IAEA's Technical Meeting on International Network of Nuclear Reaction Data Centres (NRDC, 23-25 April 2013, IAEA Headquarters, Vienna, Austria.

A brief progress report on EXFOR compilations by Nuclear Data Physics Centre of India(NDPCI)

On behalf of NDPCI

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Outline:

I. Brief History of NDPCI

II. Brief progress report on the activities of NDPCI during 2012-2013.

I. Brief History of NDPCI

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

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

http://www-nds.iaea.org/nrdc/

NDPCI is the youngest full member of NRDC joining in September 2008. Since then, there is no looking back.
NDPCI with the help from IAEA-NDS is responsible for all EXFOR compilations in India.

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Activities of Nuclear Data Physics Centre of India (NDPCI)

To cater to various needs of the Department of Atomic Energy(DAE), the Nuclear Data Physics Centre of India (NDPCI) was formed which has been successful in pursuing:

*** Coordinating the EXFOR compilation in India with the help of IAEA-NDS through

     i)   Projects/funds giving mechanisms to university faculties in collaboration with different DAE units.

     ii)   Organizing EXFOR theme meetings/workshops

     iii) From voluntary compilers including young researchers as well as authors of the articles.

***   Basic nuclear data physics measurements using facilities in India and abroad.

***   Nuclear model based calculations using codes such as TALYS and EMPIRE are being continued. Workshops related to these have also been conducted.

** * Efforts to digest the status of covariance error methodology in nuclear data and its applications.

*** Financially Supporting researchers partly/fully to attend national as well as international conferences.

*** Improved nuclear structure and decay data for nuclear models in the heavy nuclides region(NDPCI project with A.K.Jain, IIT-Kanpur).

*** Preparation of integral Indian experimental criticality benchmarks for integral nuclear data validation studies.

EXFOR compilation workshops in India:

1. DAE-BARC theme meeting on EXFOR compilation of nuclear data" in mumbai from 4th – 8th September,2006.

2. DAE-BARC theme meeting on EXFOR compilation of nuclear data" BARC, Mumbai from 29th – 2ndOctober,2007.

3. The 3rd DAE-BARC theme meeting on EXFOR compilation of nuclear data" Jaipur University, Jaipur from 3 – 7 November 2009.

4. The 4th DAE-BARC theme meeting on EXFOR compilation of nuclear data" *2011 (Chandigarh, Panjab University, April 4-8).*

5. The 5th DAE-BARC theme meeting on EXFOR compilation of nuclear data" *2013 (Varanasi, Banaras Hindu University, Feb 18-22).*

Number of Compilations since 2006

www-nds.iaea.org/exfor-master/x4compil/exfor_input.htm

Welcome to Facebo...   NASA art: 50 years o...   b.lalremruata journa...   Pre-Installation Har...   New Tab   OrderE

Full EXFOR Compilation Statistics.
Information updated: 26-Mar-2013, 13:40:02

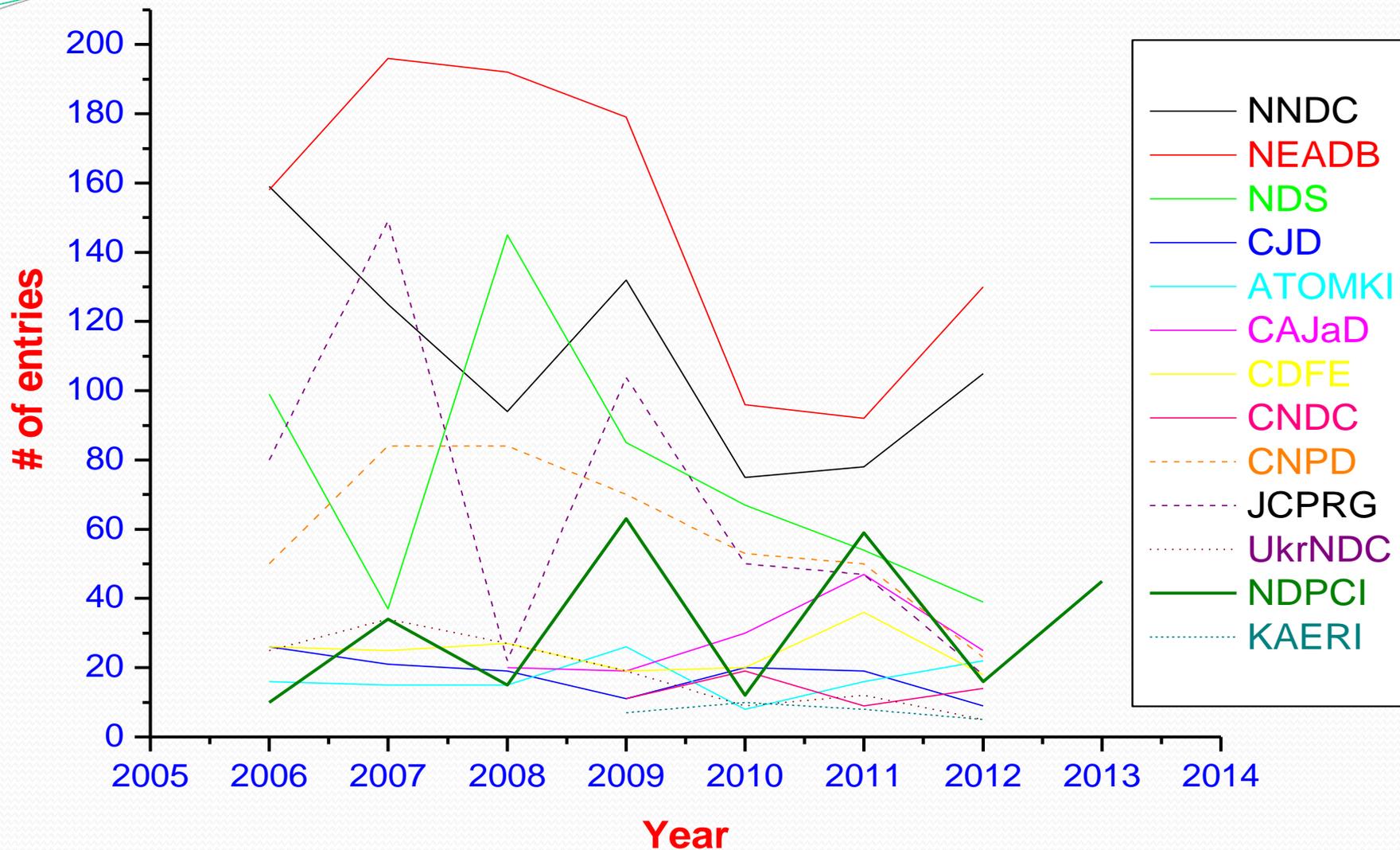|	KACHAPAG	RIKEN	NNDC	NEA-DB	NDS	CJD	ATOMKI	CAJaD	CDFE	CNDC	CNPD	JCPRG	UkrNDC	India	KAERI	Sum
2012			105	130	39	9	22	25	18	14	23	18	5	16	5	429
2011			78	92	54	19	16	47	36	9	50	47	12	59	8	527
2010			75	96	67	20	8	30	20	19	53	50	9	12	10	469
2009			132	179	85	11	26	19	19	11	70	104	19	63	7	745
2008			94	192	145	19	15	20	27		84	22	27	15		660
2007			125	196	37	21	15		25		84	149	34	34		720
2006			159	158	99	26	16	10	26	21	50	80	25	10		680
2005			460	127	119	16	12	11	16	2	67	100	7			937
2004			204	179	188	8	9	60	16		107	72	5			848
2003			72	114	22	22	31	30	8	4	136	93	3			535
2002			92	122	7	18	1	68	15	1	34	54	1			413
2001			128	125	15	14	22	17	11	7	72	5	3			419

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Legend:
- ■ Mumbai2006
- ● Mumbai2007
- ▲ Jaipur2009
- ▼ Chandg2011
- ◆ BHU2013

EXFOR Workshop compilation results

X-axis: Compilation Year
Y-axis: # of entries
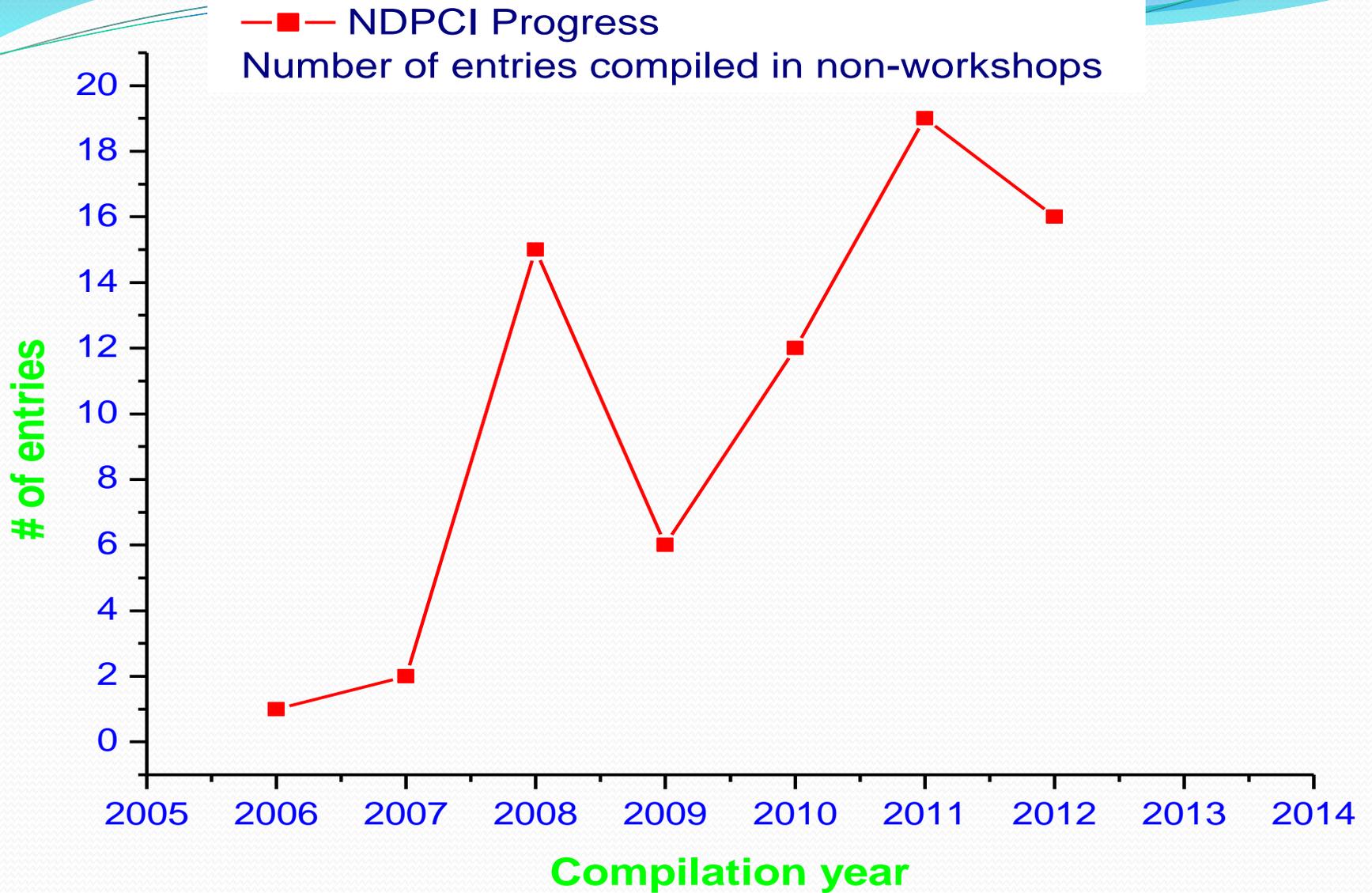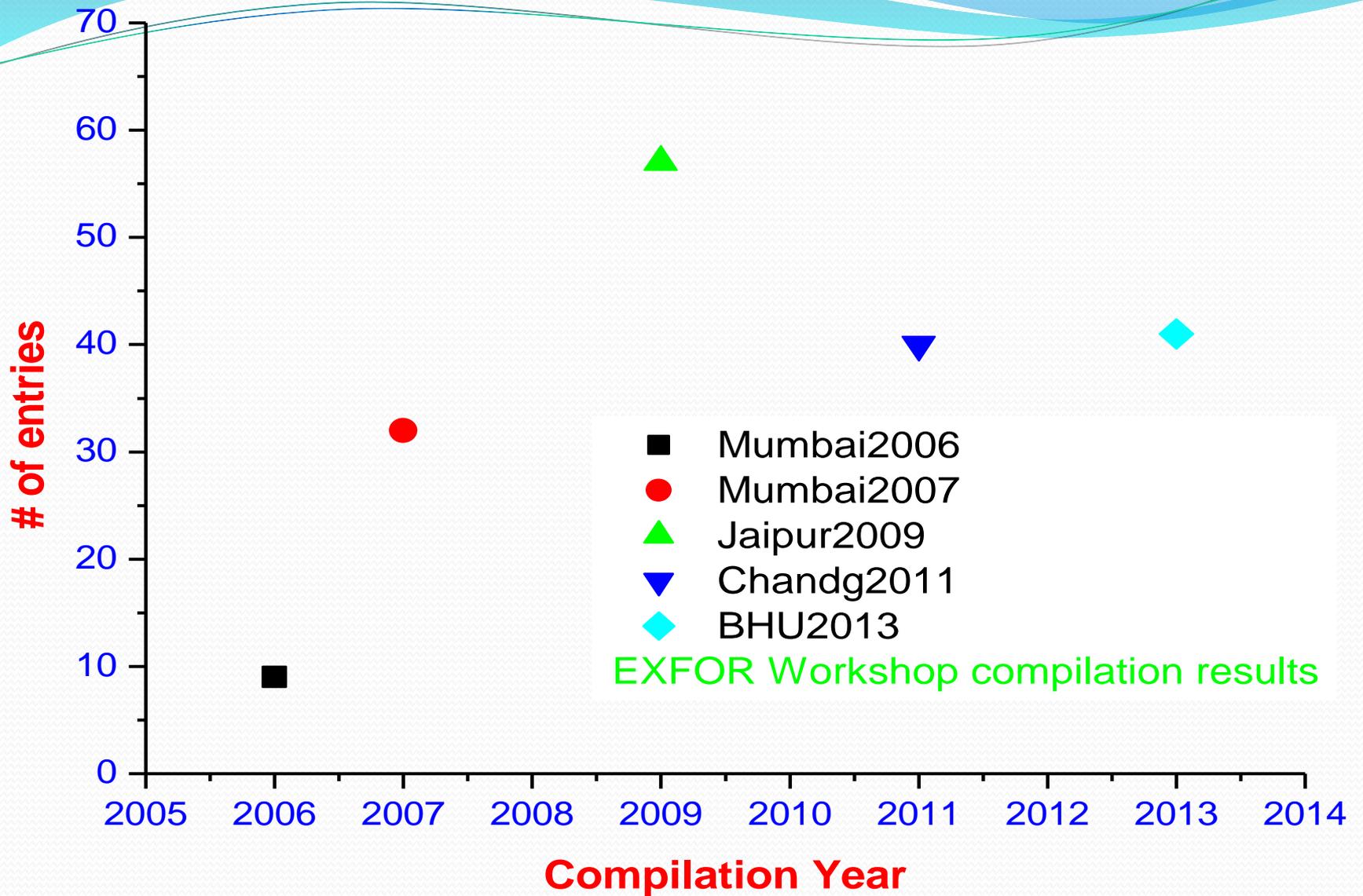
# of EXFOR compilations by different nuclear data centres

Legend: NNDC, NEADB, NDS, CJD, ATOMKI, CAJaD, CDFE, CNDC, CNPD, JCPRG, UkrNDC, NDPCI, KAERI

X-axis: Year (2005–2014)
Y-axis: # of entries (0–200)

II. Brief progress report on the activities of NDPCI during 2012-2013.

- EXFOR compilation on a regular basis has been started since 2012 through funds given by NDPCI to Universities.
- There are few voluntary compilers who have been doing compilations since 2006 in their respective laboratories.

NDPCI Projects on EXFOR:

Sl.No	Title of the Project	PI/CI	PCs	Amount (Rupees)	Period	Staff	Institute
1	EXFOR compilation of nuclear Data	B.Jyrwa	S.Ganesan, A.Saxena, H.Naik (BARC)	8.15 lakhs	2011-2013	R. Ghosh S.Badwar (Project Assistant)	NEHU
2	EXFOR Compilation of Nuclear Reaction Data	S.N.Roy	G.Mukherjee (VECC), A.Saxena (BARC)	9.11 lakhs	2012-2014	U.S.Ghosh K.Mondal (Project Assistant)	Vishva-Bharati University
3	Measurements, EXFOR compilation and theoretical study of nuclear data	B.Lalremruata H.H.Thanga	S.V.Suryanarayana, A.Saxena, H.Naik (BARC)	24.69 Lakhs	2012-2015	L.Punte(JRF) Postdoc position yet to be filled	Mizoram University

We are evolving a mechanism to coordinate the EXFOR compilation activities with IAEA-NDS

EXFOR Compilation Procedure
Naohiko Otsuka (IAEA-NDS, 2012-03-19 Rev.)

List of article for EXFOR compilation
Central EXFOR CoCoS (EXFOR Compilation Control System)
http://www-nds.iaea.org/exfor-master/x4compil/progress_India.htm
Indian EXFOR CoCoS (EXFOR Compilation Control System)
http://www-nds.iaea.org/nrdc/india/

EXFOR software
NRDC Software (editor, digitizer, checking code etc.)
http://www-nds.iaea.org/nrdc/nrdc_sft/
ORDER+CHEX on WEB: http://www.jcprg.org/exfor/tool/
E-mail address (to be included in all communications)
ganesan555@gmail.com, aloks279@gmail.com, marema08@gmail.com, n.otsuka@iaea.org

	Who	What
1	Compiler	Ask Naohiko a new article.
2	Naohiko	Send a new article with its entry number to the compiler. (Normally figures and tables for compilation are also provided with their REACTION codes.)
3	Compiler	Send authors a request of numerical data.
4	Compiler	Compile the article. Indicate the request of data by `(UNOBT) Request sent to A.B.Author by e-mail (2012-03-15)` under the keyword STATUS. This will be deleted when the compiler receive numerical data.
5	Compiler	Send two files (ordered EXFOR draft and its CHEX output) to Rema when the entry is made.
6	Rema	Check - if BIB information (Title, Author, Institute, Reference) is coded as given in the article. - if CHEX error messages are removed as much as possible. (Ask Naohiko if these messages are not understandable.)
7	Rema	Make correction with the compiler when necessary.
8	Rema	Send the corrected file to Naohiko.
9	Naohiko	Do further checking and correct the file with Rema when necessary.
10	Naohiko	Notify Rema and Compiler when the compilation is completed.

EXFOR entries prepared under NDPCI projects:

Serial No.	ENTRY #	COMPILER	STATUS	DATE of FINALIZATION
1	33034	MZU	Finalized	20120311
2	D6136	Ranjita Mandal(IIT-Kharagpur)	Finalized	20120430
3	D6127	Ranjita Mandal(IIT-Kharagpur)	Finalized	20120502
4	D6149	NEHU Team	Finalized	20120511
5	D6083	NEHU Team	Finalized	20120606
6	D6130	Ranjita Mandal(IIT-Kharagpur)	Finalized	20120703
7	D6154	Ranjita Mandal(IIT-Kharagpur)	Finalized	20120704
8	D6129	NEHU Team	Finalized	20120712
9	D6133	NEHU Team	Finalized	20120713
10	33037	Paresh Prajapati	Finalized	20120723
11	D6144	Ranjita Mandal(IIT-Kharagpur)	Finalized	20130109
12	D6158	NEHU Team	Finalized	20120921
13	D6152	NEHU Team	Finalized	20121024
14	D6156	NEHU Team	Finalized	20121127
15	D6157	NEHU Team	Finalized	20121022
16	D6164	NEHU Team	Finalized	20120606
17	D6169	NEHU Team	Finalized	20121204
18	D6143	VECC team	Finalized	20120925
19	D6161	VECC team	Finalized	20130109
20	33041	VECC team	Finalized	20120829
21	D6132	NEHU Team	Finalized	20130404
22	D6165	NEHU Team	Finalized	20130404
23	D6207	NEHU Team	Pending	
24	D6208	NEHU Team	Pending	

Sheet1 / Sheet2 / Sheet3

On Behalf of NDPCI,

B. Lalremruata(Mizoram University), P.D.Krishnani(BARC), R.Ghosh and S.Badwar(NEHU) participated "The AASPP Workshop ,The 3rd Asian Nuclear Reaction Database Development Workshop, Pohang Accelerator Laboratory, Pohang, Korea, 27-29 August, 2012"

B. Lalremruata also participated in Benchmarking of Digitization Software, (Consultants' Meeting, 12 to 14 November 2012, IAEA Headquarters, Vienna, Austria)

The 5th DAE-BARC theme meeting on EXFOR compilation of nuclear data" *2013 (Varanasi, Banaras Hindu University, Feb 18-22).*

Dr. S.Ganesan

S.Dunaeva

N.Otsuka

NRDC Meeting, 23-25 April 2013, IAEA Headquarters, Vienna, Austria.

Details about the BHU EXFOR workshop

Local Convener:
Ajay Tyagi(BHU)
Technical Convener:
Alok Saxena(BARC)

Faculty:
N. Otsuka (IAEA-NDS),
S. Dunaeva (Center of Nuclear- Physics Data RFNC-VNIIEF, Russia)
Vidya Thakur (Hokkaido University)

Number of participants: ~ 51 (Graduate students+Research Scolars + Faculties from   universities and scientists from Research Centres)

***   *We concentrated on recent papers/articles (since 2010)*

Numerical Data Collection for articles compiled in BHU:

*** In the beginning of December 2012, N. Otsuka (IAEA-NDS) finalized the Indian articles to be compiled into EXFOR in the BHU, Varanasi workshop, 18-22 Feb 2013.

*** *4 neutron induced, 2 photonuclear articles, and 35 charged particle induced articles.*

*** *Out of 41 articles, 20 articles reported cross sections in Figures, and requires digitization.*

*** We started sending emails to authors at the end of December 2012 requesting the numerical data for those 20 articles.

*** We received numerical data of all the articles(18 of them) well in advance of the workshop from the authors *(Except for* D6188 - Data no longer available with author , G0504 - data never arrived although author promised to send).

*** This kind of positive response from the authors is well attributed to the continuous awareness efforts on nuclear data pursued by NDPCI for the past few years.

*** *The identification for coding into EXFOR of all the suitable Indian articles published in the literature was done in consultation with and by the IAEA-NDS staff (N.Otsuka).*

*** *Many experimentalists participated in the workshop, and they compiled their own paper into EXFOR.*

*** *As a result of workshops like this, we encourage authors and motivated young researchers to do compilation of their own work or send the numerical data to NDPCI for EXFOR compilation.*

***   Around 50 delegates worked from 9:30 AM to 7:00 PM every day. The Theme meeting was very unique, phenomenally successful and was not in the nature of an usual seminar or conference.

***   The morning session starts with Lectures on EXFOR basics, rules etc. by N. Otsuka and S. Dunaeva, followed by practical sessions in the afternoon when participants work on EXFOR compilation for the articles assigned to them.

***   During the practical sessions, discussions over some doubts on the EXFOR coding as well as on the physics with experts took place.

*** After the compilation is completed, every participant checked their respective EXFOR entries with the help of website (www.oecd-nea.org/janisweb). These entries were submitted to S. Dunaeva for further checking and corrections along with explanations were done on the spot.

*** As a follow up of the workshop, S. Dunaeva spent about a week, as a visiting scientist, at BARC, Mumbai after the BHU theme meeting to finalize the entries before they can be sent for approval from authors, and at this stage, she sent the corrections to be made to the participants, and the updated entries were then submitted back to her. She then submitted the entries to Naohiko.

*** Even after the workshop, we received many requests from the participants for articles to be compiled into EXFOR!!

Sl.No	Entry #	Reference	Lab.	Compiler
1	33039	J,JRN,292,745,2012	3INDTRM	V.K.Mulik
2	33042	J,ANE,47,160,2012	3INDTRM	S.S. Manian
3	33043	J,JRN,293,469,2012	3INDTRM	V.K.Mulik
4	33044	J,PRM,79,249,2012	3INDTRM	Arindam Chakraborty
5	D6171	J,CHP,49,884,2011	3INDVEC	R.Ghosh
6	D6172	J,EPJ/A,47,118,2011	3INDTRM	S.S.Manian
7	D6173	J,EPJ/A,47,156,2011	3INDNSD	S.Badwar
8	D6174	J,EPJ/CS,17,03004,2011	3INDTRM	N.P.Sathik
9	D6175	J,EPJ/CS,17,03006,2011	3INDNSD	Hranghmingthanga
10	D6176	J,EPJ/CS,21,10009,2012	3INDNSD	B.Jyrwa
11	D6177	J,IMP/E,20,645,2011	3INDNSD	U.S.Ghosh
12	D6178	J,IMP/E,20,2119,2011	3INDVEC	M.M.Musthafa
13	D6179	J,IMP/E,20,2305,2011	3INDTRM?	B. Lalremruata
14	D6180	J,NP/A,874,14,2012	3INDTRM	Vidya Thakur
15	D6181	J,NP/A,879,107,2012	3INDVEC	Kalyan Mondal
16	D6182	J,NP/A,882,62,2012	3INDTRM	Najmunnisa
17	D6183	J,PR/C,81,044610,2010	3INDNSD	B.Satheesh
18	D6184	J,PR/C,83,034616,2011	3INDTRM	B.Satheesh
19	D6185	J,PR/C,83,054604,2011	3INDVEC	Najmunnisa
20	D6186	J,PR/C,83,064606,2011	3INDTRM	Arindam Chakraborty
21	D6187	J,PR/C,83,067601,2011	3INDTRM	B.Satheesh
22	D6188	J,PR/C,84,011602,2011	3INDTRM	S.Badwar
23	D6189	J,PR/C,84,014612,2011	3INDNSD	Bhavin Trivedi
24	D6190	J,PR/C,84,024614,2011	3INDNSD	R.Ghosh

23	D6189	J,PR/C,84,014612,2011	3INDNSD	Bhavin Trivedi
24	D6190	J,PR/C,84,024614,2011	3INDNSD	R.Ghosh
25	D6191	J,PR/C,84,031603,2011	3INDTRM	H.B.Sachhidananda
26	D6192	J,PR/C,84,044615,2011	3INDTRM	B.Satheesh
27	D6193	J,PR/C,84,067601,2011	3INDTRM	Munish Gupta
28	D6194	J,PR/C,85,014612,2012	3INDTRM	Parveen Kumari
29	D6195	J,PR/C,85,034606,2012	3INDNSD	H.B.Sachhidananda
30	D6196	J,PR/C,85,034614,2012	3INDNSD	Abhijit Bhattacharya
31	D6197	J,PR/C,85,064607,2012	3INDTRM	Lalrinmawia Punte
32	D6198	J,PR/C,86,014609,2012	3INDNSD	Amit Kumar
33	D6199	J,PR/C,86,014615,2012	3INDTRM	Abhijit Bhattacharya
34	D6200	J,PR/C,86,024607,2012	3INDTRM	S.S. Manian
35	D6201	J,RCA,99,359,2011	3INDTRM	B.S.Shivashankar
36	D6202	J,RCA,99,527,2011	3INDTRM	M.M.Musthafa
37	D6203	J,PR/C,87,014604,2013	3INDNSD	B.S.Shivashankar
38	D6204	J,IMP/E,21,1250059,2012	3INDVEC	B.Satheesh
39	D6205	J,PR/C,81,024603,2010	3INDTRM	B.Rudraswamy
40	G0504	J.IMP/E,20,2361,2011	3INDMNG	B.Satheesh
41	G0505	J,JRN,290,367,2011	3INDTRM	B.Rudraswamy

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NDPCI FUTURE PLANS

***   To identify and nurture potential young researchers for our future ventures into EXFOR Compilation and for various activities of NDPCI.

***   To continue supporting researchers through funds giving mechanisms to generate basic nuclear data for various applications. (for eg. Measurement of prompt neutron spectra for 232Th(n,f), neutron induced cx measurements using Li(p,n), D-T neutron sources etc)

***   Procurement of gamma spectrometry systemfor dedicated use by NDPCI at 40 Lakhs in 2013 is foreseen.

***   Web-design for NDPCI is under construction.

***   The 6th Indian EXFOR compilation workshop is planned for in Jan.2015 at Bangalore University. It is under informal discussions. Application for funding will be made.

Acknowledgement:

THANK YOU VERY MUCH FOR YOUR ATTENTION!!