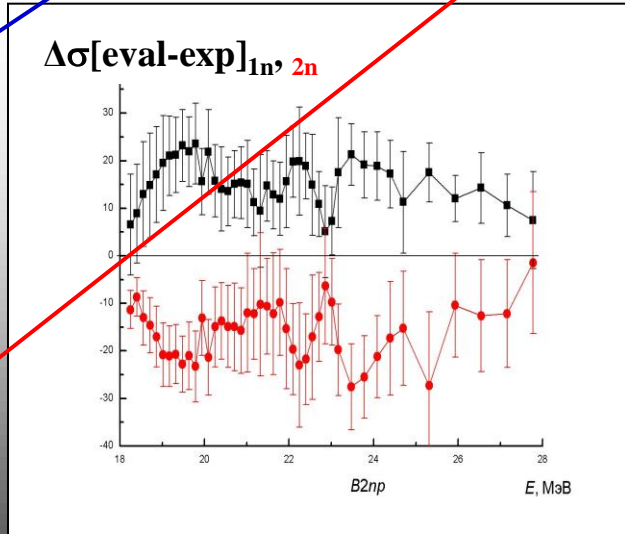
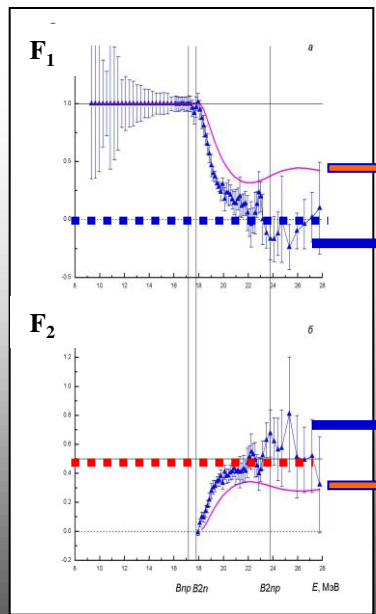
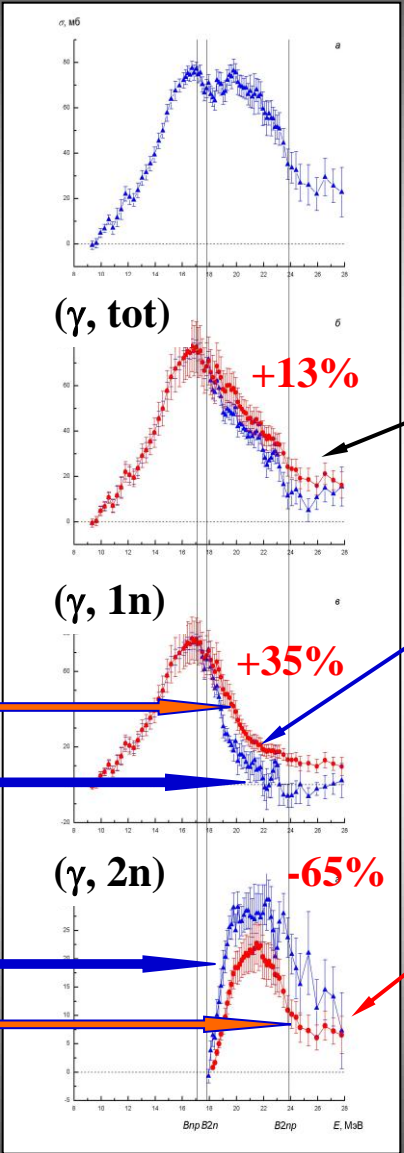


**Noticeable disagreements between
 evaluated cross sections and experimental
 those obtained using photoneutron
 multiplicity sorting methods.**



⁶⁵Cu
(Livermore)

Reaction	E ^{int} = B2n = 17.8 MeV		E ^{int} = 28.0 MeV	
	Experiment	Evaluation	Эксперимент	Evaluation
(γ, tot)	334.7(2.8)	344.7(11.1)	624.8(11.6)	702.9(14.3)
(γ, 1n)	334.7(5.0)	370.3(11.1)	432.5(13.0)	581.0(13.4)
(γ, 2n)			200.0(9.5)	121.9(4.9)



**Unreliable
 moving of neutrons
 from channel
 “1n”
 into channel
 “2n”**



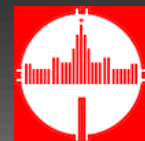
Using specially proposed objective physical criteria of data reliability and new experimentally-theoretical method for evaluation many new reliable data for partial $(\gamma, 1n)$, $(\gamma, 2n)$, $(\gamma, 3n)$ reactions cross sections and also for total photoneutron $(\gamma, \text{tot}) = (\gamma, 1n) + (\gamma, 2n) + (\gamma, 3n)$ and neutron yield $(\gamma, \text{Sn}) = (\gamma, 1n) + 2(\gamma, 2n) + 3(\gamma, 3n)$ reaction cross sections were obtained for many nuclei



in addition to those investigated before



New reliable evaluated data were included into the EXFOR database and will be presented at the International Meetings on Nuclear Spectroscopy and Nuclear Structure (NUCLEUS 2015, Russia, June 29 – July 3, 2015, Russia, Peterhof, Saint-Petersburg).



Short-term (2015/2016) Program

The main items of CDFE (2015/2016) program, main priorities and most important tasks are traditional and the following:

- continuation of photonuclear data compilation using EXFOR format, new TRANSEs (M079, M080, etc.) production;
- correction of old ENTRYs in accordance with new EXFOR coding rule changes and the NRDC Network experts comments and recommendations;
- continuation of joint analysis and evaluation using objective physical criteria of total and partial photonuclear reaction cross sections obtained in various experiments;
- upgrading of all databases put upon the CDFE Web-site <http://cdfe.sinp.msu.ru>).



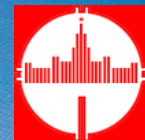
International Atomic Energy Agency

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**Centre for
Photonuclear
Experiments
Data**



Vladimir Varlamov

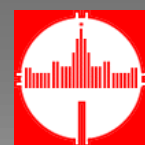
**THANKS A LOT
FOR ATTENTION!**

4/23/2015

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21 - 23 April 2015, IAEA's Headquarters, Vienna, Austria

Thanks!



CDFE as participant of NRDC

International Network of Nuclear Reaction Data Centres - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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www.nds.iaea.org/nrdc/

CDFE НИИЯФ ИСТИНА МГУ РФФИ NRDC-Net NDS-cmpltn X4Cmpltn NDSX4 EXFOR-chex RapidShare Google Google Maps IAEA ND2013 "Ежедневный журна..."

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International Atomic Energy Agency
Nuclear Data Services
 Sección Datos Nucleares, OIEA

Databases » EXFOR | ENDF | CINDA | IBANDL | Medical | PGAA | NGAtlas | RIPL | FENDL | IRDF-2002 | IRDFF

International Network of Nuclear Reaction Data Centres (NRDC)
 (To previous NRDC Home / NRDC Internal Archive / Cite map)

What is NRDC?

The International Network of Nuclear Reaction Data Centres (NRDC) constitutes a worldwide cooperation of nuclear data centres under the auspices of the International Atomic Energy Agency. The Network was established to coordinate the world-wide collection, compilation and dissemination of nuclear reaction data.

Objectives and Tasks

The primary goal of the Network is the dissemination of nuclear reaction data and associated documentation to users. The following specific tasks must be carried out in order to accomplish this important aim:

- Compilation of relevant bibliographic information (CINDA),
- Compilation of experimental nuclear reaction data (EXFOR),
- Collection of evaluated nuclear reaction data (ENDF),
- Exchange of nuclear reaction data of all types,
- Promotion of the development of special purpose evaluated data files,
- Development of common formats for computerized exchange of nuclear data,
- Coordinated development of computer software for managing and disseminating nuclear data,
- Coordination and dissemination of end user software for both on line and local access to nuclear data,
- Documentation of current and future data needs in order to be able to meet changing user demands.

Core Centres | **Specialized Centres** | Discontinued Centres

Regional, national and specialized data centres provide essential complementary functions to the core data centres by assuming particular responsibility for the collection and dissemination of data of a specialized type or application.

Country	Centre	Joined
China	Chinese Nuclear Data Center (CNDC) China Institute of Atomic Energy Beijing	1987
Hungary	Nuclear Data Group ATOMKI, Debrecen	1992
India	Nuclear Data Physics Centre of India BARC, Trombay, Mumbai	2008
Japan	Nuclear Data Center Japan Atomic Energy Agency, Tokai-mura, Naka-gun, Ibaraki	1991
Japan	Japan Nuclear Reaction Data Centre (JCPRG) Hokkaido University, Sapporo	1975
Korea	Nuclear Data Center Korea Atomic Energy Research Institute, Yuseong, Daejeon	2000
Russia	Nuclear Structure and Nuclear Reaction Data Centre (CAJad) Kurchatov Institute, Moscow	1974
Russia	Centre for Experimental Photonuclear Data (CDFE) Moscow State University, Moscow	1982
Russia	Center for Nuclear Physics Data (CNPD) All Russian Scientific Research Institute of Experimental Physics, Sarov	1997
Ukraine	Ukrainian Nuclear Data Center (UkrNDC) Institute for Nuclear Research, Kyiv	1998

Documents

- Network Document
- EXFOR Basics (pdf)
- EXFOR Basics (html)
- EXFOR Formats
- LEXFOR
- Protocol
- Dictionary
- Short Guide
- CINDA2001
- ENDF-6 Formats
- More Documents

Codes

- Codes
- Comments on ZCHEX

NRDC Meetings

- 2014 (Smolenice)
- 2013 (Vienna)
- 2012 (Paris)
- 2011 (Vienna)
- 2010 (Sapporo)
- 2009 (Vienna)
- 2008 (Obninsk)
- 2007 (Vienna)
- 2006 (Vienna)
- 2005 (Vienna)
- 2004 (Brookhaven)
- 2003 (Vienna)
- 2002 (Paris)
- 2001 (Vienna)
- 2000 (Obninsk)
- 1999 (Vienna)
- All meetings

Other Events

- Workshop 2013
- Workshop 2011
- Workshop 2010
- Workshop 2003
- More Meetings

Memos

- 4C-1 (NNDC)
- 4C-2 (NEA-DB)
- 4C-3 (NDS)
- 4C-4 (CJD)
- CP-A (CAJad)
- CP-B (KaChaPaG)
- CP-C (NNDC)
- CP-D (NDS)
- CP-E (JCPRG)
- CP-F (CNPD)
- CP-M (CDFE)
- CP-N (NEA-DB)

Contacts

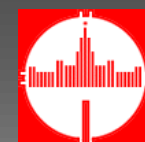
- N.Otsuka
- V.Semkova
- S.Simakov
- V.Zerkin

Links

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- Nuclear Data Services
- Nuclear Data Section



EXFOR Database



Technical Meeting on International
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CENTRE FOR PHOTONUCLEAR EXPERIMENTS

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CDFE => Online Services

Nuclear Reaction Database (EXFOR)
 [[Direct Geometry](#)]
[Inverse Geometry](#)

The source of data is the EXFOR fund prepared and maintained by the [Nuclear Reaction Data Centres Network](#).

Each field in this form is optional - may be blank.

Number ENTRY / SUBENTRY	<input type="text"/>	M0025 - M0025 A0075002 - A0075002 C0128, L00128
Reaction		
Target Nucleus : Z (digits) or Chemical symbol (letters) and Mass number (digits)	Z or Symbol : <input type="text"/>	A : <input type="text"/>
Incident Particle :	<input type="text"/> any <input type="checkbox"/> No incident particle - spontaneous decay <input type="checkbox"/> Alphas <input type="checkbox"/> Deuterons <input type="checkbox"/> Electrons	
	or Ions <input type="text"/> Sequence : Be-8, Pb-208, Li-7	
Inc-Source : Source of the incident particle beam	<input type="text"/> any <input type="checkbox"/> A-BE Alpha-Beryllium <input type="checkbox"/> ARAD Annihilation radiation <input type="checkbox"/> ATOMI Atomic beam source <input type="checkbox"/> BRST Bremsstrahlung	
Outgoing Particle / Process :	<input type="text"/> any <input type="checkbox"/> No outgoing particle <input type="checkbox"/> A Alphas <input type="checkbox"/> B- Decay Beta- <input type="checkbox"/> D Deuterons <input type="checkbox"/> ABS Absorption <input type="checkbox"/> EL Elastic scattering <input type="checkbox"/> F Fission <input type="checkbox"/> INL Inelastic scattering	
	or Sum (e.g., n + p) <input type="text"/>	
Product Nucleus : Z (digits) or Chemical symbol (letters) and Mass number (digits)	Z or Symbol : <input type="text"/>	A : <input type="text"/>

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Angular correlation
 Angular distributions, general
 Angular distributions, partial reactions
 Double differential data
 Energy/momentum/mass correlation (photonuclear data)
 Fission fragment data
 Fitting coefficients

Quantity :
 Reaction parameter

Energy / Angle range :
 Low
 High

Status :
 Various types of information
 any
 APF
 COP
 CPX
 CUR

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Methodic

Method :
Experimental technique(s) employed in the experiment
 any
 ABSFY Absolute fission yield measurement
 ACTIV Activation
 AMS Accelerator mass spectrometry
 ASEP Separation by mass-separator

Facility :
Main apparatus used in the experiment
 any
 BETAT Betatron
 CCW Cockcroft-Walton accelerator
 CHOPF Fast chopper
 CHOPS Slow chopper

Detector :
Detector(s) used in the experiment
 any
 BF3 Boron Trifluoride neutron detector
 BGO Bismuth-Germanate crystal detector
 BPAIR Electron-pair spectrometer
 CEREN Cerenkov detector

Bibliography

Reference :
Type, code and year of publication
 Type : any
 B Book
 C Conference
 Code : [help](#)
 Year : 1999 1965 1975 1948,1985,1997

Author :
Name of any author of publication

Institute :
Institute(s) at which experiment was performed [help](#)

Number of subentrys founded / page 50

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If you have any questions, comments, and/or suggestions, please, contact
 CDFE Head: [Vladimir V. Varlamov](#)

CDFE search engine - Mozilla Firefox

CDFE => Online Services => EXFOR Sea... CDFE search engine.

cdfe.sinp.msu.ru/cgi-bin/exfv3.cgi?entry=&ztarg=&atarg=&

Save
 Look through sel

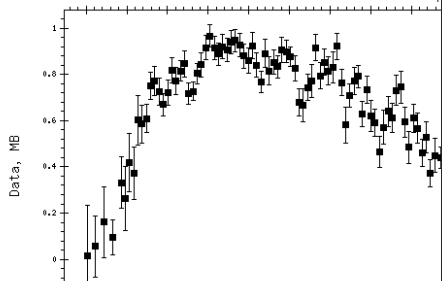
Subent	First Author	Reference (+NSR)	Target Nucleus	
<input type="checkbox"/>	L0152002	Y.Ilieva+	J.EPJA.43.261.2010	1-H-2
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<input type="checkbox"/>	L0152006	Y.Ilieva+	J.EPJA.43.261.2010	1-H-2
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<input type="checkbox"/>	M0478002	B.L.BERMA	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	L0052005	D.D.Faul+	J.EPJA.43.261.2010	1-H-2
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<input type="checkbox"/>	M0469003	B.L.BERMA	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	L0023002	B.L.BERMA	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	M0520002	M.MACCO	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	M0546002	M.MACCO	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	L0051002	B.L.BERMA	J.EPJA.43.261.2010	1-H-2
<input type="checkbox"/>	L0051003	B.L.BERMAN+	J.PR/C.22.2273.8012	2-HE-4 (G,N)* 2-HE-3 INT
<input type="checkbox"/>	M0327002	J.D.IRISH+	J.CJP.53.802.75	2-HE-4 (G,N) 2-HE-3 DA/T
<input type="checkbox"/>	M0327003	J.D.IRISH+	J.CJP.53.802.75	2-HE-4 (G,N) 2-HE-3 DA/T

EXFOR L0018002 Data/Graph - Mozilla Firefox

cdfe.sinp.msu.ru/cgi-bin/exfv3.cgi?entry=L0018002

```

SUBENT      L0018002  970129
AUTHOR      (B.L.BERMAN,S.C.FULTZ,P.F.YERGIN)
TITLE       Three-body photodisintegration of He3.
REFERENCE   (J,PR/C,10,2221,7412)
              (J,PRL,24,1494,7006)
INSTITUTE   (1USALRL)
INC-SOURCE  Positron annihilation
FACILITY    (LINAC)
REACTION    (2-HE-3(G,X)0-NN-1,,SIG)
              The sum: (G,N) + (G,NP)
              Threshold of (gamma,n+p) reaction
    
```



Mozilla Firefox

cdfe.sinp.msu.ru/cgi-bin/exfv3.cgi?entry=L0018002&SOURCE=ON

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SUBENT      L0018001  970129
BIB         8          11
INSTITUTE   (1USALRL)
REFERENCE   (J,PR/C,10,2221,7412)
              (J,PRL,24,1494,7006)
AUTHOR      (B.L.BERMAN,S.C.FULTZ,P.F.YERGIN)
TITLE       Three-body photodisintegration of He3.
FACILITY    (LINAC)
INC-SOURCE  Positron annihilation
DETECTOR    (PROPC) BF3 counters in polyethylene moderator
              (780511T) Converted from Berman compilation
HISTORY     (891201A) BIB Updated
              (950330A) BIB Updated
ENDBIB      11         0
NOCOMMON    0         0
ENDSUBENT   14         0
SUBENT      L0018002  970129
BIB         1          3
REACTION    (2-HE-3(G,X)0-NN-1,,SIG)
    
```

Subent	First Author	Reference (+NSR)	Target Nucleus
L0018 1	1C		
L0018 1	2		
L0018 1	3		
L0018 1	4		
L0018 1	5		
L0018 1	6		
L0018 1	7		
L0018 1	8		
L0018 1	9		
L0018 1	10		
L0018 1	11		
L0018 1	12		
L0018 1	13 I		
L0018 1	14		
L0018 1	15		
L0018	199999		
L0018 2	1C		
L0018 2	2C		
L0018 2	3		
L0018 2	4 I		
L0018 2	5 I		
L0018 2	6		

Nucleus Ground and Isomeric States Parameters - results - Mozilla Firefox

cdfe.sinp.msu.ru/cgi-bin/gsearch.cgi?z=2&a=3&datasset=all&meta=exclude&t12=6&fields=abn&fields=am&fields=ip&fields=dan&fields=ib&fields=me&f

Return to the CDFE Online Services Main Menu

Nucleus Ground and Isomeric States Parameters - results

^2He

The source of data is the current version of [Nuclear Wallet Cards](#) database prepared and maintained by the USA NNDC

[See description]

A	JP	$T_{1/2}$, G, Abundance	Atomic Mass M, Micro-U	Atomic Mass M, MeV	$D_{A.M.}$, Micro-U	Mass Excess M.A., MeV	Atomic Mass, MeV	$D_{M.E.}$, keV
3	1/2+	0.000137%	3.016029	2809.413		14.931	2808.391	

CDFE search engine - Mozilla Firefox

cdfe.sinp.msu.ru/cgi-bin/nussy/current/nussy.cgi?Msd=18Lch=68Lch=on&Lms=11&Len=on&Lsp=on&Llu=19&Lln=on&Lfu=19&Lfu=19

Get all data

ENSDF Source	Nucleus	Level energy	Spin-parity	Half-life
11.55	6-C-11	0	3/2-	20.39 M (2)
11.55	6-C-11	2000.0 (5)	1/2-	7.1 FS (5)
11.55	6-C-11	4318.8 (12)	5/2-	< 8.3 FS
11.55	6-C-11	4804.2 (12)	3/2-	< 7.6 FS
11.55	6-C-11	6339.2 (14)	1/2+	< 76.2 FS
11.55	6-C-11	6478.2 (13)	7/2-	< 6 FS
11.55	6-C-11	6904.8 (14)	5/2+	< 48 FS
11.55	6-C-11	7499.7 (15)	3/2+	< 63 FS
11.55	6-C-11	8104.5 (17)	3/2-	0.04 FS (3)
11.55	6-C-11	8420 (2)	5/2-	0.030 FS (8)
11.55	6-C-11	8655 (8)	7/2+	<= 5 KEV

Help

148197

J,PR/C,10,2221,7412

Physics

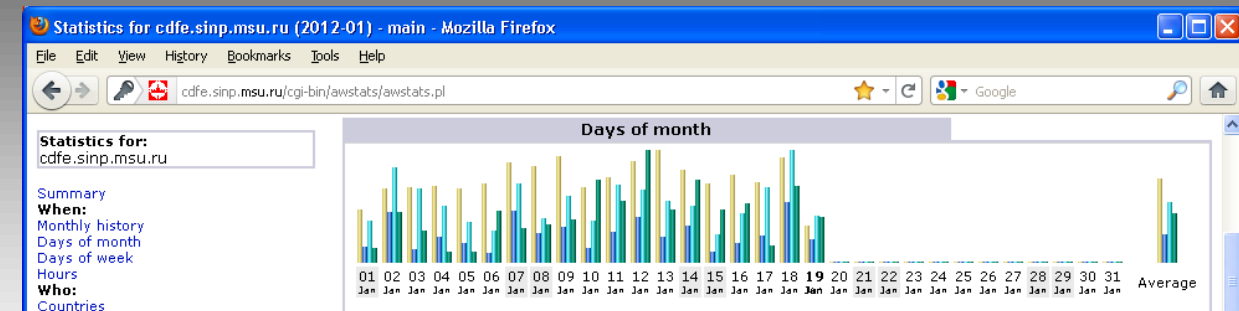
V, measured |s(E,En),

4/23/2015

CDFE services statistics: January 2012



Technical Meeting on International
 Network of Nuclear Reaction Data
 Centres (NRDC)



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Germany de	74	108	3.60 MB
China cn	67	100	2.23 MB
Japan jp	66	163	2.76 MB
Poland pl	65	71	964.64 KB
Canada ca	41	73	3.02 MB
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Iraq iq	31	55	4.41 MB
India in	30	111	15.89 MB
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Netherlands nl	22	25	1.35 MB
Italy it	20	21	1.61 MB
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Thailand th	16	39	456.50 KB
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