



**International Atomic Energy Agency**

**IAEA Nuclear Data Section: Progress  
Report for period 2015/16**

**A.J. Koning**

**Nuclear Data Section**

**Department of Nuclear Sciences and Applications**

# NDS Staff

## ● 12 Professional + 4 Support staff

- Ann Jensby moved from Nuclear Data Development Unit to Secretariat of the Policy-making Organs in April 2015.
- Robin Forrest (Section Head) retired on 30 June 2015.
- Arjan Koning joined in July 2015 as Section Head.
- Malgorzata Rydeng joined in Nuclear Data Development Unit in April 2015, and moved to Soil and Water Management and Crop Nutrition Section in September 2015.
- Lidija Vrapcenzak returned from maternity leave to Nuclear Data Services Unit as Nuclear Data Services Assistant in September 2015.
- Kira Nathani returned from Nuclear Data Service Unit to Nuclear Data Development Unit as Team Assistant in September 2015.
- Stanislav Simakov (Head of Nuclear Data Services Unit) retired on 31 January 2016.



## **EXFOR transmission**

- **During the reporting period, the following final tapes have been transmitted:**
  - **5 neutron final TRANS tapes (3169 – 3173) containing 51 new entries and 79 revised entries;**
  - **7 CPND final TRANS tapes (D098 – D103, S019) containing 129 new entries and 58 revised entries;**
  - **3 PhND final TRANS tapes (G032 - G034), containing 24 new entries and 3 revised entries.**



# Number of new entries transmitted by final tapes in May 2015 - May 2016

(NK: Nurzat Kenzhebeyev, MO: Myagmarjav Odsuren)

	<b>NDS</b>	<b>ATOMKI</b>	<b>CNDC</b>	<b>KNDC</b>	<b>NDPCI</b>	<b>UkrNDC</b>	<b>NK</b>	<b>MO</b>	<b>Sum</b>
<b>Neutron</b>	<b>32</b>	<b>-</b>	<b>0</b>	<b>3</b>	<b>16</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>51</b>
<b>CPND</b>	<b>15</b>	<b>18</b>	<b>30</b>	<b>11</b>	<b>26</b>	<b>11</b>	<b>7</b>	<b>11</b>	<b>129</b>
<b>PhND</b>	<b>5</b>	<b>-</b>	<b>-</b>	<b>8</b>	<b>6</b>	<b>5</b>	<b>-</b>	<b>-</b>	<b>24</b>
<b>Sum</b>	<b>52</b>	<b>18</b>	<b>30</b>	<b>22</b>	<b>48</b>	<b>16</b>	<b>7</b>	<b>11</b>	<b>204</b>



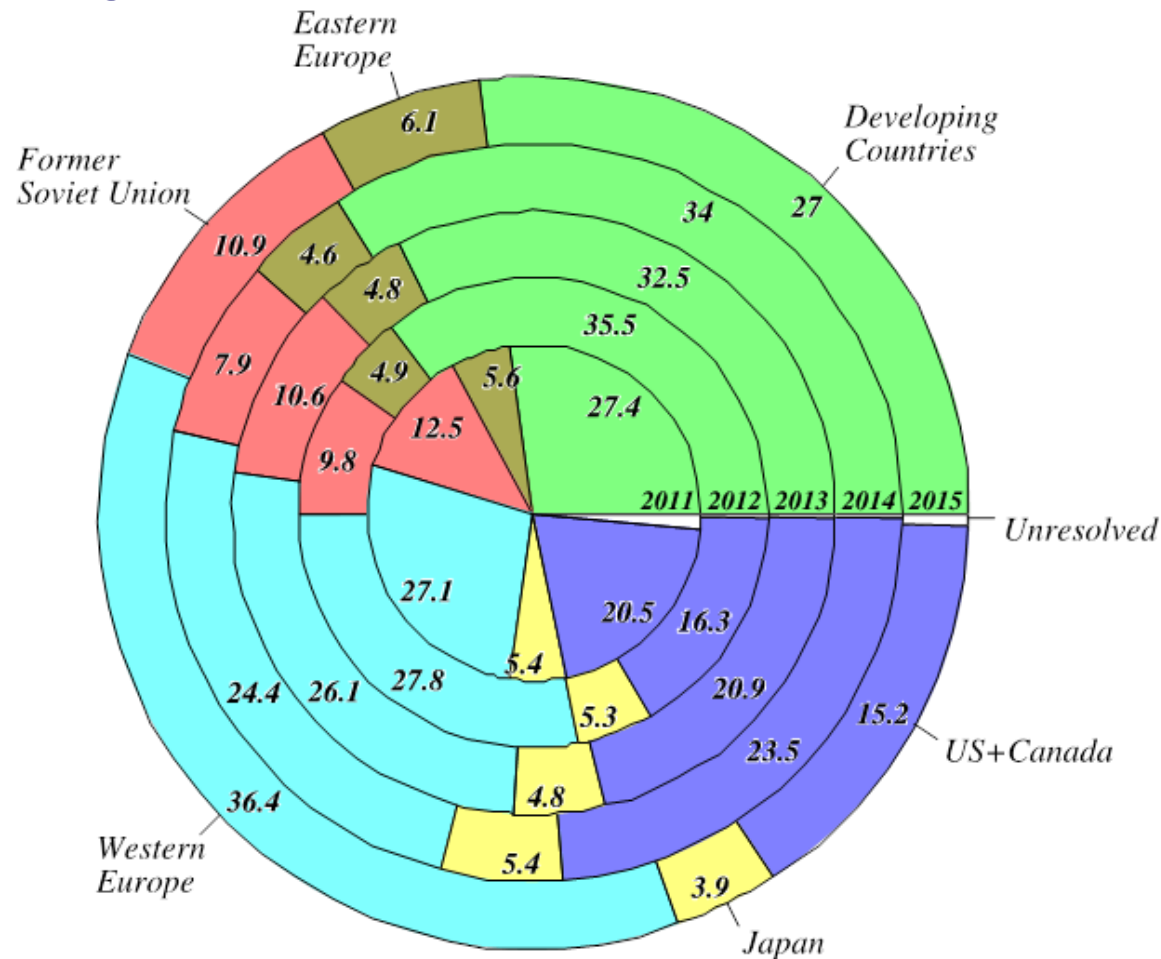
# Other EXFOR progress

- Over 22,000 EXFOR entries
- Consultants' Meeting on EXFOR Compilation of Thermal Neutron Scattering Data, 2 - 4 November 2015, Vienna, Scientific Secretary: V. Semkova).
- During the reporting period, 365 new datasets from 50 publications were transmitted to IBANDL.
- EXFOR-PDF database: 22 updates (now in total: 25,633 PDF files)
- new web interface: database listing with information EXFOR and NSR databases and links to retrieval systems accessible from MyEnsdf, MyExfor and EXFOR web systems



# IAEA Nuclear Data services: Web statistics

## Geographical distribution



# Coordinated Research Projects (CRP)

CRPs - Technical reports	2009	2010	2011	2012	2013	(6) 2014	(6) 2015	(6) 2016	(6) 2017	(5) 2018
Technical report (Capote Noy): <i>Nuclear Data Sheets 131</i> (2016) 1-106 <b>Prompt fission neutron spectra of actinides</b>										
Technical report (Dimitriou) <b>Development of a reference database of Particle-Induced Gamma-ray Emission Spectroscopy (PIGE)</b>										
Technical report (Capote Noy) <b>Nuclear data for charged-particle monitor reactions and Medical isotope production</b>										
Technical report (Dimitriou) <b>Reference Database for beta-delayed Neutron Emission</b>										
Technical report (Simakov/Trkov) <b>Testing and improving the International Reactor Dosimetry and Fusion File (IRDF)</b>										
Technical report (Simakov/Koning) <b>Primary radiation damage cross sections</b>										
Technical Report (Capote Noy) <b>RIPL for fission cross section calculations</b>										
Technical Report (Dimitriou) <b>Updating the photonuclear data library and generating a reference database for photon strength functions</b>										

Coordinated Research Projects (CRPs) - an IAEA tool to produce outputs by encouraging collaboration between various parties

New CRP's are discussed  
at our biannual INDC meeting (next: June 27-30 2016)



# Data Development projects

- **Maintain the international neutron cross section standards file and evaluation techniques**
- **CIELO collaboration: coordination and technical work**
- **Neutron data evaluation work up to 150 MeV:  $^{55}\text{Mn}$  nucleus**
- **Ion Beam Analysis Nuclear Data Library (IBANDL)**
- **Development of evaluation methodology and nuclear reaction modelling systems**
- **Evaluation of charged-particle-induced reaction data in the resolved-resonance region for applications**
- **Improvement of analysis codes for nuclear structure and decay data evaluations**
- **Stopping power database**
- **Total absorption gamma-ray spectroscopy (TAGS): Decay data for decay heat calculations and other applications**
- **Data for Safeguards**
- **Nuclear Data Libraries for Advanced Systems: Fusion Devices (FENDL-3)**
- **Thermal scattering law data**





# Collaborative International Evaluated Library” (CIELO) project

- Improve evaluated data for  $1\text{H}$ ,  $16\text{O}$ ,  $56\text{Fe}$ ,  $235,238\text{U}$  and  $239\text{Pu}$
- Set up a CIELO network to continue this effort for more targets subject to availability of resources
- **NDS** leading in a large publication (CRP) effort

## Prompt Fission Neutron Spectra of Actinides

R. Capote,<sup>1,\*</sup> Y.-J. Chen,<sup>2</sup> F.-J. Hamsch,<sup>3</sup> B. Jurado,<sup>4</sup> N. Kornilov,<sup>5</sup> J.P. Lestone,<sup>6</sup>  
O. Litaize,<sup>7</sup> B. Morillon,<sup>8</sup> D. Neudecker,<sup>6</sup> S. Oberstedt,<sup>3</sup> T. Ohsawa,<sup>9</sup> N. Otuka,<sup>1</sup>  
V.G. Pronyaev,<sup>10</sup> A. Saxena,<sup>11</sup> K.-H. Schmidt,<sup>4</sup> O. Serot,<sup>7</sup> O.A. Shcherbakov,<sup>12</sup> N.-C. Shu,<sup>2</sup>  
D.L. Smith,<sup>13</sup> P. Talou,<sup>8</sup> A. Trkov,<sup>1</sup> A.C. Tudora,<sup>14</sup> R. Vogt,<sup>15,16</sup> and A.S. Vorobyev<sup>12</sup>

<sup>1</sup>NAPC-Nuclear Data Section, International Atomic Energy Agency, Vienna, A-1400 Austria

<sup>2</sup>China Institute of Atomic Energy, China Nuclear Data Center, Beijing, China, 102413

<sup>3</sup>European Commission, Joint Research Centre - IRMM, Retieseweg 111, B-2440 Geel, Belgium

<sup>4</sup>CENBG, CNRS/IN2P3, Chemin du Solarium B.P.120, F-33175 Gradignan, France

<sup>5</sup>Physics and Astronomy Department Ohio University, Athens, OH 45701, USA

<sup>6</sup>Los Alamos National Laboratory, Los Alamos, NM 87544, USA

<sup>7</sup>CEA, DEN, DER, SPRC, F-13108 Saint-Paul-lez-Durance, France

<sup>8</sup>CEA, DAM, DIF, F-91297 Arpajon, France

<sup>9</sup>School of Science and Engineering, Kinki University, Higashi-osaka, Osaka-fu 577-8502, Japan

<sup>10</sup>Institute of Physics and Power Engineering, Obninsk, Russian Federation

<sup>11</sup>Nuclear Physics Division, Bhabha Atomic Research Centre, Mumbai 400 085, India

<sup>12</sup>Neutron Research Department, Petersburg Nuclear Physics Institute  
of NRC “Kurchatov Institute”, Gatchina, 188300, Russian Federation

<sup>13</sup>Argonne National Laboratory, 1710 Avenida del Mundo #1506, Coronado, CA 92118, USA

<sup>14</sup>University of Bucharest, Faculty of Physics, Magurele, POB MG-11, RO-077125, Romania

<sup>15</sup>Nuclear and Chemical Sciences Division, Lawrence Livermore National Laboratory, Livermore, CA 94551, USA

<sup>16</sup>Physics Department, University of California, Davis, CA 95616, USA

(Dated: July 31, 2015; Received xx July 2015; revised received xx September 2015; accepted xx October 2015)



# NSDD

- International Network of Nuclear Structure and Decay Data Evaluators (NSDD)
- Aim:
  - ▶ Provide up-to-date evaluated nuclear structure and decay data
- Regular meetings since 1974
- Last 20-24 April 2015 in Vienna see <http://www-nds.iaea.org/nsdd/>
- 18 evaluation centres
- **ENSDF** master database at NNDC

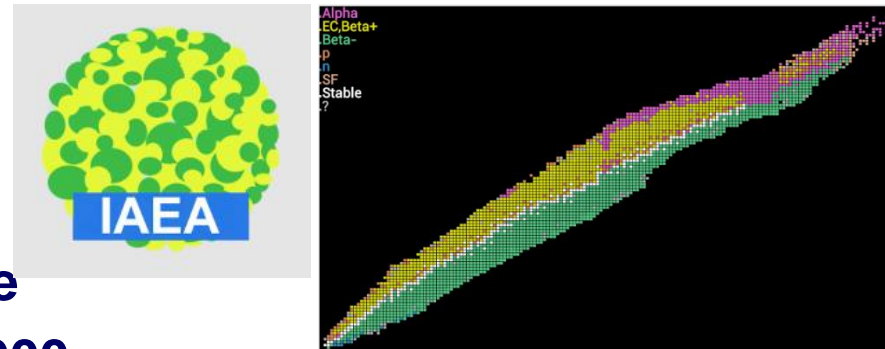


# Training

- Provide outreach in the form of training, especially to developing countries
- Workshops held at **ICTP Trieste** (3 in 2015)
  - ▶ Modern Methods in Plasma Spectroscopy, A+M (*March*)
  - ▶ Nuclear Data for Neutron Dosimetry and Analytical Methods by Applying Research Reactors (*April*)
  - ▶ Nuclear Data Measurements for Science and Applications in collaboration with n\_TOF/CERN (*October*)



# Isotope Browser – App for smart phones



- Interactive App for Tablet or phone
- Provides nuclide properties for 4,000 nuclides and isomers (data from ENSDF)
- Android version - Jul. 2013
- Apple version - Dec. 2014
- ~20,000 downloads so far (~1,200 x month)
- 2 new releases per year



- <https://play.google.com/store/apps>
- <https://itunes.apple.com>

Sort by name																	
1 H		Alkaline Metals										Other non-Metals				2 He	
3 Li		Alkaline Earth Metals				Transition Metals		Halogens				Noble Gases					
11 Na		Post Transition Metals				Metalloid		Lanthanides				Actinides					
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Lv	116 Ts	117 Og	118	
57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr			





# Thank you!

