Manipulation of Experimental Data with NDPlot

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Contents

1.1 Nuclear Data Service in China（NDS-C)

On-line → NDS-C → nuclear reactor / nuclear fuel / nuclear chemistry / scientific research / experiments

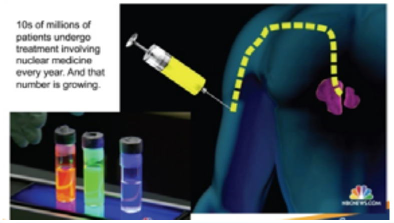
Starting from 2000，more than 20 years

Offline → Evaluation Processing Calculation … → …

evaluation




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



1.2 The Goal of the NDS-C

- ENDF
- EXFOR
- Free Format
- Images

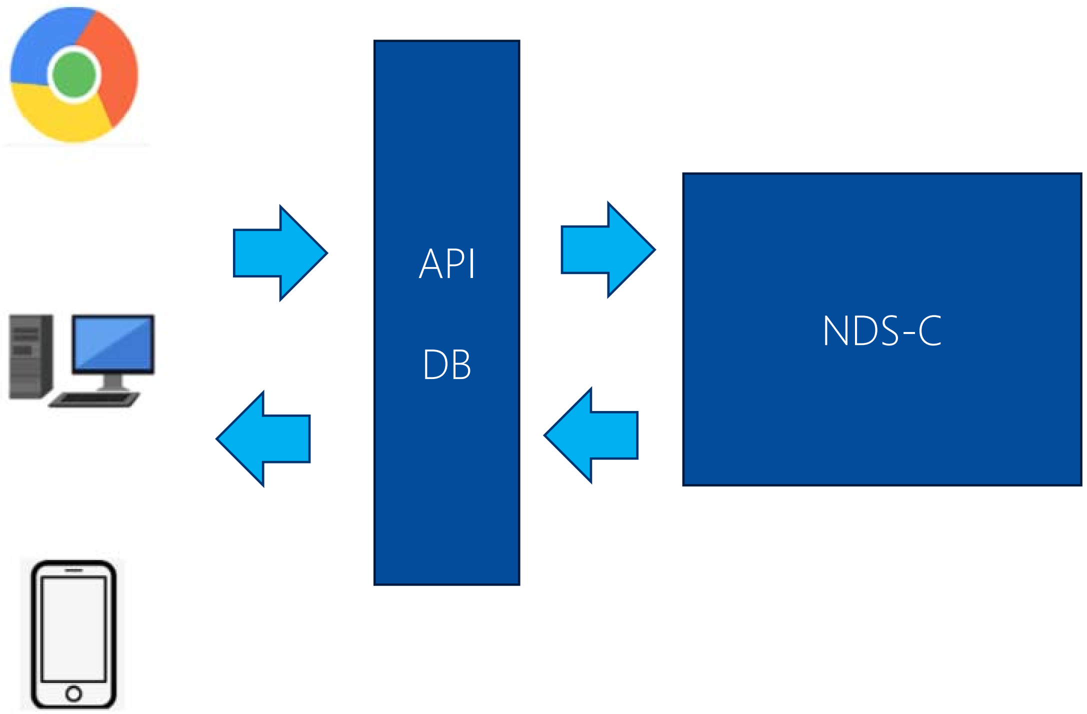
Evaluators → Nuclear Data Network of China

Non-evaluators →
- Institutes
- Universities
- Nuclear Power Plants
- Nuclear Fuel Factories
- …
- Nuclear Instruments

Different Purposes

中国核数据中心 CHINA NUCLEAR DATA CENTER
北京大学 PEKING UNIVERSITY
清华大学 Tsinghua University
吉林大学
西安交通大学 XI'AN JIAOTONG UNIVERSITY
北京应用物理与计算数学研究所 Institute of Applied Physics and Computational Mathematics
中国科学院近代物理研究所 Institute of Modern Physics, Chinese Academy of Sciences

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

Mobile Apps

FY APP

Decay APP

Web Applications

Calculations

Retrieval

Visualization

Why is Desktop

Local File

Data Mining

Batch Task

Dev. For GUI is easier

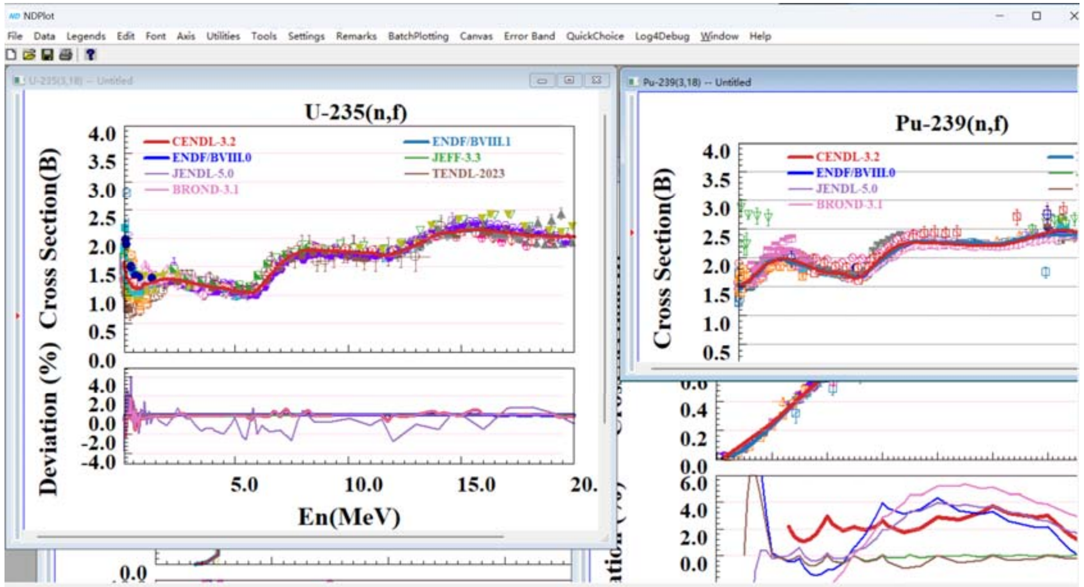
Save work in progress

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

NDPlot
应用

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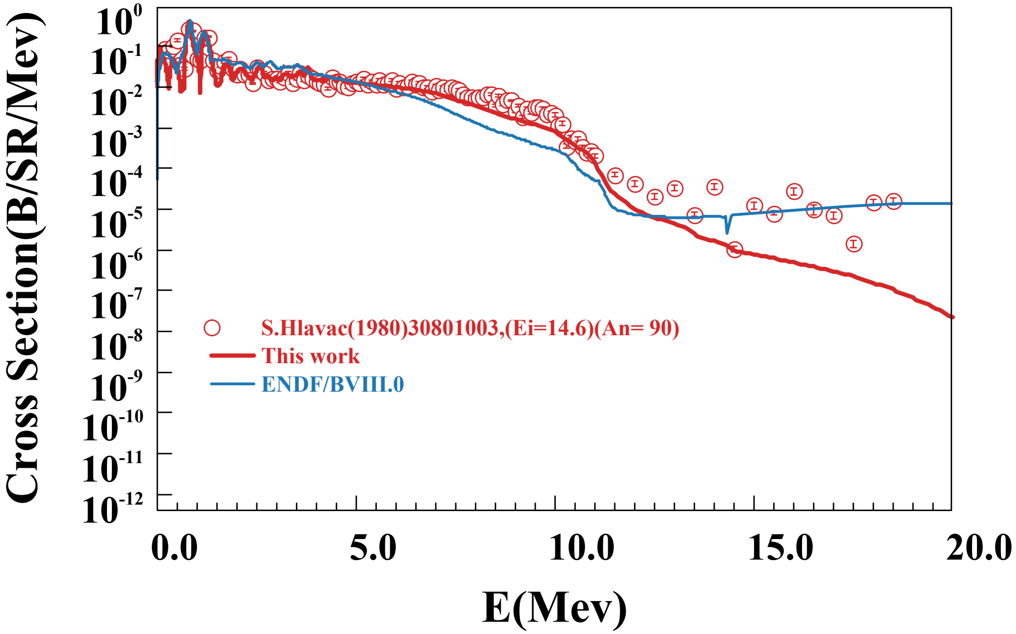
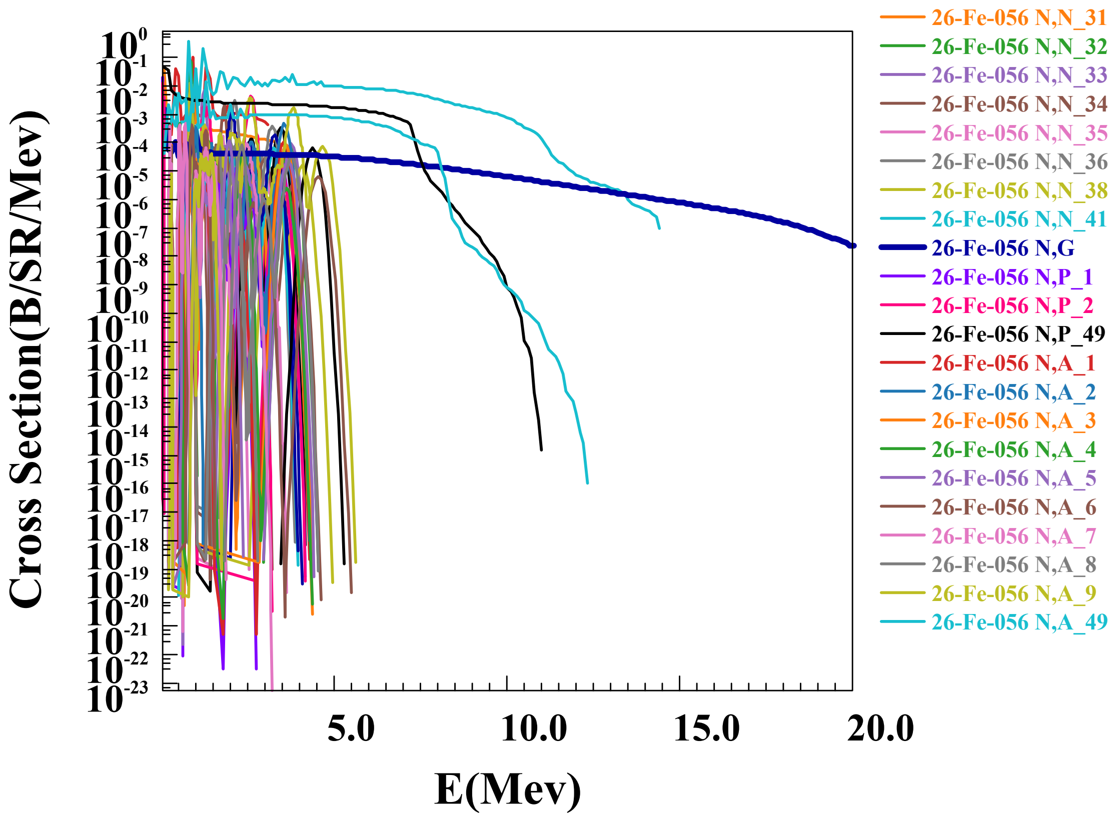
2. Application examples of NDPlot

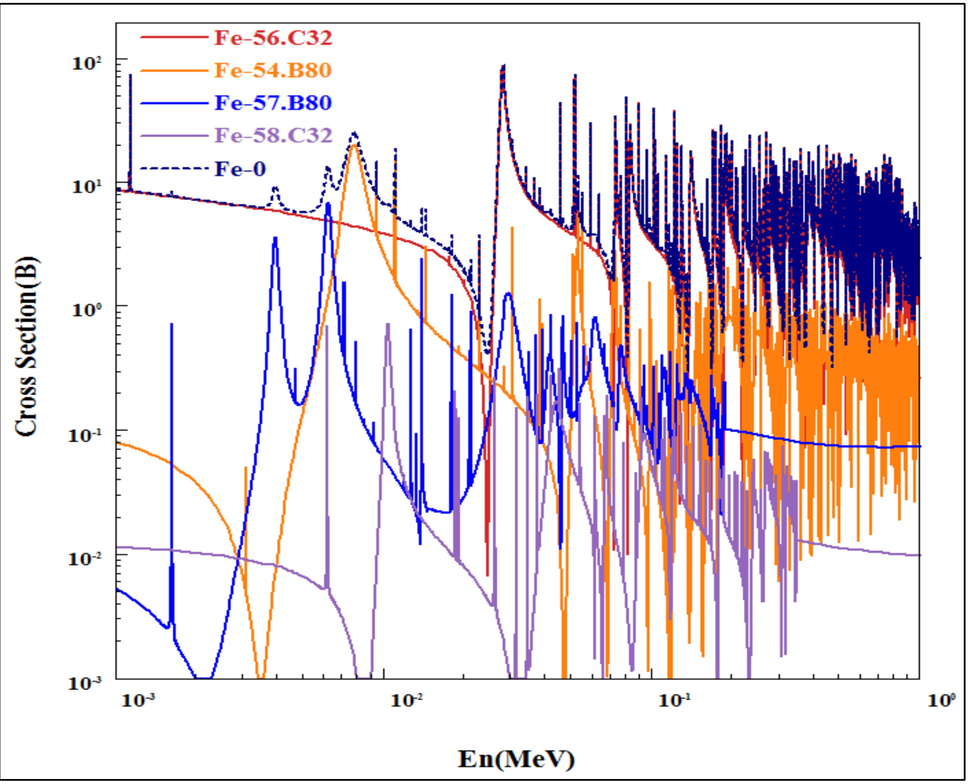


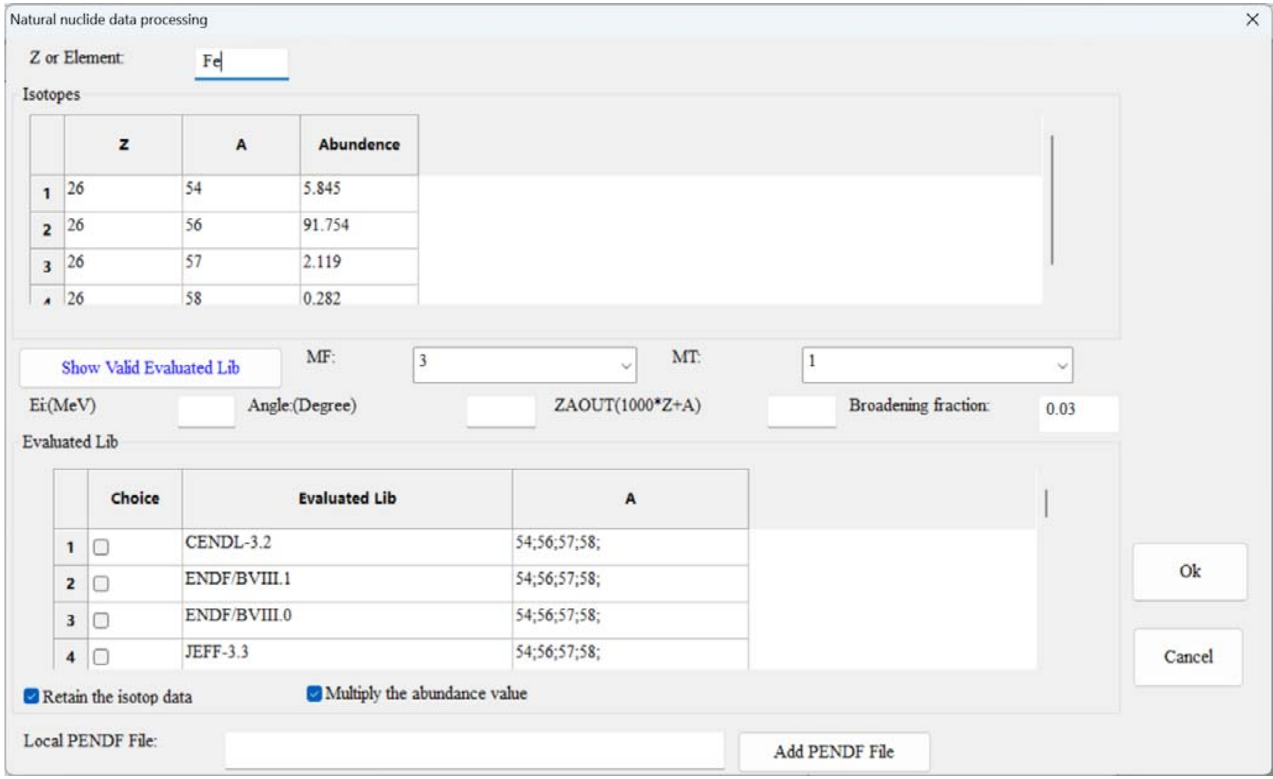
Total Emitted Gamma Spectrum Analysis of Fe-0（14.6MeV，90degree)



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

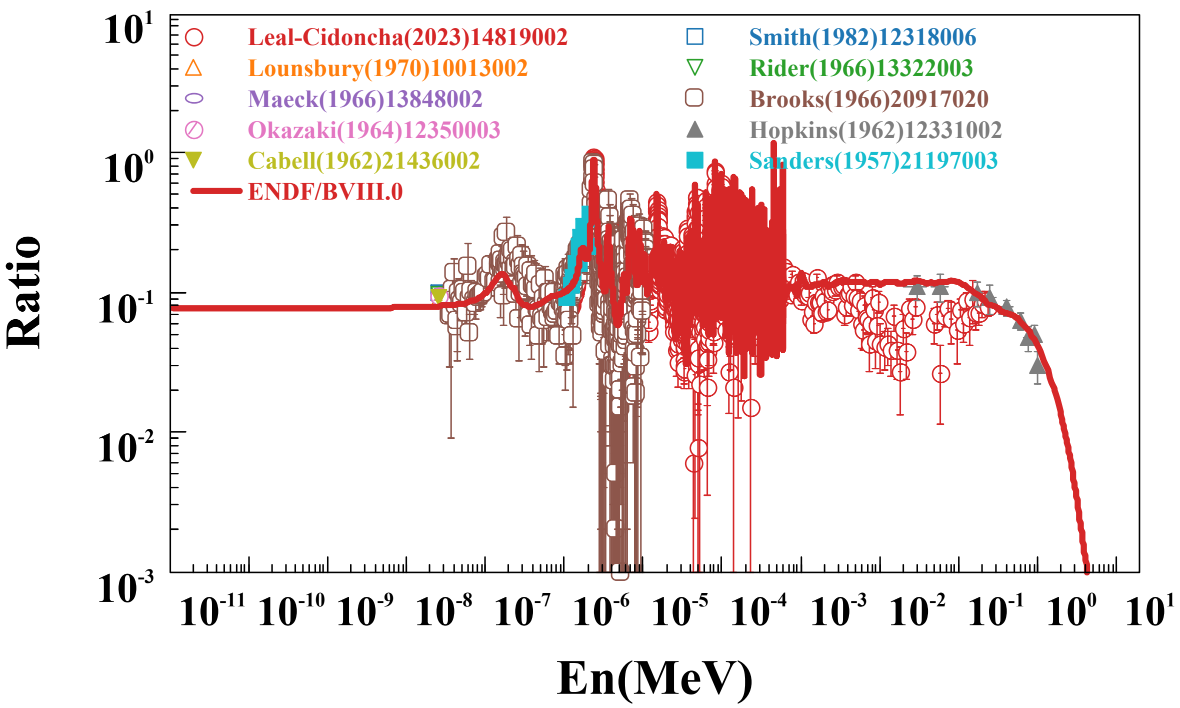
2. Application examples of NDPlot

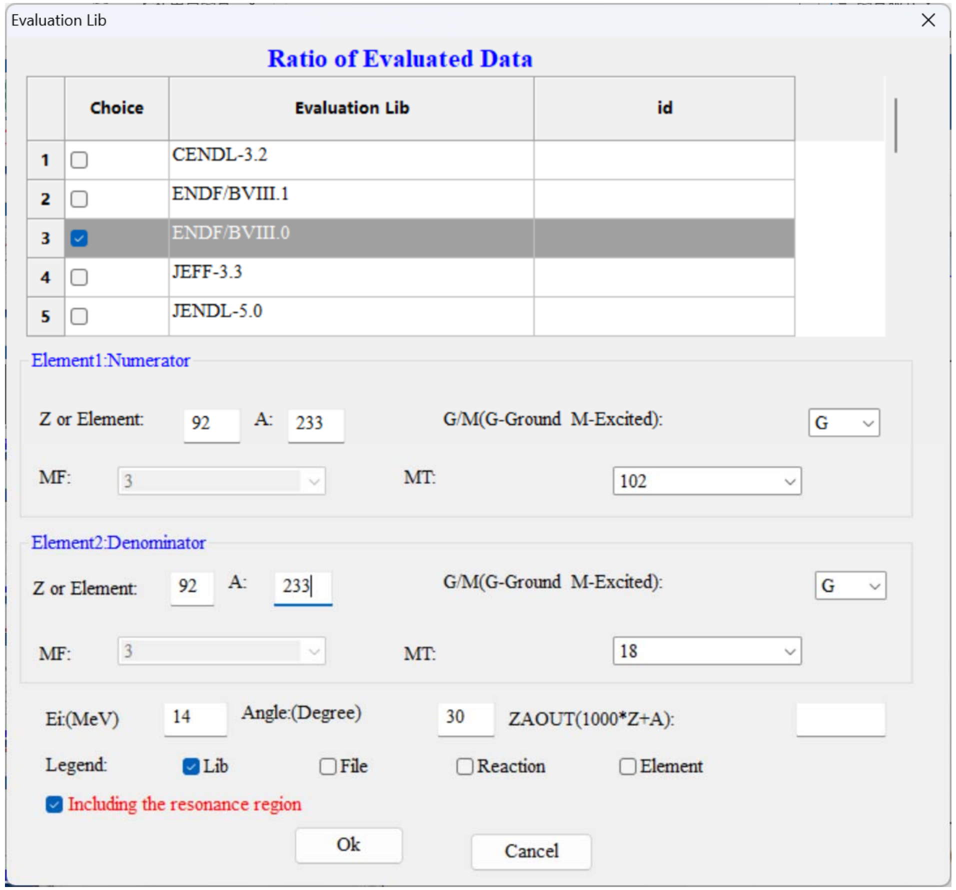




Improve Fe-0 Data for Radiation Shield Design

2. Application examples of NDPlot





U-233(n, abs),ALF

2. Application examples of NDPlot

中国原子能科学研究院
China Institute of Atomic Energy
中核集团 CNNC

Comments on the Cu HPRL entry

2024.5.29

Haicheng WU

China Nuclear Data Center, China Institute of Atomic Energy

- $^{63}Cu(n,n'\gamma)$

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 bellow 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 bellow 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.

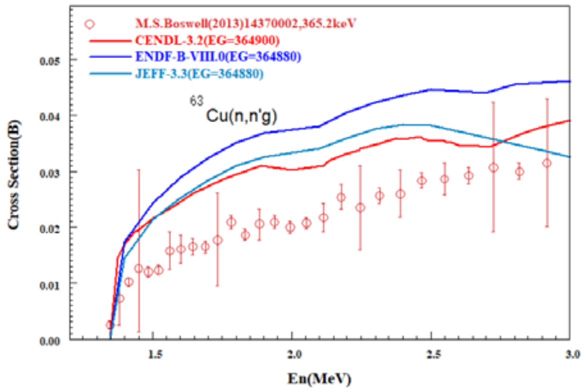
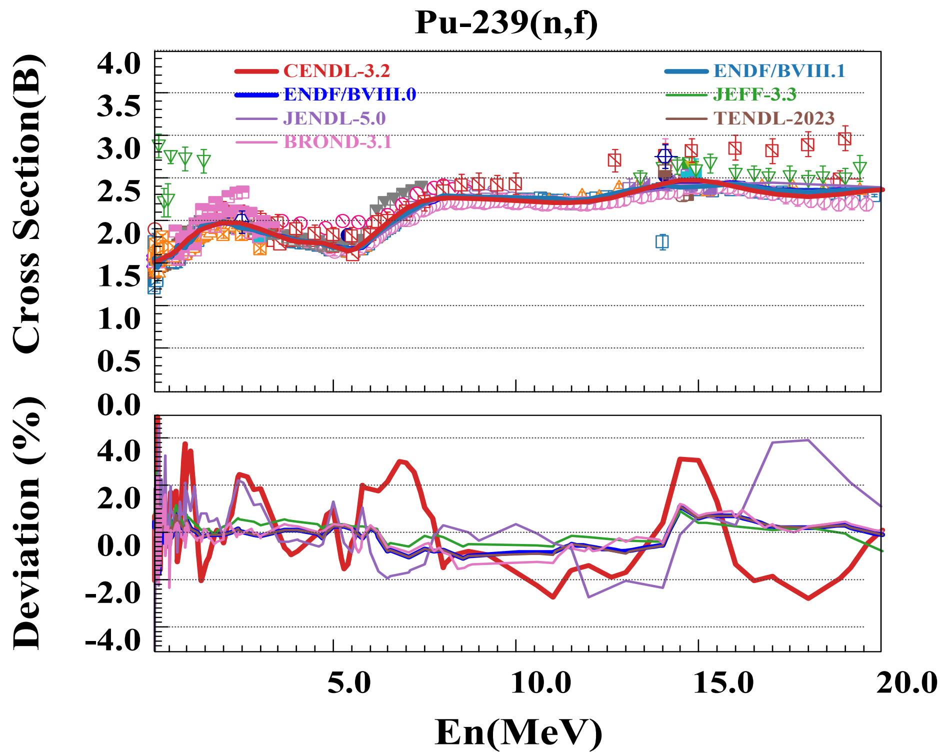


Fig.1 Comparison of the gamma production cross sections for the 365.2keV gamma-ray from $^{63}Cu(n,n'\gamma)$



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

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

Contents

3. Correction of EXFOR data

3.1 Error Data in EXFOR

Los Alamos NATIONAL LABORATORY

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	
PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	PER-CENT	PRT/FIS
0.05	0.05	0.2	0.1	0.05	0.1	3.732	

These descriptors are NOT helpful!

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-S) 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) Delyaed gamma-rays (0.1%)

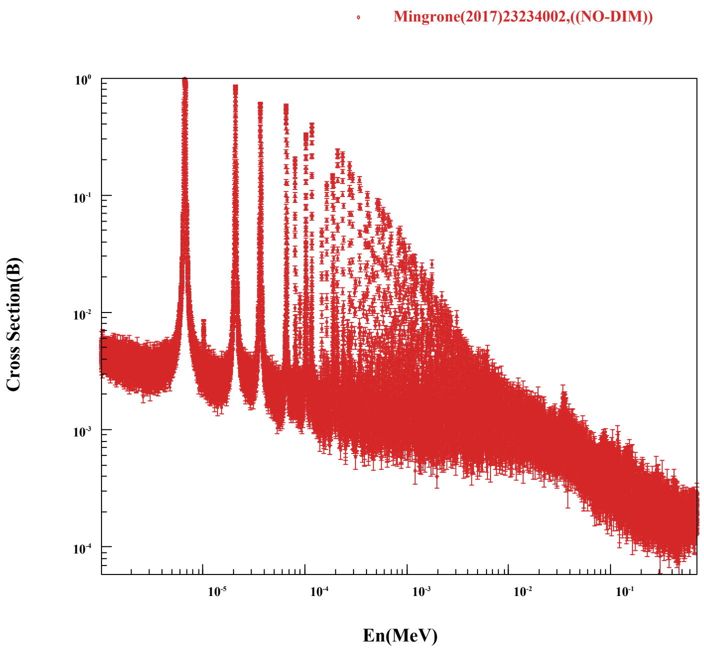
This free-text description is very helpful but cannot be automated and causes repetitive work.

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. Correction of EXFOR data

3.1.1 Further processing the error data



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

```
STATUS      (TABLE) Data received from Federica Mingrone
HISTORY      (20161209R) Data received from F.Mingrone via E.Dupont
ENDBIB               12
COMMON                2          3
THICKNESS ERR-1      ERR-2
ATOMS/B   PER-CENT   PER-CENT
   9.56E-04 0.1         1.
ENDCOMMON             3
DATA                   9      29416
EN-MIN     EN-MAX     DATA       1ERR-S     1DATA      2ERR-S     2
ERR-3      ERR-4      2MISC
EV         EV         NO-DIM     NO-DIM     NO-DIM     NO-DIM
PER-CENT   PER-CENT   NO-DIM
 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
 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
 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
 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
 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
 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
 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
 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
```

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

3. Correction of EXFOR data

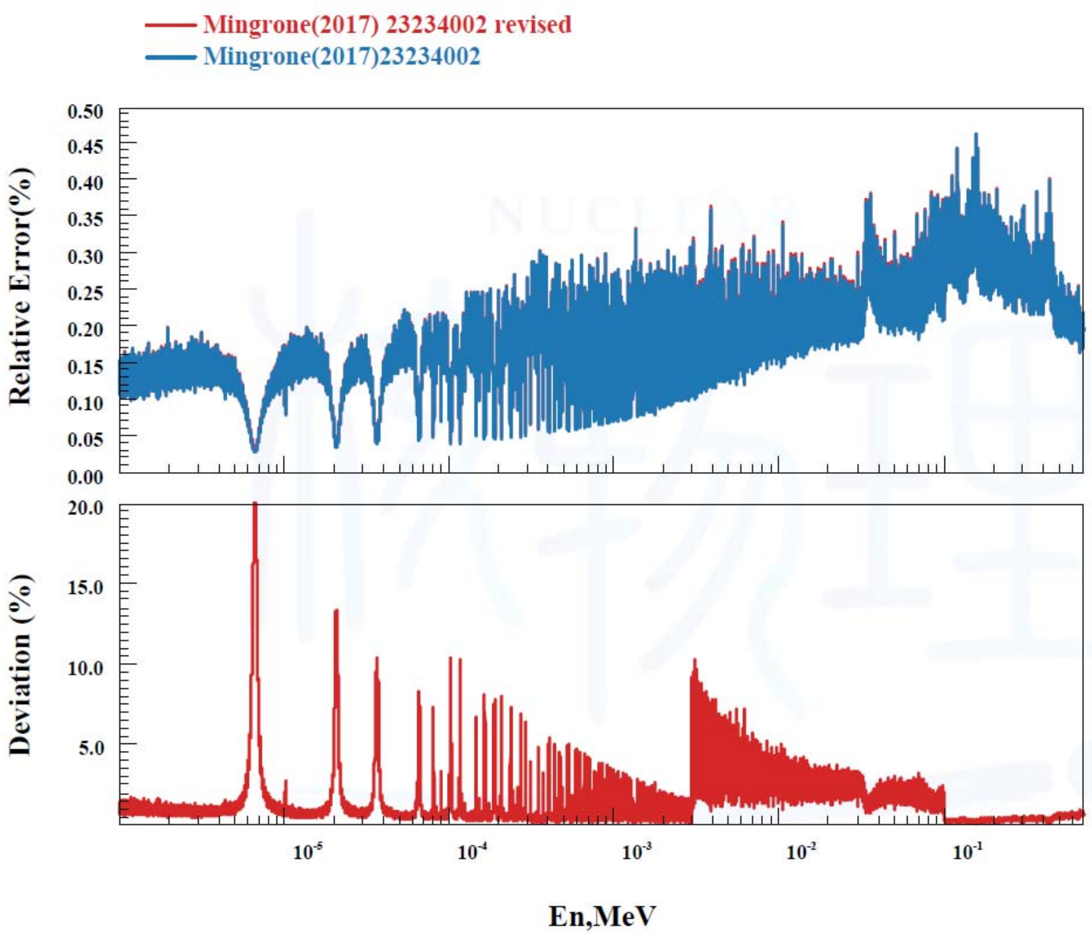
Correct

$$error = \sqrt{(ERR\_S1)^2 + (ERR\_3)^2 + (ERR\_1)^2 + (ERR\_2)^2}$$

	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															
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.

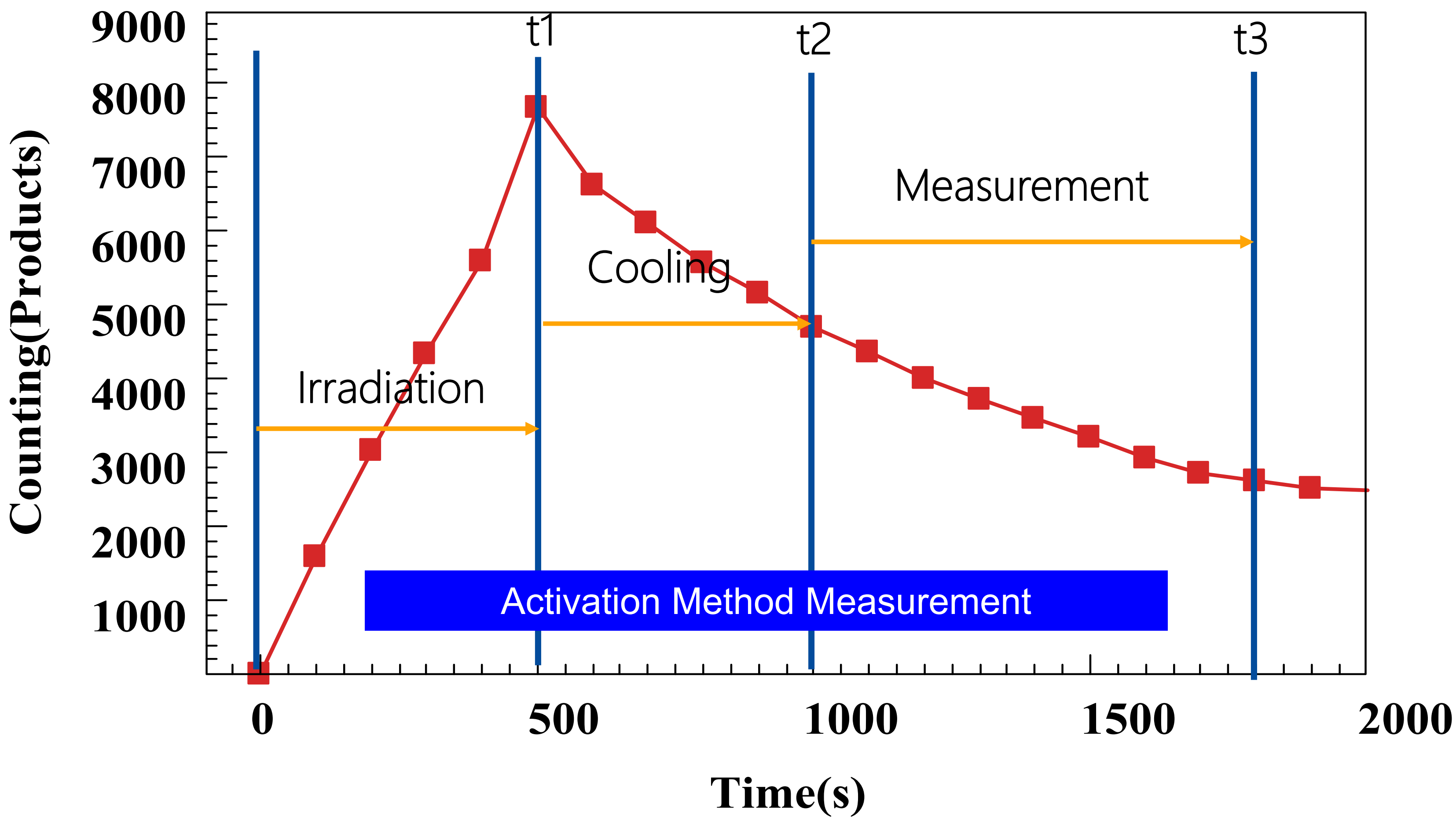
Update Cancel

3. Correction of EXFOR data



Deviations before and after handling

3.2 Correcting Activation Method Measurement Data of EXFOR



3.2.1 Absolute Measurement

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

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

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

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

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 t1, t2, t3 must be known

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

$\emptyset$: 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:

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

Standard sample:

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

In the absence of considering the neutron attenuation by the sample (t_1, $\emptyset$)

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

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

Relative Measurement

Correction items:

$I_{\gamma 0}$, I_γ, σ_0

λ_0, λ : t1, t2, t3 must be known

σ_0: 0 means standard sample(Monitor)

3. Correction of EXFOR data

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

σ_0 → Standard CS Correction

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

$I_{\gamma 0},\ I_{\gamma},\ \lambda,\ \lambda_0$ → Factor Correction

The factors of sample and monitor are reciprocal in form. A/B⇔ B/A

I_γ: (Sample)

$$factor = \frac{I_{\gamma old}}{I_{\gamma new}}$$

$I_{\gamma 0}$: (Monitor)

$$factor = \frac{I_{\gamma new}}{I_{\gamma old}}$$

λ: (Sample)

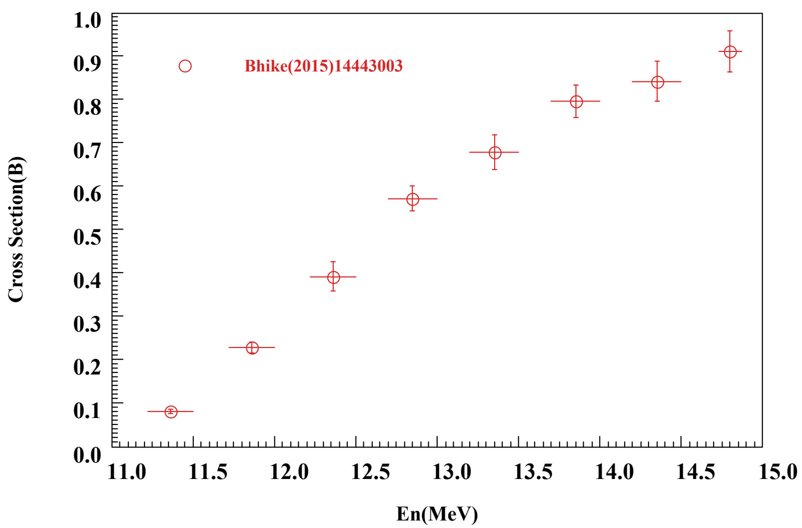
$$factor = \frac{\lambda_{new}\left(1-e^{-\lambda_{old}t1}\right)\left[e^{-\lambda_{old}(t2-t1)} - e^{-\lambda_{old}(t3-t1)}\right]}{\lambda_{old}\left(1-e^{-\lambda_{new}t1}\right)\left[e^{-\lambda_{new}(t2-t1)} - e^{-\lambda_{new}(t3-t1)}\right]}$$

λ_0: (Monitor)

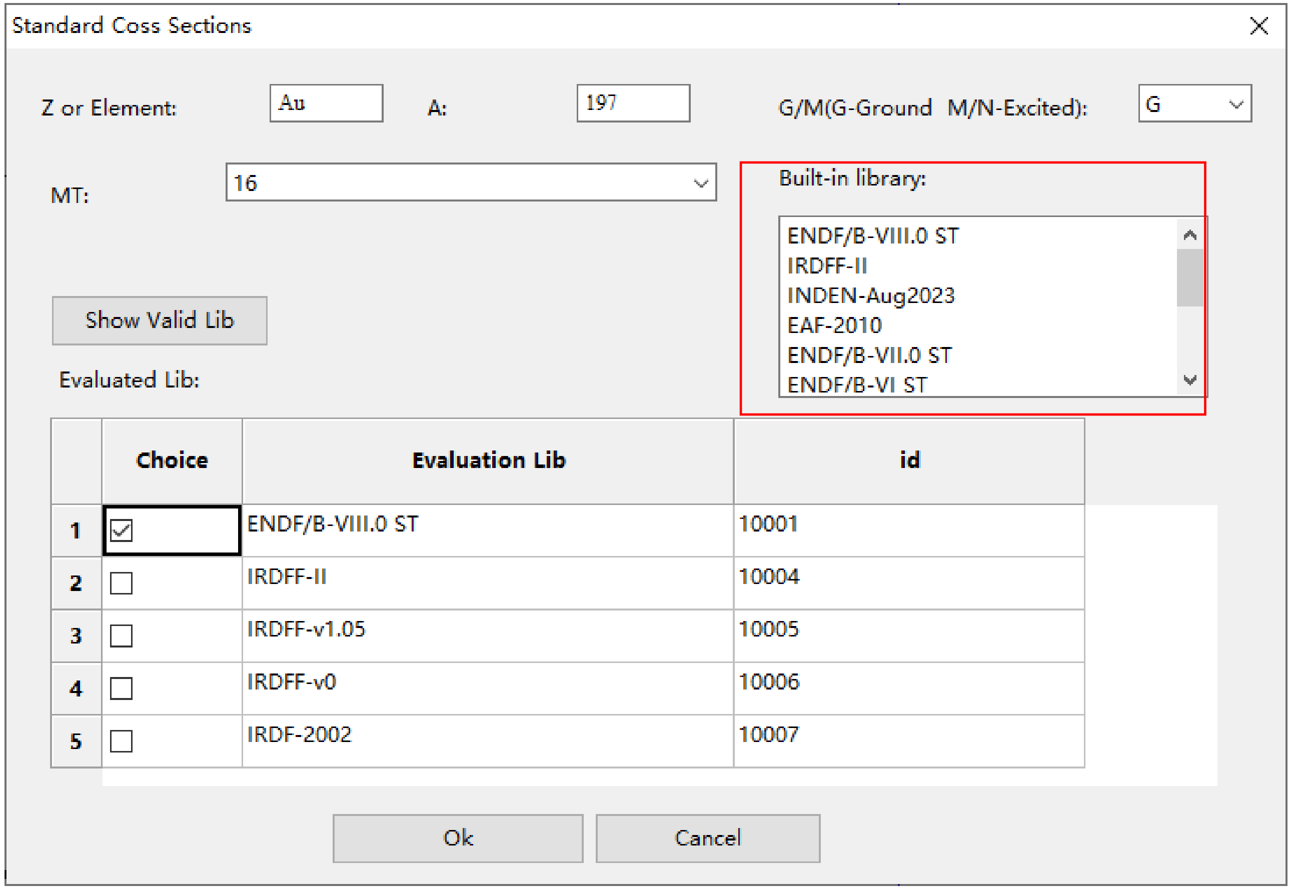
$$factor = \frac{\lambda_{0old}\left(1-e^{-\lambda_{0new}t1}\right)\left[e^{-\lambda_0 new(t_{20}-t_1)} - e^{-\lambda_0 new(t_{30}-t_1)}\right]}{\lambda_{0new}\left(1-e^{-\lambda_{0old}t1}\right)\left[e^{-\lambda_{0old}(t_{20}-t_1)} - e^{-\lambda_{0old}(t_{30}-t_1)}\right]}$$

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

3.2.3 Standard Cross-Sections Correction



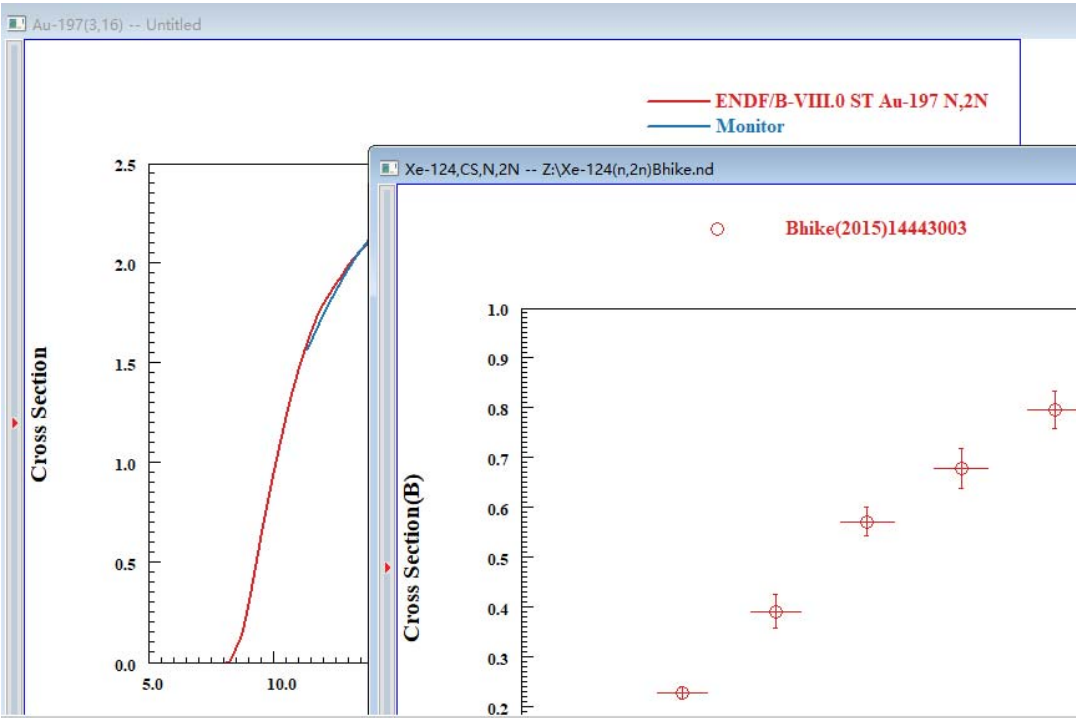
54-XE-124(N,2N)54-XE-123,,SIG
Monitor:Au-197(n,2n)

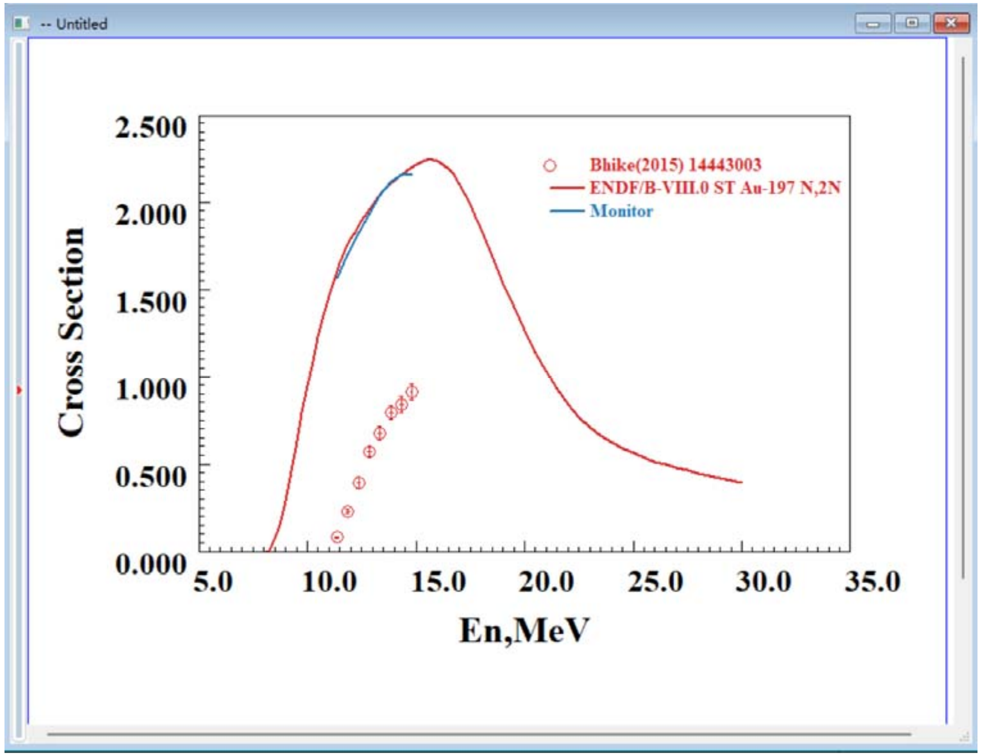


3.2.3 Standard Cross-Sections Correction

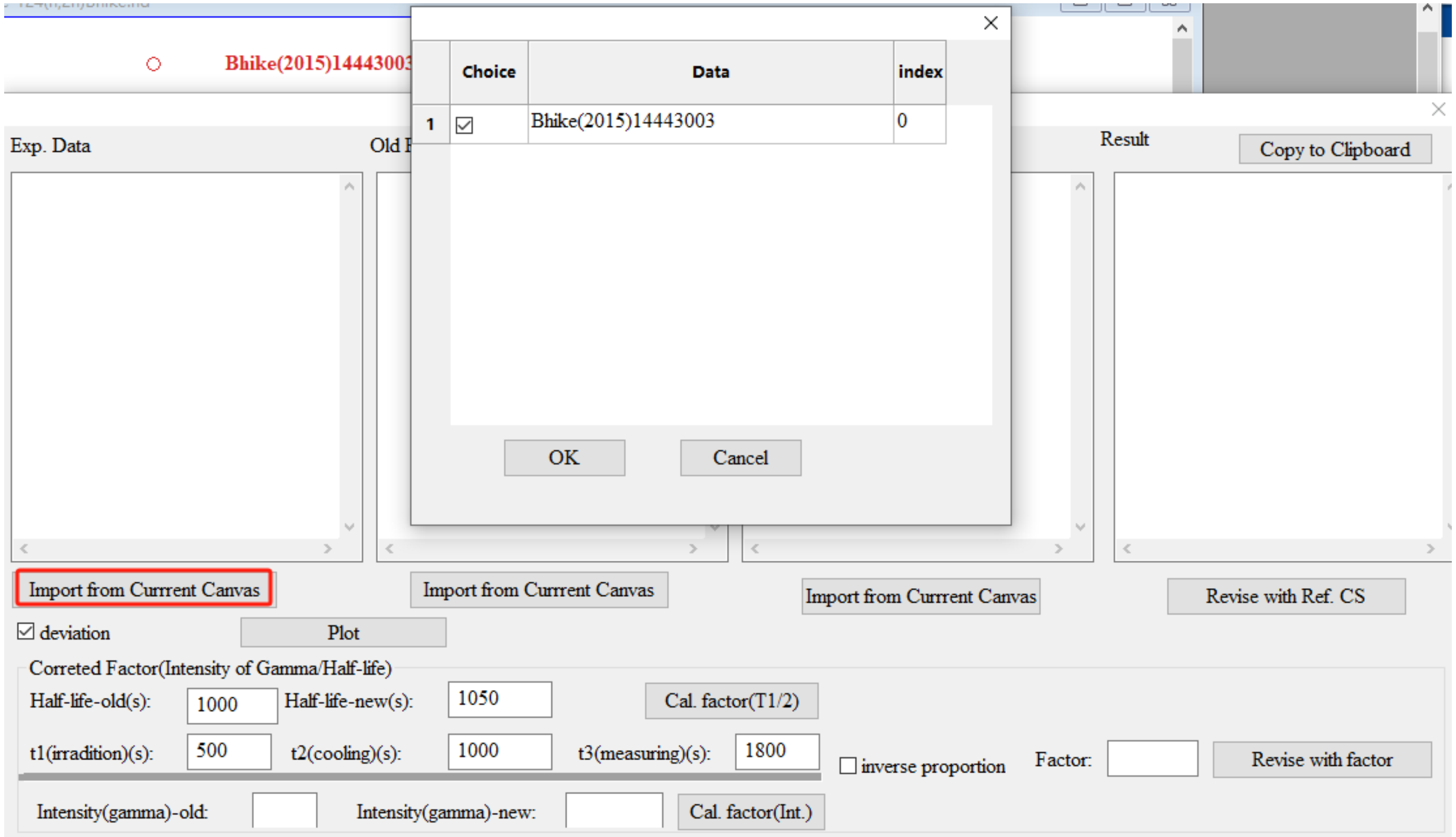
Standard Cross-Sections and experimental data can be plotted on the same canvas or different canvas.

Imported data will not be affected





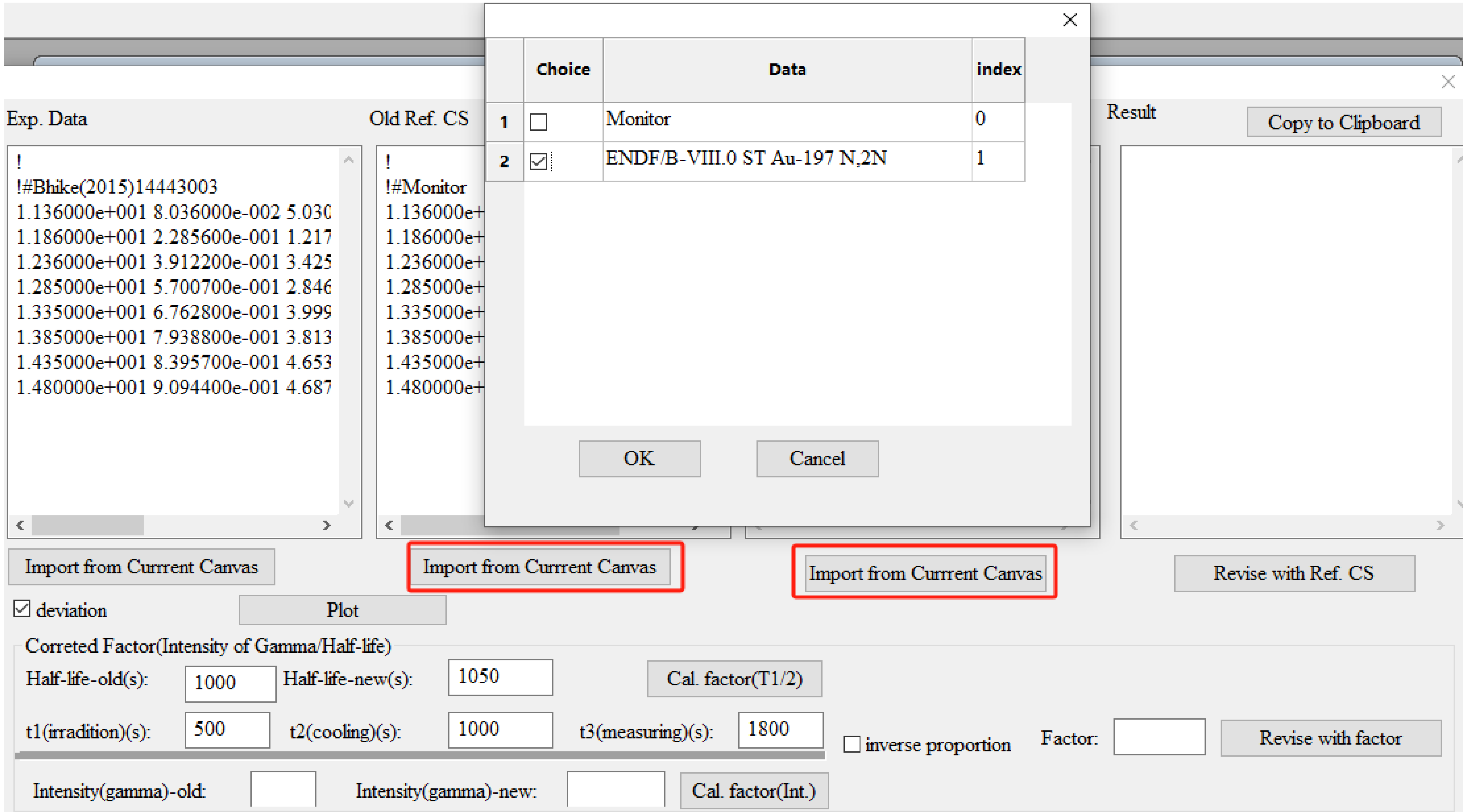
3.2.3 Standard Cross-Sections Correction



Menu: Revise Exp. Data

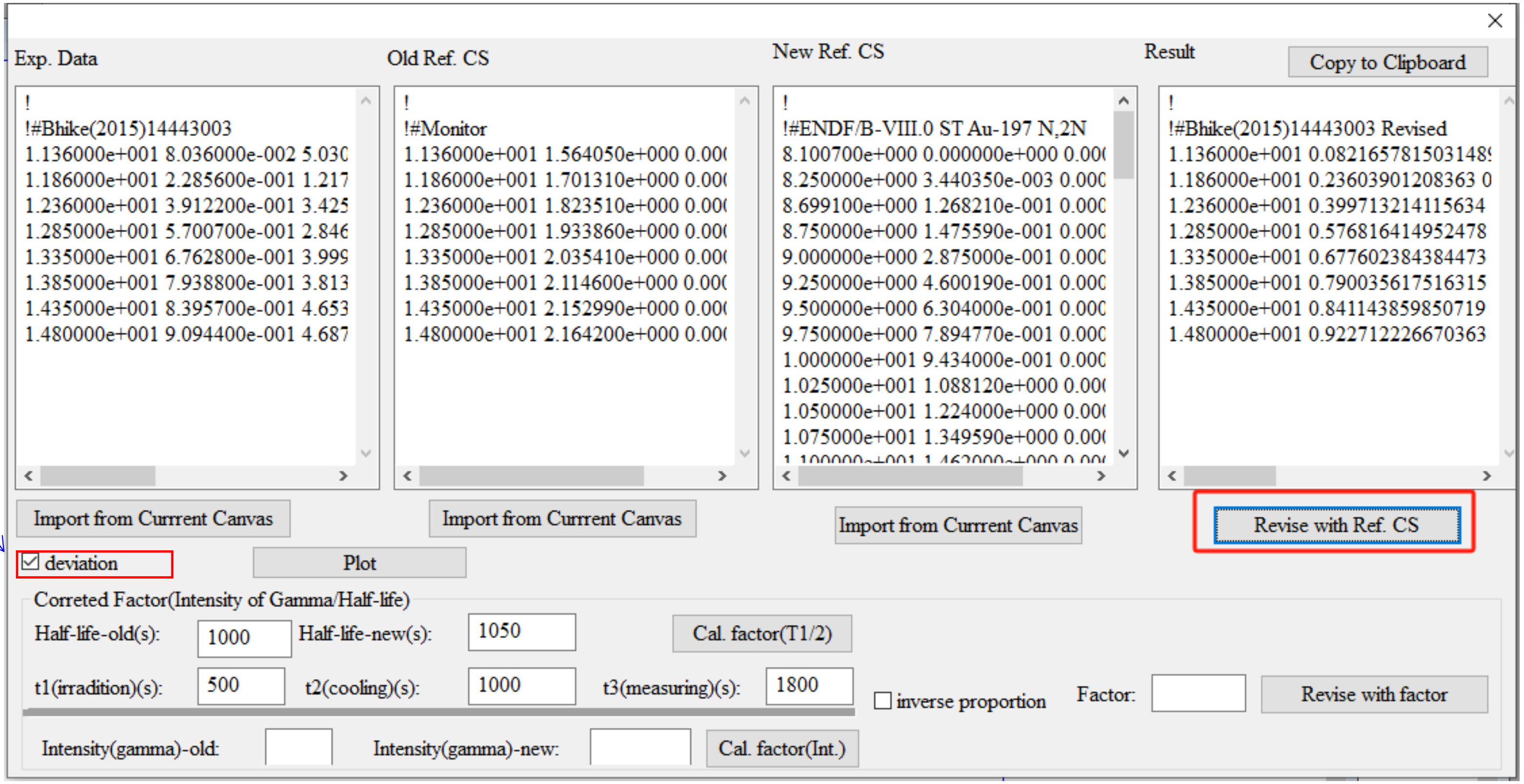
Import or paste data

3.2.3 Standard Cross-Sections Correction

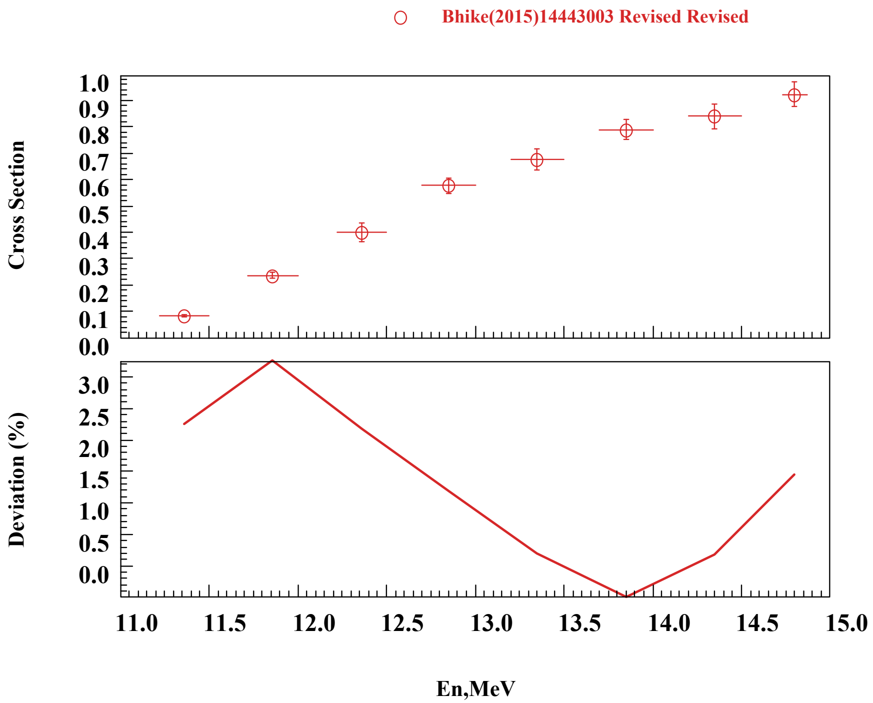


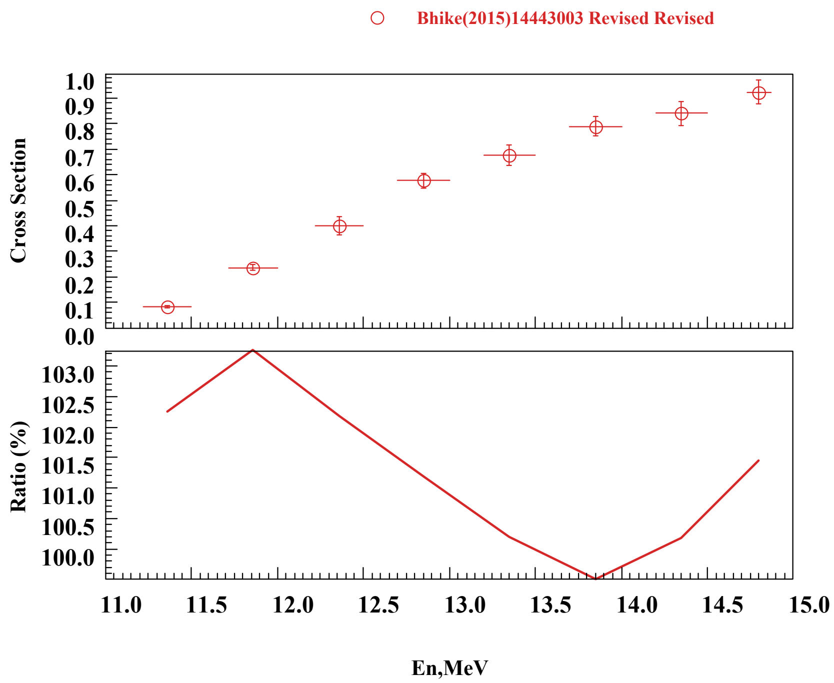
3.2.3 Standard Cross-Sections Correction

Ratio or Deviation



3.2.3 Standard Cross-Sections Correction



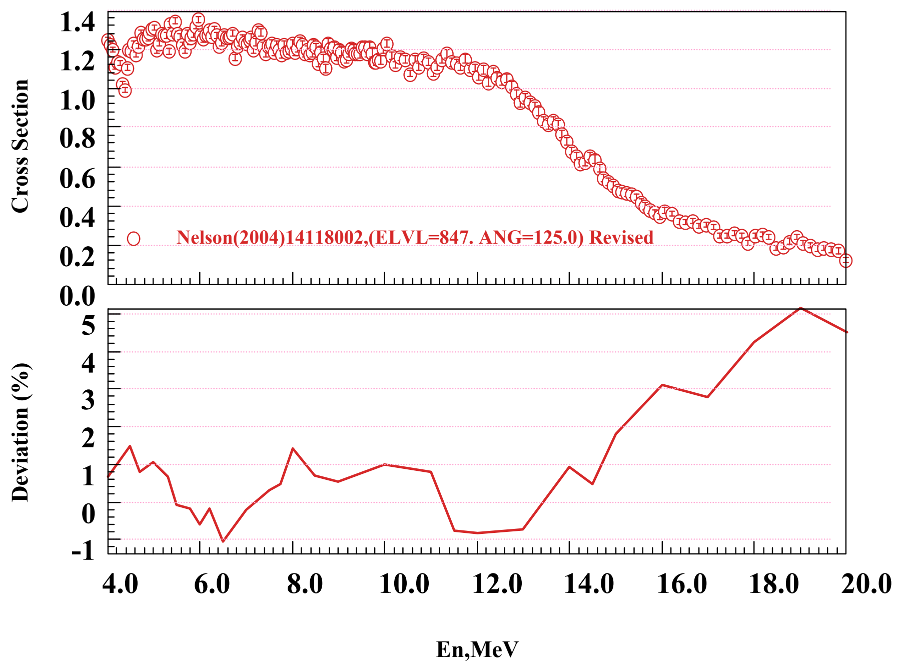


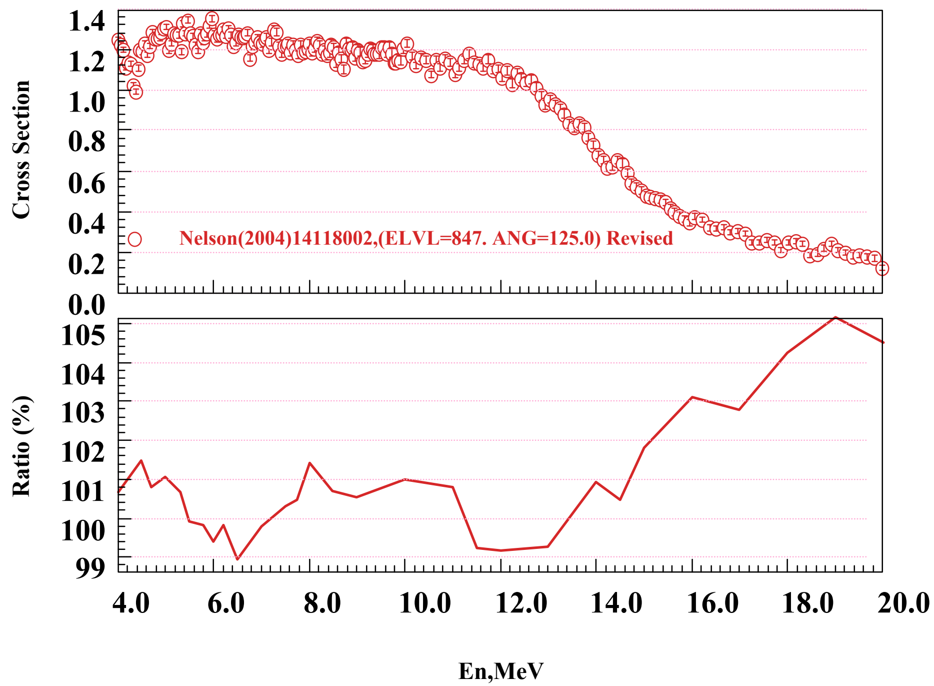
Deviation= $(\sigma_{new}-\sigma_{old})/\ \sigma_{old}*100$

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

3.2.3 Standard Cross-Sections Correction

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





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

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

3. Correction of EXFOR data

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

```
            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
           (20201119A) On. Major revisions in (
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)
DECAY-DATA (26-FE-53-G,8.51MIN,DG,378.,0.42)
MONITOR    (13-AL-27(N,P)12-MG-27,,SIG)
DECAY-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
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
ENDDATA               7
```

Subentry: 30978014 Retrieve

Normalization: 1±0.071429

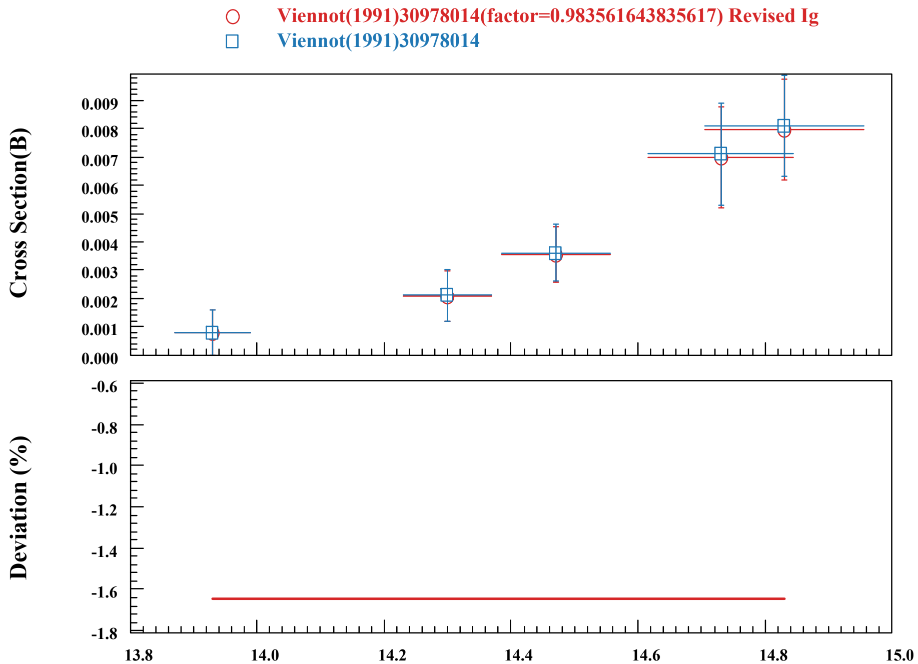
#	E, keV	Intensity, %	I/Imax, %	RTYP	TYPE
1	377.9±0.1	42±0	100±0	2 EC|β+	
2	1288±0.1	0.042±0.042	0.1±0.1	2 EC|β+	

#	E, keV	Intensity, %	I/Imax, %	RTYP	TYPE
1	170.82±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-	

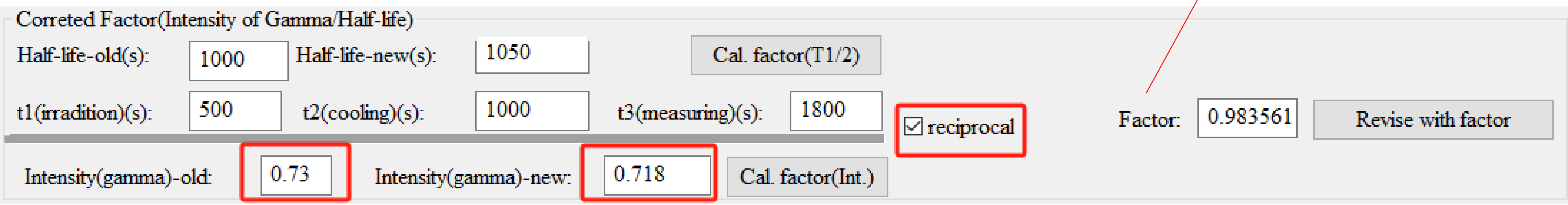
ContinuousSpectrum: 173

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

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



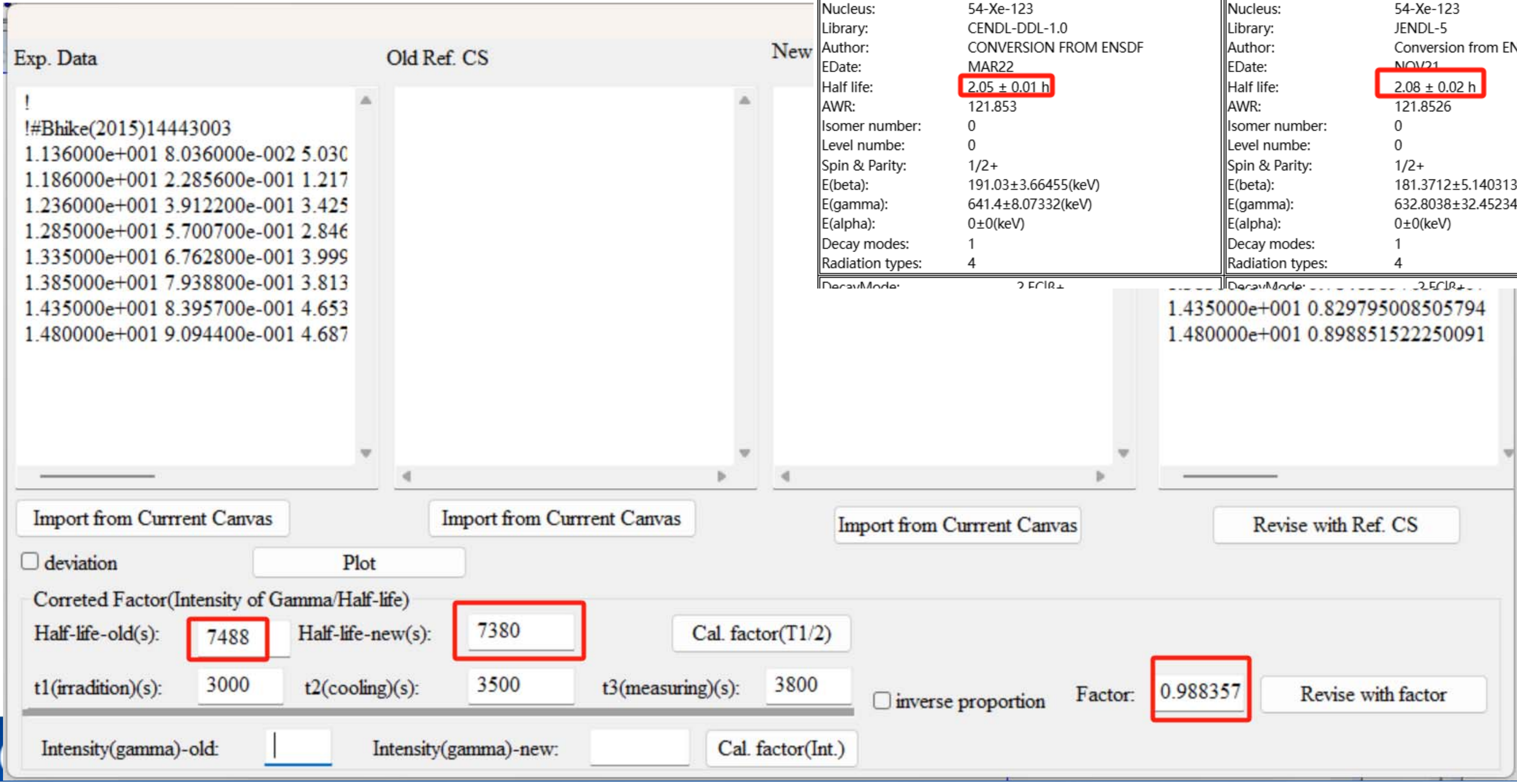
$I_{\gamma 0}$



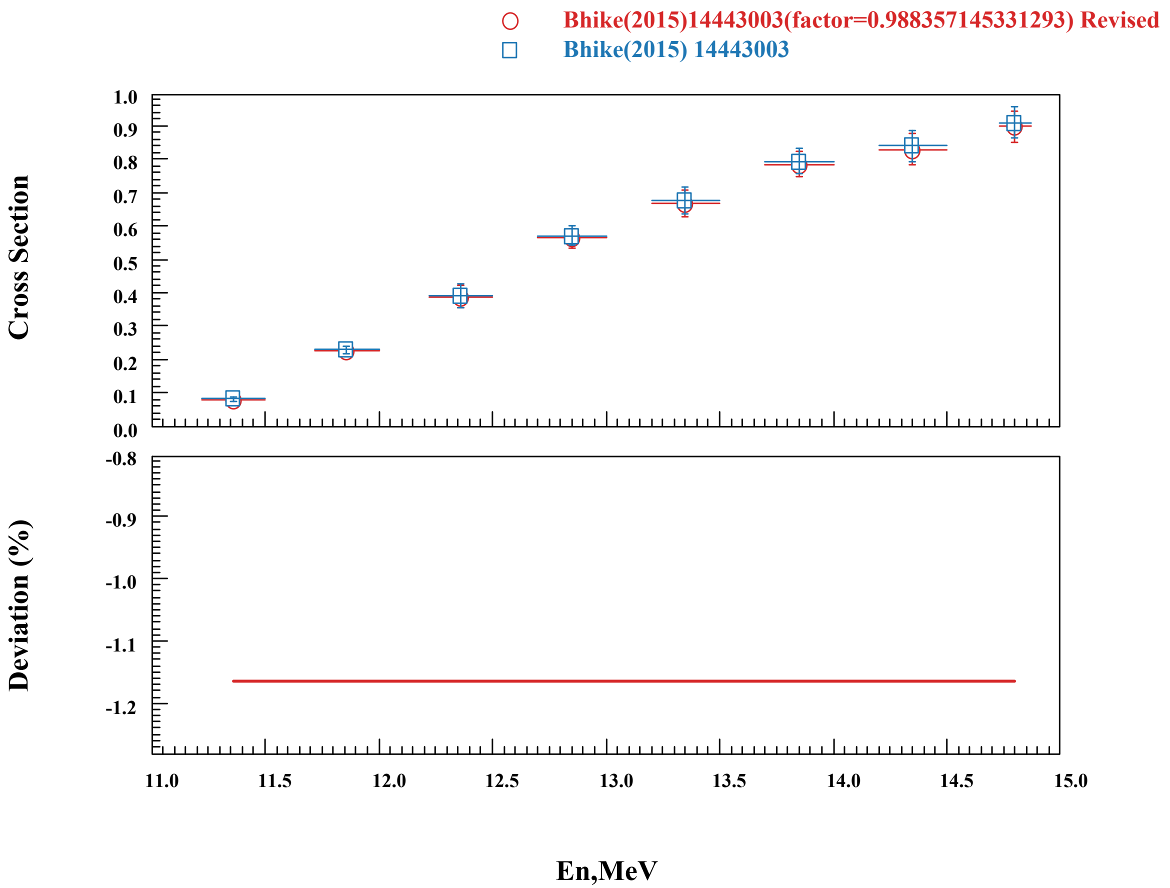
3. Correction of EXFOR data

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



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



Contents

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