

2014/15 Status Report of China Nuclear Data Center

GE Zhigang

**China Nuclear Data Center(CNDC)
China Committee of Nuclear Data(CCND)
China Institute of Atomic Energy(CIAE)
P.O.Box 275-41,Beijing 102413, P.R.China
E-Mail:gezg@ciae.ac.cn**



1. *General Information of CNDC*

CNDC View

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.

The main task of CNDC:

- **The nuclear data evaluations, libraries and relevant technique researches.**
- **The exchange of nuclear data activities with IAEA, foreign nuclear data centers and agencies.**
- **The management of domestic nuclear data activities.**
- **The services for domestic and foreign nuclear data users.**

1-1 Manpower Information of CNDC

CNDC consists of the four units + an office:

<i>Evaluation Unit</i>	<i>Head: Dr. Huang Xiaolong</i>	<i>4 official staff</i>
<i>Theory Unit</i>	<i>Head: Dr. Ge Zhigang</i>	<i>6 official staff</i>
<i>Macroscopic Data Unit</i>	<i>Head: Dr. Liu Ping</i>	<i>4 official staff</i>
<i>Data Library Unit</i>	<i>Head: Dr. Shu Nengchuan</i>	<i>5 official staff</i>
<i>Secretary Office</i>		<i>2 official staff</i>

- ✓ **Two graduated students and two Ph.D started their master degree study in CNDC for nuclear data evaluation and data process and related works.**
- ✓ **21 official staff + 5 technical support seniors (retired staff) + 6 graduated students.**
- ✓ **Planning to increase the official staff up to 25 in two years.**

1-2 Mainly tasks of CNDC in 2014/2015:

- **New evaluations for CENDL Project.**
- **Neutron data library evaluations and data processing for Th-U fuel cycling studies(Chinese TMSR Project).**
- **Nuclear data evaluation and benchmark/validation for China ADS project.**
- **Nuclear structure and decay data evaluation.**
- **Experimental data compilations for EXFOR.**
- **Nuclear data methodology studies.**
- **The benchmark/validation of nuclear data libraries (CENDL-3.1, ENDF/B-VII, JENDL-4. JEFF etc.).**

1-3 Activities information

- ✓ **Regular update and maintenance of IAEA/NDS mirror-site in China with the support of NDS.**
- ✓ **Foreign scientists (Drs. M.Herman, N.Otsuka, T.Kawano, et al) from NNDC, IAEA/NDS, LANL, Russia and Belarus visited CNDC last year.**
- ✓ **A symposium of the fundamental study of nuclear data held in Beijing on 31, Oct. 2014.**
- ✓ **A proposal for the fundamental study of nuclear data has been submitted to the National Natural Science Foundation of China (NSFC) and a positive response has been received from NSFC.**

2. Nuclear Data Evaluation and Methodological Studies

2-1 CENDL Project

- The evaluation activities are performing for the updating of CENDL, which contain the neutron reaction data, activation and fission yields files. As some examples, following are the new evaluations for the neutron files and activation of ^{184}W , ^{237}U , ^{56}Fe .

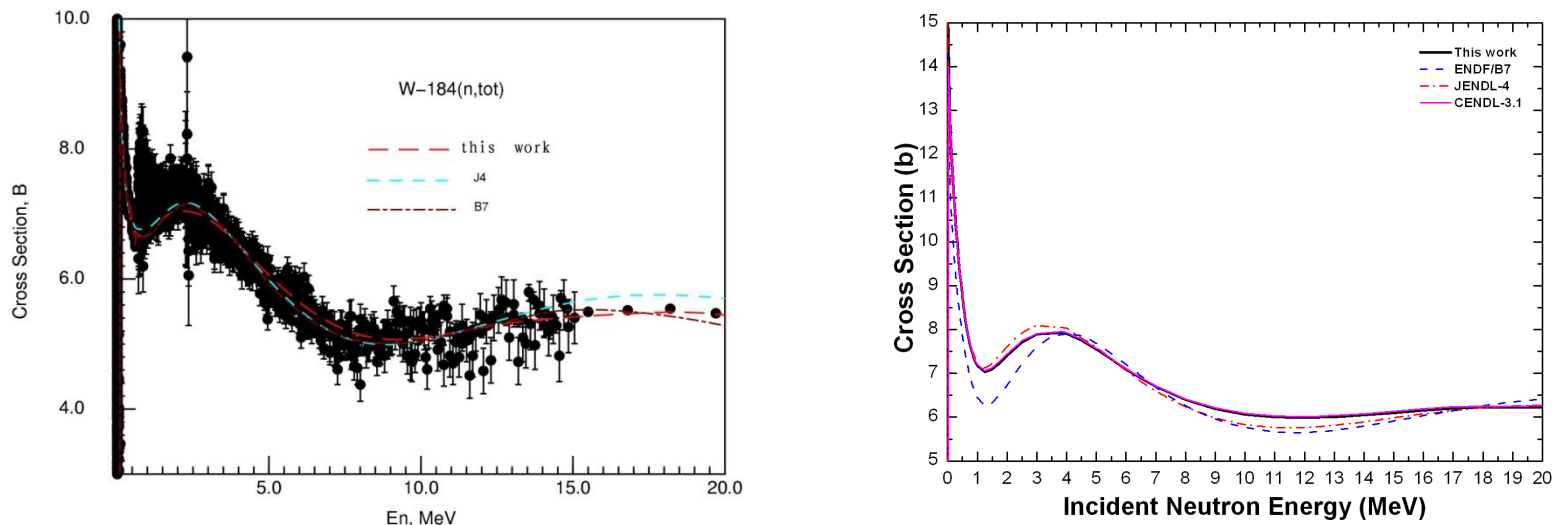


Fig.1 $^{184}\text{W}(n, \text{tot})$ (left), $^{237}\text{U}(n, \text{tot})$ (right) new evaluation comparison with evaluated files and exp.data.

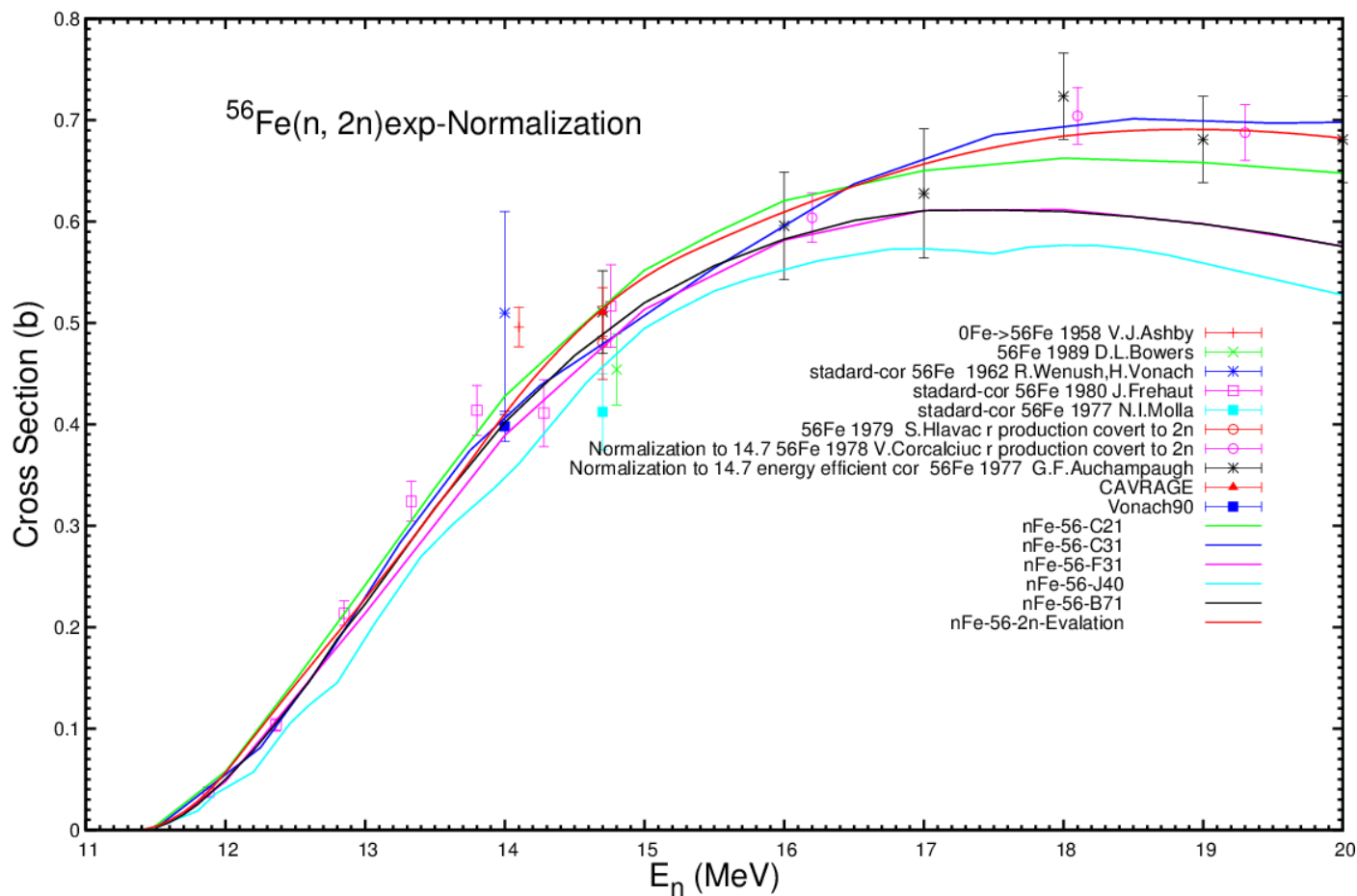


Fig.2 $^{56}\text{Fe}(n, 2n)$ new evaluation compared with exp. data.

- **The covariance evaluation (COVAC) of neutron cross section for the structure nuclei has been completed and for importance actinide is developing.**

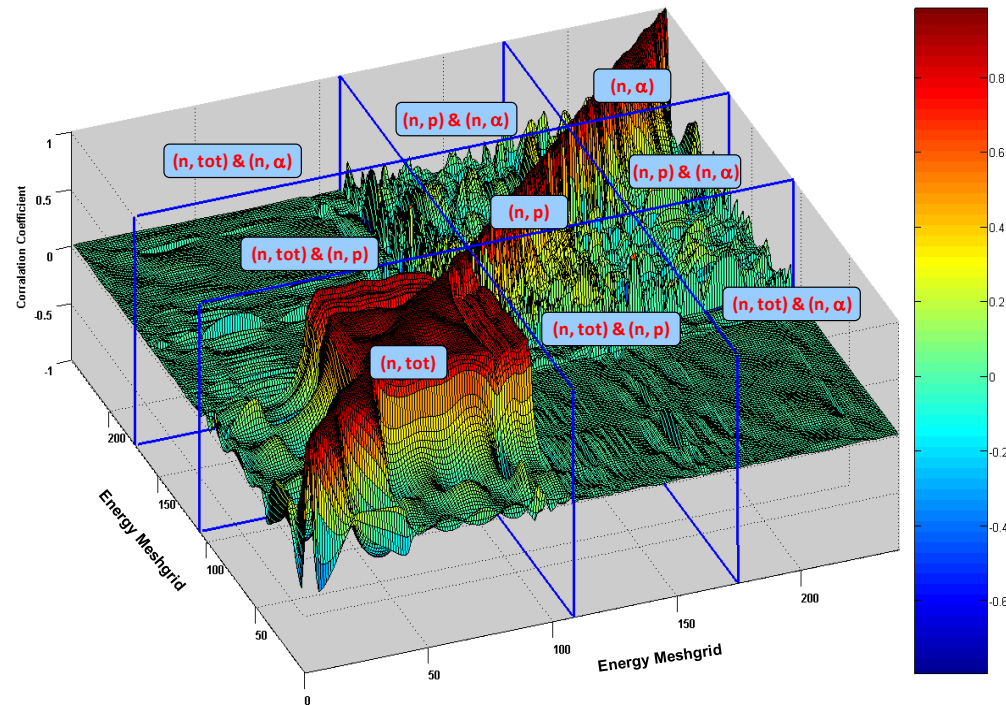


Fig.3 The updated covariance evaluations for the different reaction channels of $n+^{48}\text{Ti}$ with COVAC system.

- A analyze system **NewS** of nuclear data uncertainty/sensitivity is developing and some preliminary results has been obtained which show as following Fig.4.

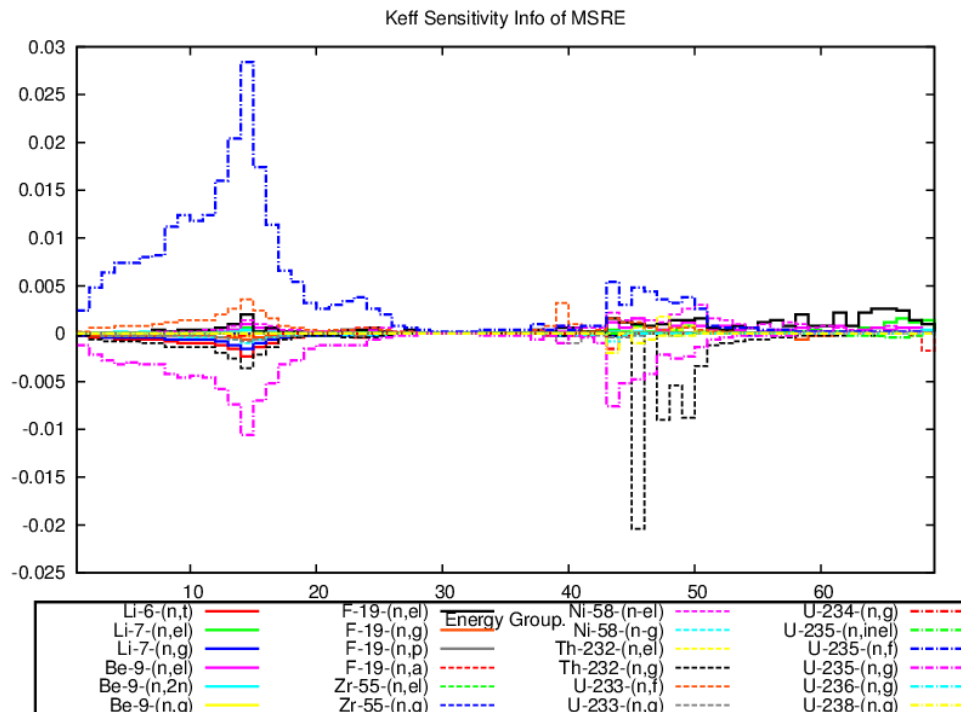


Fig.4 The k_{eff} sensitivity of preliminary analyze for the Molten Salt Reactor Experiment (MSRE) at ORNL obtained by NewS

● **Nuclear Structure and Decay Data Evaluation.**
¹³²I decay data evaluation which contained half-life, decay type, data and level scheme et al., has been performed.

Decay Type	Energy/keV	Intensities (absolute)/%
e Au _L	3.430	1.07 4
e Au _K	24.60	0.129 4
e Ce _{2K}	102.1 4	0.014 16
e Ce _{3K}	112.84 10	0.057 6
e Ce _{3L}	141.95 10	0.0074 10
e Ce _{3M}	146.26 10	0.001499
e Ce _{4K}	149.0 3	0.021 7
e Ce _{10K}	220.54 20	0.014 4
e Ce _{12K}	228.34 10	0.064 6
e Ce _{15K}	250.34 10	0.029 3
e Ce _{12L}	257.45 10	0.0084 8

Decay Scheme

Intensities: I_y and I_z per 100 parent decays
& Multiply placed; undivided intensity given
@ Multiply placed; intensity suitably divided

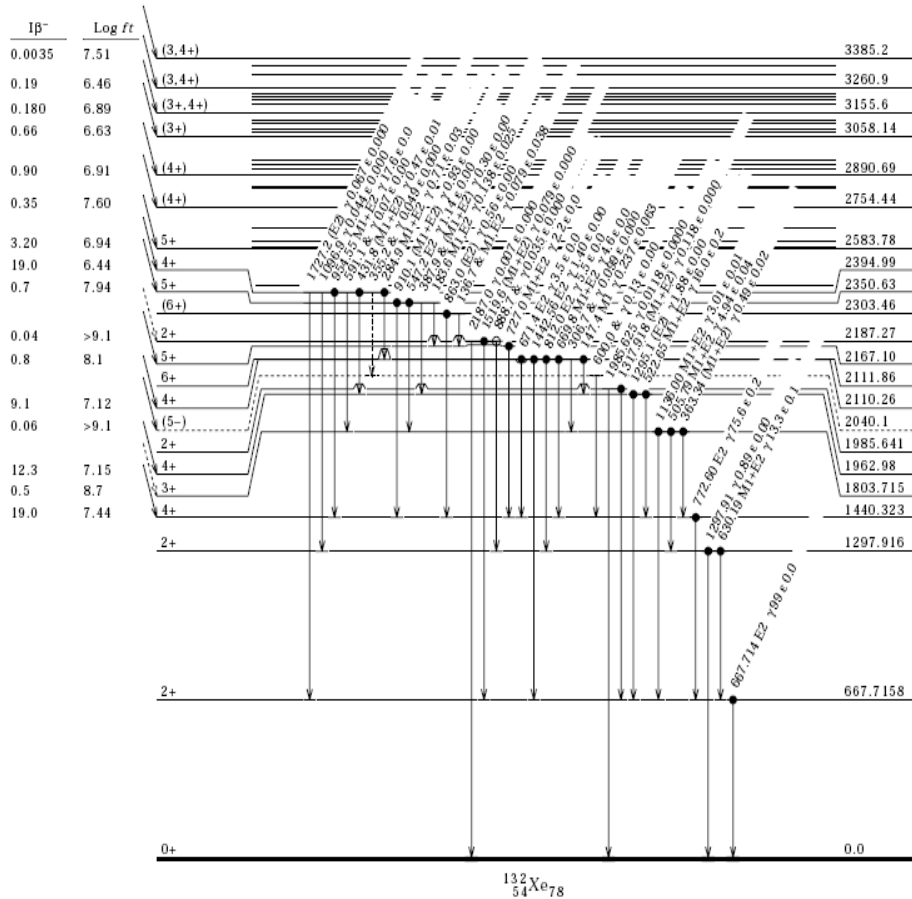
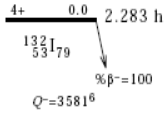
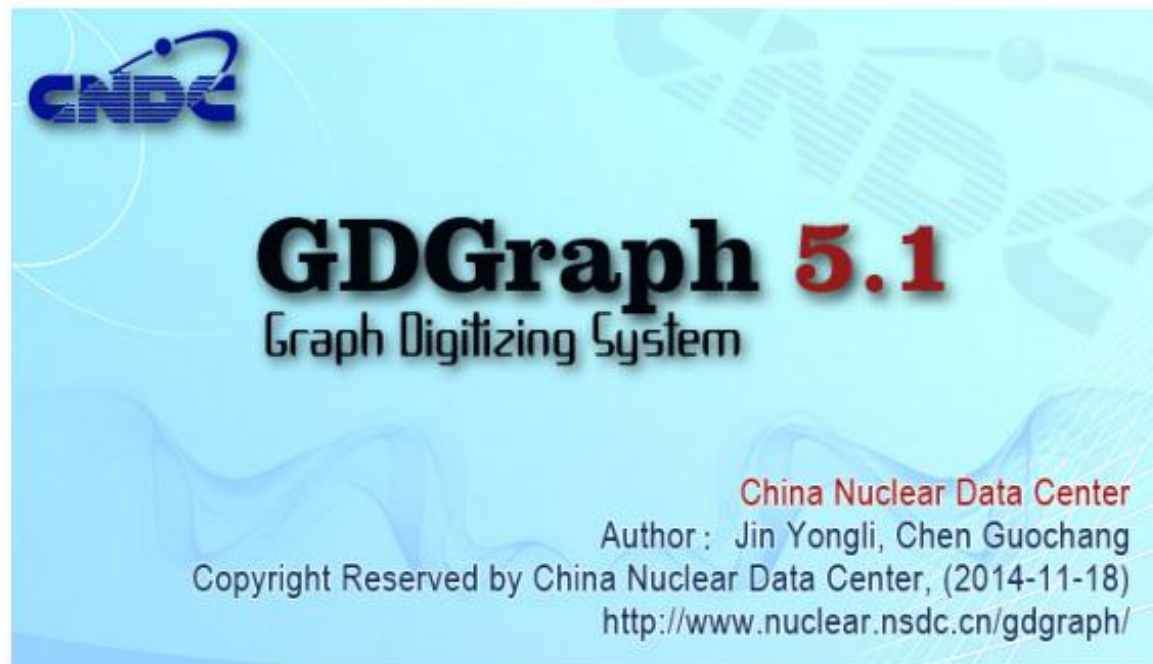


Fig.5 Decay Scheme of ^{132}I (partial)

3. EXFOR Software and Database Compilation Progress

- **GDgraph Software**

The upgrade of the GDgraph has been finished according to the feedbacks from the participants of workshop on EXFOR Compilation 6-10 Oct. 2014, Vienna. The updated version **GDgraph-v5.1, and user's manual is updating.**



● **EXFOR Compilation.**

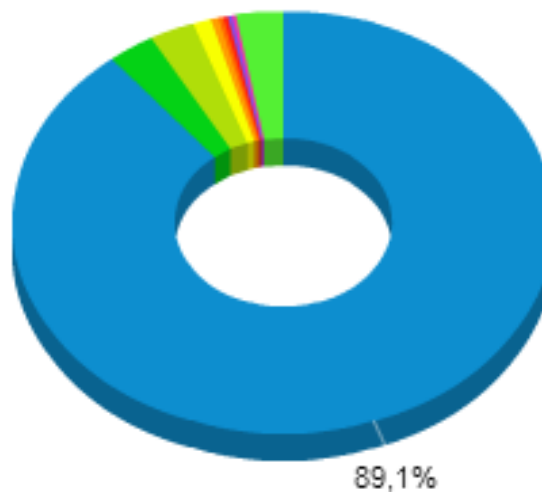
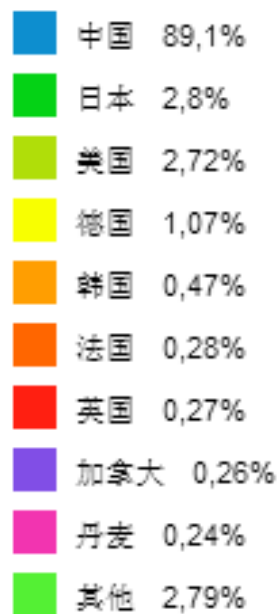
- ✓ **During the 2014-2015 EXFOR compile group at CNDC have finished following tasks:**
- ✓ **Scan all previous articles in the 《High Energy Physics and Nuclear Physics》 《Chinese Physics C》 (ENG/2007;HEN) 17,**
- ✓ **Compiled 88 entries, Feedback and correction more than 20 entries, Charge particle: 38, Neutron: 50, Compiling > 25 entries, Checking > 5**

EXFOR compilation statue

vol,page,year	First author	Lab	Proj.	Quantity	Entry	Remark	status
8,199,1984	Kong XiangJing	NRS	a	DAP	S0078	need to digitize DA data	yes
25,304,2001	Bao ShangLian	BJG	sf	DE	32726	need to digitize data, it is a ratio between ^{248}Cm and ^{252}Cf fission count.	yes
25,834,2001	Wang HongWei	IMP	17N	CS	S0081	Need to digitize fig.5, Tab.1 is list breakup cross section.	yes
25,1165,2001	Wang QuanJin	IMP	$^8\text{B}, ^9\text{C}$	CS	S0086	Have exp. data.	yes
26,35,2002	Zhang HuYong	IMP	$^{17,18,19,20,21}\text{F}$	CS	S0097	Digitize 1 figures	yes
26,239,2002	Tian WenDong	AEP	^{19}F	DAE	S0099	Digitize 2 figures	yes
26,589,2002	Xu Yan-Bing	IMP	^{18}O	CS	S0100	= A0300(needn't to compile, delete)	correct
26,594,2002	Lu Zhao-Hui	IMP	$^{17}\text{F}, ^{18}\text{Ne}$	DA	S0101	Digitize 2 figures	yes
26,683,2002	Li Jia-Xing	IMP	^{20}Ne	CS	S0102	Digitize 6 figures	yes
27,206,2003	Li Zhi-Huan	IMP	^6He	DAE	S0103	Digitize 4 figures	yes
27,399,2003	Wu Yue-Wei	AEP	^6Li	CS	S0104	The same as A0608, correct A0608	correct
28,1256,2004	Li Jia-Xing	IMP	Many	CS	S0105	Merge S0106 to S0105, and Digitize Figure. 3. S0106 is one reaction in S0105.	yes
29,28,2005	Li Jia-Xing	IMP	^{17}Ne	CS	S0106		delete
29,944,2005	Li Chen	IMP	^8He	CS	S0107	Have exp. data	yes
29,1142,2005	Han Jian-Long	AEP	^{19}F	DA	S0108	The same exp. data as S0109, so merged together as one entry. Digitize 18 figures.(delete S0109)	yes
30,612,2006	Han Jian-Long	AEP	^{19}F	DA	S0109		delete
31,52,2007	Li Chen	IMP	^8He	CS	S0110	Have exp. data	yes

4. Nuclear data services

CNDC is providing the nuclear data services to all the nuclear data users in China and foreign countries and regions by the web site: <http://www.nuclear.csdb.cn> and other ways. The services for the users contains the general purpose and special purpose libraries services, and related information/technology. The statistics of the nuclear data services through the web site show as Fig.7 and Tab.3.



The statistics (visiting and data download) of the nuclear data service. (2014-2015)

Country and Region	Visiting	Request	Data Download(MB)
CHINA	284843	476808	4901.25
JAPAN	8950	10158	78.60
U.S.A.	8689	30026	1035.64
GERMANY	3426	5269	85.34
KOREA	1496	3081	59.57
FRANCE	890	1981	87.74
U.K.	869	2940	86.63
CANADA	846	2567	91.56
DENMARK	773	2098	73.56
SWEDEN	604	1604	53.12

The statistics (visiting and data download) of the nuclear data service.(2014-2015)



***Thank you for your attention !
Comments and suggestion welcome !***