

Progress Report of  
Nuclear Data Center of Japan Atomic Energy Agency  
for April 2015 – March 2016

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*Japan Atomic Energy Agency*



chaired by N. Yamano, Univ. of Fukui

## Subcommittee on Nuclear Data (H.Harada, JAEA)

- Activation Cross Section Evaluation WG (N.Iwamoto, JAEA)
- ENSDF Group (H.Iimura, JAEA)
- Japanese Nuclear Data Measurement Network (Y.Watanabe, Kyushu Univ.)

## Subcommittee on Reactor Constants (K. Okumura, JAEA)

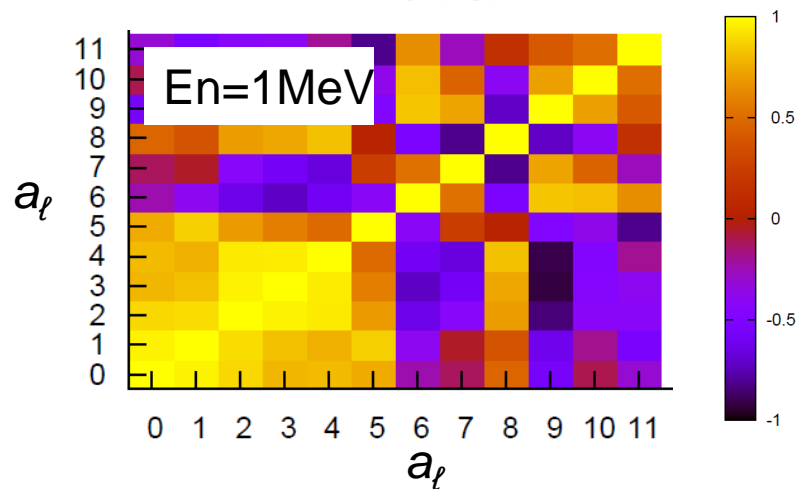
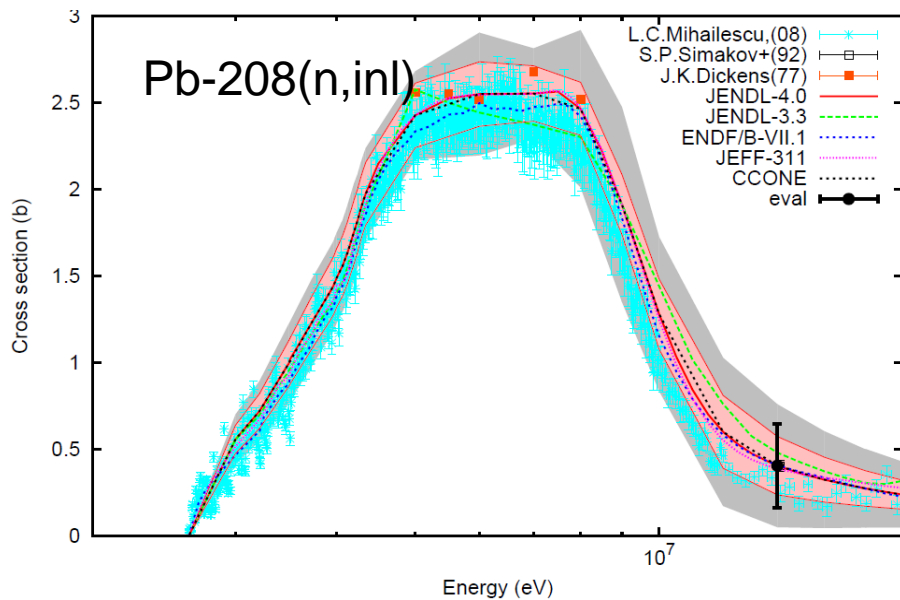
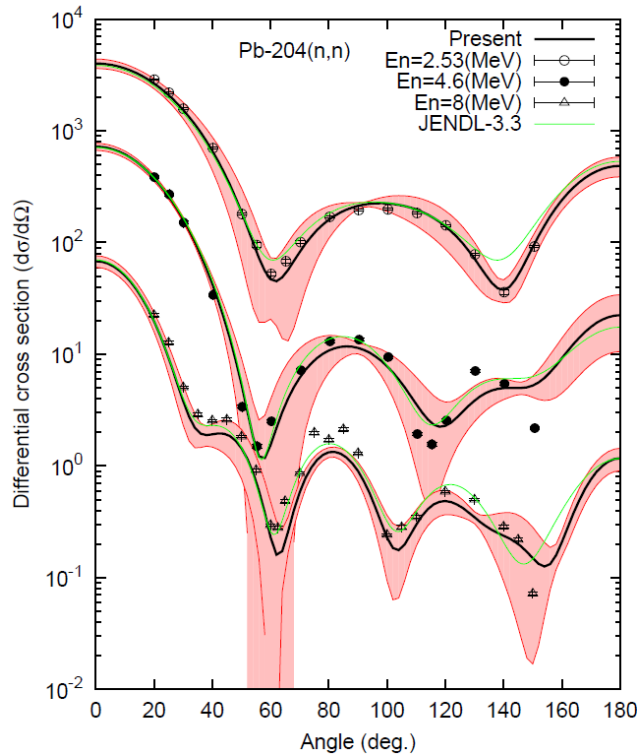
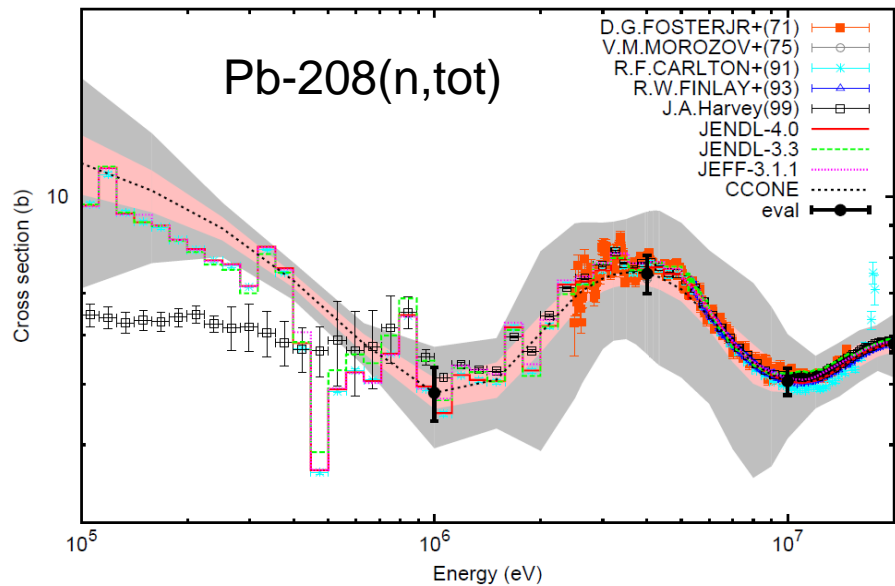
- Reactor Integral Test WG (G.Chiba, Hokkaido Univ.)
- Shielding Integral Test WG (C.Konno, JAEA)
- WG on Evaluation of Nuclide Generation and Decay Heat (K.Okumura, JAEA)
- Covariance Utilization WG (T.Iwasaki, Tohoku Univ.)
- Nuclear Data Processing Program WG (K.Suyama, JAEA)

A new subcommittee related to international strategy on nuclear data and neutronics calculation codes will be established in 2016.

# JENDL-4.0 update files

- Pb-204, 206, 207, 208
  - Covariance data were added.
  - cross sections (MF=33/MT=1, 2, 4, 16, 17, 51-91, 102)
  - angular distribution for elastic scattering (MF=34/MT=2)
- Rh-105
  - The target spin in RRR (MF/MT=2/151) was corrected.
  - The resonance parameters (pseudo resonance) were modified so as to reproduce the thermal capture cross section and resonance integral of Mughabghab et al.

# Covariance data of Pb isotopes



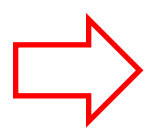
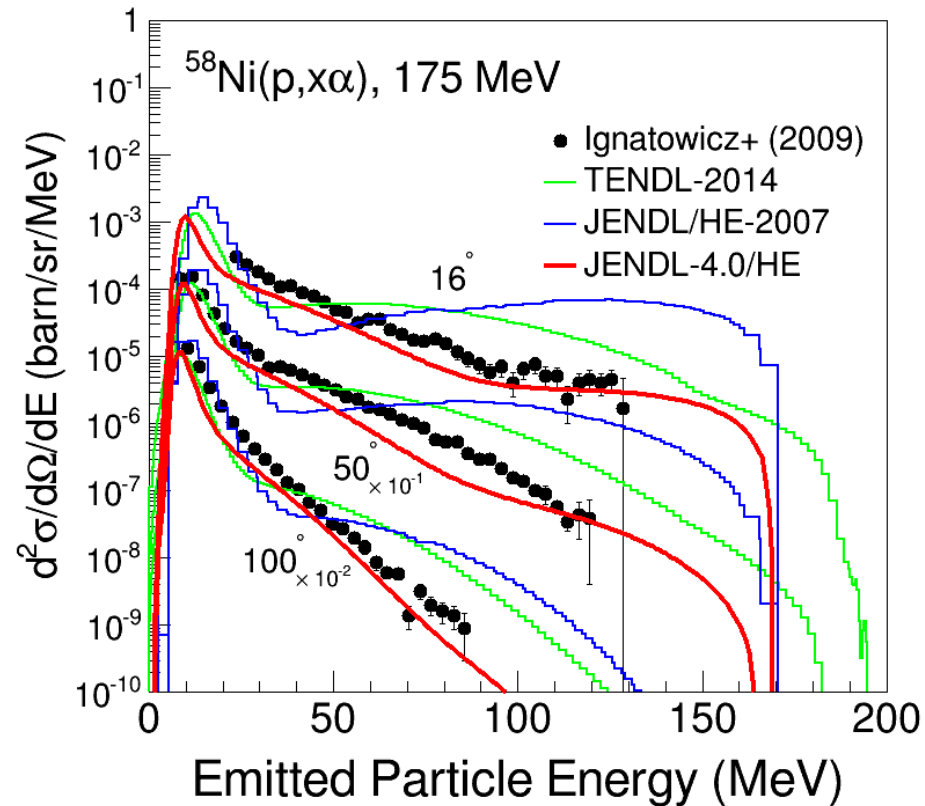
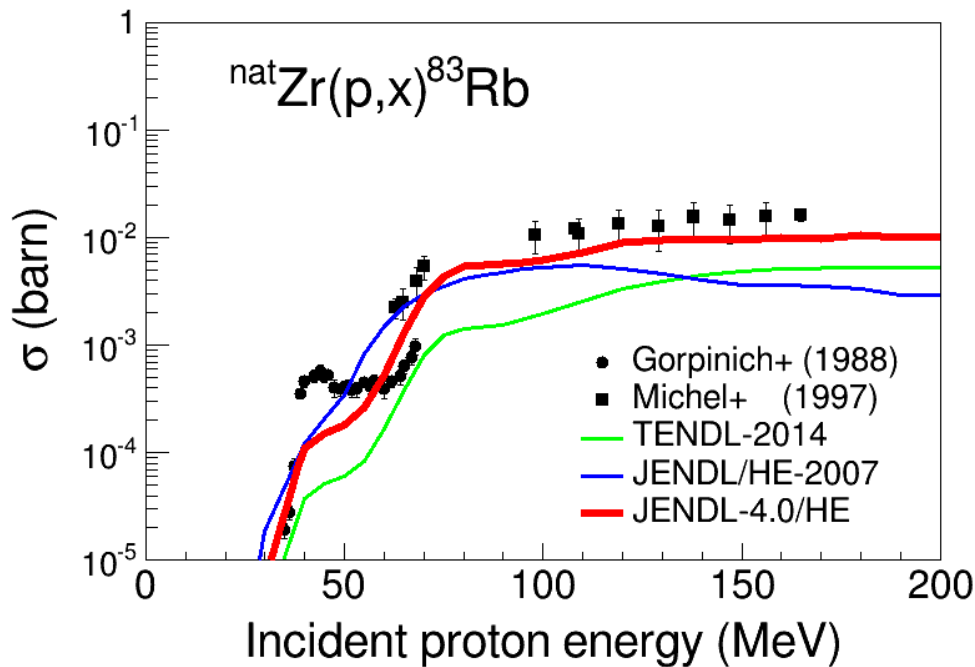
# Newly released libraries in 2015

- JENDL Decay Data File 2015 (JENDL/DDF-2015)
  - 3,237 nuclei of A= 1 to 260
  - JENDL/FPD-2011 (1,284 nuclei) + ENSDF (1,953 nuclei)
- JENDL-4.0 High Energy File (JENDL-4.0/HE)
  - an extended version of JENDL-4.0 up to 200 MeV
  - Neutron  $10^{-5}$  eV – 200 MeV (130 nuclei\*)
  - Proton 1 MeV – 200 MeV (133 nuclei\*)
  - DDX, residual production

# JENDL-4.0/HE CCONE Calculation

Isotope-production XS

composite-particle emission



Consistent with experimental data,  
obviously better than the other evaluations.

# JENDL-4.0/HE Light-nuclei

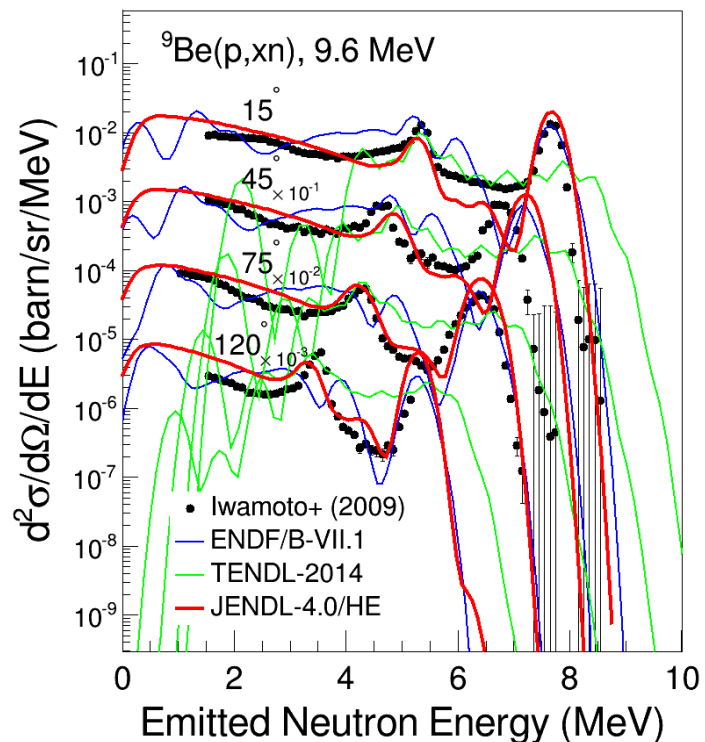
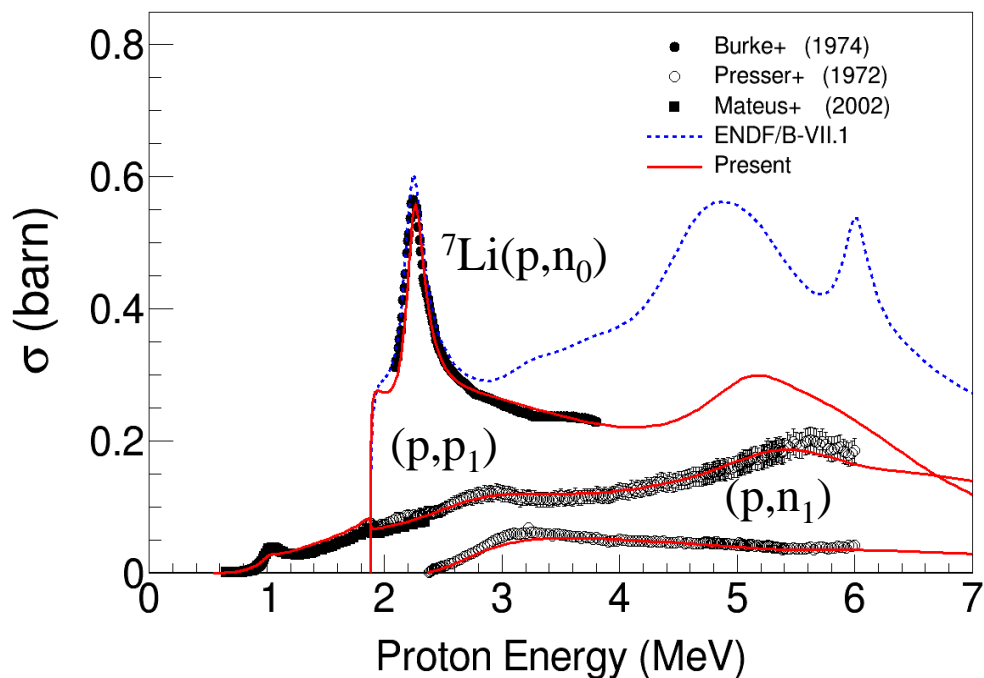
<sup>1,2</sup>H, <sup>6,7</sup>Li, <sup>9</sup>Be, <sup>12,13</sup>C, <sup>14,15</sup>N, <sup>16,18</sup>O, ...

- Inherited from JENDL/HE-2007,

- **New (p only) evaluation**

R-matrix analysis

OPTMAN +CCONE



# Activation Cross-section File for Decommissioning of LWRs

To be released as JENDL/AD-2016

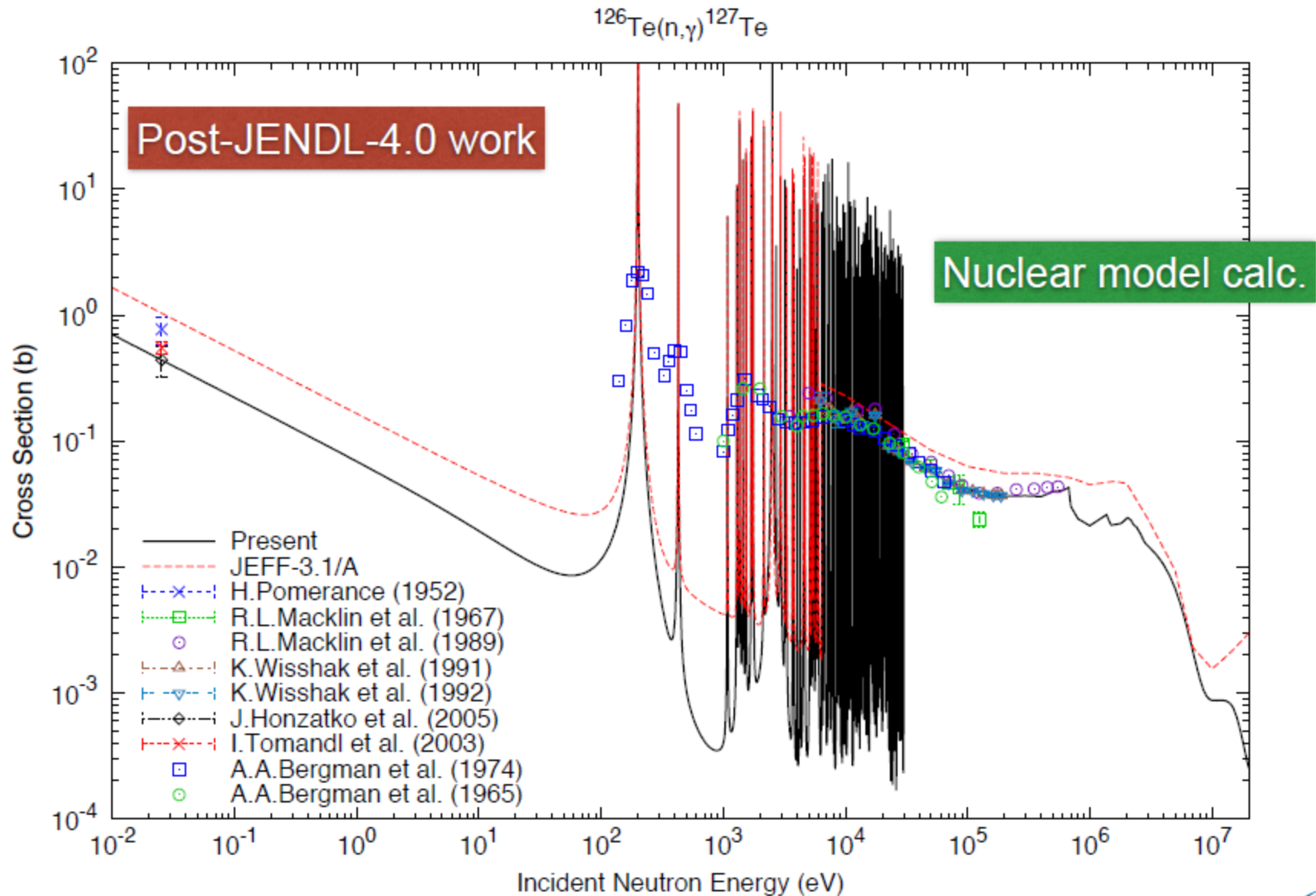
Compiled Results (T = 0 K, 293.6 K)

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• JENDL-4.0	50 nuclides
• JENDL-4.0 + $\alpha$	19 nuclides
• JENDL/A-96	1 nuclide
• JENDL/A-96 + $\alpha$	5 nuclides
• Nuclear model calc.	158 nuclides
• Nuclear model calc. + $\alpha$	69 nuclides
Total	302 nuclides



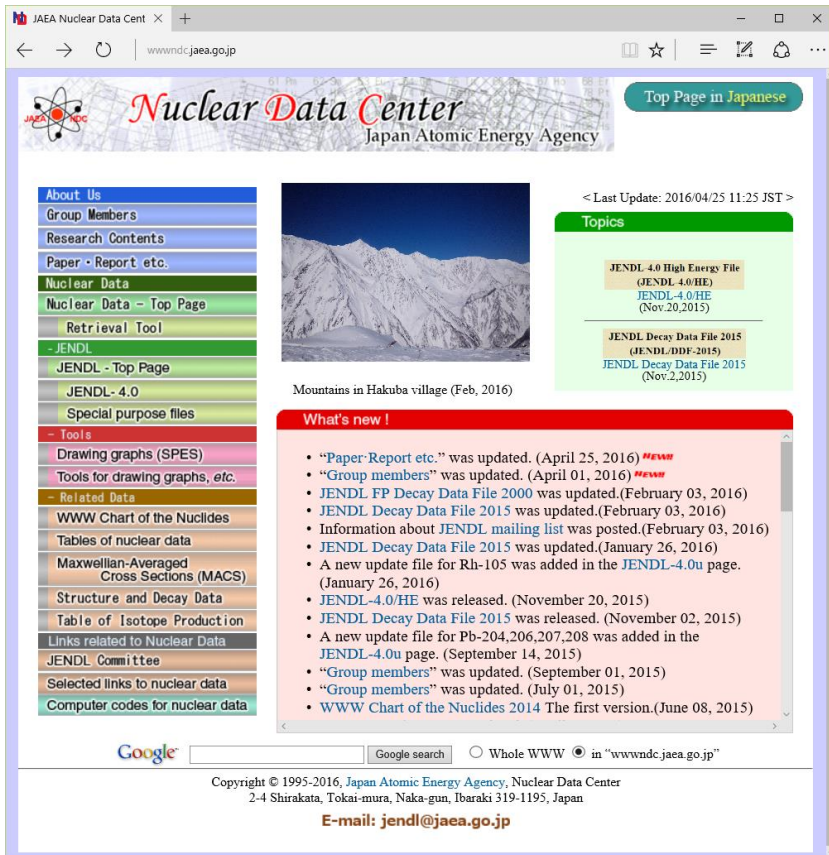
# Figure $^{126}\text{Te}(n,\gamma)^{127}\text{Te}$



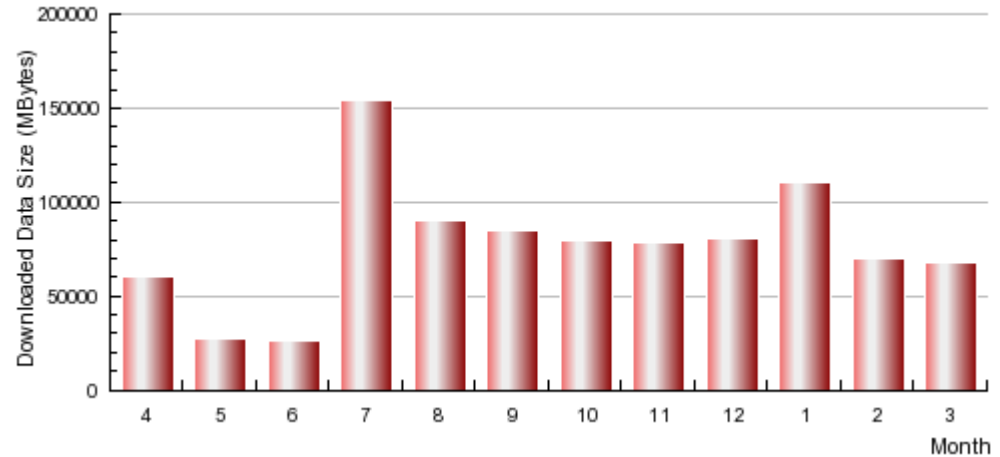
# Data service by web

wwwndc.jaea.go.jp

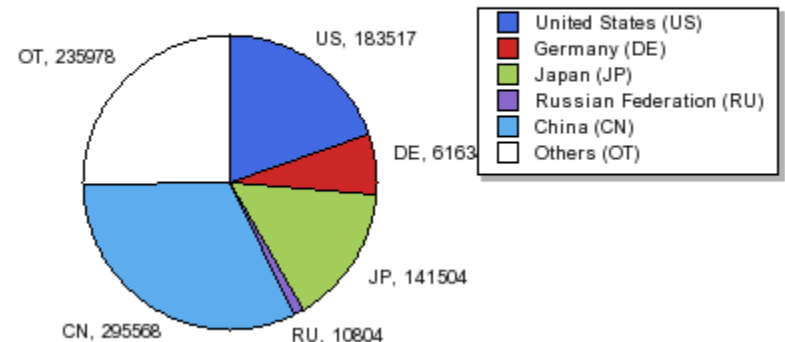
Downloaded data size in period of April 2013 to February 2014.



Downloaded Data Size (MBytes) [ 2015/04/01 - 2016/03/31 ]



Downloaded Data Size (MBytes) ( Top 5 ) [ 2015/04/01 - 2016/03/31 ]



\* Top 5 of nationalities about access times

# WWW Chart of the Nuclides 2014

- Web version of the Chart of the Nuclides 2014 was released on 8 June 2015. It contains basic nuclear properties such as mass, spin, half-life etc. The user interface was also updated from the previous version

**WWW Chart of the Nuclides 2014**

You can see the enlarged nuclear chart at [click point](#) or enter an **atomic number** (or **symbol** [CS or Cs, U or u, n:neutron]) and a **mass number**

Z:  A:

Atom: 0 Mass: 0 \*approximately

Click the nuclide name for more information. Other cursor mode can drag scroll.

-54 59ms	Zn-55 19.8ms	Zn-56 30.0ms	Zn-57 40ms	Zn-58 86ms	Zn-59 182.0ms	Zn-60 2.38n	Zn-61 1.49m *140ms	Zn-62 9.193h	Zn-63 38.47m	Zn-64 49.17	Zn-65 243.93n
	Cu-54 p 1.3E-15s	Cu-55 27ms	Cu-56 93ms	Cu-57 196.3ms	Cu-58 3.20s	Cu-59 1.36n	Cu-60 23.7m	Cu-61 3.333h	Cu-62 9.67m	Cu-63 69.15	Cu-64 12.701n
-52 0.8ms	Ni-53 55.2ms	Ni-54 107ms	Ni-55 204.7ms	Ni-56 6.075d	Ni-57 35.60h	Ni-58 68.077	Ni-59 7.6E-4y	Ni-60 26.223	Ni-61 1.140	Ni-62 3.6346	Ni-63 101.2y
-51 8.8ms	Co-52 104ms	Co-53 *247ms 240ms	Co-54 *1.49m 193.28ms	Co-55 17.53h	Co-56 77.236d	Co-57 271.74d	Co-58 70.86d *9.10h	Co-59 100	Co-60 1.650h *10.467m	Co-61 1.650h	Co-62 *13.869h 1.54m
-50 55ms	Fe-51 303ms	Fe-52 8.275h *45.3s	Fe-53 8.51m *2.538m	Fe-54 5.84s	Fe-55 2.744y	Fe-56 91.754	Fe-57 2.119	Fe-58 0.282	Fe-59 44.495d	Fe-60 2.626E6y	Fe-61 5.98n
-49 82ms	Mn-50 *1.75m 283.19ms	Mn-51 46.2m	Mn-52 5.591d *21.1m	Mn-53 3.7456y	Mn-54 312.05d	Mn-55 100	Mn-56 2.5789h	Mn-57 1.42m	Mn-58 *1.09m 3.0s	Mn-59 4.59s	Mn-60 *1.77s 280ms
-48 1.56h	Cr-49 42.3m	Cr-50 4.34s G. 1.3E18y	Cr-51 27.701d	Cr-52 83.789	Cr-53 9.501	Cr-54 2.365	Cr-55 3.497m	Cr-56 5.94m	Cr-57 21.1s	Cr-58 7.0s	Cr-59 460ms
-47 2.6m	V-48 15.9735d	V-49 330d	V-50 0.250 1.4E17y	V-51 99.750	V-52 3.743m	V-53 1.543m	V-54 49.8s	V-55 6.54s	V-56 216ms	V-57 320ms	V-58 191ms

### 27-Co-60

**Spin**

Level energy (keV)	Spin & Parity
ground state	5+
5.86030E+01	2+

Mass (The Ame2012 atomic mass evaluation (II) by M.Wang, G.Audi, A.H.Wapstra, F.G.Kondev, M.MacCormick, X.Xu, and B.Pfeiffer Chinese Physics C36 p. 1603-2014, December 2012)

59.933816299 ± 0.000000561 (amu) [mass excess = -61649.720 ± 0.523 (keV) ]

**Beta-decay energy** (calculated as  $M(A,Z)-M(A,Z+1)$ , taken from Ame2012)

2822.913 ± 0.212 (keV)

**Strong Gamma-rays from Decay of Co-60** (Compiled from ENSDF as of March 2011)

[ Intensities before May 23th of 2013 were values when total intensity of the decay mode was 100(%) and a branching ratio of each decay mode was not multiplied. ]

$\gamma$ -ray energy (keV)	Intensity (%)	Decay mode
826.28	~ 8.E-03	B-
1332.50	0.24	B-
2158.77	~ 7.E-04	B-
58.60	--	IT
826.10	8.E-03	B-
1173.23	99.95	B-
1332.49	99.98	B-

\*: relative, ~ approximate, ? calculated or estimated  
>: greater than or equal to, <: less than or equal to  
[ Intensities: total intensity of the nuclide is 100(%) . ]

**Decay data**(Chart of the Nuclides 2014)

Abundance or Half-life  
5.271y

**Evaluated Data Libraries**

[Links to the libraries.](#)