

Manipulation of Experimental Data with NDPlot

JIN Yongli, WANG Jimin, TAO Xi

China Nuclear Data Center (CNDC)

China Institute of Atomic Energy (CIAE)

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- 1. What is NDPlot**
- 2. Application examples of NDPlot**
- 3. Correction of EXFOR data**
- 4. Summary**

1.1 Nuclear Data Service in China (NDS-C)

On-line

NDS-C

nuclear reactor

nuclear fuel

nuclear chemistry

scientific research

experiments

Offline

Evaluation
Processing
Calculation
...

...

evaluation

Starting from 2000, more than 20 years



Nuclear data are essential to develop, produce and use nuclear medicines.

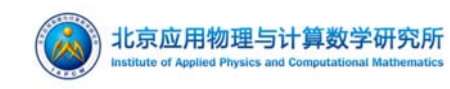
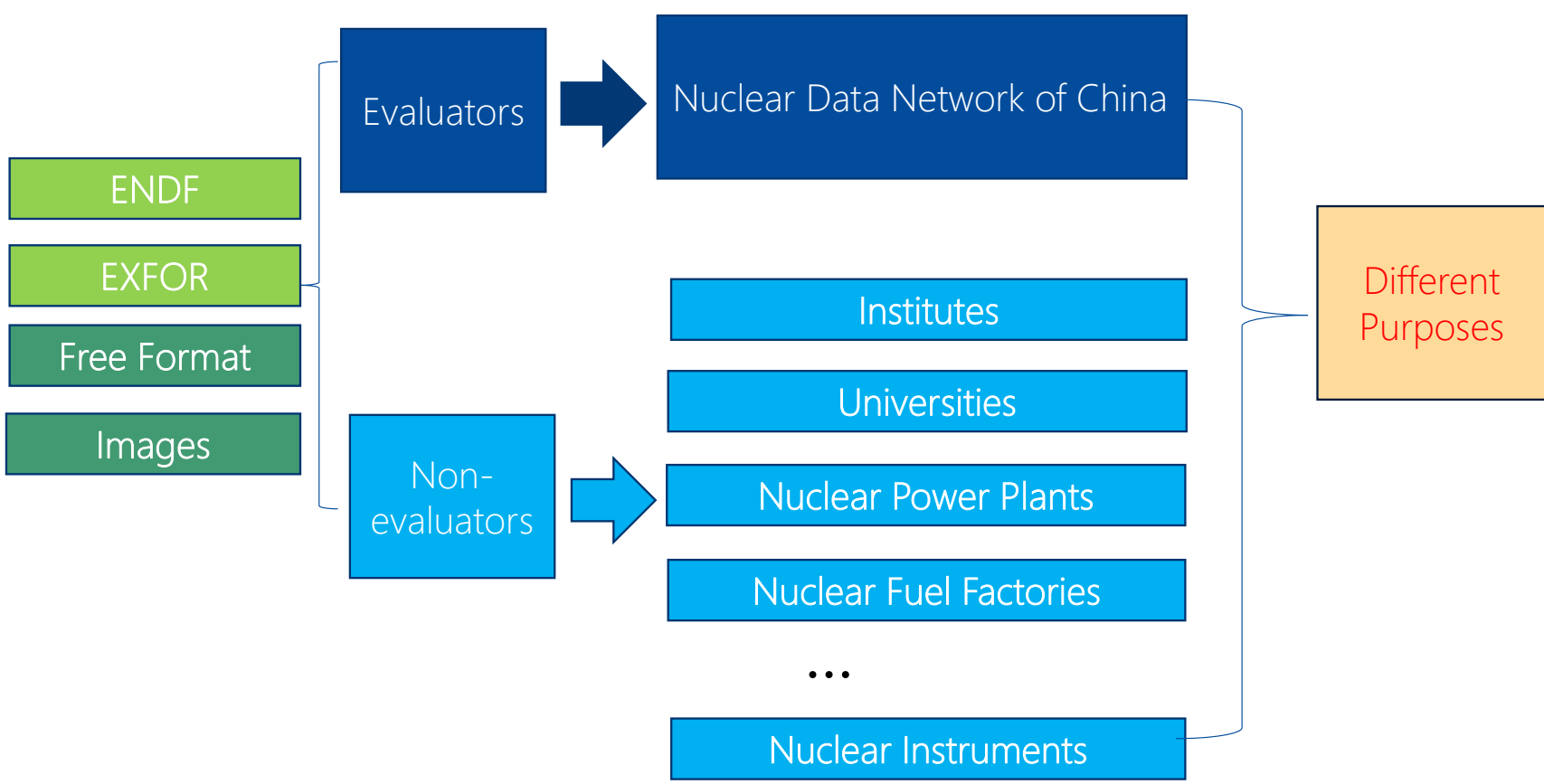


10s of millions of patients undergo treatment involving nuclear medicine every year. And that number is growing.

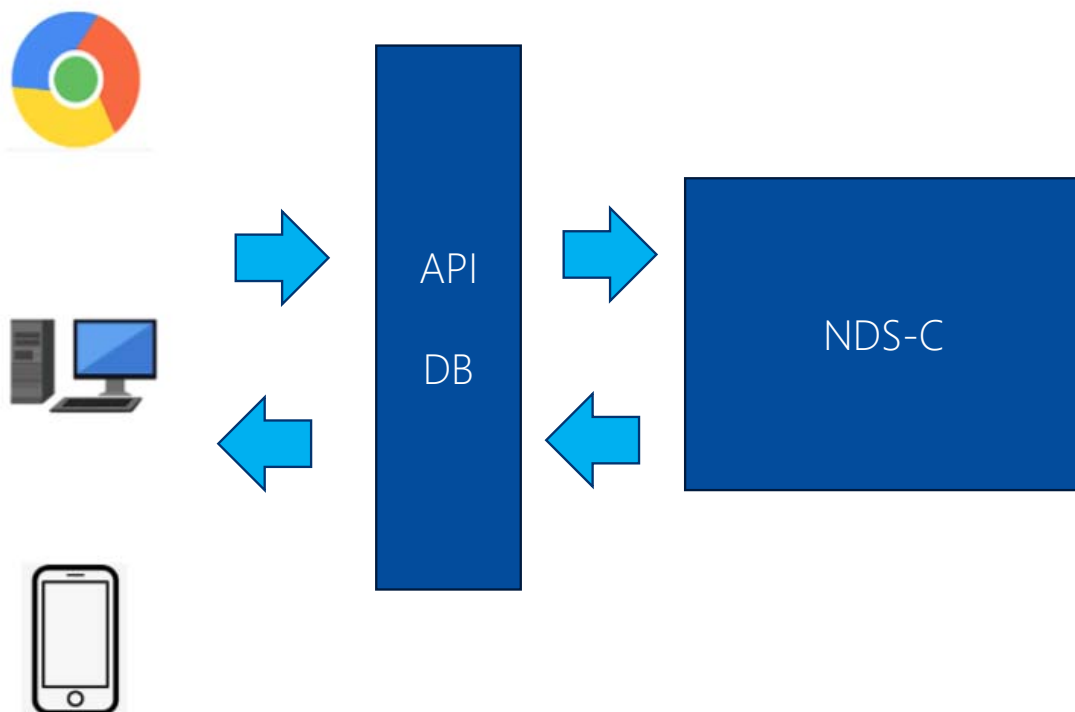


1. What is NDPlot

1.2 The Goal of the NDS-C



1.3 API: Provides Uniform Data Processing



Advantages

- Easy to maintain
- Reduce code redundancy
- Enhance flexibility
- Cross-Platform independent
- Increase dev. efficiency

1.4 Software and Tools Based on NDS-C' s API



Desktop
Applications

NDPlot



Nuclear Reaction Data Analysis,
Comparison, Visualization

BatchPlot



Batch Plotting tool for comparison,
Visualization

CovPlot



Covariance Data
Analysis, Visualization

GDGraph



Image Digitization

FissionYield



Fission Yield Data
Batch Retrieval

Decay



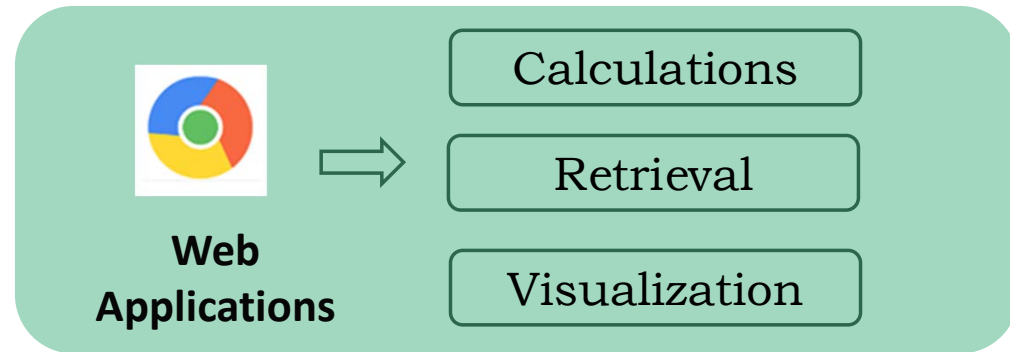
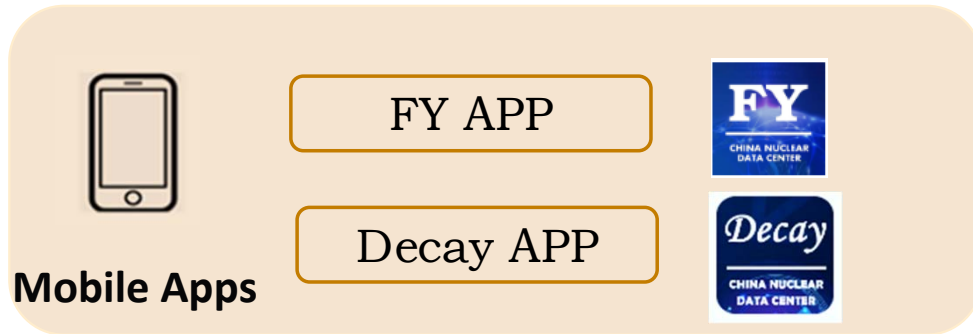
Decay Data
Batch Retrieval

EXFOR-SIG



EXFOR Cross-sections Data
Batch Retrieval, ML Datasets

1. What is NDPlot



Why is Desktop

- Local File
- Data Mining
- Batch Task
- Dev. For GUI is easier
- Save work in progress
-  Powerful

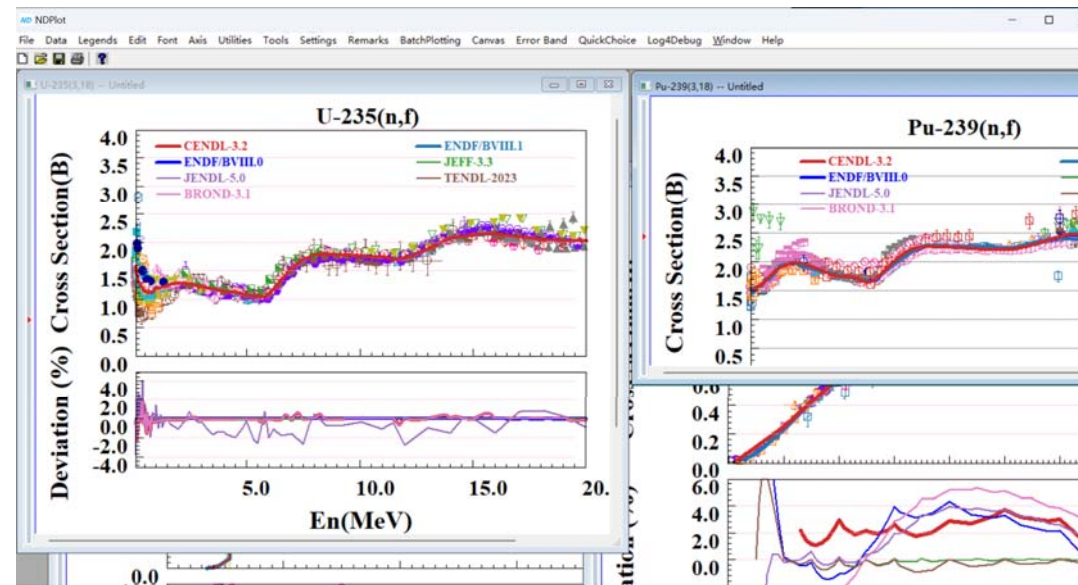
Disadvantages

- Less convenient for users
- Platform-dependent

1.5 NDPlot

Features

- All-in-one project file: ND、NDS
- ENDF/EXFOR/FREE format
- Work with GDGraph, BatchPlot
- Template is available
- Clipboard: data, image
- CS, DA, DE, DAE, FY, natural nuclide data processing, photon production CS, Radioactive production CS ...
- Ratio, summation, emitted particle energy spectrum shape analysis, covariance data analysis, integral, interpolation

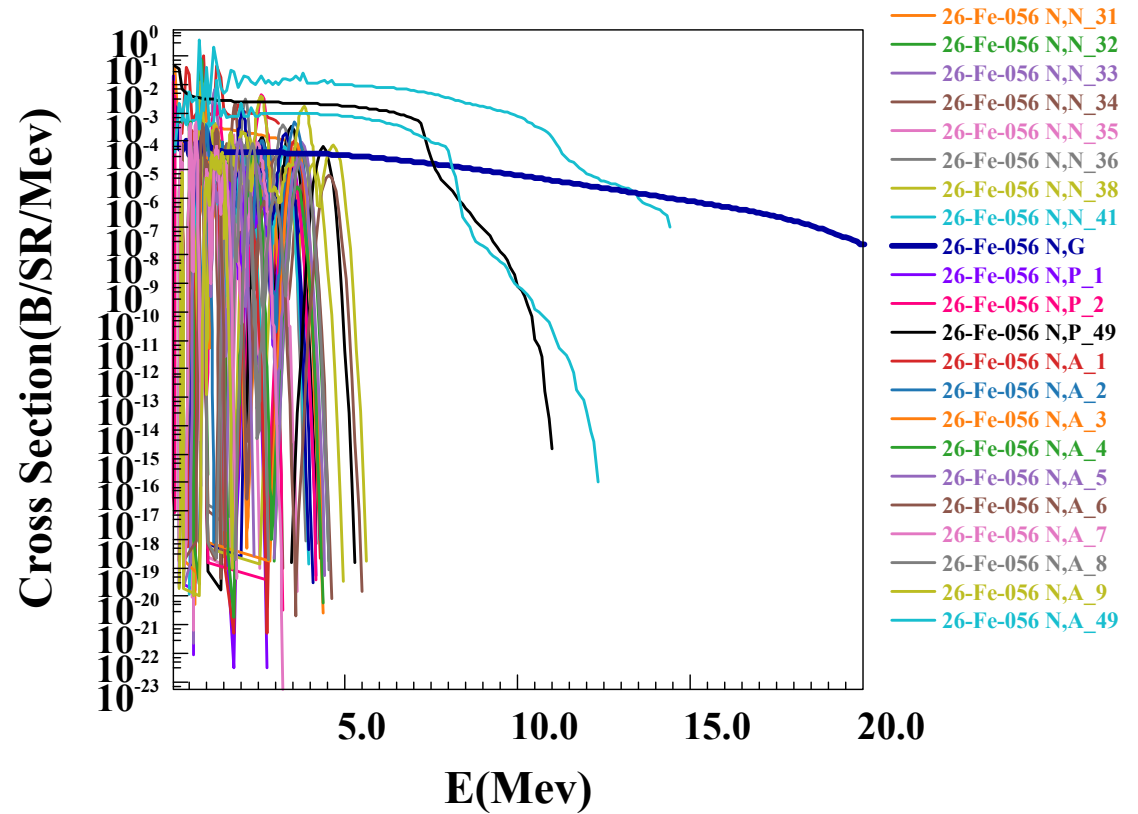
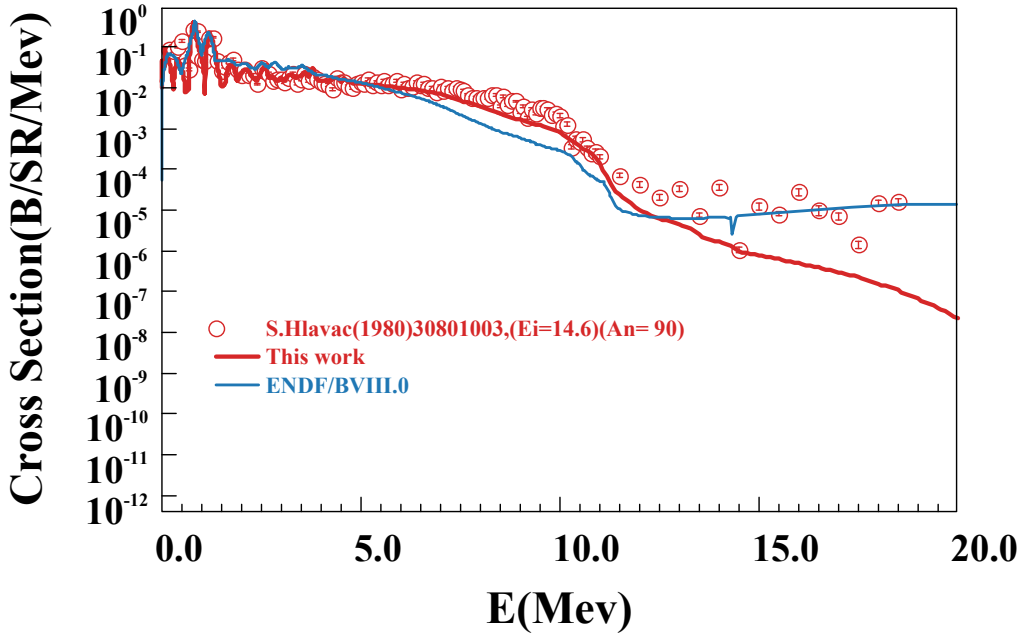




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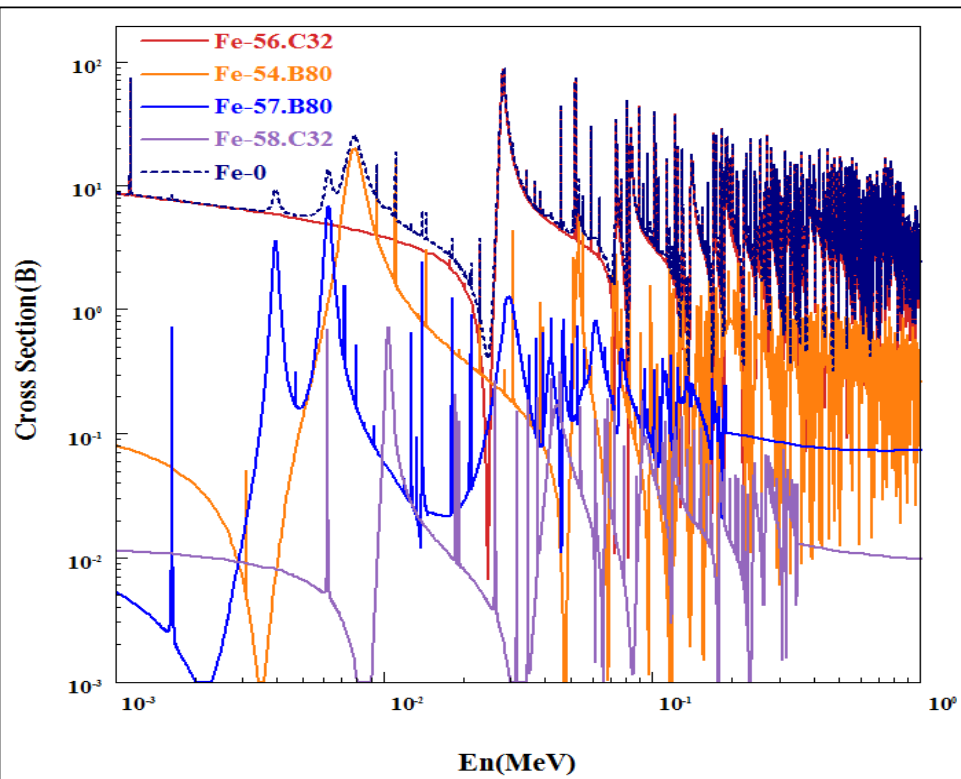
2. Application examples of NDPlot



Total Emitted Gamma Spectrum Analysis of Fe-0 (14.6MeV, 90degree)

Emitted Gamma Spectrum Analysis of Fe-56 (14.6MeV, 90degree)

2. Application examples of NDPlot



Natural nuclide data processing

Z or Element:

Isotopes

	Z	A	Abundance
1	26	54	5.845
2	26	56	91.754
3	26	57	2.119
4	26	58	0.282

Show Valid Evaluated Lib MF: MT:

Ei(MeV) Angle:(Degree) ZAOUT(1000*Z+A) Broadening fraction:

Evaluated Lib

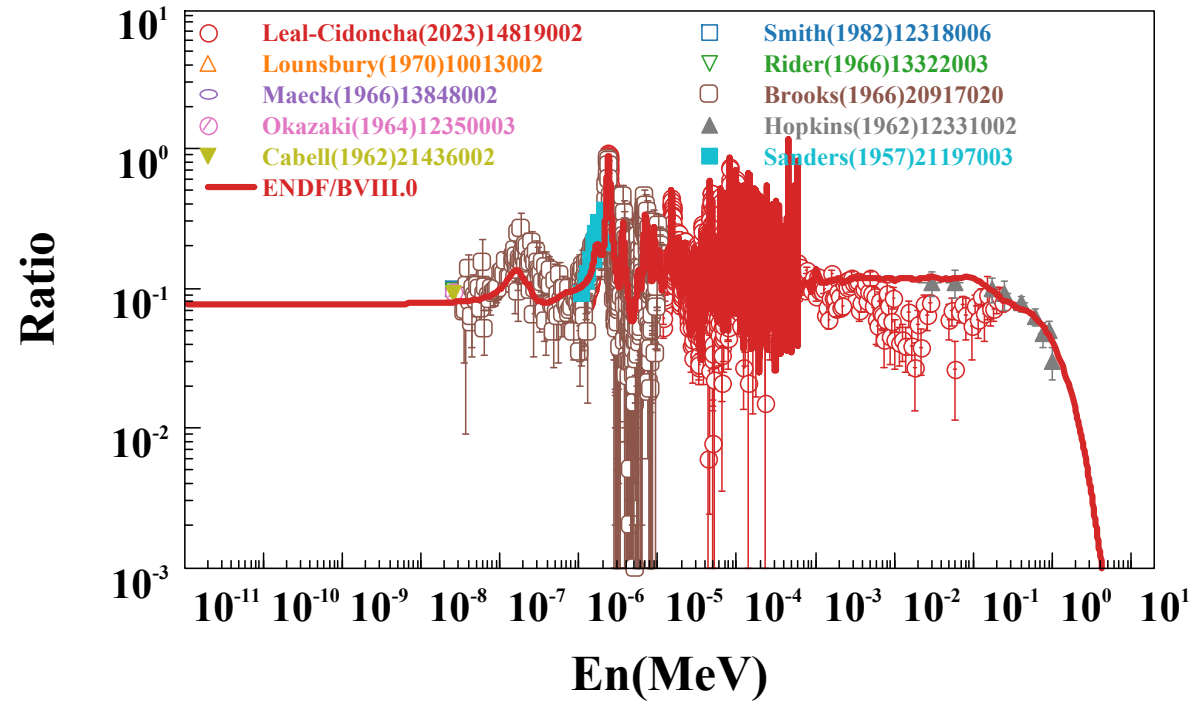
	Choice	Evaluated Lib	A
1	<input type="checkbox"/>	CENDL-3.2	54;56;57;58;
2	<input type="checkbox"/>	ENDF/BVIII.1	54;56;57;58;
3	<input type="checkbox"/>	ENDF/BVIII.0	54;56;57;58;
4	<input type="checkbox"/>	JEFF-3.3	54;56;57;58;

Retain the isotop data
 Multiply the abundance value

Local PENDF File:

Improve Fe-0 Data for Radiation Shield Design

2. Application examples of NDPlot



Evaluation Lib

Ratio of Evaluated Data

	Choice	Evaluation Lib	id
1	<input type="checkbox"/>	CENDL-3.2	
2	<input type="checkbox"/>	ENDF/BVIII.1	
3	<input checked="" type="checkbox"/>	ENDF/BVIII.0	
4	<input type="checkbox"/>	JEFF-3.3	
5	<input type="checkbox"/>	JENDL-5.0	

Element1:Numerator

Z or Element: 92 A: 233 G/M(G-Ground M-Excited): G

MF: 3 MT: 102

Element2:Denominator

Z or Element: 92 A: 233 G/M(G-Ground M-Excited): G

MF: 3 MT: 18

Ei(MeV) 14 Angle(Degree) 30 ZAOUT(1000*Z+A):

Legend: Lib File Reaction Element

Including the resonance region

Ok Cancel

U-233(n, abs),ALF

2. Application examples of NDPlot

Comments on the Cu HPRL entry

2024.5.29

Haicheng WU

China Nuclear Data Center, China Institute of Atomic Energy

• $^{63}\text{Cu}(n,n'\gamma)$

Two measured data sets are available, and they are discrepancy (M.S.Boswell, K.Nishimura, 1965 - 2013). As shown in Fig.1, the current evaluated gamma production cross sections for 365.2keV gamma-ray below 2.9MeV(excluding MT91 contribution) are much larger the experimental values measured by Boswell(2013).As shown in Fig.2, the current evaluated gamma production cross sections for 669.62keV gamma-ray below 2.9MeV(excluding MT91 contribution) are much larger the experimental values measured by Boswell(2013), but close to Nishimura(1965), indicating that the evaluation of (n,n') discrete level cross sections for the Cu-63 may poor because of the unreliable experiment data.

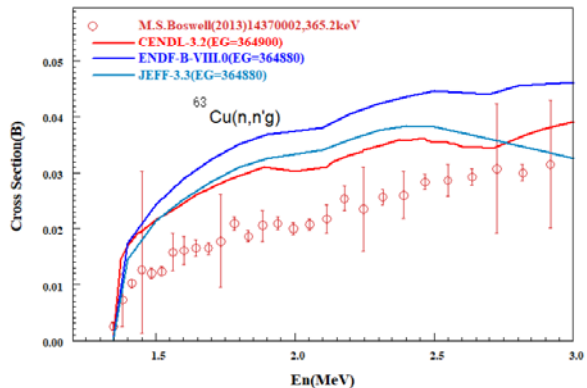
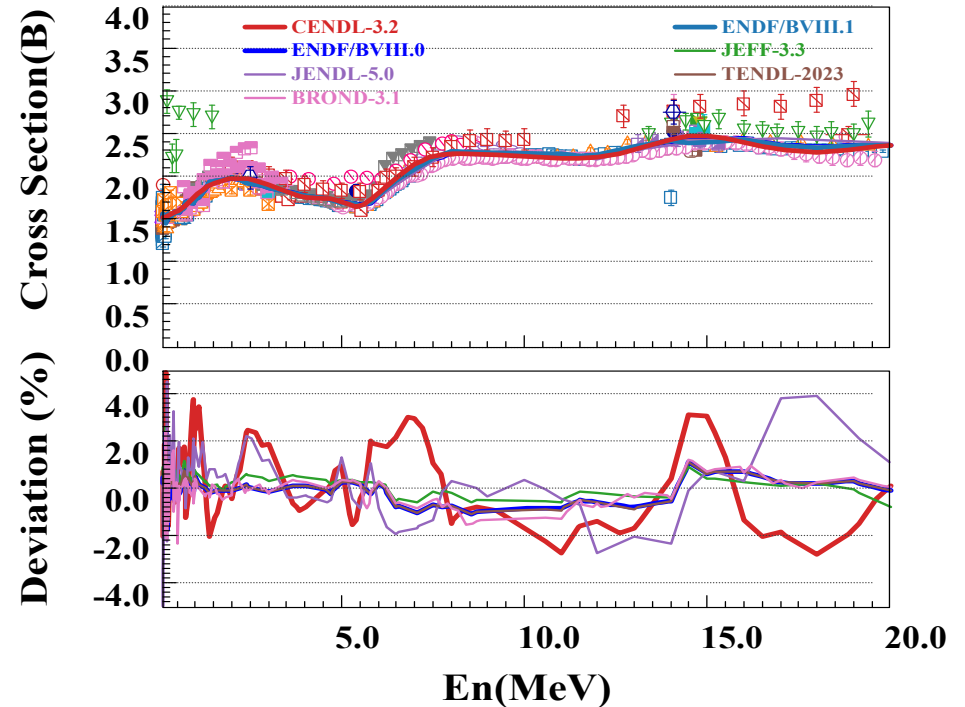


Fig.1 Comparison of the gamma production cross sections for the 365.2keV gamma-ray from $^{63}\text{Cu}(n,n'\gamma)$

Comparison of the gamma production cross sections Cu-63(n,n' g)

Pu-239(n,f)



Deviation to ENDF/BVIII.1
Pu-239(n,f)



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3.1 Error Data in EXFOR



Where do I hit limits of EXFOR or loose time?



- Evaluation:
 - Uncertainty heading cannot be automated for exp. UQ. Very much “by-hand process”.
 - Concerns on data from other evaluators not stored. I re-invent the wheel constantly!!!

ERR-4	ERR-5	ERR-6	ERR-7	ERR-8	ERR-9	MONIT	PRT/FIS
PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	
0.05	0.05	0.2	0.1	0.05	0.1	3.732	

within the limits of the statistical error.
 ERR-ANALYS By compiler (2020-09-24):
 The compiler assumed all uncertainties in Table 1 of CEA-R-4626 except for neutron scattering by Pt are relevant to the nu-bar determination.
 (ERR-5) purely statistical
 (ERR-1,0.1,0.3) Background (0.1-0.3%)
 (ERR-2,0.1,0.2) Dead time (0.1-0.2%)
 (ERR-3,0.05,0.42) Spectrum difference (0.05-0.42%)
 (ERR-4) Relative sample position (0.05%)
 (ERR-5) Impurities (0.05%)
 (ERR-6) Anisotropy in fragment emission (0.2%)
 (ERR-7) Fission event loss (0.1%)
 (ERR-8) French effect (0.05%)
 (ERR-9) Delayed gamma-rays (0.1%)

These descriptors are NOT helpful!

This free-text description is very helpful but cannot be automated and causes repetitive work.

Denise Neudecker
 Nuclear Data Retrieval, Dissemination, and Data Portals, 2024-11-11/2024-11-15 (Vienna, AUSTRIA)

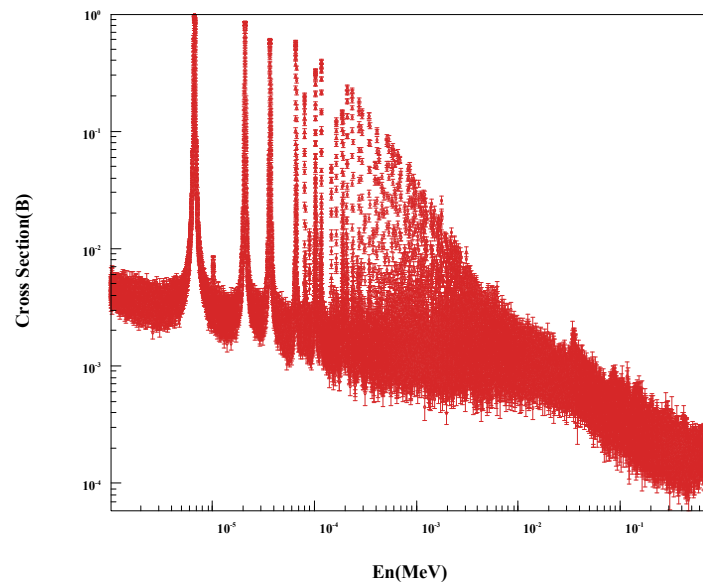
There are multiple error columns in the data, representing different sources. as Dennis said, It can't be automated sometimes.

One of columns should be treated as total error by NDPlot. The order is: DATA-ERR, ERR-T, ERR-S, the first error column.

This approach is effective in the majority of cases, but there are exceptions, that means our users have to adjust the data errors manually : the relative errors, absolute errors and units that must be unified. Therefore, a tool to solve this issue is necessary.

3.1.1 Further processing the error data

Mingrone(2017)23234002,((NO-DIM))



Data & Original Data

Save Cancel EX4 Error Correction

	X	Y	+YError/YError	-YError	+XError/XError	-XError
Col Name	A	B	C	D	E	F
Col Oper.						
1	1.0004e-06	5.3152e-03	6.3613e-04	6.3613e-04	2.3000e-10	2.3000e-10
2	1.0009e-06	3.4782e-03	3.6608e-04	3.6608e-04	2.3000e-10	2.3000e-10
3	1.0014e-06	4.3861e-03	4.7145e-04	4.7145e-04	2.3000e-10	2.3000e-10
4	1.0018e-06	4.2977e-03	6.5120e-04	6.5120e-04	2.3000e-10	2.3000e-10
5	1.0023e-06	4.8942e-03	6.8956e-04	6.8956e-04	2.3500e-10	2.3500e-10
6	1.0027e-06	5.0167e-03	6.4099e-04	6.4099e-04	2.3000e-10	2.3000e-10
7	1.0032e-06	4.4882e-03	6.0718e-04	6.0718e-04	2.3000e-10	2.3000e-10
8	1.0037e-06	6.0010e-03	8.6022e-04	8.6022e-04	2.3000e-10	2.3000e-10
9	1.0041e-06	5.2456e-03	7.8644e-04	7.8644e-04	2.3000e-10	2.3000e-10
10	1.0046e-06	3.7009e-03	4.4019e-04	4.4019e-04	2.3500e-10	2.3500e-10
11	1.0051e-06	5.0043e-03	6.1548e-04	6.1548e-04	2.3000e-10	2.3000e-10
12	1.0055e-06	4.5170e-03	5.3767e-04	5.3767e-04	2.3000e-10	2.3000e-10

```

118 STATUS (TABLE) Data received from Federica Mingrone
119 HISTORY (20161209R) Data received from F.Mingrone via E.Dupont
120 ENDBIB 12
121 COMMON 2 3
122 THICKNESS ERR-1 ERR-2
123 ATOMS/B PER-CENT PER-CENT
124 9.56E-04 0.1 1.
125 ENDCOMMON 3
126 DATA 9 29416
127 EN-MIN EN-MAX DATA IERR-S IDATA IERR-S 2
128 ERR-3 ERR-4 2MISC
129 EV EV NO-DIM NO-DIM NO-DIM NO-DIM
130 PER-CENT PER-CENT NO-DIM
131 1.00020E+0 1.00066E+0 5.31518E-3 6.36135E-4 1.67363E-3 6.56592E-4
132 1.5 1.5 3.64155E-3
133 1.00066E+0 1.00112E+0 3.47820E-3 3.66082E-4 4.09611E-4 4.46808E-4
134 1.5 1.5 3.88781E-3
135 1.00112E+0 1.00158E+0 4.38610E-3 4.71454E-4 9.08906E-5 8.06893E-4
136 1.5 1.5 4.29521E-3
137 1.00158E+0 1.00204E+0 4.29772E-3 6.51199E-4 1.16630E-4 9.07970E-4
138 1.5 1.5 4.41435E-3
139 1.00204E+0 1.00251E+0 4.89424E-3 6.89562E-4 1.25247E-3 7.26658E-4
140 1.5 1.5 3.64178E-3
141 1.00251E+0 1.00297E+0 5.01667E-3 6.40994E-4 1.15998E-3 6.95458E-4
142 1.5 1.5 3.85669E-3
143 1.00297E+0 1.00343E+0 4.48816E-3 6.07185E-4 1.55119E-4 9.01909E-4
144 1.5 1.5 4.64320E-3
145 1.00343E+0 1.00389E+0 6.00097E-3 8.60218E-4 2.17905E-3 9.05220E-4
146 1.5 1.5 3.82192E-3
          
```

92-U-238(N,G)92-U-239,,RYL,,RAW(Subentry= 23234002)

3. Correction of EXFOR data

Correct

$$error = \sqrt{(ERR_S1)^2 + (ERR_3)^2 + (ERR_1)^2 + (ERR_2)^2}$$

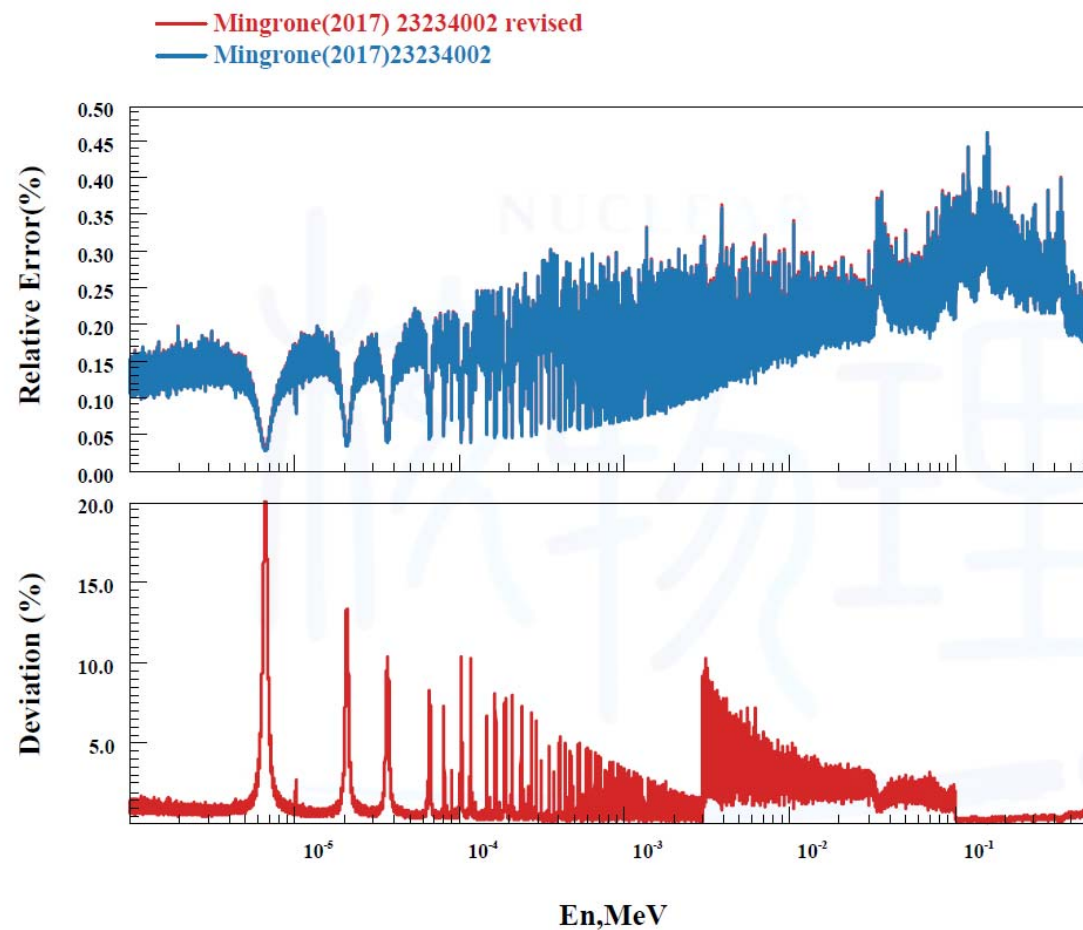
✕

	Y	Error	Corrected	EN-MIN	EN-MAX	DATA 1	ERR-S 1	DATA 2	ERR-S 2	ERR-3	ERR-4 2	MISC	THICKNESS	ERR-1	ERR-2
Unit				EV	EV	NO-DIM	NO-DIM	NO-DIM	NO-DIM	PER-CENT	PER-CENT	NO-DIM	ATOMS/B	PER-CENT	PER-CENT
Choice factor				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	.3152e-03	6.3613e-04	0.000643333	1.00020E+0	1.00066E+0	5.31518E-3	6.36135E-4	1.67363E-3	6.56592E-4	1.5	1.5	3.64155E-3	9.56E-04	0.1	1.
1	.4782e-03	3.6608e-04	0.000371429	1.00066E+0	1.00112E+0	3.47820E-3	3.66082E-4	-4.09611E-4	4.46808E-4	1.5	1.5	3.88781E-3	9.56E-04	0.1	1.
2	.3861e-03	4.7145e-04	0.000478059	1.00112E+0	1.00158E+0	4.38610E-3	4.71454E-4	9.08906E-5	8.06893E-4	1.5	1.5	4.29521E-3	9.56E-04	0.1	1.
3	.2977e-03	6.5120e-04	0.000655805	1.00158E+0	1.00204E+0	4.29772E-3	6.51199E-4	-1.16630E-4	9.07970E-4	1.5	1.5	4.41435E-3	9.56E-04	0.1	1.
4	.8942e-03	6.8956e-04	0.000695201	1.00204E+0	1.00251E+0	4.89424E-3	6.89562E-4	1.25247E-3	7.26658E-4	1.5	1.5	3.64178E-3	9.56E-04	0.1	1.
5	.0167e-03	6.4099e-04	0.000647362	1.00251E+0	1.00297E+0	5.01667E-3	6.40994E-4	1.15998E-3	6.95458E-4	1.5	1.5	3.85669E-3	9.56E-04	0.1	1.
6	.4882e-03	6.0718e-04	0.000612568	1.00297E+0	1.00343E+0	4.48816E-3	6.07185E-4	-1.55119E-4	9.01909E-4	1.5	1.5	4.64328E-3	9.56E-04	0.1	1.
7	.0010e-03	8.6022e-04	0.000867014	1.00343E+0	1.00389E+0	6.00097E-3	8.60218E-4	2.17905E-3	9.05220E-4	1.5	1.5	3.82192E-3	9.56E-04	0.1	1.
8	.2456e-03	7.8644e-04	0.000792123	1.00389E+0	1.00435E+0	5.24564E-3	7.86441E-4	6.14819E-4	9.57323E-4	1.5	1.5	4.63083E-3	9.56E-04	0.1	1.
9	.7009e-03	4.4019e-04	0.000445236	1.00435E+0	1.00482E+0	3.70088E-3	4.40194E-4	4.54460E-5	4.90160E-4	1.5	1.5	3.65543E-3	9.56E-04	0.1	1.
10	.0043e-03	6.1548e-04	0.000622072	1.00482E+0	1.00528E+0	5.00431E-3	6.15476E-4	4.28807E-4	1.01516E-3	1.5	1.5	4.57551E-3	9.56E-04	0.1	1.
11	.5170e-03	5.3767e-04	0.000543816	1.00528E+0	1.00574E+0	4.51704E-3	5.37666E-4	8.24903E-4	6.06972E-4	1.5	1.5	3.69214E-3	9.56E-04	0.1	1.
12	.7363e-03	4.4866e-04	0.000453698	1.00574E+0	1.00621E+0	3.73626E-3	4.48655E-4	-7.63444E-6	4.84622E-4	1.5	1.5	3.74389E-3	9.56E-04	0.1	1.

Update

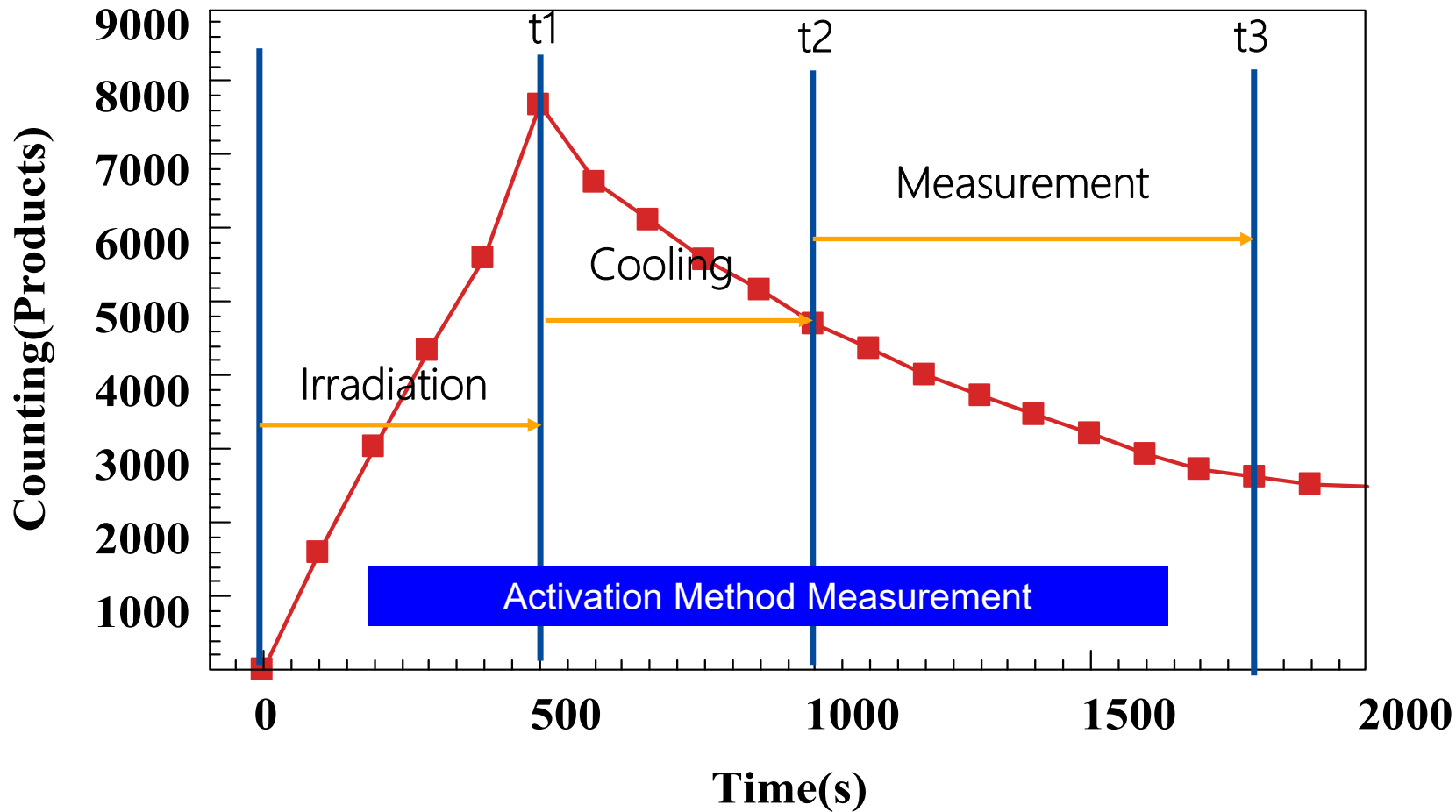
Cancel

3. Correction of EXFOR data



Deviations before and after handling

3.2 Correcting Activation Method Measurement Data of EXFOR



3.2.1 Absolute Measurement

$$N(t_1) = \frac{C_\gamma}{I_\gamma \varepsilon [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]}$$

$$\frac{\phi \sigma N_t}{\lambda} (1 - e^{-\lambda t_1}) = \frac{C_\gamma}{I_\gamma \varepsilon [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]}$$

$$\lambda C_\gamma = \phi \sigma N_t I_\gamma \varepsilon (1 - e^{-\lambda t_1}) [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]$$

$$\sigma = \frac{\lambda C_\gamma}{\phi N_t I_\gamma \varepsilon (1 - e^{-\lambda t_1}) [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]}$$

Absolute Measurement

Correction items:

1. I_γ : refers to the absolute intensities of gamma-ray, and the result is inversely proportional to I_γ
2. λ : decay constant, but t_1, t_2, t_3 must be known

C_γ : refers to the count of a certain gamma ray measured experimentally

ϕ : refers to the neutron fluence rate

N_t : refers to the number of target nuclei

ε : refers to detector efficiency

3.2.2 Relative Measurement

Sample to be measured:

$$\sigma = \frac{\lambda C_{\gamma}}{\Phi N_t I_{\gamma} \varepsilon (1 - e^{-\lambda t_1}) [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]}$$

Standard sample :

$$\sigma_0 = \frac{\lambda_0 C_{\gamma 0}}{\Phi N_0 I_{\gamma 0} \varepsilon_0 (1 - e^{-\lambda_0 t_1}) [e^{-\lambda_0(t_{20}-t_1)} - e^{-\lambda_0(t_{30}-t_1)}]}$$

In the absence of considering the neutron attenuation by the sample (t_1, Φ)

$$\frac{\sigma}{\sigma_0} = \frac{\lambda C_{\gamma} N_0 I_{\gamma 0} \varepsilon_0 (1 - e^{-\lambda_0 t_1}) [e^{-\lambda_0(t_{20}-t_1)} - e^{-\lambda_0(t_{30}-t_1)}]}{\lambda_0 C_{\gamma 0} N_t I_{\gamma} \varepsilon (1 - e^{-\lambda t_1}) [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]}$$

$$\sigma = \frac{\lambda C_{\gamma} N_0 I_{\gamma 0} \varepsilon_0 (1 - e^{-\lambda_0 t_1}) [e^{-\lambda_0(t_{20}-t_1)} - e^{-\lambda_0(t_{30}-t_1)}]}{\lambda_0 C_{\gamma 0} N_t I_{\gamma} \varepsilon (1 - e^{-\lambda t_1}) [e^{-\lambda(t_2-t_1)} - e^{-\lambda(t_3-t_1)}]} \sigma_0$$

Correction items:

$I_{\gamma 0}, I_{\gamma}, \sigma_0$

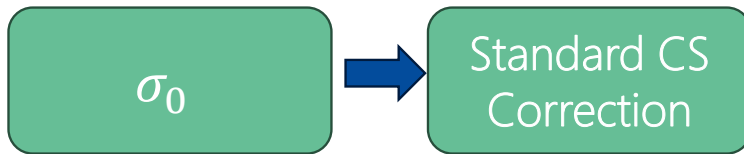
$\lambda_0, \lambda : t_1, t_2, t_3$ must be known

σ_0 : 0 means standard sample(Monitor)

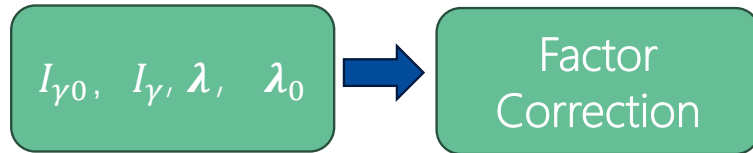
Relative Measurement

3. Correction of EXFOR data

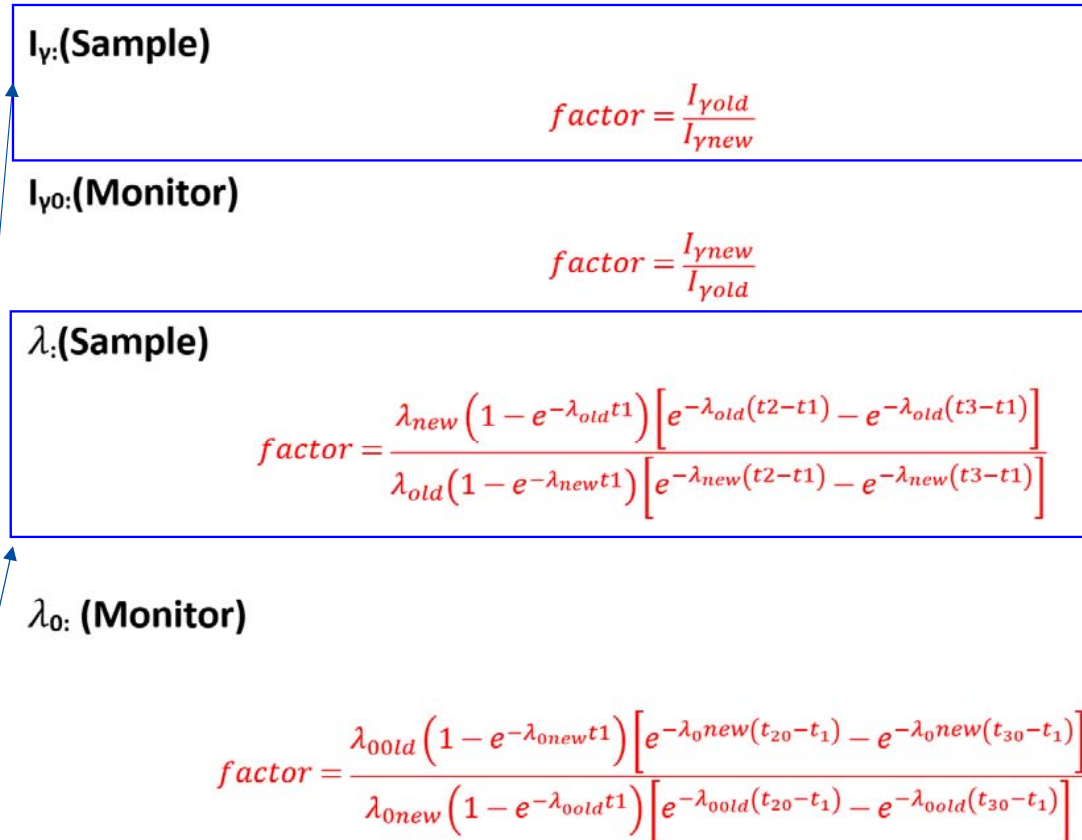
1 *Standard cross – sections correction:* $\sigma_{new} = \sigma_{old} * (\sigma_{0new} / \sigma_{0old})$



2 *Factor correction:* $\sigma_{new} = factor * \sigma_{old}$

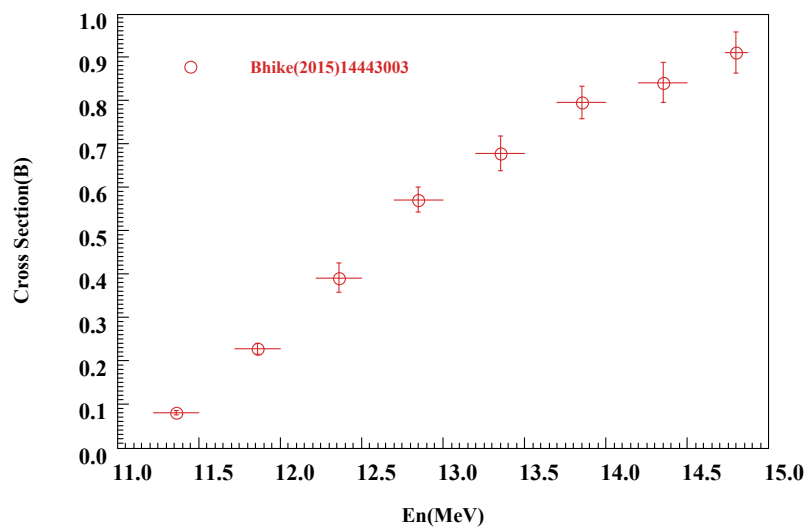


The factors of sample and monitor are reciprocal in form. $A/B \Leftrightarrow B/A$



We only retain the factor formula of the sample.
 for monitor, We take the reciprocal

3.2.3 Standard Cross-Sections Correction



54-XE-124(N,2N)54-XE-123,,SIG
Monitor: Au-197(n,2n)

Standard Cross Sections

Z or Element: A: G/M(G-Ground M/N-Excited):

MT:

Evaluated Lib:

Built-in library:

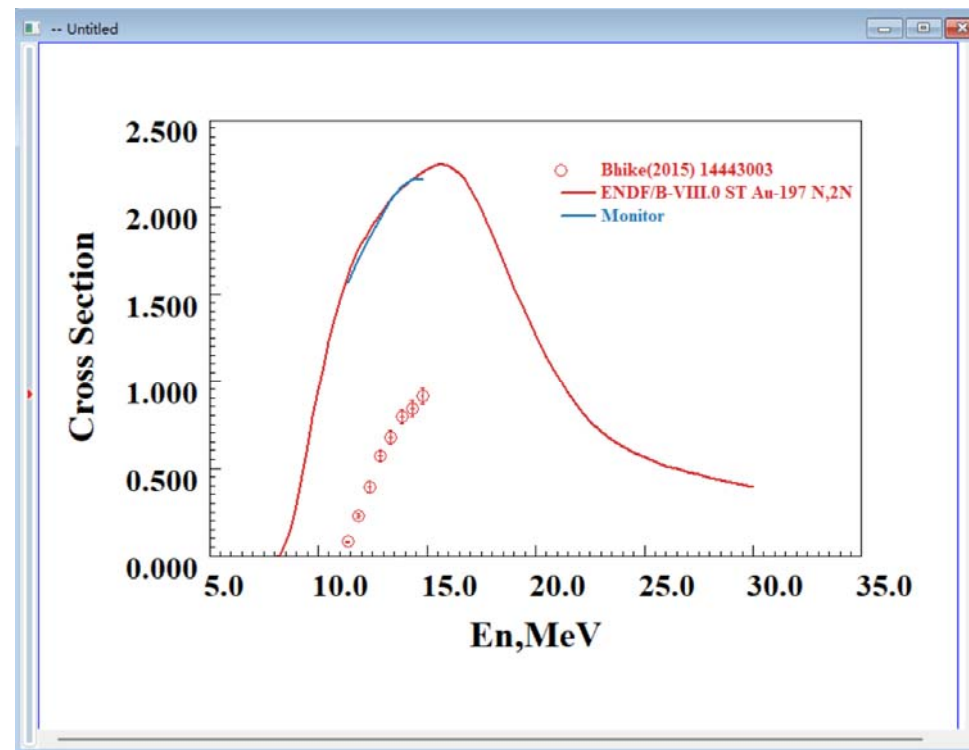
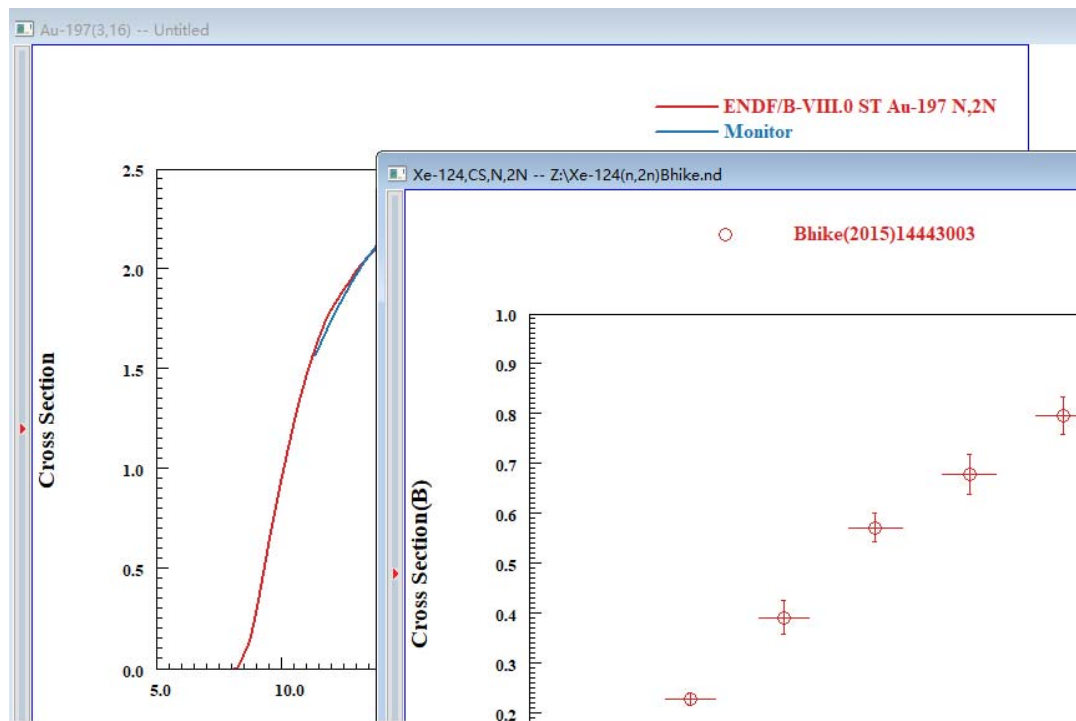
- ENDF/B-VIII.0 ST
- IRDF-II
- INDEN-Aug2023
- EAF-2010
- ENDF/B-VII.0 ST
- ENDF/B-VI ST

	Choice	Evaluation Lib	id
1	<input checked="" type="checkbox"/>	ENDF/B-VIII.0 ST	10001
2	<input type="checkbox"/>	IRDF-II	10004
3	<input type="checkbox"/>	IRDF-v1.05	10005
4	<input type="checkbox"/>	IRDF-v0	10006
5	<input type="checkbox"/>	IRDF-2002	10007

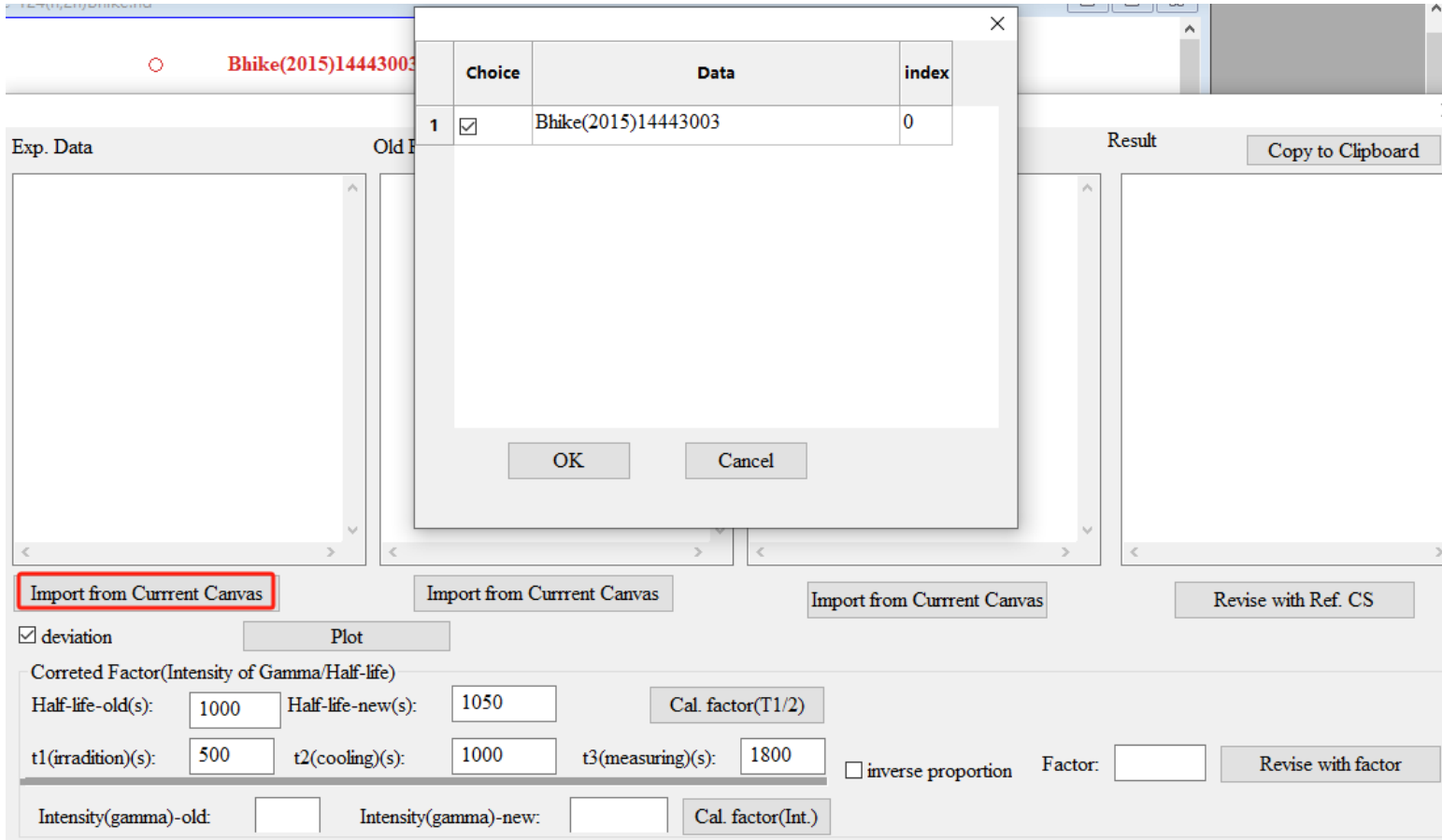
3.2.3 Standard Cross-Sections Correction

Standard Cross-Sections and experimental data can be plotted on the same canvas or different canvas.

Imported data will not be affected



3.2.3 Standard Cross-Sections Correction

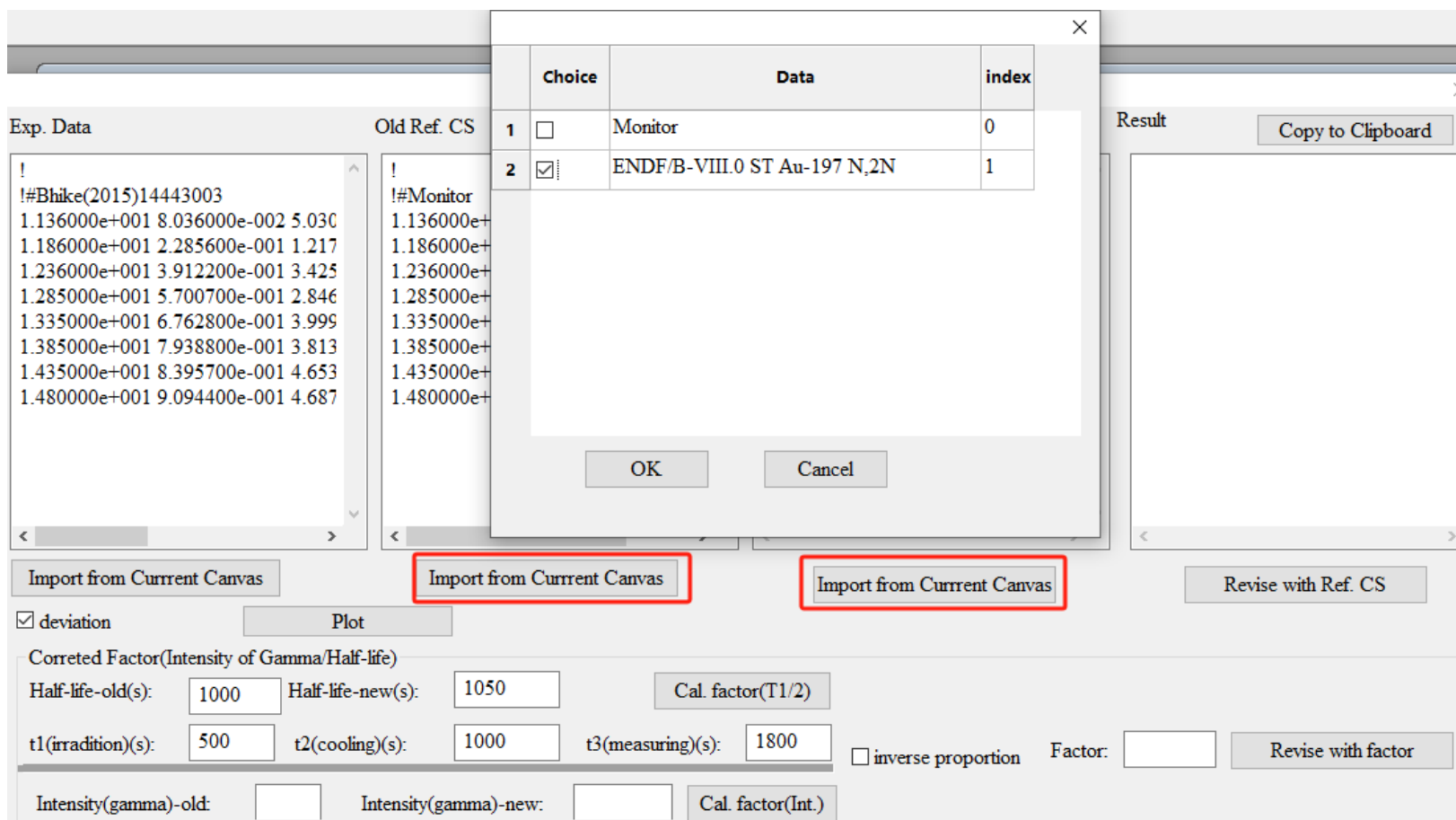


Choice	Data	index
1	Bhike(2015)14443003	0

deviation Plot
 Corrected Factor(Intensity of Gamma/Half-life)
 Half-life-old(s): 1000 Half-life-new(s): 1050 Cal. factor(T1/2)
 t1(irradiation)(s): 500 t2(cooling)(s): 1000 t3(measuring)(s): 1800 inverse proportion Factor: Revise with factor
 Intensity(gamma)-old: Intensity(gamma)-new: Cal. factor(Int.)

Menu: Revise Exp. Data
Import or paste data

3.2.3 Standard Cross-Sections Correction



The screenshot displays the EXFOR data correction software interface. A central dialog box titled "Choice" is open, showing a table with columns "Choice", "Data", and "index".

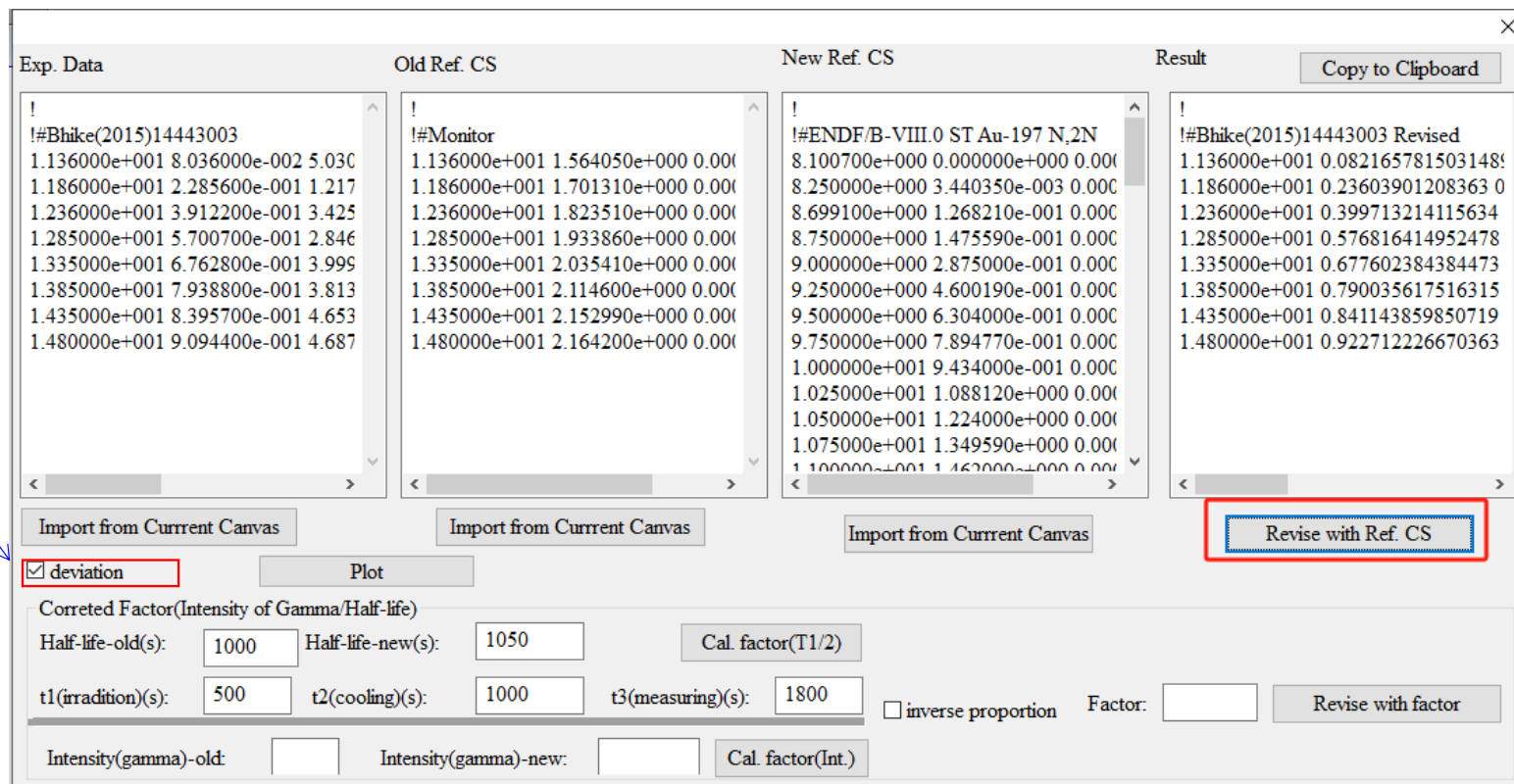
Choice	Data	index
<input type="checkbox"/>	Monitor	0
<input checked="" type="checkbox"/>	ENDF/B-VIII.0 ST Au-197 N,2N	1

Below the dialog box, the main interface shows two columns of data: "Exp. Data" and "Old Ref. CS". Both columns contain a list of data points with values in scientific notation. Below these columns are three "Import from Current Canvas" buttons, with the middle and right ones highlighted by red boxes. To the right is a "Result" window with a "Copy to Clipboard" button.

At the bottom of the interface, there are several input fields and buttons:

- deviation
- Plot
- Corrected Factor(Intensity of Gamma/Half-life)
- Half-life-old(s): Half-life-new(s): Cal. factor(T1/2)
- t1(irradiation)(s): t2(cooling)(s): t3(measuring)(s): inverse proportion Factor: Revise with factor
- Intensity(gamma)-old: Intensity(gamma)-new: Cal. factor(Int.)

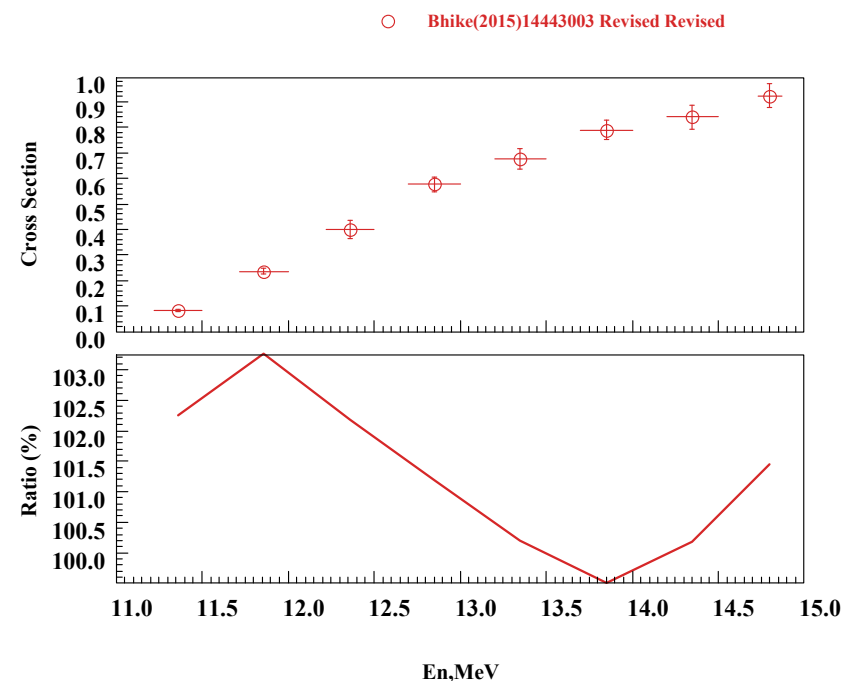
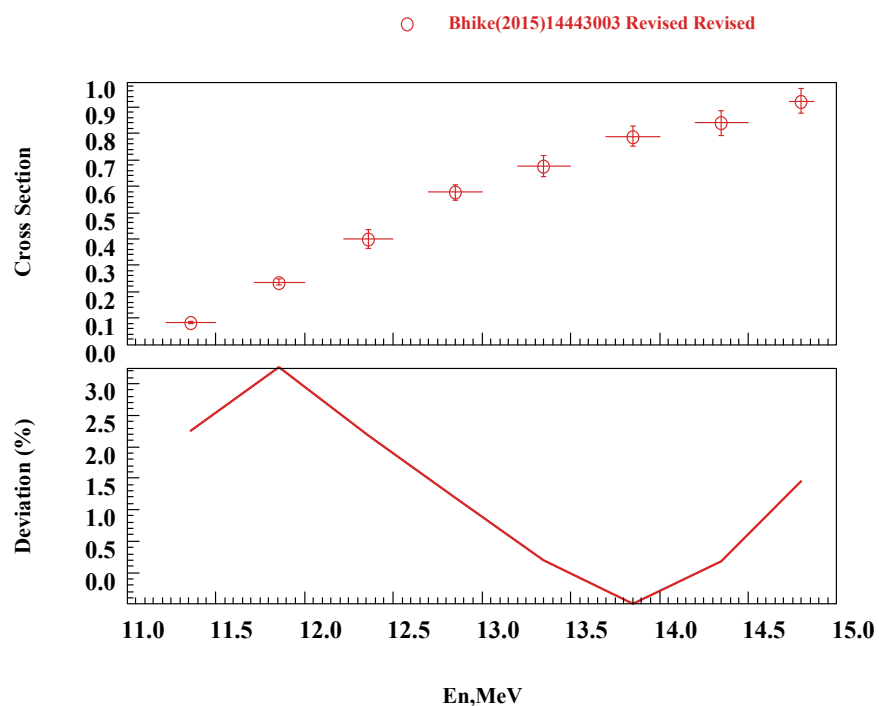
3.2.3 Standard Cross-Sections Correction



Exp. Data	Old Ref. CS	New Ref. CS	Result
!#Bhike(2015)14443003	!#Monitor	!#ENDF/B-VIII.0 ST Au-197 N,2N	!#Bhike(2015)14443003 Revised
1.136000e+001 8.036000e-002 5.030	1.136000e+001 1.564050e+000 0.000	8.100700e+000 0.000000e+000 0.000	1.136000e+001 0.0821657815031489
1.186000e+001 2.285600e-001 1.217	1.186000e+001 1.701310e+000 0.000	8.250000e+000 3.440350e-003 0.000	1.186000e+001 0.23603901208363 0
1.236000e+001 3.912200e-001 3.425	1.236000e+001 1.823510e+000 0.000	8.699100e+000 1.268210e-001 0.000	1.236000e+001 0.399713214115634
1.285000e+001 5.700700e-001 2.846	1.285000e+001 1.933860e+000 0.000	8.750000e+000 1.475590e-001 0.000	1.285000e+001 0.576816414952478
1.335000e+001 6.762800e-001 3.995	1.335000e+001 2.035410e+000 0.000	9.000000e+000 2.875000e-001 0.000	1.335000e+001 0.677602384384473
1.385000e+001 7.938800e-001 3.813	1.385000e+001 2.114600e+000 0.000	9.250000e+000 4.600190e-001 0.000	1.385000e+001 0.790035617516315
1.435000e+001 8.395700e-001 4.653	1.435000e+001 2.152990e+000 0.000	9.500000e+000 6.304000e-001 0.000	1.435000e+001 0.841143859850719
1.480000e+001 9.094400e-001 4.687	1.480000e+001 2.164200e+000 0.000	9.750000e+000 7.894770e-001 0.000	1.480000e+001 0.922712226670363

deviation Plot
 Corrected Factor(Intensity of Gamma/Half-life)
 Half-life-old(s): 1000 Half-life-new(s): 1050 Cal. factor(T1/2)
 t1(irradiation)(s): 500 t2(cooling)(s): 1000 t3(measuring)(s): 1800 inverse proportion Factor: Revise with factor
 Intensity(gamma)-old: Intensity(gamma)-new: Cal. factor(Int.)

3.2.3 Standard Cross-Sections Correction

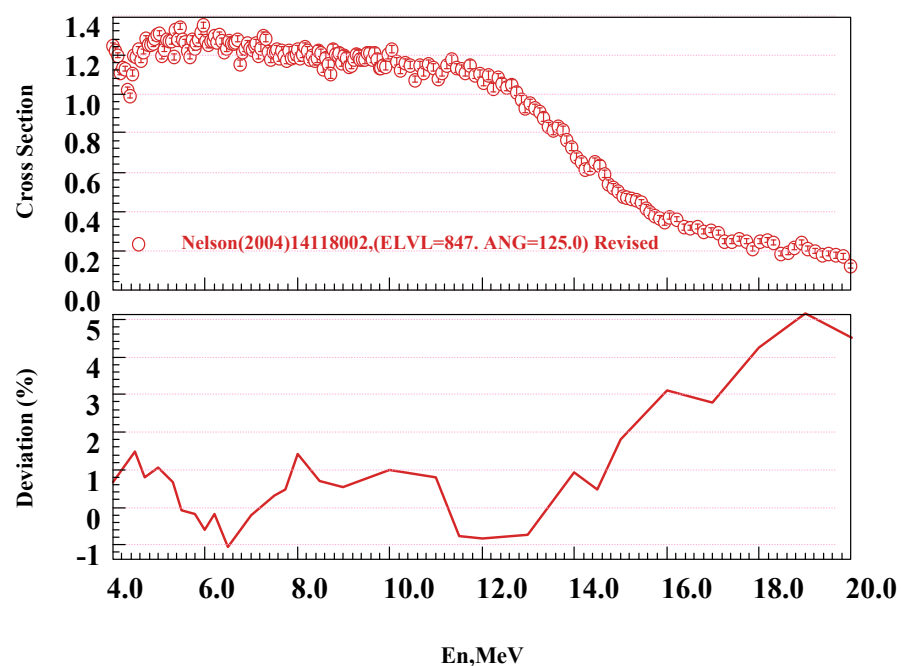


$$\text{Deviation} = (\sigma_{\text{new}} - \sigma_{\text{old}}) / \sigma_{\text{old}} * 100$$

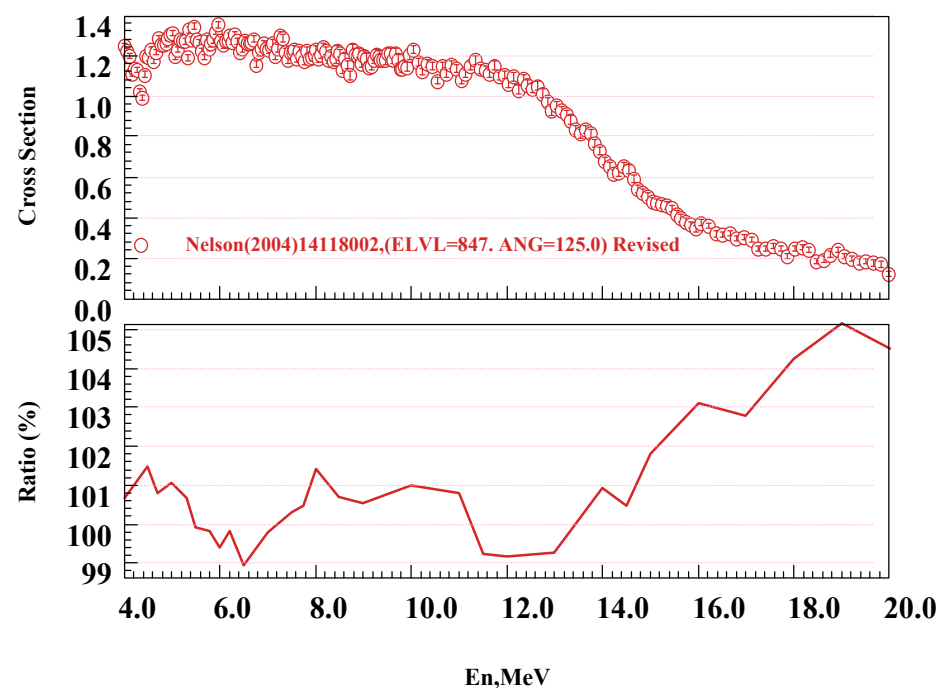
$$\text{Ratio} = (\sigma_{\text{new}}) / \sigma_{\text{old}} * 100$$

3.2.3 Standard Cross-Sections Correction

(26-FE-56(N,INL)26-FE-56,PAR,DA,G,4PI) 14118002, METHOD:TOF



$$\text{Deviation} = (\sigma_{new} - \sigma_{old}) / \sigma_{old} * 100$$



$$\text{Ratio} = (\sigma_{new}) / \sigma_{old} * 100$$

3.2.4 Correcting with Factor ($\tau_{1/2}, I_{\gamma}$)

OS. Institute codes added
 (20110817A) On. Error values corrected (0.3% -> 0.1%)
 (20130130A) VS. REACTION code in subent. 031 corrected.
 (20130429U) On. Formal correction or Normalization: $1 \pm 0.01 / 1429$
 (20201119A) On. Major revisions in (

#	E, keV	Intensity, %	I/Imax, %	RTYP	TYPE
1	377.9±0.1	42±0	100±0	2 EC β+	
2	1288±0.1	0.042±0.042	0.1±0.1	2 EC β+	

ENDBIB 48
 COMMON 2 3
 ERR-1 ERR-2
 PER-CENT PER-CENT
 0.1 0.1
 ENDCOMMON 3
 ENDSUBENT 55
 SUBENT 30978014 20201119 20210220 20210220 3198
 BIB 8 10
 REACTION (26-FE-54(N,2N)26-FE-53,,SIG)
 SAMPLE (26-FE-54 NAT=0.0058)
 DECAF-DATA (26-FE-53-G, 8.51MIN, DG, 378., 0.42)
 MONITOR (13-AL-27(N,P)12-MG-27,,SIG)
 DECAF-MON (12-MG-27, 9.46MIN, DG, 844., 0.73,
 DG, 1014., 0.273)
 MONIT-REF (, P. G. Young+, P. BNL-NCS-17541, 1979)
 (V0002001, A. A. Lapenas+, B. LAPENAS,, 1975)
 ERR-ANALYS (ERR-T) Quadrature sum of partial uncertainties
 HISTORY (20201119A) On. EN-ERR -> EN-RSL-HW.
 ENDBIB 10
 NOCOMMON 0 0
 DATA 6 5

#	E, keV	Intensity, %	I/Imax, %	RTYP	TYPE
1	1179.92±0.1	0.86±0.02	1.198±0.028	1 β-	
2	843.76±0.1	71.8±0.02	100±0.028	1 β-	
3	1014.52±0.1	28.2±0.02	39.276±0.028	1 β-	

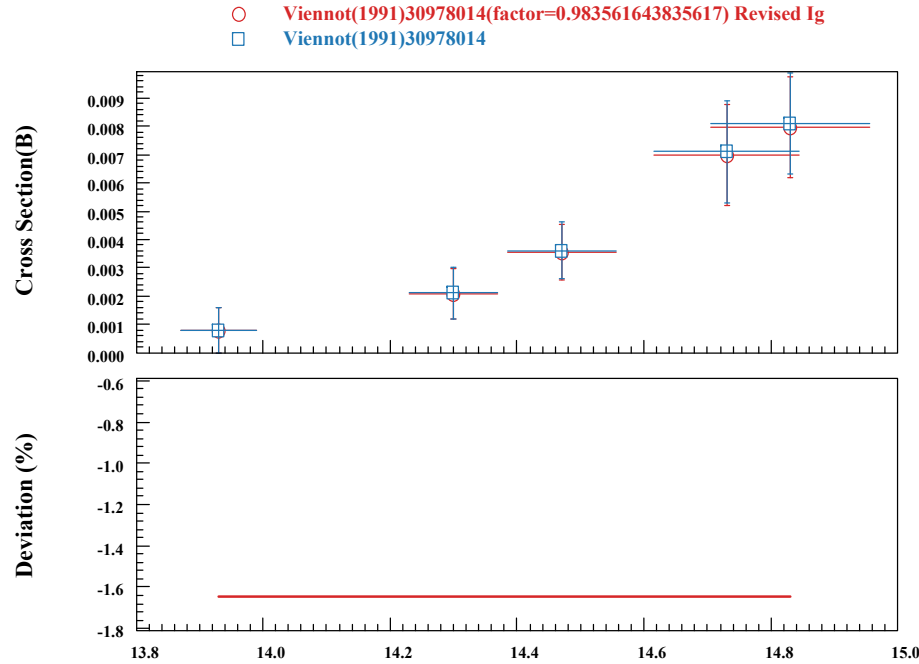
Continuous Spectrum: 173

EN	EN-RSL-HW	DATA	ERR-T	MONIT	MONIT-ERR
MEV	MEV	MB	MB	MB	MB
13.93	0.12	0.8	0.8	78.9	2.3
14.30	0.14	2.1	0.9	75.5	2.3
14.47	0.17	3.6	1.0	74.2	2.4
14.73	0.23	7.1	1.8	72.3	2.5
14.83	0.25	8.1	1.8	71.5	2.5

Subentrv: 30978014 Retrieve

(26-FE-54(N,2N)26-FE-53,,SIG)
 SUBENT 30978014

3.2.4 Correcting with Factor ($\tau_{1/2}$, I_γ)



$I_{\gamma 0}$

↗

Corrected Factor(Intensity of Gamma/Half-life)

Half-life-old(s): Half-life-new(s):

t1(irradiation)(s): t2(cooling)(s): t3(measuring)(s): reciprocal

Intensity(gamma)-old: Intensity(gamma)-new:

Factor:

3.2.4 Correcting with Factor ($T_{1/2}$, I_γ)

CENDL-DDL-1.0		JENDL-5	
Nucleus:	54-Xe-123	Nucleus:	54-Xe-123
Library:	CENDL-DDL-1.0	Library:	JENDL-5
Author:	CONVERSION FROM ENSDF	Author:	Conversion from ENSDF
EDate:	MAR22	EDate:	NOV21
Half life:	2.05 ± 0.01 h	Half life:	2.08 ± 0.02 h
AWR:	121.853	AWR:	121.8526
Isomer number:	0	Isomer number:	0
Level numbe:	0	Level numbe:	0
Spin & Parity:	1/2+	Spin & Parity:	1/2+
E(beta):	191.03±3.66455(keV)	E(beta):	181.3712±5.140313(keV)
E(gamma):	641.4±8.07332(keV)	E(gamma):	632.8038±32.45234(keV)
E(alpha):	0±0(keV)	E(alpha):	0±0(keV)
Decay modes:	1	Decay modes:	1
Radiation types:	4	Radiation types:	4

Exp. Data

```

!
!#Bhike(2015)14443003
1.136000e+001 8.036000e-002 5.030
1.186000e+001 2.285600e-001 1.217
1.236000e+001 3.912200e-001 3.425
1.285000e+001 5.700700e-001 2.846
1.335000e+001 6.762800e-001 3.999
1.385000e+001 7.938800e-001 3.813
1.435000e+001 8.395700e-001 4.653
1.480000e+001 9.094400e-001 4.687
          
```

Old Ref. CS

New

Decay Mode: 2 ECIB+

```

1.435000e+001 0.829795008505794
1.480000e+001 0.898851522250091
          
```

Import from Current Canvas

Import from Current Canvas

Import from Current Canvas

Revise with Ref. CS

deviation Plot

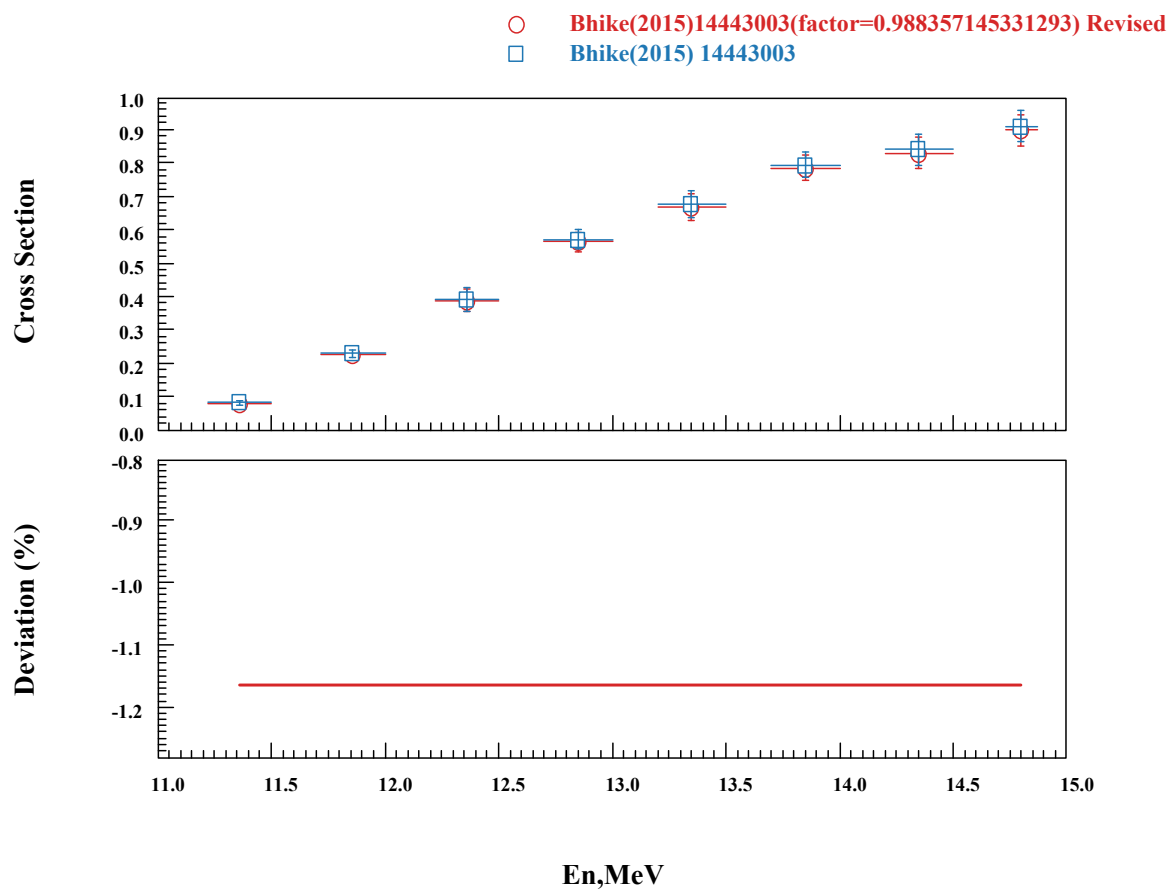
Correted Factor(Intensity of Gamma/Half-life)

Half-life-old(s): **7488** Half-life-new(s): **7380** Cal. factor(T1/2)

t1(irradiation)(s): 3000 t2(cooling)(s): 3500 t3(measuring)(s): 3800 inverse proportion Factor: **0.988357** Revise with factor

Intensity(gamma)-old: Intensity(gamma)-new: Cal. factor(Int.)

3.2.4 Correcting with Factor ($T_{1/2}$, I_γ)





Contents

1. What is NDPlot
2. Application examples of NDPlot
3. Correction of EXFOR data
- 4. Summary**

- ✓ NDPlot is a nuclear data analysis and visualization tool.
 - ✓ It is capable of using error source terms for error correction of cross-sections.
 - ✓ It can perform standard cross-sections, $T_{1/2}(\lambda)$, I_γ corrections and can visualize the results
- ? How to share the revised results should be considered.(Exchange format: results ,raw data, report..... JSON?)

Thank you for your attention

以身许国
敢为人先 严谨求实