Features needed for traditional evaluation methods at CNDC

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CNDC/SG50

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

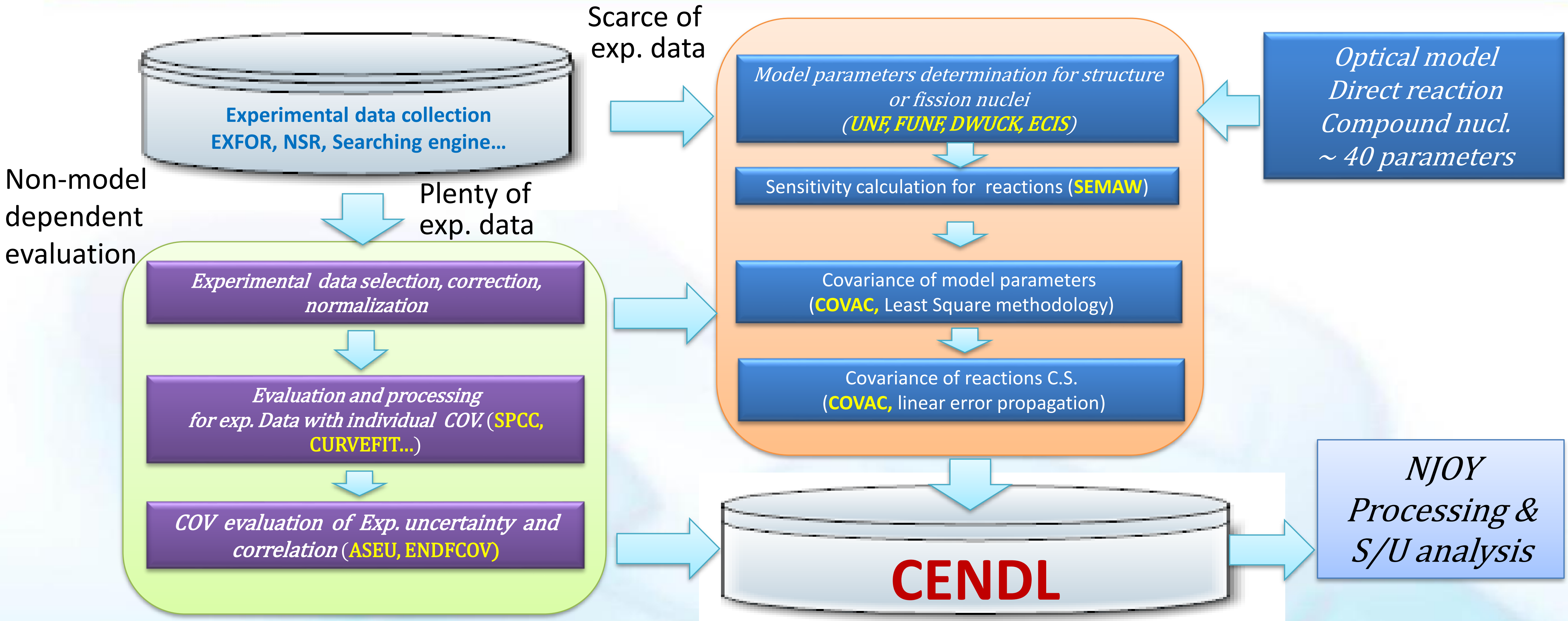
Contents

Required from Arjan:

1. experimental covariances?
2. how you currently deal with that?
3. how you would like to see that handled in EXFOR?

Four issues	1. Traditional evaluation methods 2. Samples to deal with the experimental covariance 3. China's contribution to EXFOR compilation 4. Some considerations to future EXFOR

1. traditional evaluation methods



Correlations among single (or multiple) set(s) of experimental data are vital elements to get an 'honest' covariance.

1. traditional evaluation methods

Descriptions to the current COV scheme at CNDC:

① Tech. for non-model & model dependent

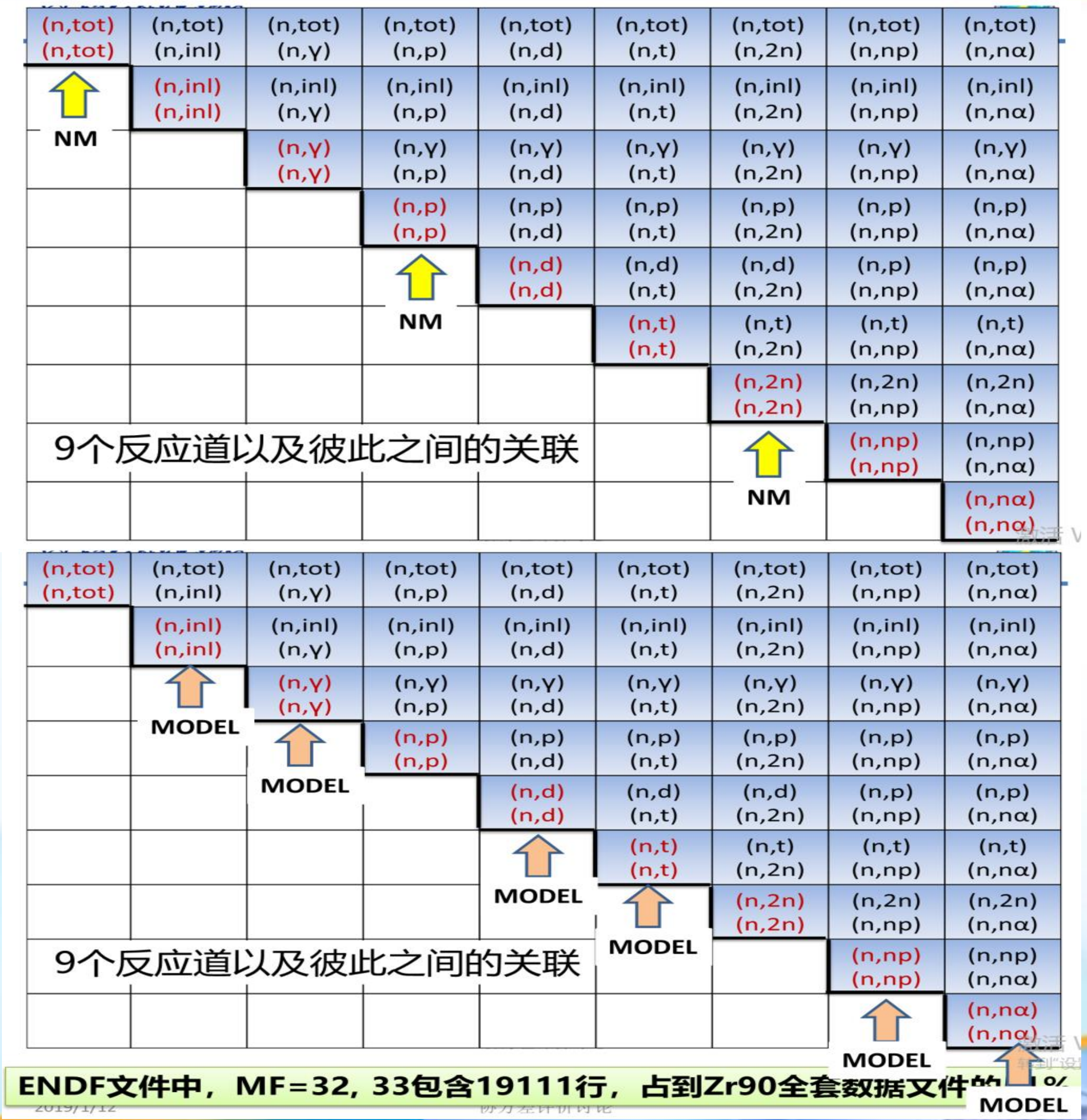
② Energies for structure & smooth regions

③ COV data types for NI & NC

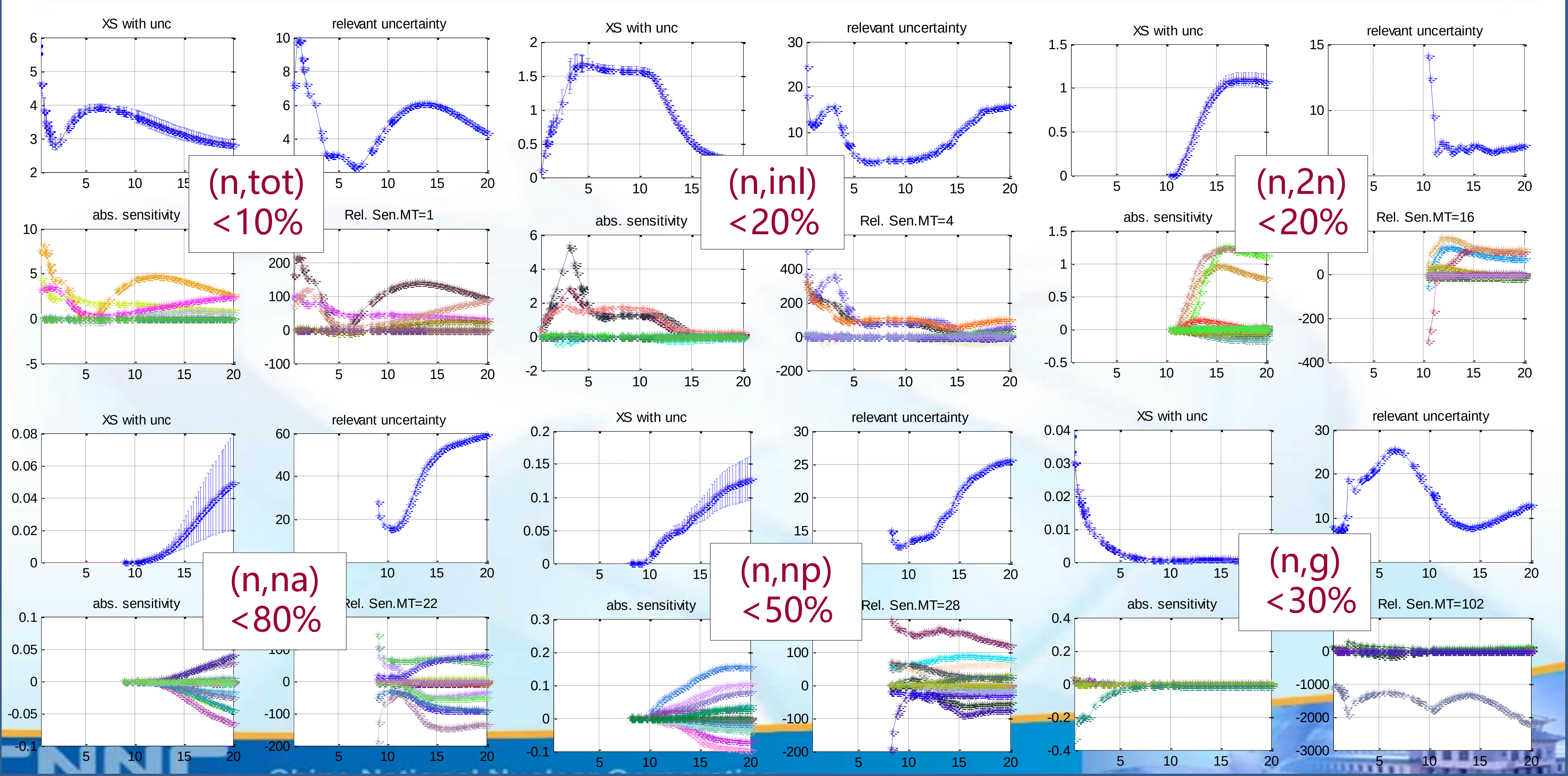
④ Tech. deal with single & multiple measurements

⑤ Tech. for parameter sensitivity selection

⑥ COV matrix positive definition treatment

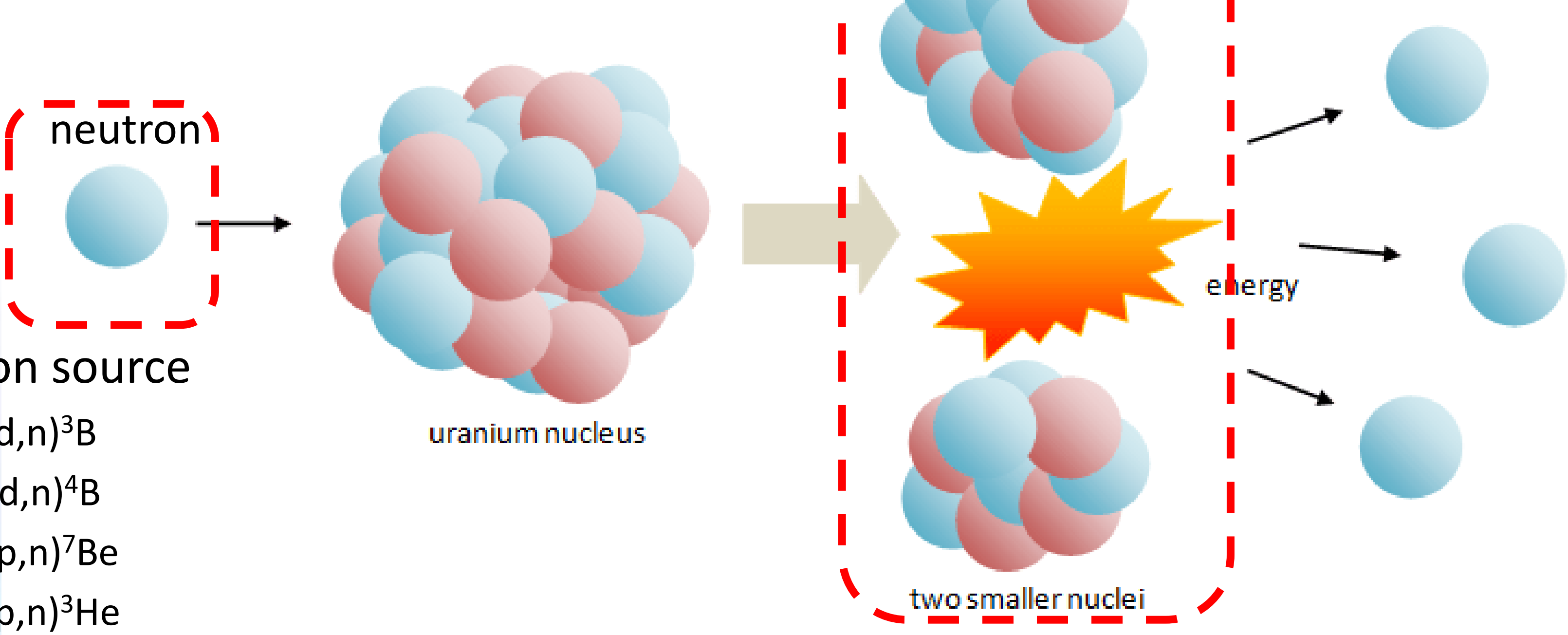


CENDL-3.2 COV for main reactions of FP(70)， averaged unc with LS



2. Samples to deal with the exp. COV

n+ ^{235}U fission reaction



Information from EXFOR

- Neutron source

D-D ^{2}H(d,n)^{3}B
D-T ^{3}H(d,n)^{4}B
P-LI7 ^{7}Li(p,n)^{7}Be
P-T ^{3}H(p,n)^{3}He
PHOTO Photoneutron
SPALL Spallation
P-Be Be(p,n)B
P-V51 ^{51}V(p,n)^{51}Cr
D-U
REAC Reactor
EVAP Evaporation neutrons
EVPLO Nuclear explosive device

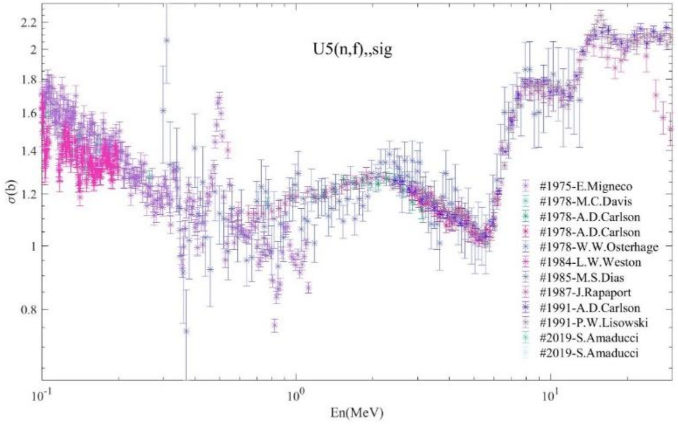
■ Neutron Flux and Energy

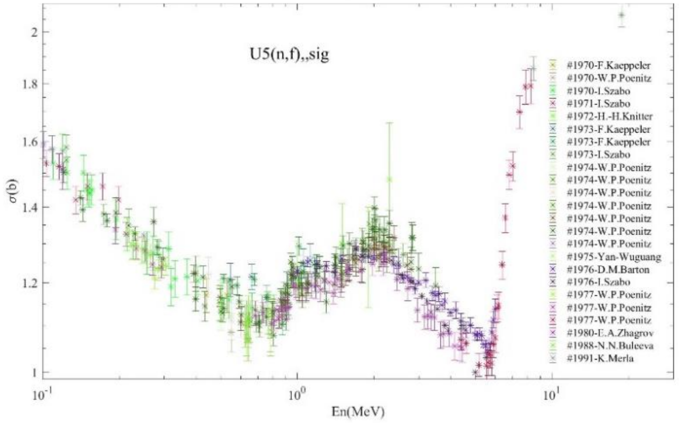
TOF: Time-of-flight
ASSOP: Associated particle
COINC: Coincidence
MANGB: Manganese bath

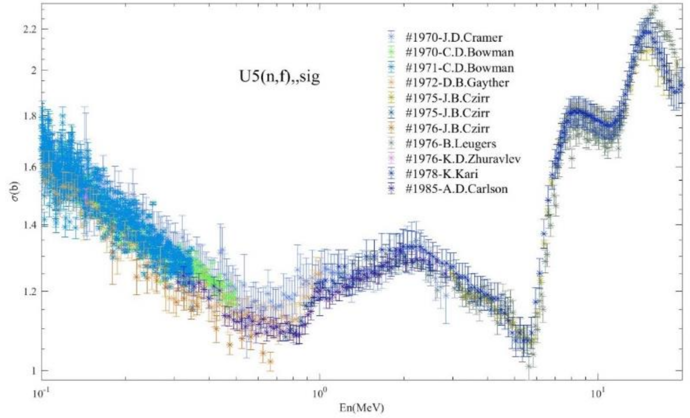
■ Detector

FISCH: Fission chamber
SCIN: Scintillation detector
IOCH: Ionization chamber
SIBAR: Silicon surface barrier
TRD: Track detector
SOLST: Solid-state detector
BF3: Boron Trifluoride
NAICR: Sodium-Iodide crystal
TELES: Counter telescope
LONGC: Long counter
PROPC: Proportional counter
GELI: Germanium-Lithium

2. Samples to deal with the exp. COV







Index	Year	Author	E_Min(MeV)	E_Max(MeV)	Institute	Facility	n-Sourc	Monitor	Method	Detector	
1.1	2019	S.Amaducci	1.780E-08	1.780E-01	2ITYLNS	SYNCY	SPALL	5U(n,f)/6Li(n,t) 5U(n,f),,INT 6Li(n,t)	TOF	SI	1)U5(n,f)/Li6(n,t), 2)U5(n,f)/B10(n,a)
1.2			1.780E-08	1.780E-01			SPALL				
1.3	1991	A.D.Carlson	2.470E+00	3.020E+01	1USANIS	LINAC	SPALL	H(n,el),,da,p	TOF	IOCH, TELES	
1.4	1991	P.W.Lisowski	3.030E+00	2.020E+02	1USALAS	LINAC	SPALL	H(n,el),,da,p	TOF	IOCH, TELES	1)U8/U5, 2)Pu9/U5
1.5	1987	J.Rapaport	5.390E-01	9.480E+02	1USALAS	LINAC	SPALL	-	-	IOCH, SCIN	
1.6	1985	M.S.Dias	1.070E+00	5.990E+00	1USANBS	LINAC	PHOTO	H(n,el)	TOF	FISCH, SCIN	
1.7	1984	L.W.Weston	9.730E-06	2.000E-01	1USAORL	LINAC	PHOTO	6Li(n,t),10B(n,a)	TOF	FISCH, GLASD	1)U5(n,f),,sig,,av, 2)Pu9(n,f),,sig, 3)Pu9(n,f),,sig,,av, 4)Pu0(n,f),,sig, 5)Pu0(n,f),,sig,,av
1.8	1978	M.C.Davis	1.400E-01	9.640E-01	1USAMH G	-	PHOTO	Efficiency of manganese bath determined relative to secondary national standard source NBS-II.	MANGB	TRD	1)Pu9(n,f), 2)Pu9/U5
1.9	1978	A.D.Carlson	1.171E+00	3.114E+00	1USANBS	LINAC	PHOTO	H(n,el),,da,p	TOF	FISCH, SILI	
1.10			2.788E+00	6.203E+00			PHOTO				
1.11	1978	W.W.Osterhage	3.000E-01	1.300E+01	2UK GLS	LINAC	PHOTO	5U(u,f)	TOF	SCIN	U8(n,f)
1.12	1975	E.Migneco	7.470E-04	1.120E+00	2ZZZGEL	LINAC	PHOTO	5U(n,f),,are	TOF	SCIN, IOCH, BF3	

information is incomplete.

Important information

^{235}U(n,f) XS error and correction analysis

Spallation

	2019-S.Amaducci	1991-A.D.Carlson	1991-P.W.Lisowski	1987-J.Rapaport
En(MeV)	1.78E-08~1.78E-01	2.47E+00~3.02E+01	3.03E+00~2.02E+02	5.39E-01~9.48E+02
Error		Total uncertainty	Total uncertainty	
	(S)Counting statistics	Statistics	Statistics	
	Statistical uncertainty of ^{235}U(n,f)/^{6}Li(n,t) or ^{235}U(n,f)/^{10}B(n,a) in the 7.8-11 eV cross section integral	Fission fragment counting efficiency	Efficiency	
	^{6}Li and ^{10}B efficiency correction	Transmission and scattering		
		Background		

	1985-M.S.Dias	1984-L.W.Weston	1978-M.C.Davis	1978-A.D.Carlson	1978-W.W.Osterhage	1975-E.Migneco
En(MeV)	1.07~5.99	9.73E-06~2.00E-01	1.40E-01~9.64E-01	1.171-6.203	3.00E-01~1.30E+01	7.47E-04~1.12E+00
Error	Total uncertainty		Total uncertainty	Total uncertainty		Total uncertainty
	Statistical uncertainty			Statistical uncertainty	Statistical uncertainty	Statistical uncertainty
	^{235}U mass+fission fragment		Net fission counts/source			

	1985-M.S.Dias	1984-L.W.Weston	1978-M.C.Davis	1978-A.D.Carlson	1978-W.W.Osterhage	1975-E.Migneco
En(MeV)	1.07~5.99	9.73E-06~2.00E-01	1.40E-01~9.64E-01	1.171-6.203	3.00E-01~1.30E+01	7.47E-04~1.12E+00
Correction		Constant-in-time background was small for flux monitors and the ^{235}U and ^{239}Pu fission plates but appreciable for ^{240}Pu, which was determined accurately.	fragment emission anisotropy		alpha-background	Background
			angular distribution normalization to lab.		photomultiplier-afterpulses	
			D(g,n) reaction in solution		incident flux monitor efficiency	
			parasitic absorption		detector geometry	
			leakage		events not recorded due to stopped fragments in the sample foil	
			scattering in Pt backings			
			scattering in other structures			
			foil impurities			
			energy spectrum.			

Photo-neutron

$^{235}U(n,f)$ XS error analysis

	1991-K.Merla	1988-T.Iwasaki	1988-Li Jingwen	1983-Li Jingwen	1982-O.A.Wasson	1982-M.Mahdavi	1978-M.Cance	1977-V.M.Adamov
En(MeV)	14.7	13.5~14.9	14.2	14.7	14.1	14.6	13.9	14.8
Error	Total	Total uncertainty	Total uncertainty		Total uncertainty	Total uncertainty	Total	Total error
	Statistics	(S)Fission counts including extrapolation and background	Statistics		(S)Ratio of net alpha-fission coincidence yield to alpha yield	(S)Fission track counting		
	Random coincidence	Sample assay	areal sample density		Neutrons scattered from beam	Fission fragment anisotropy	Loss of fissions	Error in the solid angle arising at the weighing of the sample in the small-solid-angle camera
	Correlated background	n-p cross section	Fission chamber detection efficiency		Fission fragment absorption	Angular dist. normalization to lab	Number of atoms per cm^2	Statistical error arising at the sample weighing in the small-solid-angle camera
	Fission fragment spectrum extrapolation	anisotropy	effects of incident neutron momentum		Fission spectrum loss	Total scattering perturbation	Neutron attenuation in target backing	Error of the isotope fraction determination at the sample weighing
	Fission fragment absorption		self-absorption of fragment in sample		Neutron beam shape and deposit uniformity	Total geometric error	Neutron attenuation in front face of fission chamber	Error of the fissionable isotope half-life influencing on the sample weighing
	Associated particle background		anisotropic of fission fragments		Standard ^{235}U reference mass	Total flux uncertainty	Fissions due to other isotopes	Statistical error arising by the number-of-fissions determination of isotope under
	Neutron scattering and foil thickness effect		nonuniformity of sample	uniformity of sample	Standard ^{235}U reference areal density	Deposit masses		Error due to the random coincidence number by the fission number determination
	Cone neutron outside angular extent of foils		neutron attenuation		Thermal neutron scattering from Pt backing of reference deposit			Error due to the neutron flux losses by the fission number determination
	Fission sample areal density		fission of other than ^{235}U		^{235}U areal density uncertainty			Error due to the extrapolation of the fission-fragments-spectrum to zero-energy arising by the number-of-fission determination
	Fission sample inhomogeneity		neutron cone spread		Estimated 1 standard deviation uncertainty			Error due to the correction on neutron absorption in the layer by the number-of-fissions determination
			(n,g) effect				(T)Quadrature sum of the following uncertainties:- Statistics including background subtraction;- Extrapolation to zero pulse height	Error due to the fission of the admixture isotopes
	D-T		neutron produced by secondary charged particle such as Ti(d,p), C(d,a)					Error due to the associated-particles number determination

$^{235}U(n,f)$ XS correction analysis

	1991-K.Merla	1988-T.Iwasaki	1988-Li Jingwen	1983-Li Jingwen	1982-O.A.Wasson	1982-M.Mahdavi	1978-M.Cance
En(MeV)	14.7	13.5~14.9	14.2	14.7	14.1	14.6	13.9
Correction	random coincidence	coincidence losses of recoil protons	fission detector efficiency		variation in uranium deposit thickness	fragment emission anisotropy	background
	correlated background	fission counts extrapolation to zero pulse height	neutron flux attenuation in samples		uncertainty in neutron beam profile	angular distribution normalization to Lab.	ionization chamber efficiency
	fission fragment spectrum extrapolation	self-absorption of sample	fission events due to other isotopes in the sample		fission events below discrimination level	scattering in Pt backings	extrapolation to zero pulse height
	fission fragment absorption	interaction of recoiled protons			fission fragments absorbed in deposits	scattering in other structure materials	loss of fissions
	associated particle background	neutrons scattered by target material			fission by other than ^{235}U	foil isotopic composition	neutron attenuation in target backing
	neutron scattering and foil thickness effect	neutrons scattered by chamber material			neutron attenuation	dsigma/dEn adjustment for Fe(n,p) cross section	neutron attenuation in front face of fission chamber
		attenuation of source neutrons			accidental coincident background contributions	detector efficiency	fissions due to other isotopes

Neutron source: D-T

1、Fission detector efficiency 2、Neutron attenuation
3、Isotopes in the sample 4、Fission fragment absorption
5、Fission fragment spectrum extrapolation

中国原子能科学研究院

Something need to fix in the EXFOR

CNDC

ENTRY 41112001 20150627 20150817 20150810 4169
SUBENT 41112001 20150627 20150817 20150810 4169
BIB 12 43
TITLE Correction of the results of absolute measurements of U-235 fission cross-section by neutrons with energy 1.9 and 2.4 MeV
AUTHOR (V.A.Kalinin, V.N.Kuz'min, L.M.Solin, B.I.Shpakov, K.Merla)
INSTITUTE (4RUSRI) Kalinin,Kuz'min,Solin,Shpakov
(2GERDRE) Merla, former 3DDRTUD
(4RUSRI) t.Petersburg, Russia
(2GERDRE) , Germany
REFERENCE (J,AE,71,(2),181,1991) Main Reference.
(J,SJA,71,700,1991) Engl.translation of AE,71,(2),181
(J,AE,64,(3),194,1988) Preliminary results.
(J,SJA,64,239,1988) Engl.translation of AE,64,(3),194
(J,AE,71,(2),181,1991) Jour: Atomnaya Energiya, Vol.71, Issue.2, p.181 (1991),
#+ #Title=Correction of the results of absolute measurements of U-235 fission cr
#+ #Authors=V.A.Kalinin, V.N.Kuz`min, L.M.Solin, B.I.Shpakov,K.Merla
(J,SJA,71,700,1991) Jour: Soviet Atomic Energy, Vol.71, p.700 (1991), SAU
#+ #URL=http://dx.doi.org/10.1007/BF01121671
#+ #DOI=10.1007/BF01121671
(J,AE,64,(3),194,1988) Jour: Atomnaya Energiya, Vol.64, Issue.3, p.194 (1988),
#+ #NSR=1988KA34
#+ #Title=Absolute Measurements of the Cross Section for Fission of ^{235}U by 1.
#+ #Authors=V.A.Kalinin, S.S.Kovalenko, V.N.Kuzmin, Yu.A.Nemilov, L.M.Solin, V
(J,SJA,64,239,1988) Jour: Soviet Atomic Energy, Vol.64, p.239 (1988), SAU
#+ #URL=http://dx.doi.org/10.1007/BF01123132
#+ #DOI=10.1007/BF01123132
MONITOR Absolute counting
METHOD (ASSOP) Method of
He-3 (~ 3 MeV).
Separation of CP t
(ASSOP) Associated particle
INC-SOURCE (D-T) Deuteron energy 2.8 MeV and 3.4 MeV .
(D-T) 3H(d,n)

Information wrong !

This paper presents the results of absolute TCAP measurements of ^{235}U fission cross sections at neutron energies E_n of 1.9 and 2.4 MeV. These energy points lie in the range 1-5 MeV, where the existing experimental data have the greatest discrepancy (10% or more) and are in two groups: with higher values of σ_f and a convex form of the dependence $\sigma_f(E_n)$ and with lower values of σ_f and a concave form (i.e., the values of the cross sections cannot be brought into agreement by renormalization). The ENDF/BV library estimate that is accepted at the present time is midway between the two. The results of previous TCAP measurements for 2.6-MeV neutrons belong to the group with lower values of σ_f.

In this study, the D(d, n)^{3}He reaction at a deuteron-beam energy E_d = 3 MeV was used to obtain neutrons. The reaction kinematics in this case is such that neutrons of the required energy are emitted into the rear hemisphere and the associated helions are emitted

Translated from Atomnaya Énergiya, Vol. 64, No. 3, pp. 194-198, March, 1988. Original article submitted January 19, 1987.

0038-531X/88/6403-0239$12.50 © 1988 Plenum Publishing Corporation 239

ENTRY 10711001 20170628 20171110 20171103 1432
SUBENT 10711001 20170628 20171110 20171103 1432
BIB 9 20
TITLE Additional measurements of the 235U(n,f) cross section in the 0.2 to 8.2-MeV range
AUTHOR (W.P.Poenitz)
INSTITUTE (1USAANL)
(1USAANL) Argonne National Laboratory, Argonne, IL,
REFERENCE (J,NSE,64,894,1977)
(J,NSE,64,894,1977) Jour: Nuclear Science and Engineering, V
#+ #URL=http://dx.doi.org/10.13182/NSE77-A14509
#+ #NSR=1977PO19 #DOI=10.13182/NSE77-A14509
#+ #Title=Additional Measurements of the ^{235}U(n,f) Cross S
#+ #Authors=W.P.Poenitz
FACILITY (VDG,1USAANL)
(VDG Van de Graaff
,1USAANL) Argonne National Laboratory, Argonne, IL,
MONITOR Flux measured using black neutron detector
DETECTOR (SCIN) Black neutron detectors:
- small (~15 cm height, ~6.4 cm radius) below 1.5 MeV
- large (~40 cm height, ~20 cm radius) above 0.7 MeV
(SCIN) Scintillation detector

The Black Neutron Detector (BND)

The fast-neutron flux is often determined with proton-recoil counters,[52-54] utilizing the well-known total cross section of hydrogen. The flux measurements with these detectors depends on the knowledge of the scattering cross section of hydrogen and its angular distribution, the active volume of the counter, the amount of hydrogenous material, the extrapolation to zero pulse height, etc., depending on the type of detector used. For the present measurements, a total energy conversion detector was designed for the measurement of the absolute neutron flux which was based on the detection of proton recoils but which did not depend in first order on the above-cited effects and cross sections. The detector is a medium-sized scintillator of cylindrical shape with a neu-
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Information need to be explicit。

EN	EN-ERR	DATA	ERR-S	ERR-T
KEV	KEV	NO-DIM	PER-CENT	PER-CENT
1.2456E+01	6.2000E-02	6.5500E-01	5.0550E+01	5.1060E+01
1.7274E+01	1.0100E-01	4.9200E-01	2.4930E+01	2.5950E+01
2.2098E+01	1.4600E-01	3.1700E-01	1.3590E+01	1.5380E+01
2.2489E+01	1.5000E-01	2.9900E-01	1.4180E+01	1.5900E+01
2.6029E+01	1.8700E-01	4.2100E-01	9.8700E+00	1.2220E+01
2.8684E+01	2.1600E-01	3.2700E-01	8.6500E+00	1.1250E+01
3.1112E+01	2.4400E-01	3.5800E-01	7.4400E+00	1.0350E+01
3.1767E+01	2.5100E-01	3.3700E-01	7.3300E+00	1.0270E+01
3.3862E+01	2.7700E-01	3.8500E-01	6.8600E+00	9.9400E+00
3.6170E+01	3.0500E-01	3.6400E-01	6.7600E+00	9.8800E+00
3.8723E+01	3.3800E-01	3.7900E-01	6.2800E+00	9.5500E+00
4.1556E+01	3.7600E-01	3.9300E-01	5.8100E+00	9.2500E+00

20880002 18

H. BEER AND F. KÄPPELER

$E_n \pm \Delta E_n$ (keV)

12.5

Data corrected without indicating the

STATUS .Data taken from priv. Comm..
HISTORY (19790330C) Wwo.
(19790518E)
(19800303A) Main reference for the experimental setup added.
(19800331E)
(19810402A) Err-analys corrected.
(19810429E)
(20070314A) Date is corrected

3. China’s contribution to EXFOR compilation

Measurements carried out in China

Main Facility of China:

- (REAC,3CPRAEP) Heavy-water reactor
- (CYCLO,3CPRAEP) Cyclotron
- (REAC,3CPRAEP) 35 kW Miniature Neutron Source Reactor
- (VDGT,3CPRAEP) The HI-13 Tandem Accelerator
- (VDG,3CPRAEP) 2.5 MV Van de Graaff
- (CCW,3CPRAEP) 600 kV Cockroft-Walton accelerator
- (VDG,3CPRBJG) 4.5 MV Van de Graaff accelerator
- (NGEN,3CPRLNZ) ZF-300-II intense neutron generator
- (CYCLO,3CPRIMP) Heavy Ion Research Facility
- (FRS,3CPRIMP) Radioactive Ion Beam Line
- (CCW,3CPRIMP) 320 kV,600kV Cockroft-Walton accelerator
- (NGEN,3CPRIMP) T-600 neutron generator
- (NGEN,3CPRNPC) The K-400 Intense Neutron Generator
- (NGEN,3CPRNPC) Pd-300 Neutron Generator
- (CYCLO,3CPRNRS)1.2 Meter Cyclotron
- (LINAC,3CPRIHP) The Back-streaming white neutron source (Back-n WNS) at China Spallation Neutron Source (CSNS)
- ……

3. China's contribution to EXFOR compilation

Scanning Chinese journals or conference proceedings

1) Chinese Physics C (CPH/C, English edition, 2008)

Former Title: High Energy Physics and Nuclear Physics (PHE, Chinese edition, 1977)

2) Atomic Energy Science and Technology (CST, Chinese edition, 1959)

3) Journal of Nuclear and Radiochemistry (HFH, Chinese edition, 1979)

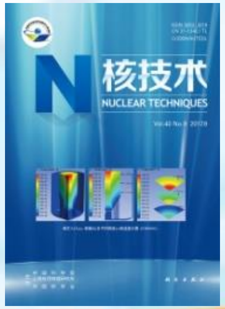
4) Nuclear Techniques (NTC, Chinese edition, 1978)

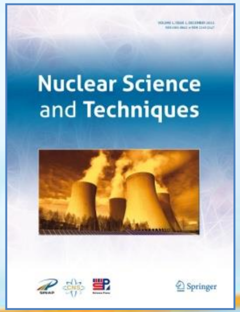
5) Nuclear Science and Techniques (CNST, English edition, 1989)

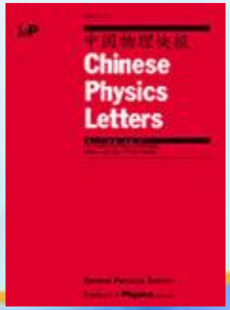
6) Chinese Physics Letters (CPL, English edition, 1984)

7) Acta Physica Sinica (ASI, English edition, 1933)

8) Conference Proceedings, Journal of University, etc.







3. China's contribution to EXFOR compilation

EXFOR Compilation Status

- Compilation history and CNDC X4 Group

Period	Compiler	Type
Since 1985	Youxiang Zhuang	Charged-Particle (CP)
Since 1989	Qichang Liang	Neutron (N)
2004-2009	Hongwei Yu	N/CP
Since 2010	CNDC X4 group	N/CP

ERR-ANALYS

- For Some EXFOR Entries, there are detailed source of uncertainty and relative or absolute values in ERR-ANALYS. For example, the EXFOR entry 32766 for ‘Measurement of neutron-induced fission cross section of 238U at 14 MeV’, and 10314 for ‘Absolute measurements of 235U and 239PU fission cross-sections with photoneutron sources’.
- For Some EXFOR Entries, there are not detailed source of uncertainty, or no relative or absolute values in ERR-ANALYS. There are only “No information”, or only Total uncertainty, or only Statistical uncertainty.

4. Some considerations to future EXFOR

ERR-ANALYS

```
ENTRY            32766   20181121   20190225   20190223       318732766000    1
SUBENT        32766001   20181121   20190225   20190223       318732766001    1
BIB                 11         31                                 32766001    2
TITLE      Measurement of neutron-induced fission cross section   32766001    3
           of 238U at 14 MeV                                      32766001    4
AUTHOR     (Hu Zhongkang, Qi Bujia, Li Anli, Zhang Baisheng,      32766001    5
           Zhou Huiming, Dong Mingli)                             32766001    6
INSTITUTE  (3CPRAEP)                                              32766001    7
REFERENCE  (J,CST,14,201,1980)                                    32766001    8
FACILITY   (CCW,3CPRAEP)                                          32766001    9
INC-SOURCE (D-T) 0.7 mg/cm2 thick TiT for 150 & 200 keV           32766001   10
           deuterons at 45 & 90 deg. 0.24 mg/cm2 thick TiT for    32766001   11
           220 keV deutrons at 0 deg.                             32766001   12
SAMPLE     Natural U foils (898 ug and 899 ug) electrodeposited   32766001   13
           on Pt foil (0.1 mm thick).                             32766001   14
           The masses of U foils were determined by weighing,     32766001   15
           coulometry, and alpha spectrometry.                    32766001   16
DETECTOR   (FISCH) Ar (95%)+ CO2(5%) at 500 mmHg                  32766001   17
           (SOLST) Detection of associated alpha particles at     32766001   18
            90 deg.                                               32766001   19
METHOD     (ASSOP) Detection of alpha from T(d,n)4He              32766001   20
CORRECTION Corrected for                                          32766001   21
            - Anisotropic emission of associated alpha in         32766001   22
              lab system                                          32766001   23
            - Subthreshold fission number (2%)                    32766001   24
            - Materials between TiT target and U sample (1.6%)    32766001   25
            - Central position of U foil                          32766001   26
            - The sum (3%) of D(d,n)3He neutron contribution (<1%)32766001   27
              and scattered neutrons                              32766001   28
            - Self-absorption of fission fragment                 32766001   29
            - Alpha originated from 3He(d,p)4He with 3He decayed  32766001   30
              from T (0.2% at 14.10 MeV, 0.4% at 14.60 MeV,       32766001   31
                      1.8% at 15.04 MeV)                          32766001   32
HISTORY    (20181121C) Wang Jimin (CNDC) + Otuka Naohiko (NDS)    32766001   33
ENDBIB              31                                            32766001   34
NOCOMMON             0          0                                 32766001   35
ENDSUBENT           34                                            3276600199999
```

```
SUBENT        32766002   20181121   20190225   20190223       318732766002    1
BIB                  3         17                                 32766002    2
REACTION   (92-U-238(N,F),,SIG)                                   32766002    3
ERR-ANALYS (ERR-T) Total uncertainty                              32766002    4
           (ERR-1) Solid angle of alpha detector  (1.1%)          32766002    5
           (ERR-2) Background of alpha detection  (0.3%)          32766002    6
           (ERR-3) Direction of alpha emission    (0.5%)          32766002    7
           (ERR-4) Effect of material between                     32766002    8
                    TiT target and U sample       (0.8%)          32766002    9
           (ERR-5) U sample mass                  (0.8%)          32766002   10
           (ERR-6) Distance between TiT target                    32766002   11
                    and U sample                  (1.2%)          32766002   12
           (ERR-7) Extrapolation of fission                       32766002   13
                    fragment spectrum             (0.7%)          32766002   14
           (ERR-8) Background subtraction         (0.6%)          32766002   15
           (ERR-S) Statistics deviation           (0.5%)          32766002   16
           (ERR-9) 3He(d,p)4He contribution                       32766002   17
                   (1% at 15.04 MeV, <0.4% at 14.10 and 14.60 MeV)32766002   18
STATUS     (TABLE) Table 2 of Atom.Energy Sci.Tech.14(1980)201    32766002   19
ENDBIB              17                                            32766002   20
```

Dear Wang-san,

I am going to adopt it this EXFOR entry in my least-squares analysis for JENDL update!

This entry summaries uncertainty information very nicely!

Best regards,

Naohiko Otsuka

中国原子能科学研究院 CHINA INSTITUTE OF ATOMIC ENERGY

4. Some considerations to future EXFOR

ERR-ANALYS

- Very detailed information for **U**ncorrelated, **F**ully correlated, **P**artially correlated and **C**orrelated.

```
SUBENT        10314002   20171207   20180625   20180619       143910314002    1
BIB                  5         24                                 10314002    2
REACTION    (92-U-235(N,F),,SIG)                                  10314002    3
SAMPLE      U308 deposits of 8.16 and 6.85 mg on Pt (+/-30 ug).   10314002    4
            The mass was determined by microbalance weighings     10314002    5
             and confirmed by thermal neutron fission and alpha   10314002    6
             counting.                                            10314002    7
ERR-ANALYS  (ERR-T) Total uncertainty                             10314002    8
            (ERR-1,,,U)  Net fission counts/source neutron        10314002    9
            (ERR-2,,,U)  Manganese bath comparison of sources     10314002   10
            (ERR-3,,,C)  Fragment emission anisotropy             10314002   11
            (ERR-4,,,C)  Angular distribution normalization to lab.10314002  12
            (ERR-5,,,C)  Half-life extrapolation                  10314002   13
            (ERR-6,,,F)  NBS-II reference source        (0.50%)   10314002   14
            (ERR-7,,,F)  Fissile foil masses            (0.50%)   10314002   15
            (ERR-8,,,C)  Scattering in Pt backings                10314002   16
            (ERR-9,,,C)  Scattering in other structures           10314002   17
            (ERR-10,,,U) Compensated beam geometry      (0.57%)   10314002   18
            (ERR-11,,,C) Energy spectrum                (0.30%)   10314002   19
            (ERR-12,,,U) Aperture diameter              (0.13%)   10314002   20
            (ERR-13,,,U) Deposit-aperture distance      (0.14%)   10314002   21
STATUS      (TABLE) Tables 6 and 8 of Ann.Nucl.Energy 5(1978)569  10314002   22
HISTORY     (19790315A) Data updated.                             10314002   23
            (20170724A) On. Partial uncertainties added.          10314002   24
             DATA-ERR -> ERR-T and %-uncertainties adopted for it. 10314002  25
            (20171207A) On. ERR-12 and ERR-13 added.              10314002   26
```

- No information or incomplete.

```
SUBENT        22304007   20180724   20190424   20190423     227522304007    1
BIB                  5          5                             22304007    2
REACTION    (92-U-238(N,F),,SIG)                              22304007    3
FACILITY    (NGEN,2GERDRE)                                    22304007    4
ERR-ANALYS  (DATA-ERR) No information on the source of uncertainty 22304007    5
STATUS      (TABLE) Text (p.513) of 1991 Juelich Conf. p.510  22304007    6
HISTORY     (20180724A) On. Re-compiled.                      22304007    7
ENDBIB               5                                        22304007    8
NOCOMMON             0          0                             22304007    9
```

```
ERR-ANALYS  (ERR-T) The total error given includes all the errors, 21520001   66
              except those due to the uncertainties in the      21520001   67
              isotopic composition and chemical purity of the   21520001   68
              boron foils.                                      21520001   69
STATUS      (NDD)   Data taken from NEUDADA.                    21520001   70
HISTORY     (19800422T) G.C.                                    21520001   71
            (19800429E)                                         21520001   72
            (20070926A) Date is corrected. DATA-ERR To ERR=T ,  21520001   73
              units in SAN 004 changed  -  SM                   21520001   74
            (20071001U) Last corrections have been done.        21520001   75
```

```
CORRECTION DATA ARE CORRECTED FOR DEAD TIME, CONSTANT AND TIME-   12905001   24
              DEPENDENT BACKGROUND                                12905001   25
COMMENT    DATA SHOULD BE USED WITH CAUTION ABOVE 20 EV.          12905001   26
ERR-ANALYS (ERR-S) STATISTICAL ERROR                              12905001   27
STATUS     DATA RECEIVED IN PRIVATE COMMUNICATION 86/7/31 FROM    12905001   28
            R. GWIN                                               12905001   29
           (APRVD) R.GWIN, 86/9/5.                                12905001   30
HISTORY    (860821C)                                              12905001   31
           (870605A) MONITOR CORRECTED.                           12905001   32
```

- **It will be better that the detailed information on the source of uncertainty was included in ERR-ANALYS, from articles or authors.**

4. Some considerations to future EXFOR

- Real-time feedback platform for EXFOR is expected to build, which provides users from various countries and regions a more convenient channel to record the insufficient, and the maintainer can know them quickly;
- For same source of the incident particle beam, or same experimental technique, etc. standardization of the main sources of uncertainty was handled in EXFOR will makes processing more effective for experimental covariance;

4. Some considerations to future EXFOR

- The correlated coefficient of each experimental sources (beam, sample, detector…) are looking forward to presenting in entries by the experimenter, which is important to create a more reliable non-model dependent COV;
- The content in COMMENTS requires more complete description, especially why compiler modified the data and if the data in the subentries are better recommendation for application?

Thank you for your attention!