

Status of EXFOR Compilation in CNDC

the 1st Asian Nuclear Reaction Database Development Workshop
(Hokkaido University/Sapporo)

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

October 27, 2010



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- ② Responsibility Journals
- ③ Compilation tools
- ④ X4 compilation status
- ⑤ Summary

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Short History

- **1977** Neutron center network and charged-particle network were merged as NRDC (Nuclear Reaction Data Center) network

Short History

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Core Center

Country	Center	Joined
U.S.A	US National Nuclear Data Center	1966
France	OECD NEA Data Bank	1966
Austria	IAEA Nuclear Data Section	1966
Russia	Russian Nuclear Data Center	1966

Short History

- **1977** Neutron center network and charged-particle network were merged as NRDC(Nuclear Reaction Data Center) network
- **1984** China joined into IAEA
- **1987** CNDC joined into NRDC

Short History

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Specialized Center

Country	Center	Joined
Russia	Nucl. Struc. & Nucl. Reac. Data Centre	1974
Japan	Japan Nuclear Reaction Data Center	1975
Russia	Centre for Exp. Photonuclear Data	1982
<i>China</i>	<i>China Nuclear Data Center</i>	<i>1987</i>
Japan	Nuclear Data Center	1991
Korea	Nuclear Data Evaluation Laboratory	2000
India	Nuclear Data Section	2008

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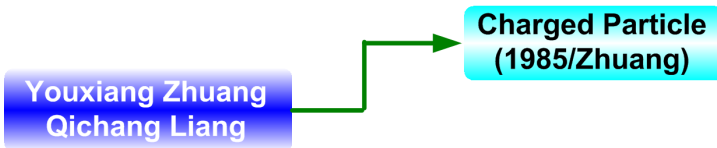
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Short History

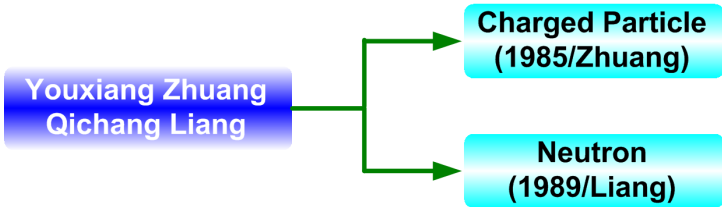


Youxiang Zhuang
Qichang Liang

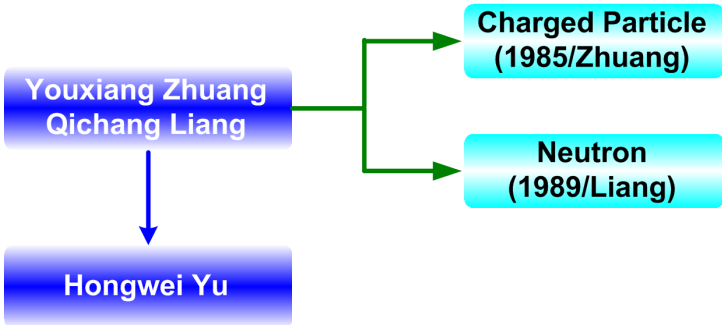
Short History



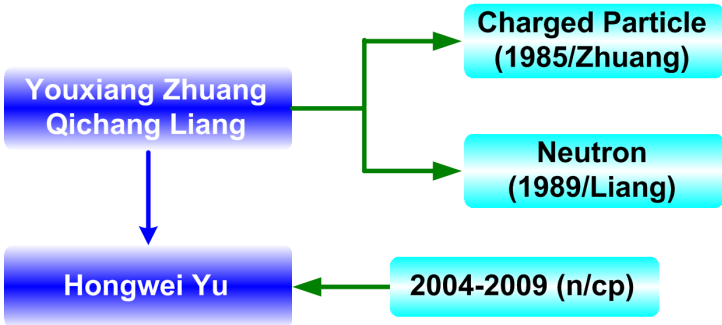
Short History



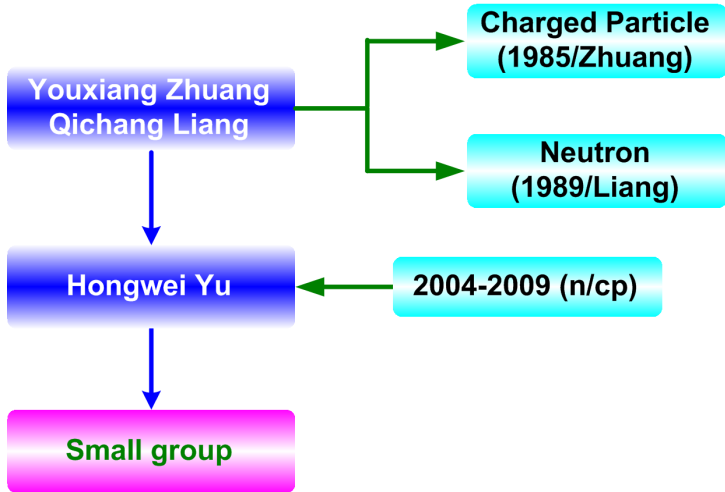
Short History



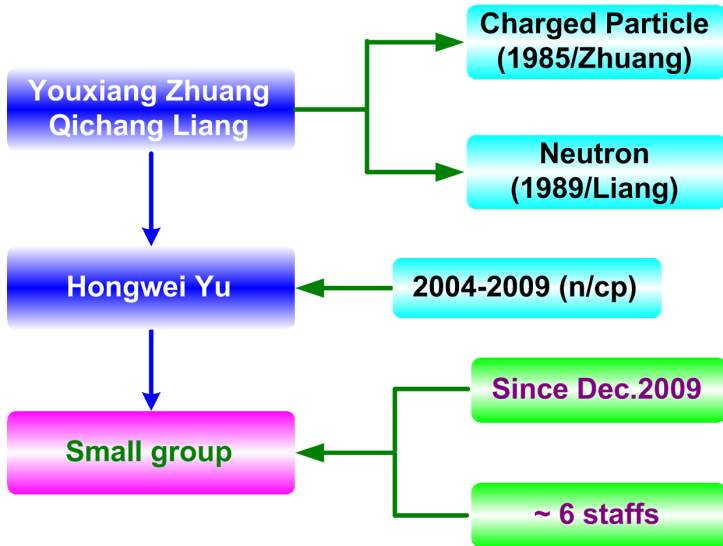
Short History



Short History



Short History



Short History

Huangshan Mountains Meeting (May 1985)

- ① IAE-CP held a working meeting about compilation in EXFOR
- ② 15 charged particle X4 entries were transmitted to IAEA
- ③ Neutron X4 started at Jan. 1989



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- | | |
|--------------------|--|
| 01 Li Zhichang+ | Yuanzineng Kexue Jishu 3(1977)229 |
| 02 Liang Qichang+ | Yuanzineng Kexue Jishu 1(1977)10 |
| 03 Mao Zhenlin+ | Conf. on Low Energy Nucl. Phys.3(1972) |
| 04 Yuan Rongfang+ | Chin. J. Nucl. Phys. 3(1981)155 |
| 05 Jiang Chenglie+ | Conf. on Low Energy Nucl. Phys.3(1972) |
| 06 Sun Hancheng+ | Yuanzineng Kexue Jishu 3(1984)329 |
| 07 Yan Chen+ | Chin. J. Nucl. Phys. 2(1980)137 |
| 08 Sun Hancheng+ | Yuanzineng Kexue Jishu 2(1981)185 |
| 09 Ma Weiyi+ | Chin. J. Nucl. Phys. 2(1980)239 |
| 10 Shen Wenqen+ | High Energ.Phys.Nucl.Phys.1(1977)70 |
| 11 Tao Zhenlan+ | Canadian Nucl Technol.45(1987) |
| 12 X.Long+ | NST-001 (1985) |
| 13 Long Xianguan+ | NST-003 (1989) |
| 14 Tao Zhenlan+ | Chin. J. Nucl. Phys. 3(1981)242 |
| 15 Tao Zhenlan+ | Yuanzineng Kexue Jishu 5(1983)506 |

Short History

Huangshan Mountains Meeting (May 1985)

- 1 IAE-CP held a working meeting about compilation in EXFOR
- 2 15 charged particle X4 entries were transmitted to IAEA
- 3 Neutron X4 started at Jan. 1989

SUBENT	32501001	900213	20050926	0000
BIB	15	33		
INSTITUTE	*(3CPRLNZ) Lanzhou Univ., Lanzhou, China			
REFERENCE	*(J,PHE,13,(4),353,8804) IN CHINESE			
AUTHOR	*(J,PHE,13,(4),353,8804) Journ.: High Energy Physics and Nucl. Phys. (WANG HUAMIN,WANG YONGCHANG,YUAN JUNQIAN,WANG XUEZHI,REN ZHONGLIANG)			
TITLE	THE CROSS SECTION MEASUREMENT FOR THE AG-107(N,2N)AG-106M REACTION			
SAMPLE	NATURAL SILVER, DIAMETER=20 MM, THICKNESS ABOUT 0.45 MM			
FACILITY	(CCW) 400 KEV NEUTRON GENERATOR AT LANZHOU UNIVERSITY. *(CCW) Cockcroft-Walton accelerator			
INC-SOURCE	(D-T) 360 KEV DEUTERON ON 1.6 MILLI-GRAM/CM ² , TITANIUM TRITIIDE TARGET, NEUTRON FLUX ABOUT (1-2)*E+11 NEUTRONS/4PI/SEC			
METHOD	(ACTIV) *(ACTIV) Activation			
DETECTOR	(HPGE) CO-AXIAL HIGH PURITY GERMANIUM DETECTOR(FWHM 1.9 KEV AT 1330 KEV) FOR GAMMA RAY MEASUREMENT. GAMMA-RAY STANDARD SOURCES WAS USED FOR DETECTOR EFFICIENCY CALIBRATION. *(HPGE) Hyperpure Germanium detector			
MONITOR	(13-AL-27(N,A)11-NA-24,,SIG) TAKEN FROM S.TAGESEN AND H. VONACH, PHYSICA DATA 13-1(1981)			
PART-DET	(DG)			
CORRECTION	CORRECTION APPLIED FOR GAMMA SELF-ABSORPTION IN SAMPLE GAMMA-CASCADE COINCIDENCE			
ERR-ANALYS	MAIN ERROR SOURCES AS FOLLOWS 0.4-0.8 PER CENT STANDARD CROSS-SECTION 0.6-1.5 PER CENT STATISTICAL 3.0 PER CENT CALIBRATION OF DETECTOR EFFICIENCY 0.18 PER CENT WEIGHT OF SAMPLE 0.2 PER CENT SELF-ABSORPTION CORRECTION 0.2 PER CENT GAMMA-CASCADE COINCIDENCE CORRECTION			
STATUS	DATA TAKEN FROM TABLE 1 OF CHINESE J. OF HIGH ENERGY PHYSICS AND NUCLEAR PHYSICS(PHYSICA ENERGIAE FORTIS ET PHYSICA NUCLEARIS),13(4),353,8804.			
HISTORY	(891015C) COMPILED BY LIANG QICHANG AT CNDC			
ENDBIB	33			
NOCOMMON	0	0		
ENDSUBENT	36			
SUBENT	32501002	900213	20050926	0000
BIB	1	1		
REACTION	(47-AG-107(N,2N)47-AG-106-M,,SIG) *(47-AG-107(N,2N)47-AG-106-M,,SIG) Quantity: [CS] Cross sect			
ENDBIB	1			
NOCOMMON	0	0		
DATA	3	6		
EN	DATA	DATA-ERR		
MEV	MB	MB		
13.5	469.	22.		
13.6	480.	22.		
13.9	503.	24.		
14.1	538.	25.		
14.35	555.	25.		
14.73	572.	26.		
ENDDATA	8			
ENDSUBENT	14			

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Responsibility Journals

Responsibility of CNDC

- ➡ Compilation of numerical data and related information (X4 & CINDA) for nuclear reaction **measurements performed in China**
- ➡ Measurements are published in **Chinese journal**
- ➡ Compilation of bibliographic references (CINDA) to microscopic neutron reaction data and related data **published in Chinese**

Original main journals

- ① High Energy Physics and Nuclear Physics
(CHN/1977;ENG/2007)
- ② Atomic Energy Science and Technology (CHN/1959)
- ③ Journal of Nuclear and Radiochemistry (CHN/1979)
- ④ Nuclear Physics Review (CHN/1984)
- ⑤ Nuclear Techniques (CHN/1978)
- ⑥ Chinese journal of Nuclear Physics (ENG/79-98)
- ⑦ Communication of Nuclear Data Progress (ENG/1989)

Present main journals

- ① Chinese Physics C(ENG/2007;HEN)
- ② Atom. Energy Sci. & Tech.(CHN/1959)
- ③ J. of Nucl. & Radiochemistry(CHN/1979)
- ④ Nuclear Physics Review(CHN/1984)
- ⑤ Nuclear Techniques(CHN/1978;+ENG/1989)
- ⑥ Com. of Nucl. Data Prog.(ENG/1989)
- ⑦ Nuclear Science and Techniques(ENG/1989)
- ⑧ Chinese Physics Letters(ENG/1984)
- ⑨ Chinese Physics B (ENG)
- ⑩ Acta Physica Sinica(ENG/1933)
- ⑪ Conference, Workshop etc.

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Compilation tools

Chinese tools

① ERES(1993): A PC code for X4 compilation

- A PC software package assisting the X4 compilation
- Developed by CNDC, Nankai Univ. & NDS
- Editor: Includes input, output, merge and editor
- Check: Checks X4 file & generates error messages file
- Retrieve: by ENTRY, SUBENT or REACTION

② TT: Plotting software



INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION



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IAEA-NDS-151
February 1994

ERES

A PC PROGRAM FOR NUCLEAR DATA COMPILATION IN EXFOR FORMAT

by Li Shubing
Nankai University, Tianjin, P.R. ChinaLiang Qichang, Liu Tingin
Chinese Nuclear Data Center, Institute of Atomic Energy
Beijing, P.R. China

Abstract: This document describes the use of the personal computer software package ERES for compilation of experimental nuclear reaction data in the internationally agreed EXFOR format. The software is available upon request from the IAEA Nuclear Data Section.

Nuclear Data Section
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna
Austriae-mail: RNDSD@IAEA1.BITNET
fax: (43-1) 234564
cable: INATOM VIENNA
telex: 1-12645 atom a
telephone: (43-1) 2360-1709

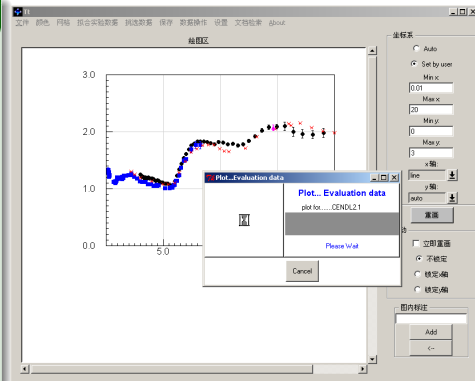
NDS online, TELNET: IAEA.NDS.AT username: IAEANDS

30 - 21

Compilation tools

Chinese tools

- ① ERES(1993): A PC code for X4 compilation
- ② TT: Plotting software for X4 & ENDF
- ③ GDgraph: Digitizing of exp. data



Compilation tools

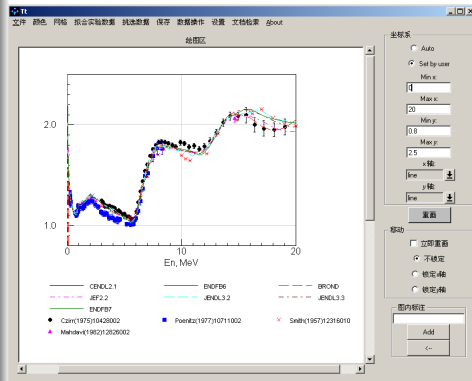
Chinese tools

① ERES(1993): A PC code for X4 compilation

② TT: Plotting software for X4 & ENDF

- A GUI platform for plotting
- Based on MySQL database

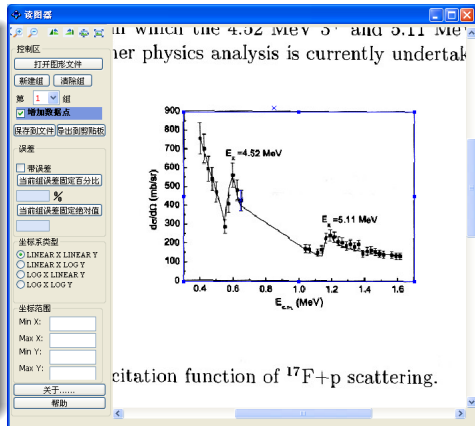
③ GDgraph: Digitizing of exp. data



Compilation tools

Chinese tools

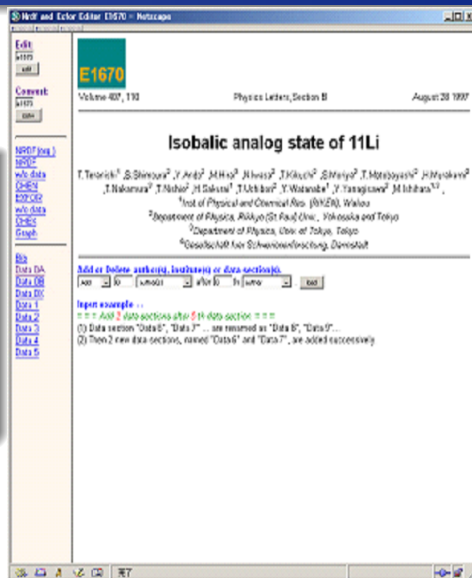
- ① ERES(1993): A PC code for X4 compilation
- ② TT: Plotting software for X4 & ENDF
- ③ GDgraph: Digitizing of exp. data



Compilation tools

Japanese tools

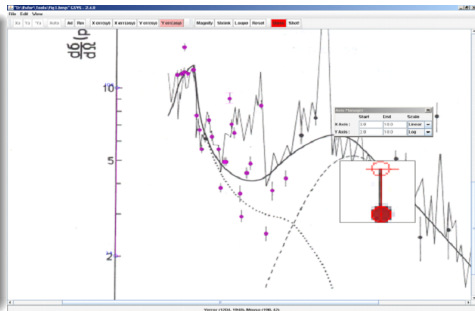
- ① **HENDEL: X4 compilation, website version, guest**
- ② **Gsys: Digitizing of exp. data**



Compilation tools

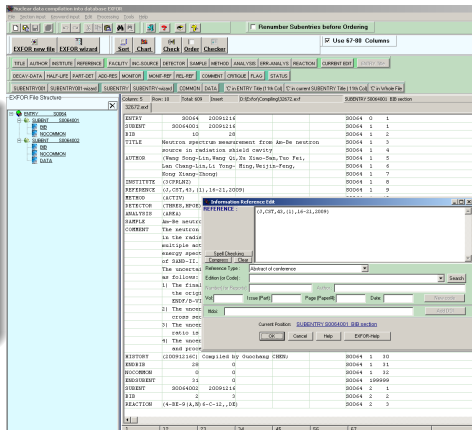
Japanese tools

- ① HENDEL: X4 compilation, website version, guest
- ② Gsys: Digitizing of exp. data



IAEA/NDS tools

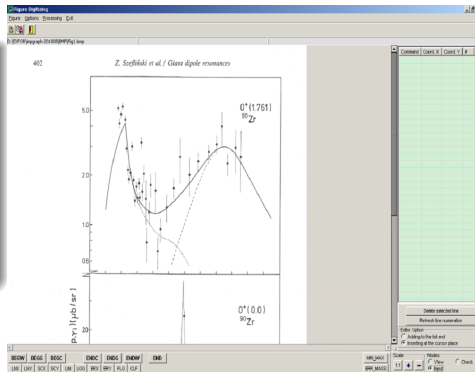
- 1 ExfData: X4 compilation main software, PC
- 2 InpGraph: Digitizing of exp. data



Compilation tools

Japanese tools

- ① ExfData: X4 compilation main software, PC
- ② InpGraph: Digitizing of exp. data



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X4 compilation status

X4 compilation group (~ 6)

- Small Group: ~ 6 staffs
- Participants: Ge, Zhuang, Wang, Tao, Wu, Shu, Chen
- Secretary of group: Guochang Chen
- Time consuming: 100%(\times), 50%(\times), $\approx 30\%$ (?)

X4 compilation status

Task assign

- Respond to scan 1~2 journals
- Collect the scan results of all responsible journals . . .
- Assign neutron & charged particle tasks
- Word \rightarrow Elec. Table \rightarrow Website(test)

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	No.	Ref.	Title	Vol.	Issue	Page	Lab	Publish date	Author	Status	Action	Entry date (n)	Compiler	Entry	Sub.
详情	1	S, JAEA-C-	Preliminary Measurement of Neutron Emission Spectra for Beryllium at 21.65 MeV	JAEA-Conf-2009-004	2009-004	169	3CPRAEP	200910	Changlin LAN	Allocated	Compiled	10	Guochang CHEN	32682	n
详情	2	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CFRBJG	201007	Tu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
详情	3	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CFRBJG	201007	Tu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
详情	4	J, BCA	Cross section measurements of $(n, 2n)$, (n, p) and (n, α) reactions on gadolinium isotopes in the neutron energy range of 13.5 to 14.6 MeV 文献2	96	3	127	3CFRNC	201003	Junhua Luo	Allocated	Compiled	6	Guochang CHEN	32680	n
详情	5	J, PR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n, \alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CFRBJG	201007	Tu. M. Gledenov	Allocated	Compiled	1	Jimin YANG	32679	n
详情	6	J, WP/A	Lithium induced nuclear reactions of astrophysical interest	834	1-4	651c	3CPRAEP	201003	W. P. Liu	Allocated		7	Xi TAO	S0070	cp
详情	7	J, WP/A	Competition between fusion-fission and quasi fission processes in $^{32}\text{S}+^{184}\text{W}$ reaction	834	1-4	201c	3CPRAEP	201003	C. L. Zhang	Allocated		7		S0069	cp
详情	8	J, WP/A	Elastic resonance scattering of ^{138}p and ^{177}p	834	1-4	100c	3CPRAEP	201003	T. B. Wang	Allocated		7	Xi TAO	S0068	cp
详情	9	J, NIM/B	Development of laboratory standards for AMS measurement of ^{237}Np	268	11-12	1949	3CPRAEP	201006	Xianggao Wang	Allocated	Compiled	3	Youxiang ZHUANG	32683	n
详情	10	J, NIM/B	Measurements of the $^{89}\text{Y}(n, \gamma)^{90}\text{mY}$ cross-section in the neutron energy range of 13.5-14.6 MeV	268	9	1367	3CFRLNZ	201005	Fengqun Zhou	Allocated	Compiled	4	Youxiang ZHUANG	32678	n

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	No.	Ref.	Title	Vol.	Issue	Page	Lab	Publish date	Author	Status	Action	Delay date (n)	Compiler	Entry	Sub.
详情	1	S, JAEA-C-	Preliminary Measurement of Neutron Emission Spectra for Beryllium at 21.65 MeV	JAEA-Conf-2009-004	2009-004	169	3CPRAEP	200910	Changlin LAN	Allocated	Compiled	10	Guochang CHEN	32662	n
详情	2	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32661	n
详情	3	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32661	n
详情	4	J, RCA	Cross section measurements of $(n, 2n)$, (n, p) and (n, α) reactions on gadolinium isotopes in the neutron energy range of 13.5 to 14.8 MeV 文献2	98	3	127	3CPBNC	201003	Junhua Luo	Allocated	Compiled	6	Guochang CHEN	32680	n
详情	5	J, FR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n, \alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Jinin YANG	32679	n
详情	6	J, NP/A	Lithium induced nuclear reactions of astrophysical interest	834	1-4	651c	3CPRAEP	201003	W. P. Liu	Allocated		7	Xi TAO	S0070	sp
详情	7	J, NP/A	Competition between fusion-fission and quasi fission processes in $^{32}\text{S}+^{184}\text{W}$ reaction	834	1-4	201c	3CPRAEP	201003	C. L. Zhang	Allocated		7		S0069	sp
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详情	9	J, NIM/B	Development of laboratory standards for AMS measurement of ^{237}Np	268	11-12	1949	3CPRAEP	201006	Xiangao Wang	Allocated	Compiled	3	Youxiang ZHUANG	32683	n
详情	10	J, NIM/B	Measurements of the $^{89}\text{Tm}(n, \gamma)^{90m}\text{Tm}$ cross-section in the neutron energy range of 13.5-14.6 MeV	268	9	1367	3CPRLXZ	201005	Fengqun Zhou	Allocated	Compiled	4	Youxiang ZHUANG	32678	n

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详情	2	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32661	n
详情	3	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32661	n
详情	4	J, BCA	Cross section measurements of $(n, 2n)$, (n, p) and (n, α) reactions on gadolinium isotopes in the neutron energy range of 13.5 to 14.8 MeV 文献2	98	3	127	3CPBNFC	201003	Jinhua Luo	Allocated	Compiled	6	Guochang CHEN	32660	n
详情	5	J, FR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n, \alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CPBBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Jinin YANG	32679	n
详情	6	J, NP/A	Lithium induced nuclear reactions of astrophysical interest	634	1-4	651c	3CPRAEP	201003	Y. P. Liu	Allocated		7	Ki TAO	S0070	cp
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详情	10	J, NIM/B	Measurements of the $^{89}\text{Tl}(n, \gamma)^{90}\text{Pb}$ cross-section in the neutron energy range of 13.5-14.6 MeV	266	9	1367	3CPRLXZ	201005	Fengqun Zhou	Allocated	Compiled	4	Younxiang ZHUANG	32678	n

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详情	5	J, FR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n, \alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CPBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Jimin YANG	32679	n
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详情	7	J, NP/A	Competition between fusion-fission and gausi fission processes in $^{32}\text{S}+^{184}\text{W}$ reaction	834	1-4	201c	3CPRAEP	201003	C. L. Zhang	Allocated		7		S0069	cp
详情	8	J, NP/A	Elastic resonance scattering of ^{13}Wp and ^{17}Tp	834	1-4	100c	3CPRAEP	201003	Y. B. Yang	Allocated		7	Xi TAO	S0068	cp
详情	9	J, NIM/B	Development of laboratory standards for AMS measurement of ^{237}Np	268	11-12	1949	3CPRAEP	201006	Xianggao Wang	Allocated	Compiled	3	Youxiang ZHUANG	32683	n
详情	10	J, NIM/B	Measurements of the $^{89}\text{Y}(n, \gamma)^{90\text{m}}\text{Y}$ cross-section in the neutron energy range of 13.5-14.6 MeV	268	9	1367	3CPRLXZ	201005	Fengqun Zhou	Allocated	Compiled	4	Youxiang ZHUANG	32678	n

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详情	1	S, JAEA-C-	Preliminary Measurement of Neutron Emission Spectra for Beryllium at 21.65 MeV	JAEA-Conf-2009-004	2009-004	169	3CFRAEP	200910	Changlin LAN	Allocated	Compiled	10	Guochang CHEN	32682	n
详情	2	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CFRBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
详情	3	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV	17	1	323	3CFRBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
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详情	5	J, FR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n, \alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CFRBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Jimin WANG	32679	n
详情	6	J, NP/A	Lithium induced nuclear reactions of astrophysical interest	834	1-4	651c	3CFRAEP	201003	W. P. Liu	Allocated		7	Xi TAO	S0070	cp
详情	7	J, NP/A	Competition between fusion-fission and quasi fission processes in $^{32}\text{S}+^{184}\text{W}$ reaction	834	1-4	201c	3CFRAEP	201003	C. L. Zhang	Allocated		7		S0069	cp
详情	8	J, NP/A	Elastic resonance scattering of ^{139}Pp and ^{177}Pp	834	1-4	100c	3CFRAEP	201003	Y. B. Wang	Allocated		7	Xi TAO	S0068	cp
详情	9	J, NIM/B	Development of laboratory standards for AMS measurement of ^{237}Np	268	11-12	1949	3CFRAEP	201006	Xianggao Wang	Allocated	Compiled	3	Youniang ZHUANG	32683	n
详情	10	J, NIM/B	Measurements of the $^{89}\text{Y}(n, \gamma)^{90\text{m}}\text{Y}$ cross-section in the neutron energy range of 13.5-14.6 MeV	268	9	1367	3CFRLJZ	201005	Fengqun Zhou	Allocated	Compiled	4	Youniang ZHUANG	32678	n

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修改 详情	5	J, PR/C	Cross-section measurement and analysis for the $^{149}\text{Sm}(n,\alpha)^{146}\text{Nd}$ reaction at 6.0 MeV	82	1	14601	3CPRJTG	201007	Yu. M. Gladenov	Allocated	Compiled	1	Jimin WANG	32679	n
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修改 详情	7	J, NP/A	Competition between fusion-fission and quasi fission processes in $^{32}\text{S}+^{184}\text{W}$ reaction	834	1-4	201c	3CPRAEP	201003	C. L. Zhang	Allocated		7		S0069	cp
修改 详情	8	J, NP/A	Elastic resonance scattering of $^{13}\text{W}^p$ and $^{17}\text{F}^p$	834	1-4	100c	3CPRAEP	201003	Y.B. Wang	Allocated		7	Xi TAO	S0068	cp
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title	Preliminary Measurement of Neutron Emission Spectra for Beryllium at 21.65 MeV *		
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修改 详情	3	S, ISINN-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 8.0 MeV	17	1	323	3CPBJG	201007	Tu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
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修改 详情	9	J, NIM/B	Development of laboratory standards for AMS measurement of ^{237}Np	268	11-12	1949	3CPRAEP	201006	Xianggao Yang	Allocated	Compiled	3	Youxiang ZHUANG	32683	n
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修改	删除	1	J, CPL	Chinese Physics Letters (中国物理快报)
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修改	删除	4	J, CST	Atomic Energy Science and Technology (原子能科学技术)
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修改 详情	3	S, ISINW-	Cross section measurements for the $^{143}\text{Nd}(n, \alpha)^{140}\text{Ce}$ reaction at 4.0, 5.0 and 6.0 MeV		17	1	323	3CPRBJG	201007	Yu. M. Gledenov	Allocated	Compiled	1	Guochang CHEN	32681	n
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修改 详情	6	J, NP/A	Lithium induced nuclear reactions of astrophysical interest	834	1-4	651c	3CPRAEP	201003	W. P. Liu	Allocated		7	Xi TAO	S0070	cp
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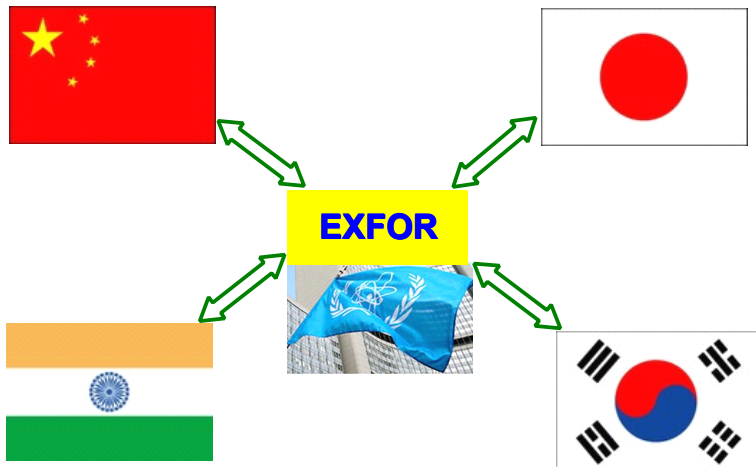
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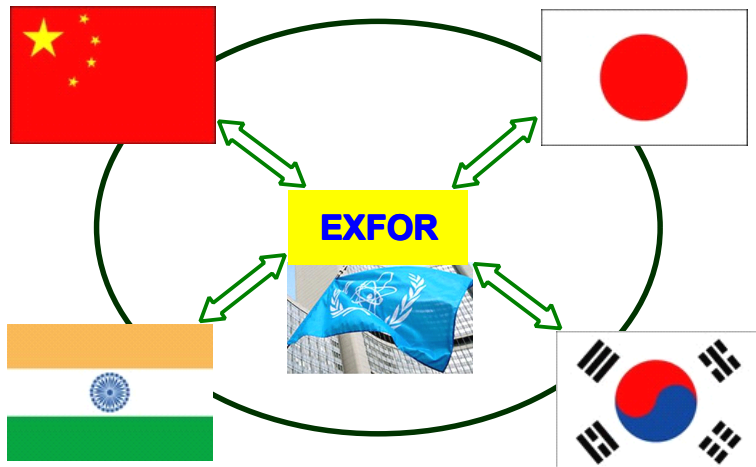
Summary

- ① 1987, CNDC joined into NRDC
- ② 1985, CNDC start to compile cp X4
- ③ 3 "generation" compile X4, do more contribution to X4
- ④ Collaboration Asian Group

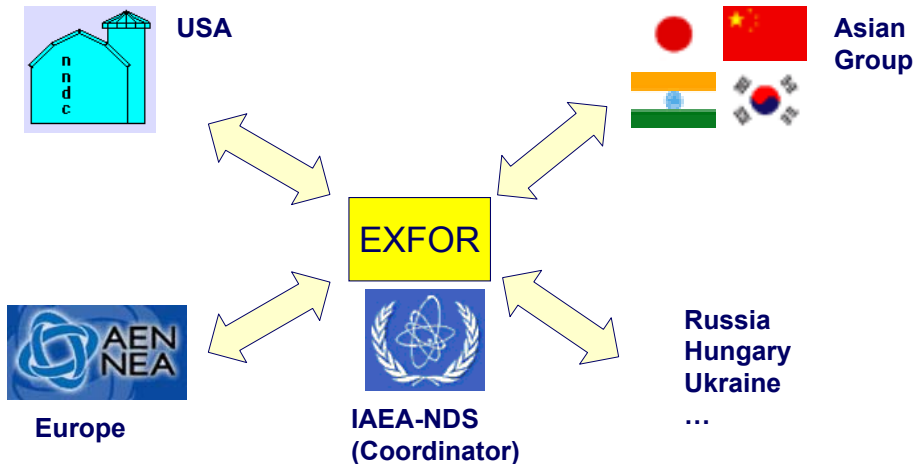
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