Technical Meeting on the International Network of Nuclear Reaction Data Centres, 14-17 May, 2024 Vienna

2023/24 Status Report of China Nuclear Data Center

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China Nuclear Data Center
China Institute of Atomic Energy (CIAE)

Contents

1. General Information of CNDC
2. Status of CENDL-3.2 and sub-libraries
3. Progresses on nuclear data theory
4. EXFOR activities at CNDC

I. General Information of CNDC

1.1 About CNDC

Nuclear data study started in 60's last century by measurements with the first reactor and cyclotron in CIAE,
China Nuclear Data Center (CNDC) was established in 1975 and joined the nuclear data activities of IAEA as the national nuclear data center of China since 1984.
As a window, CNDC has been open to the world since 1978， and has established a good cooperative relationship with the IAEA, OECD/NEA, and major nuclear data centers and institutions in the world.

- The main task of CNDC:

✓ The management of domestic nuclear data activities.
✓ The nuclear data evaluations, libraries and relevant methodology studies.
✓ Nuclear data measurements and methodology studies
✓ The exchange of nuclear data activities with IAEA, foreign nuclear data centers and agencies.
✓ The services for domestic and foreign nuclear data application users.

1.2 Main tasks of CNDC in 2023/2024:

✓ Carry out the Five Years Plan (2021-2025) for nuclear data (CENDL Project).
✓ Data evaluation for next CENDL version and sub-libraries
✓ Methodological studies of nuclear data evaluation
✓ Nuclear data measurements and related methodological studies. (Mr. Ruan)
✓ Compilations for EXFOR.
✓ Nuclear data services.

The 1st reactor and cyclotron in China

2. Status of CENDL-3.2 and sub-library

2.1 CENDL-3.2

Neutron Data Files: Released in 2020, containing mainly the neutron data of 272 nuclides from neutron to ^{241}Am. 135 Nuclides were newly evaluated or updated , 137 Nuclides were Inherited from CENDL-3.1. UNF is the main reaction program used in evaluation.

2.2 CENDL Sub-library: Neutron Activation File (CNAF) (2022-2023)

CNAF includes 818 nuclei from ^{1}H to ^{257}Fm within the neutron energy range of 10^{-5} eV to 20 MeV.

2.3 Radioactive Decay Data File: CENDL- DDL (2022-2023)

The DDL included 2350 nuclei from A=66 to A=172 (FY region) with ENSDF and ENDF formats. Evaluations are taken from : (1) CNDC & Jilin Univ.: ~500 nuclei; (2) DDEP: ~200 nuclei; (3) ENSDF: ~1500 nuclei; (4) JEFF-3.2: ~150 nuclei (for stable nuclei);

2. Status of CENDL-3.2 and sub-library

2.4 The CENDL Sub-library: Photonuclear Data file: PD

- Total of 264 materials are all newly evaluated and with ENDF-6 format.
- Mainly based on theoretical calculations with the Chinese photonuclear reaction codes GLUNF for the 6 light nuclei and MEND-G for the 264 medium-heavy nuclei.
- The incident photon energies for the medium-heavy nuclei are up to 200 MeV. The n, p, d, t, He-3, α are considered to totally 18th particle emission reactions in the MEND-G code.

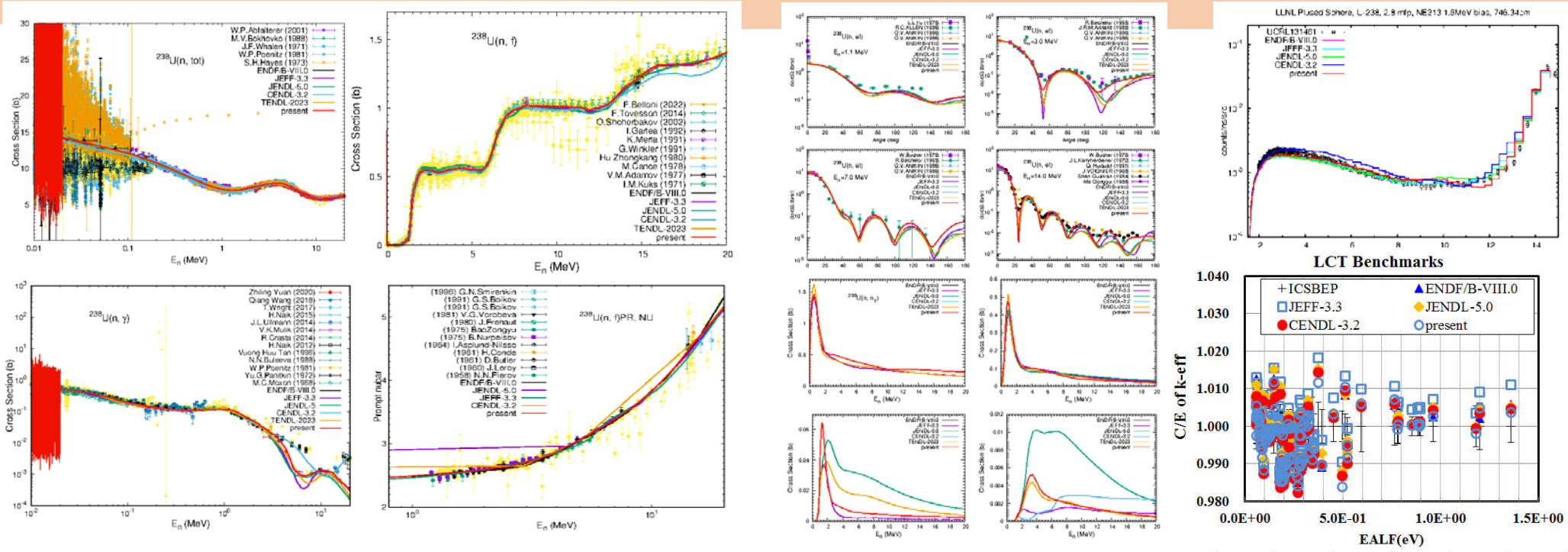
2.5 Fission Yield: CENDL – FPY (2023-2024)

Evaluation of the n+235U, 238U and 239Pu fission yield have been completed based upon Zp model. For other fission system, it is expected to been done within 2 year.

2. Status of CENDL-3.2 and sub-library

2.6 Update of neutron data files (Improvement of n+U-238 evaluation)

- Nu-bar, (n,tot), (n,γ), (n,f), (n,2n) and (n,3n) cross sections were evaluated newly.
- New theoretical calculations were performed based on Hauser-Feshbach and pre-equilibrium.
- The final benchmark test results indicates a significant improvement were obtained.



2. Status of CENDL-3.2 and sub-library

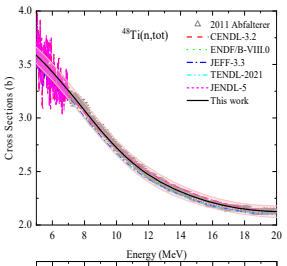
2.6 Update of neutron data files (Covariance)

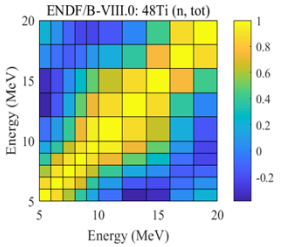
Covariance is studied with Unified Monte Carlo (UMC) for n+^{48}Ti.

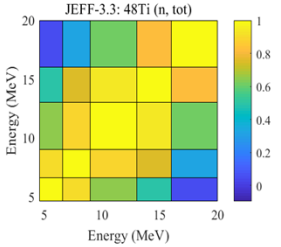
The results shows that the total cross section are in good agreement with the exp. data where the exp. data are sufficient. And the covariance is reasonable in physics and mathematics.

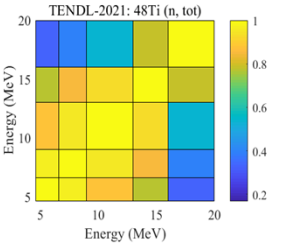
For those reaction channels lack of exp. data, the results of cs and cov. are not agreement well with the data from other libraries.

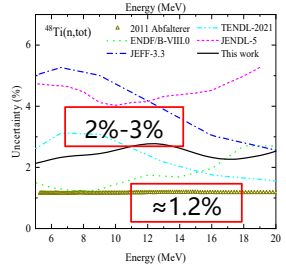
total cross section:

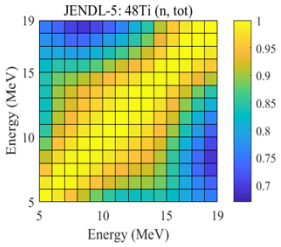


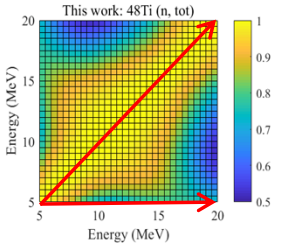






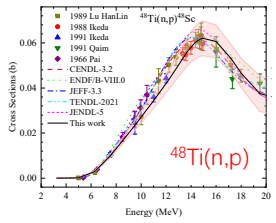


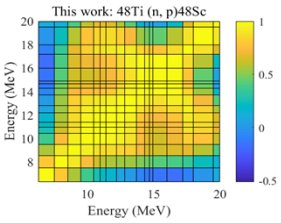


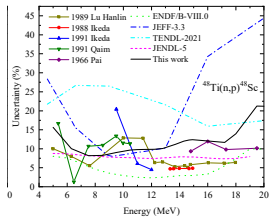


Simultaneously possessing the rationality of mathematics and nuclear reaction physics

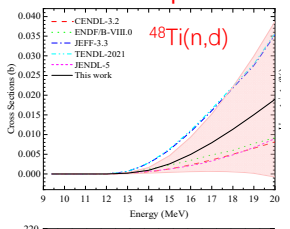
rich experimental data:

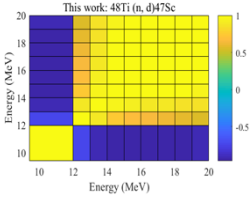


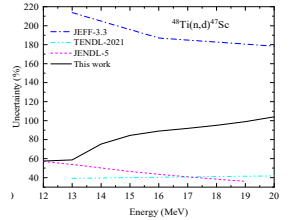




lack of experimental data:







This work was collaborated with R. Capote(IAEA) and a paper was published: HouQiong Xia, RuiRui Xu*, Ping Liu, Roberto Capote*, et al. Evaluation of Neutron Cross Sections of ^{48}Ti based on the Unified-Monte-Carlo-B Method. Chinese Physics C. doi: 10.1088/1674-1137/ad432c

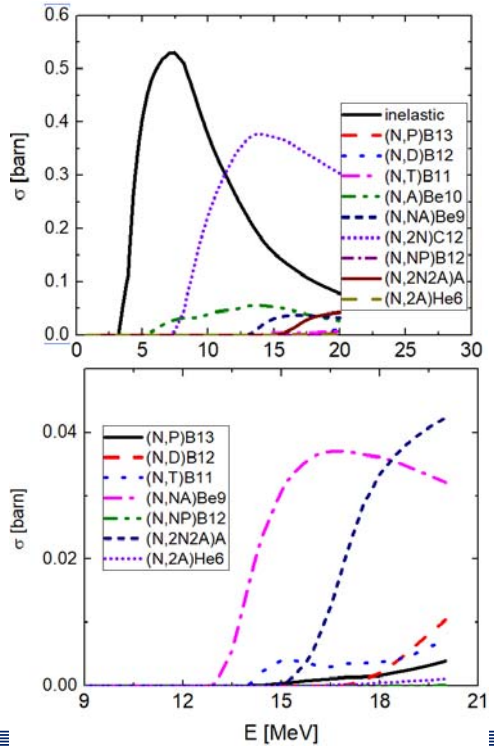
2. Status of CENDL-3.2 and sub-library

2.6 Update of neutron data files

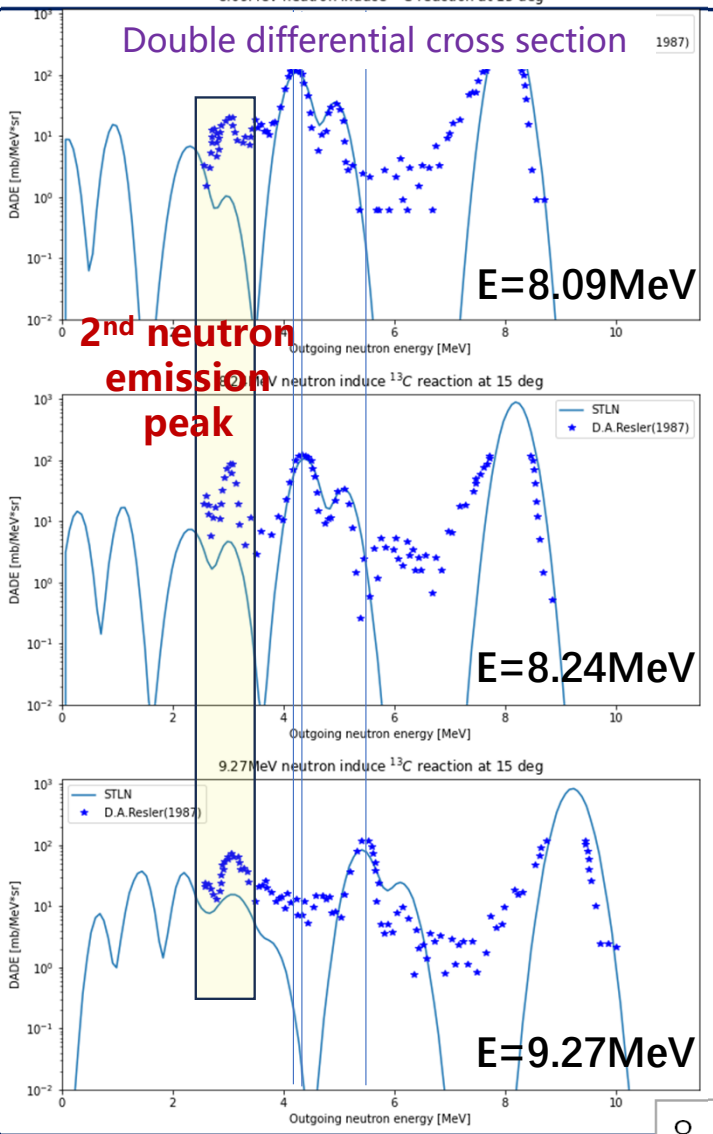
(**S**tatistical **T**heory of **L**ight **N**ucleus reactions)

- Taking n+^{13}C as an example

The unified Hauser Feshbach and exciton models are used, the preliminary shows a good progress were made to describe the angular distribution and double differential spectrum in some peaks.



$$n+{}^{13}C \rightarrow {}^{14}C^{*} \rightarrow \begin{cases} \gamma+{}^{14}C, & E_{th}=0 \\ n+{}^{13}C \begin{cases} \gamma+{}^{13}C, & k\le 6 \\ 2n+{}^{12}C, & k>6 \end{cases} & E_{th}=0 \\ p+{}^{13}B, & E_{th}=13.6MeV \\ d+{}^{12}B, & E_{th}=16.5MeV \\ t+{}^{11}B, & E_{th}=13.4MeV \\ \alpha+{}^{10}Be, & E_{th}=4.13MeV \\ {}^{5}He+{}^{9}Be \begin{cases} {}^{9}Be, & k=1 \\ n+2\alpha, & k>1 \end{cases} & E_{th}=12.3MeV \\ 2n+{}^{12}C, & E_{th}=5.33MeV \\ n+p+{}^{12}B, & E_{th}=18.9MeV \\ n+\alpha+{}^{9}Be, & E_{th}=11.5MeV \\ 2\alpha+{}^{6}He, & E_{th}=12.1MeV \end{cases}$$



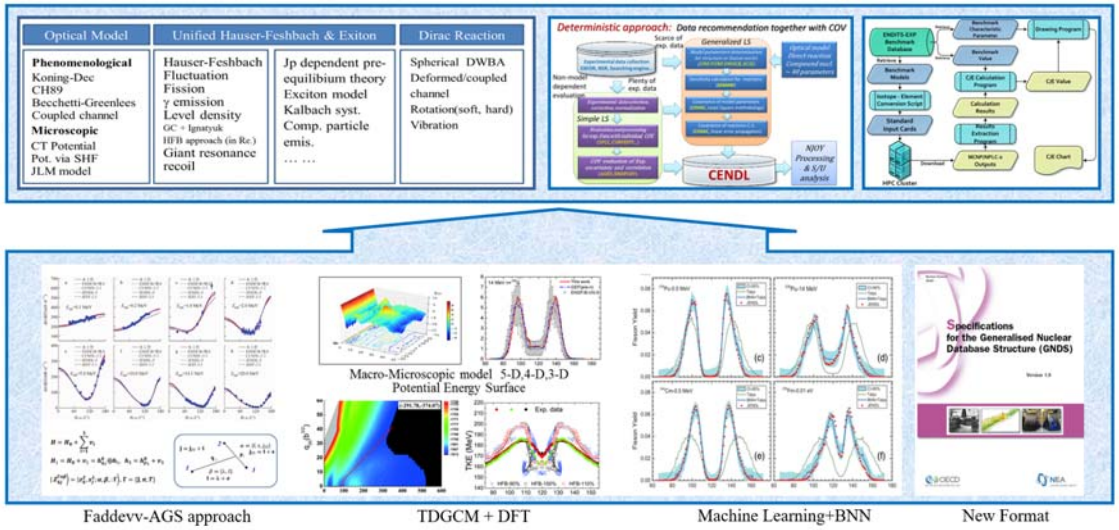
2. Status of CENDL-3.2 and sub-library

2.7 New CENDL plan

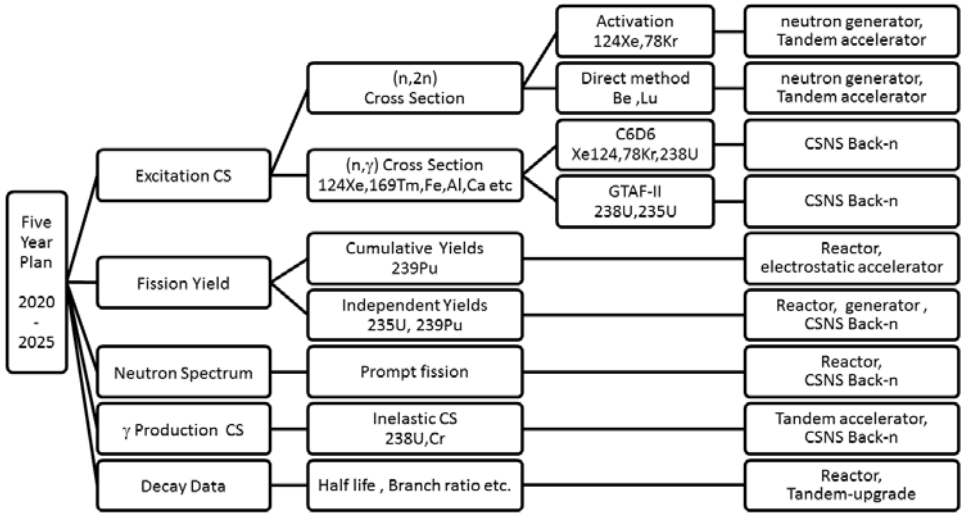
According to the plan of CENDL project, the new evaluations and measurements for the next CENDL library has been started since 2021.

1) The important evaluations will be updated, U-235,238, Pu-239,240 etc. according to the feedbacks from application and new evaluation methodology (including the covariance file)
2) The evaluations for unstable nuclei will be increased with the updated nuclear reaction mechanism studies(including the microscopic theory, machine learning etc.)
3) Sub-libraries will be updated, especially for the fission yields sub-library, which will be including the FY of n+U, Pu, etc. according to the new experimental data .
4) The next CENDL version (format: ENDF-6 and GNDS) will be released in 2025(planed)

~ 400 materials ~ 150 CS covariance files ~ 2 format (ENDF-6, GNDS) ~ 4 sub-libraries (activation, decay, fission yield, photonuclear)



The updated eval. methodology .



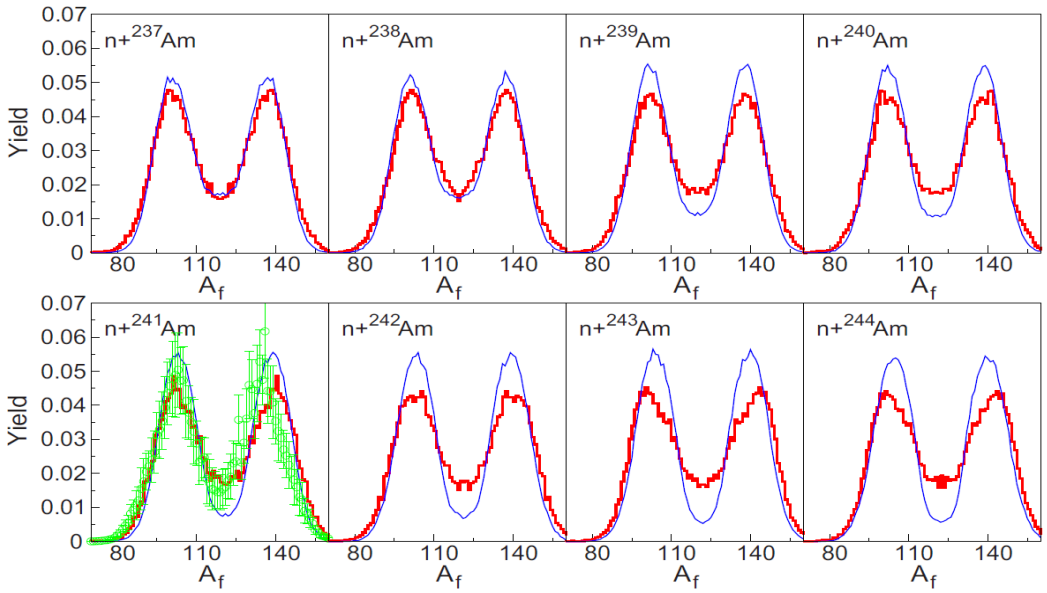
The new measurement plan during 2020-2025.

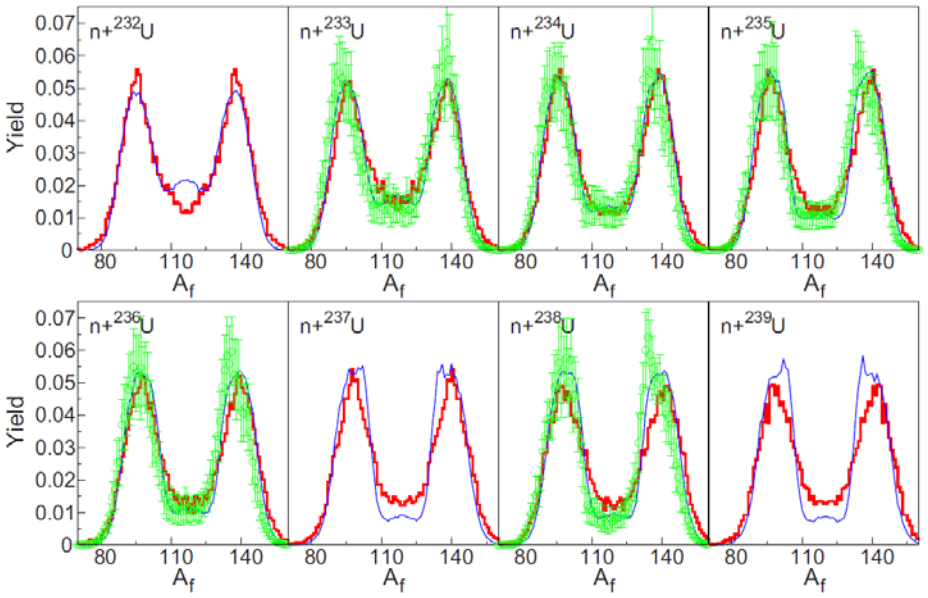
3. Progresses on nuclear data theory

☐ Macroscopic-microscopic model+ langevin model

The fission process is treated as the motion of a Brownian particle walking on the potential energy surface with the energy dissipation and fluctuation.

The mass distributions calculated are very good agreement with the data from END/B-VIII.0 and GEF.





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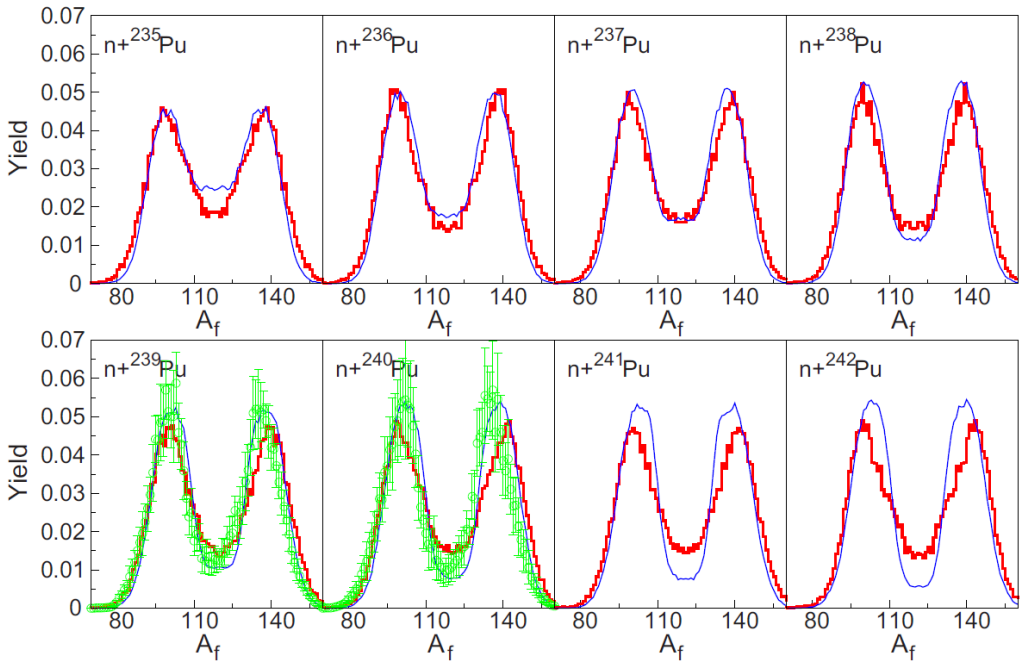
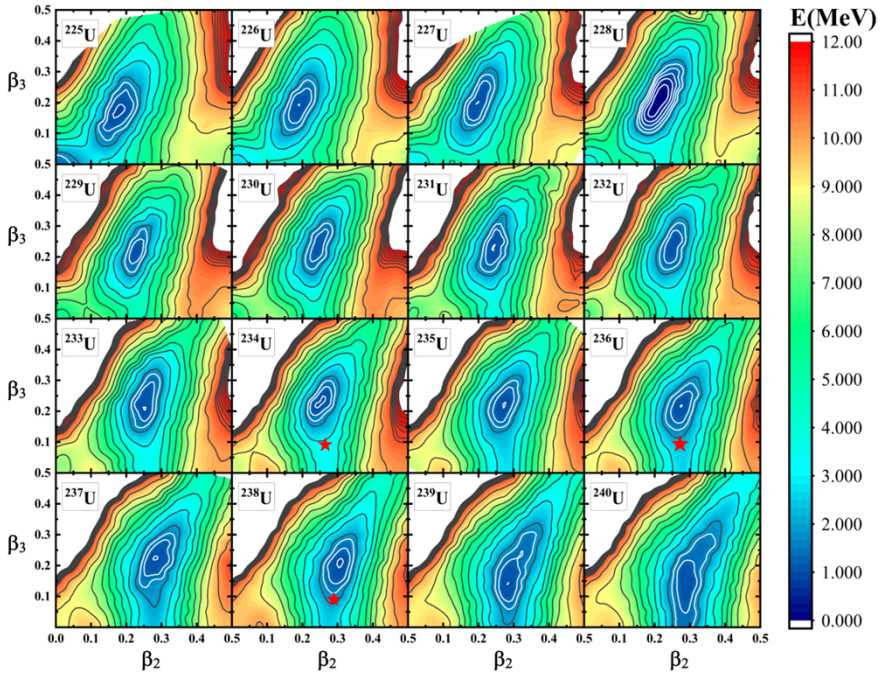


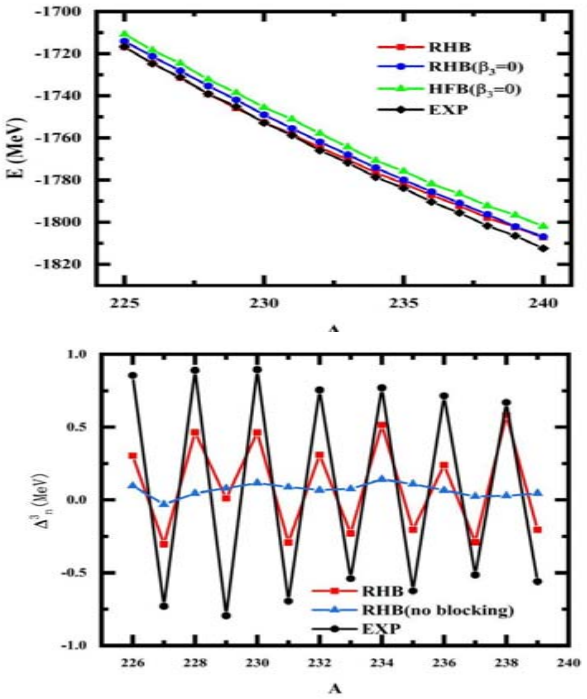
3. Progresses on nuclear data theory

☐ Covariant density functional theory are used to conduct the ground state properties of the U isotopes from 225 to 240.

The results show that for both odd-A and even-even nuclei, the ground states of the U isotope chain exhibit octupole deformation or reflection-asymmetric deformation, and the calculation results with octupole deformation are more consistent with experimental binding energies and odd-even staggering.



Chinese Physics C Vol. 48, No. 6 (2024) 064102



PAGE:12/15

CNDC X4 Team

- **Compilation:** Jimin Wang, Xi Tao, Lile Liu, Yangyang Liu, Yang Su
- **Software development:** Yongli Jin
- **Steering Committee:** Nengchuan Shu, Zhigang Ge

Responsibility

- **Compilation** of nuclear reaction data induced by neutron and charged particle measured in China under the guidance of IAEA/NDS.
- **Revision** of the entries with issues in EXFOR compiled at CNDC.
- **Scanning** of journals published in China.
- **Software development** for digitization and evaluation.

4. EXFOR Activities at CNDC

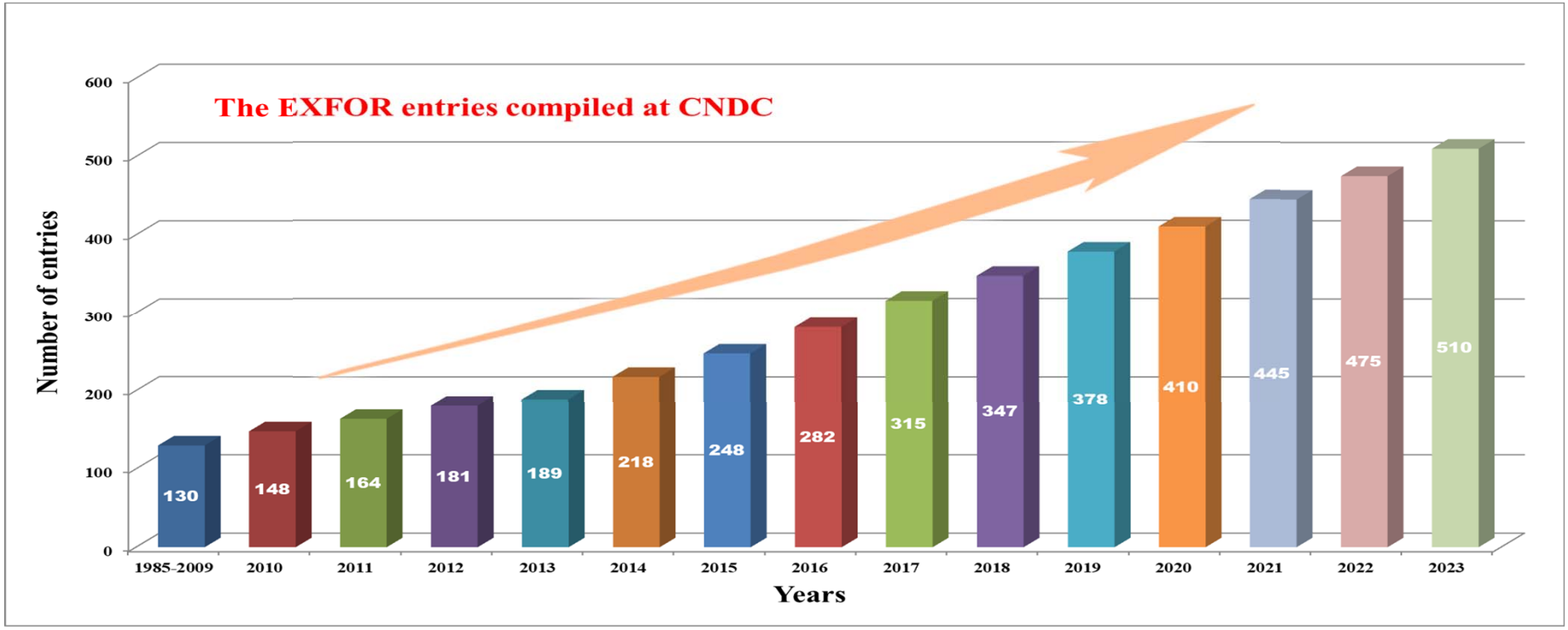
Compilation status

- Since the last NRDC meeting, we have compiled 35 new entries, 31 neutron data entries of which are contained in 2 final TRANS tapes (3209 and 3210), 4 charged particle data entries of which are contained in final TRANS S033.
- The 3209 and 3210 have been transmitted by NDS, and S033 has been transmitted by CNDC.
- Compiling and checking tool: The CNPD-developed EXFOR-Editor software.

No.	Entry No.	1st author	Reference	Status
1	S0239	Chen Zhiqiang	J,CNPR,19,387,2002	TRANS S033
2	S0240	Li Gongping	J,CNPR,19,39,2002	
3	S0247	Yang Lei	J,CNPR,30,117,2013	
4	S0259	Wu Meizhen	J,CST,3,701,1961	
5	32857	S. Q. Yan	J,AJ,919,84,2021	TRANS 3209
6	32860	Luocheng Yang	J,ANE,165,108780,2022	
7	32862	Zengqi Cui	J,EPJ/A,57,310,2021	
8	32868	Zhang Jiang-Lin	J,ASI,71,052901,2022	
9	32869	Wang De-Xin	J,ASI,71,072901,2022	
10	32870	Jie Ren	J,CPH/C,46,044002,2022	
11	32873	Yu.M.Gledenov	J,EPJ/A,58,86,2022	
12	32886	Zhizhou Ren	J,EPJ/A,59,5,2023	
13	32810	X. X. Li	J,PR/C,106,065804,2022	TRANS 3210
14	32814	Yong Li	J,CPH/C,44,124001,2020	
15	32819	Group	J,CST,2,1,1960	
16	32820	Huang Shengnian	J,CST,3,585,1961	
17	32822	Liang Qichang	J,CST,3,199,1961	
18	32824	Li Guanhua	J,CST,3,106,1961	
19	32825	Hu Ji'an	J,CST,6,554,1964	
20	32826	Hu Xuanwen	J,CST,6,368,1964	
21	32827	Ye Chuntang	J,CST,6,349,1964	
22	32828	Yuan Harong	J,CST,6,127,1964	
23	32832	Wang Yusheng	J,CST,6,1,1964	
24	32833	Ruan Jinghui	J,CST,7,108,1965	
25	32834	Group	J,CST,9,285,1975	
26	32835	Chen Ying	J,CST,10,146,1976	
27	32837	Ruan Jinghui	J,CST,11,335,1977	
28	32840	Li Ze	J,CST,14,98,1980	
29	32841	Ma Weiyi	J,CST,16,4,1982	
30	32844	Huang Ruiliang	J,CST,31,55,1997	
31	32845	Yuan Junqian	J,CTNP,11,65,1994	
32	32861	X. X. Li	J,PR/C,104,054302,2021	
33	32887	Yonghao Chen	J,PL/B,839,137832,2023	
34	32888	Chao Liu	J,NIM/A,1041,167319,2022	
35	32889	Zhi-Zhou Ren	J,CNST,34,115,2023	

Compilation status

- Since the first charged particle data entry S0001 was compiled at CNDC in 1985, there are more than 510 entries were compiled at CNDC in the EXFOR Library.



4. EXFOR Activities at CNDC

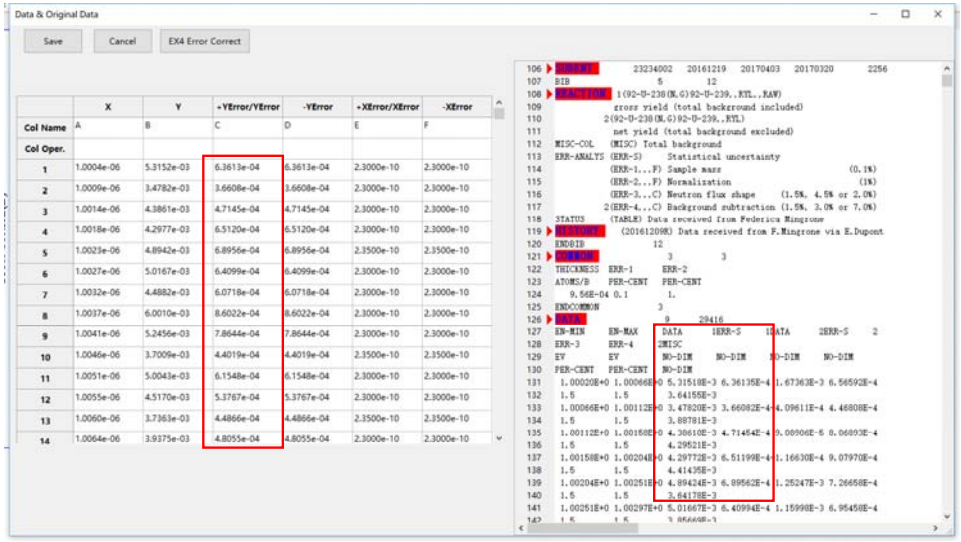
Scanning of journals

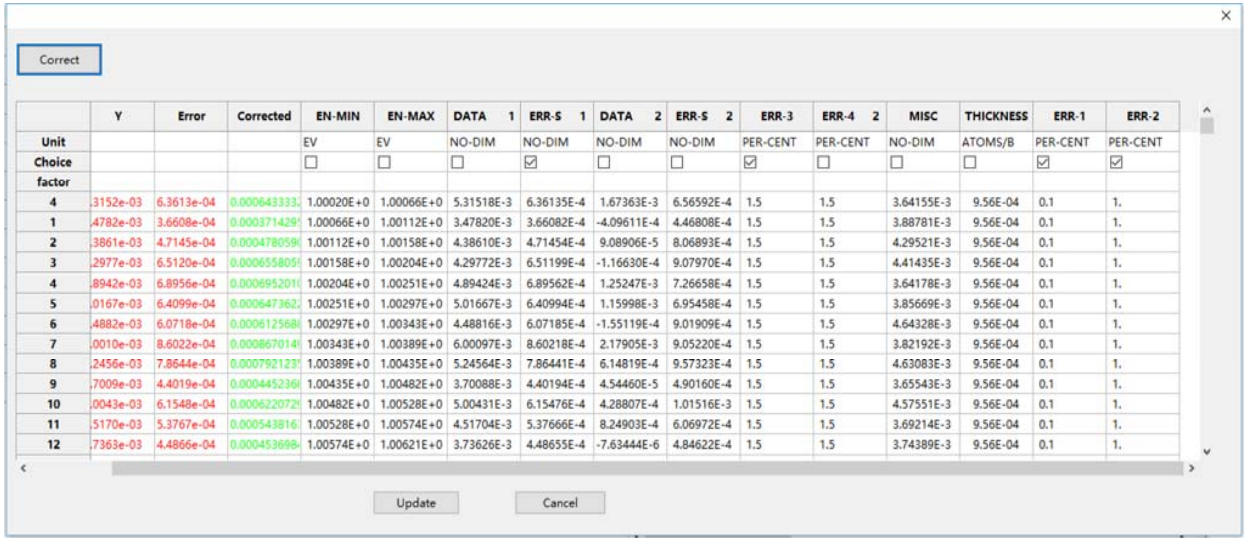
- Currently, CNDC is responsible for scanning of 8 journals of China, namely ASI, CNPR, CNST, CPH/C, CPL, CST, HFH and NTC. The ASI is semimonthly, the HFH is bimonthly, the CNPR is quarterly and others are monthly.
- The scanning results are sent to NDS every month. 23 articles published in 2023 were registered in X4CoCoS by N.Otsuka.

Journal	Vol.	Issue	Published	Page	1st author
J,CNPR	40	3	2023/9/20	356	CHANG Chang
J,CNST	34	1	2023/1/1	4	Jun-Hua Luo
		8	2023/8/1	115	Zhi-Zhou Ren
		11	2023/11/1	180	Gao-Le Yang
J,CPH/C	47	1	2023/1/15	014001	Dong-Xi Wang
		2	2023/2/15	024001	Xianlin Yang
				024002	Chun Wen
		3	2023/3/15	034001	Long He
				034002	T.S. Ganesapandy
		5	2023/5/15	054001	Lixin Chen
		7	2023/7/15	074001	Rebecca Pachuau
		8	2023/8/15	084001	Chang-Jian Wang
		9	2023/9/15	094001	Changlin Lan
		11	2023/11/15	114001	Kai Ma
				114101	Chuanxin Zhu
		12	2023/12/15	124001	Jieming Xue
				124001	I.S. Timchenko
J,CST	57	6	2023/6/20	1066	YU Gongshuo
		ZK	2023/7/20	1	Cheng Hao
		8	2023/8/20	1482	lian Gang
J,HFH	45	3	2023/6/20	216	Ren Si-xi
J,NTC	46	9	2023/9/15	090501	LIU Qize
		11	2023/11/15	110501	CHEN Yinji

Software development

- NDPlot: a program designed to facilitate the visualization and manipulation of nuclear data, developed by Dr. Yongli Jin (CNDC). The latest version 0.9.8.4 was released in April, 2024. Some new features were introduced, such as correction of total error, correction of outgoing gamma double differential spectrum, and so on.





4. EXFOR Activities at CNDC

Memo Distribution

China Nuclear Data Centre
China Institute of Atomic Energy
Beijing 102413, People's Republic of China

Memo CP-S/009

Date: 21 September 2023
To: Distribution
From: Jimin Wang, Naohiko Otsuka
Subject: **Dictionary 21 (Methods) – DIFUS**

For compilation of [1], we propose the following new method code for determination of non-elastic scattering cross section assuming the diffusion equation [2-4]:

Dictionary 21 (Methods)
DIFUS Diffusion approximation

[1] Ruan Jinghui et al., Atom. Energy Sci. and Technol. 2 (1965) 108 (EXFOR 32833)
[2] G. von Dardel et al., Phys.Rev.96 (1954) 1245. (EXFOR 20102)
[3] L.E. Beghian et al., Nucl. Sci. Eng. 15 (1963) 375. (for compilation by NNDC)
[4] L.E. Beghian et al., Nucl. Sci. Eng. 17 (1963) 82 (EXFOR 11705)

Distribution:

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daniela.foligno@oecd-nea.org
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dgremyachkin@ippe.ru
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ganesan555@gmail.com
gezg@ciae.ac.cn
iwamoto.osamu@jaea.go.jp
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kimura.atsushi04@jaea.go.jp
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nomura@nucl.sci.hokudai.ac.jp
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nrdc@jcprg.org
nshu@ciae.ac.cn
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otto.schwerer@aon.at
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pritychenko@bnl.gov
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selyankina@expd.vniief.ru
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v.zerkin@iaea.org
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zholdybayev@inp.kz

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

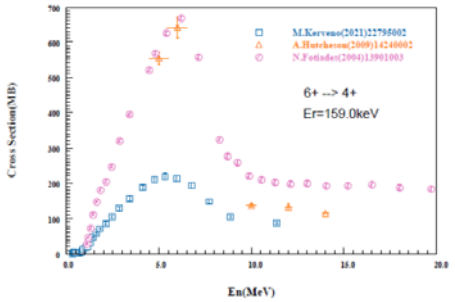
Memo 4C-3/423

Date: 2023-11-13
To: Distribution
From: N. Otsuka, J.M.Wang
Subject: **Gamma production cross sections from GEANIE spectrometer**

It has been known the "gamma production cross sections" measured with the GEANIE spectrometer and compiled in EXFOR are often "transition cross sections" (i.e., gamma production cross section multiplied by 1+α, where α is the internal conversion coefficient).

Example: ^{238}U(n,n')^{238}U 159 keV γ production cross section

The two datasets (13901.003, 14240.002) from GEANIE are gamma production cross sections multiplied by 1+α~2.8, and therefore systematically higher than the dataset from GELINA (22795.002).



The next table summarizes the situation of all absolute gamma production cross sections from GEANIE and in EXFOR. We would like to ask NNDC to check if corrections of the EXFOR entries are required. (We may think replacement of FCT or MSC with a new modifier indicating multiplication by 1+α.)

X4#	(1+α) multiplied?	Evidence	Comment
13786	Y	Eq. (3.1) of J,PR/C,64,054613,2001	
13787	Y		SF8=FCT coded except for 002 which Egamma is high

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

Memo CP-D/1091

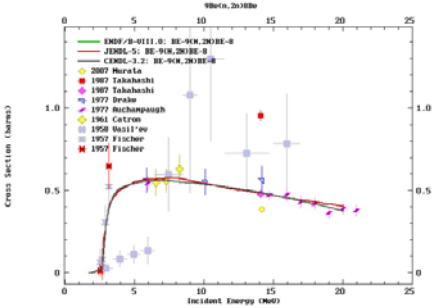
Date: 2023-09-30
To: Distribution
From: N. Otsuka, J.M. Wang
Subject: **Auchampaugh et al's superseded (n,2n) datasets in EXFOR 12936**

The (n,2n) cross sections measured with a large Gd-loaded liquid scintillator tank by Auchampaugh, Drake and Veeser in EXFOR 12936 were withdrawn by the last author on 10 October 1985.

STATUS (SPSDD) DATA WITHDRAWN, L.R.VEESER, 85/10/10.

These datasets are kept with STATUS=SPSDD and cannot be retrieved and plotted on the NDS EXFOR web retrieval system with the default setting.

In general, Auchampaugh et al. covers the energy above 14.7 MeV while Frehaut et al. covers the energy below 14.8 MeV, and hence they are complemental each other for evaluators. Some EXFOR users may want to utilize these datasets even if they are withdrawn by the author, and we would like to share their plots for your attention.



4. EXFOR Activities at CNDC

Feedback from users

Feedback list (Last updated: 2024-05-07)

Entry #	From	Keyword	Comment	Reference	Registered
21595.003	Y.J.Chen	REACTION	The denominator is not for 239Pu but for 235U (c.f. explanation of "t" in the R-value definition in the article).	N/A	2024-05-07
13395.004	Y.J.Chen	DECAY-DATA	155Eu: Mention this half-life is rather for 156Eu.	N/A	2024-04-29
21708.008	Y.J.Chen	Data	ELEMENT: 54 (Xe) -> 55 (Cs)	N/A	2024-04-18
10798.005	Y.J.Chen	Data	Must be compiled as cumulative yield (The authos mention "The data in Table III contain no corrections for possible charge distribution effects.	N/A	2023-12-25
10798.004	Y.J.Chen	Data	Must be compiled as cumulative yield (The authos mention "The data in Table III contain no corrections for possible charge distribution effects.	N/A	2023-12-25
10798.003	Y.J.Chen	Data	Must be compiled as cumulative yield (The authos mention "The data in Table III contain no corrections for possible charge distribution effects.	N/A	2023-12-25
10798.002	Y.J.Chen	Data	Must be compiled as cumulative yield (The authos mention "The data in Table III contain no corrections for possible charge distribution effects.	N/A	2023-12-25
20502.002	Sun Xiaojun	Data	COS-CM: 0.993 -> 0.593 at 4.32 MeV	N/A	2023-09-24
14571.002	Li Xinxiang	Data	EN values do not agree with those plotted in Fig.8. (It seems the compiler set the minimum energy not to 10 eV but to 1 eV during digitization from Fig.8).	N/A	2023-09-24

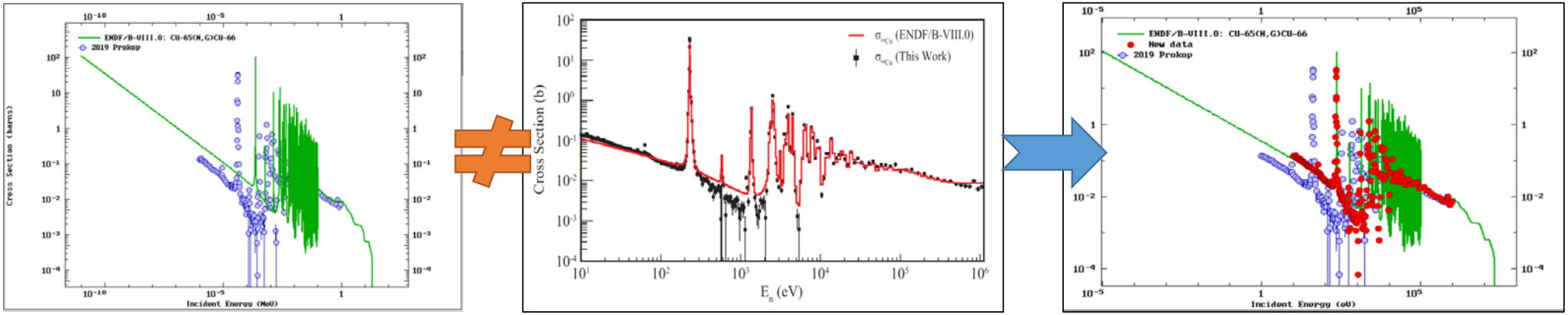
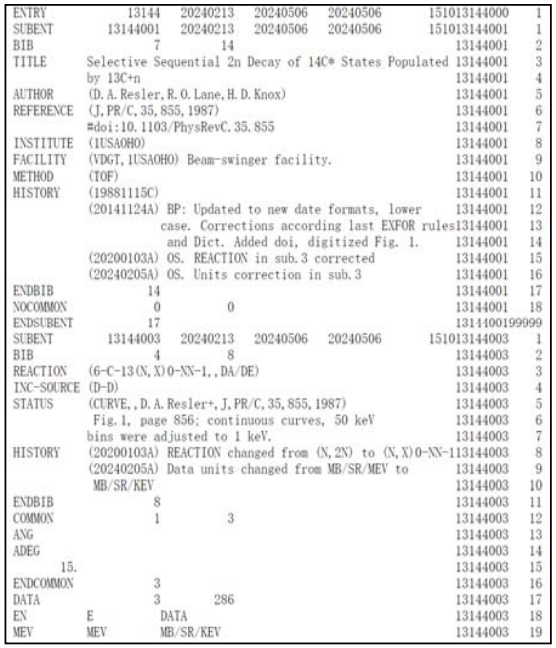


FIG. 8. Energy differential 65Cu(n, γ) cross section shown in black squares. The ENDF/B-VIII.0 65Cu(n, γ) cross section, corrected for the response of the target-moderator assembly, is shown in red.

Feedback from users

Corrected and not in Feedback List

Entry #	From	Keyword	Comment	Reference	Registered
13144.003	Sun Xiaojun	Data	MB/SR/MEV -> MB/SR/KEV	N/A	2023-11-06
22795.002	Han Yinlu	Data	The two datasets (13901.003, 14240.002) from GEANIE are systematically higher than the dataset from GELINA (22795.002).	N/A	2023-11-01
12936	Sun Xiaodong	Data	EXFOR 12936 were withdrawn by the last author on 10 October 1985.	N/A	2023-09-24
L0130	Tao Xi	REACTION	REACTION SF8: BRS -> BRA/REL	N/A	2023-05-24
L0130	Tao Xi	DATA	MB -> ARB-UNITS, EN -> EN-MAX	N/A	2023-05-24



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ENTRY         13144   20240213   20240506   20240506          151013144000   1
SUBENT    13144001   20240213   20240506   20240506          151013144001   1
BIB                7         14                                 13144001   2
TITLE     Selective Sequential 2n Decay of 14C* States Populated 13144001   3
          by 13C+n                                             13144001   4
AUTHOR    (D. A. Resler, R. O. Lane, H. D. Knox)               13144001   5
REFERENCE (J, PR/C, 35, 855, 1987)                             13144001   6
          #doi:10.1103/PhysRevC.35.855                         13144001   7
INSTITUTE (1USAOHO)                                            13144001   8
FACILITY  (VDGT, 1USAOHO) Beam-swinger facility.               13144001   9
METHOD    (TOF)                                                13144001   10
HISTORY   (19881115C)                                          13144001   11
          (20141124A) BP: Updated to new date formats, lower   13144001   12
                      case. Corrections according last EXFOR rules13144001 13
                      and Dict. Added doi, digitized Fig. 1.   13144001   14
          (20200103A) OS. REACTION in sub.3 corrected          13144001   15
          (20240205A) OS. Units correction in sub.3            13144001   16
ENDBIB             14                                          13144001   17
NOCOMMON            0          0                               13144001   18
ENDSUBENT          17                                          131410019999 9
SUBENT    13144003   20240213   20240506   20240506          151013144003   1
BIB                4          8                                 13144003   2
REACTION  (6-C-13(N,X)0-NX-1,,DA/DE)                           13144003   3
INC-SOURCE (D-D)                                               13144003   4
STATUS    (CURVE,,D. A. Resler+, J, PR/C, 35, 855, 1987)       13144003   5
           Fig. 1, page 856; continuous curves, 50 keV         13144003   6
          bins were adjusted to 1 keV.                         13144003   7
HISTORY   (20200103A) REACTION changed from (N,2N) to (N,X)0-NX-113144003  8
          (20240205A) Data units changed from MB/SR/MEV to     13144003   9
           MB/SR/KEV                                           13144003   10
ENDBIB             8                                           13144003   11
COMMON             1          3                                13144003   12
ANG                                                            13144003   13
ADEG                                                           13144003   14
      15.                                                      13144003   15
ENDCOMMON          3                                           13144003   16
DATA               3        286                                13144003   17
EN        E          DATA                                      13144003   18
MEV       MEV        MB/SR/KEV                                 13144003   19
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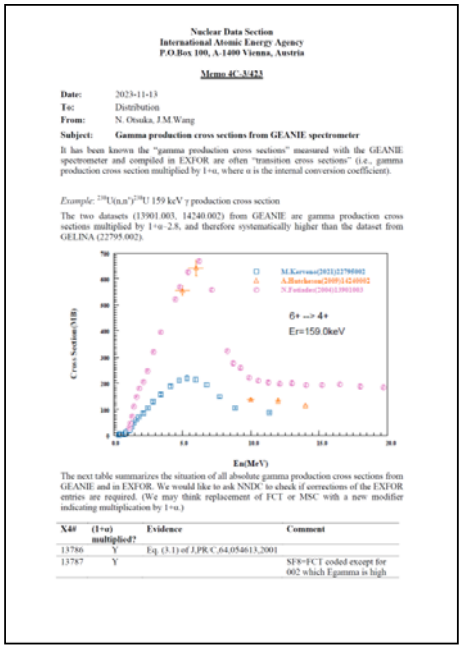

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Subject: Gamma production cross sections from GEANIE spectrometer

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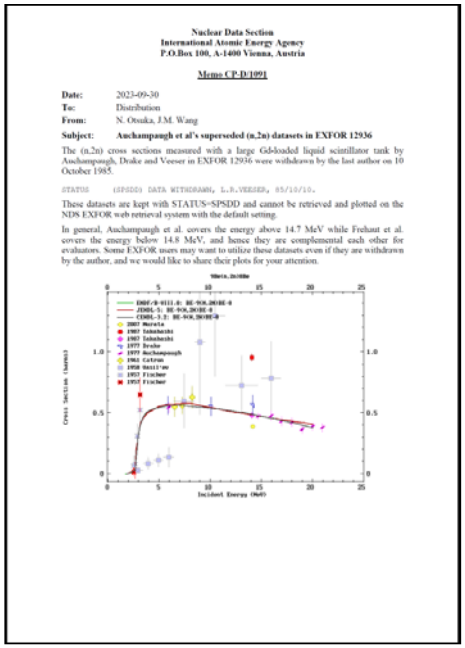

Nuclear Data Section
International Atomic Energy Agency
P.O.Box 100, A-1400 Vienna, Austria

Memo CP-D/1091

Date: 2023-09-30
To: Distribution
From: N. Otsuka, J.M. Wang

Subject: Auchampaugh et al's superseded (n,2n) datasets in EXFOR 12936

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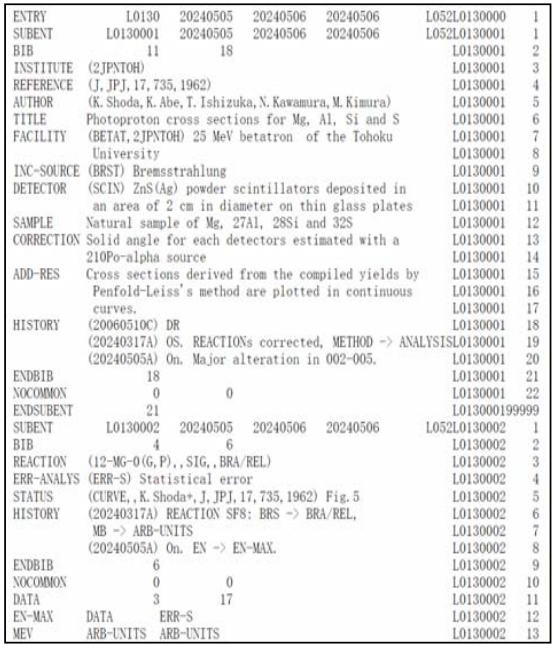

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SUBENT    L0130001   20240505   20240506   20240506          L052L0130001   1
BIB               11         18                                 L0130001   2
INSTITUTE (2JPNTOH)                                            L0130001   3
REFERENCE (J, JPJ, 17, 735, 1962)                              L0130001   4
AUTHOR    (K. Shoda, K. Abe, T. Ishizuka, N. Kawamura, M. Kimura) L0130001  5
TITLE     Photoproton cross sections for Mg, Al, Si and S      L0130001   6
FACILITY  (BETAT, 2JPNTOH) 25 MeV betatron of the Tohoku       L0130001   7
           University                                          L0130001   8
INC-SOURCE (BRST) Bremsstrahlung                               L0130001   9
DETECTOR  (SCIN) ZnS(Ag) powder scintillators deposited in     L0130001   10
          an area of 2 cm in diameter on thin glass plates     L0130001   11
SAMPLE    Natural sample of Mg, 27Al, 28Si and 32S             L0130001   12
CORRECTION Solid angle for each detectors estimated with a     L0130001   13
          210Po-alpha source                                   L0130001   14
ADD-RES   Cross sections derived from the compiled yields by   L0130001   15
           Penfold-Leiss's method are plotted in continuous    L0130001   16
           curves.                                             L0130001   17
HISTORY   (20060510C) DR                                       L0130001   18
          (20240317A) OS. REACTIONs corrected, METHOD -> ANALYSISL0130001  19
          (20240505A) On. Major alteration in 002-005.         L0130001   20
ENDBIB             18                                          L0130001   21
NOCOMMON            0          0                               L0130001   22
ENDSUBENT          21                                          L013000199999
SUBENT    L0130002   20240505   20240506   20240506          L052L0130002   1
BIB                4          6                                 L0130002   2
REACTION  (12-MG-0(G,P),,SIG,,BRA/REL)                         L0130002   3
ERR-ANALYS (ERR-S) Statistical error                           L0130002   4
STATUS    (CURVE,,K. Shoda+, J, JPJ, 17, 735, 1962) Fig. 5     L0130002   5
HISTORY   (20240317A) REACTION SF8: BRS -> BRA/REL,            L0130002   6
           MB -> ARB-UNITS                                     L0130002   7
          (20240505A) On. EN -> EN-MAX.                        L0130002   8
ENDBIB             6                                           L0130002   9
NOCOMMON           0          0                               L0130002   10
DATA               3         17                               L0130002   11
EN-MAX    DATA       ERR-S                                     L0130002   12
MEV       ARB-UNITS  ARB-UNITS                                 L0130002   13
```

Visits and Cooperation

- **Nengchuan SHU, Jimin WANG and Xi TAO visited IAEA from 9 to 12 May 2023 to attend the NRDC 2023 meeting.**
- **Naohiko OTSUKA visited CNDC from 18 to 22 September 2023 to discuss finalization of EXFOR entries compiling data measured in China.**






Visits and Cooperation

- Attending the National meetings to introduce the EXFOR library, NRDC cooperation, and collection, compilation and dissemination of nuclear reaction data.

Thank you for your attention !

Comments and suggestion are welcome !