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International Nuclear Data Evaluation Network (INDEN) on Actinide Evaluation in the Resonance Region (3)

Summary Report of the IAEA Consultants' Meeting

17-19 November 2020
(virtual event)

Gilles Noguere
CEA/DEN Cadarache
St. Paul lez Durance, France

Roberto Capote Noy
International Atomic Energy Agency (IAEA)
Vienna, Austria

July 2021

IAEA Nuclear Data Section
Vienna International Centre, P.O. Box 100, 1400 Vienna, Austria

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International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 Vienna
Austria

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ABSTRACT

A Consultants Meeting on Actinide Evaluation in the Resonance Region (3) of the International Nuclear Data Evaluation Network (INDEN) was held by video conference from 17 to 19 November 2020. The meeting was a follow-up of the working group on evaluations in the resonance region of actinide nuclei. Upcoming updates of the Prompt Fission Neutron Spectra evaluations of U-235(n,f) and Pu-239(n,f) were presented. The status of evaluations in the resonance regions of major actinides was reviewed, and possible normalization integrals were proposed for TOF fission data of fissile targets. On-going evaluation work was discussed, and new experimental and evaluation projects targeted at improving the evaluations reviewed and compared.

July 2021

Contents

1. INTRODUCTION

The aim of the third INDEN meeting on Actinide Evaluation in the Resonance Region was to discuss progresses in the evaluation of the three major actinides which are ^{235}U, ^{233}U and ^{239}Pu with special requests for improving the ^{241}Pu and ^{16}O evaluations. No evaluation improvements for ^{238}U were presented during this meeting. This meeting was an occasion to discuss with experimentalists the status of the latest neutron cross section and Prompt Fission Neutron Spectra (PFNS) data of interest for reaching the objectives of INDEN:

- The neutron capture and fission yields for ^{235}U measured at the RPI facility were provided by Y. Danon [1] to the meeting participants in 2019. The data are now available on EXFOR.
- The α-ratio, neutron capture and fission cross sections for ^{235}U measured at the n_TOF facility by CIEMAT have been distributed to the meeting participants upon request by D. Cano Ott [2]. The data are not yet available in EXFOR.
- The ^{235}U neutron fission cross section measured at the n_TOF facility by Amaducci et al. [3] are available on EXFOR in a broad multigroup format. The pointwise data set are not yet available in EXFOR.
- New PFNS (^{239}Pu) were measured in the framework of the Chi-Nu and CEA collaboration [4, 5].

New versions of the ^{239}Pu, ^{233}U and ^{235}U evaluations produced in the framework of a collaboration between ORNL and IAEA are available via the INDEN web page (https://www-nds.iaea.org/INDEN/). The latest capture and fission data from n_TOF were not included in that ^{235}U evaluation work.

The ongoing experimental, evaluation and benchmarking works on each isotope are shortly presented in Sections 2.1 to 2.4. More details can be found in the presentation summaries provided in the Appendix.

2. EVALUATION OF THE NEUTRON CROSS SECTIONS OF ACTINIDES

2.1. ^{235}U evaluation

The new version of the ^{235}U evaluation (M. Pigni, ORNL) produced with the SAMMY code in the framework of a collaboration between ORNL and IAEA proposed minor changes compared to the evaluation available in ENDF/B-VIII.0. in the region below 10 eV to better reproduce RPI data (see presentation of Y. Danon and Table 1 below). Several iterations were also driven by A. Trkov (JSI), who was looking at the calculated reactivity of ICSBEP benchmarks as a function of the neutron flux hardness. The aim of these corrections was to study the variations of the calculated reactivity observed as a function of the Burnup in PWR benchmarks. Such biases were not observed with the ^{235}U evaluation of JEFF-3.3 (L. Leal, IRSN). However, we have to keep in mind that the ORNL evaluation uses the PFNS at thermal energy produced in the framework of the neutron standard group of IAEA [6], while JEFF-3.3 uses a different set of PFNS produced by CEA/DAM of Bruyère Le Chatel. Y. Danon shows that the new ORNL/IAEA evaluation achieves a good agreement with the capture and fission yields measured at the RPI facility as shown in Table 1.

TABLE 1: CAPTURE AND FISSION DATA MEASURED AT THE RPI FACILITY COMPARED TO ^{235}U EVALUATIONS (see presentation of: Y. Danon)

			C/E Fission Yield			C/E Capture Yield		
	E1	E2	ENDF 7.1	ENDF 8.0	IAEA 2020	ENDF 7.1	ENDF 8.0	IAEA 2020
From Thermal Experiment								
	0.01	0.0206	1.01	1.00	1.00	1.02	1.01	1.01
	0.02	0.03	1.00	1.00	1.00	0.99	0.99	0.99
	0.0206	0.0623	1.00	1.00	1.00	0.98	0.99	0.99
	0.0623	0.6	0.99	1.01	1.01	0.99	1.05	1.03
	0.6	7.8	0.97	0.99	1.00	0.99	1.05	1.02
	0.0253	9.4	0.98	0.99	1.01	0.99	1.06	1.02
	7.8	11	0.98	0.98	1.01	1.00	1.10	1.02
From Epi Thermal Experiment								
	9.4	150	1.02	1.01	1.01	1.04	1.03	1.03
	150	250	1.02	1.00	1.00	1.07	1.03	1.03
	250	350	1.04	1.02	1.02	1.06	0.96	0.96
	350	450	1.03	1.04	1.04	1.12	0.99	0.99
	450	550	1.02	1.02	1.02	1.17	1.00	1.00
	550	650	1.03	1.01	1.01	1.18	1.00	1.00
	650	750	1.03	1.02	1.02	1.17	1.02	1.02
	750	850	1.03	1.03	1.03	1.17	1.03	1.03
	850	950	1.00	1.01	1.01	1.17	1.07	1.07
	950	1500	1.02	1.00	1.00	1.25	1.02	1.02
	1500	2000	1.03	1.00	1.00	1.45	1.01	1.01

Complementary results were obtained with the CONRAD code over the full resolved resonance range (G. Noguere, CEA/DES Cadarache). These results confirm that a consistent description can be achieved between 40 data sets (measured from 1966 to 2020) and the latest standard values for the thermal cross sections (σ_γ=99.5 b, $_f\sigma$=587.3 b) and the fission integral between 7.8 and 11 eV (I_f=245.7 b.eV). The analysis of 6 fission data sets provides a thermal fission cross section to fission integral ratio of σ/I_f = 2.379(13), which is in excellent agreement with the standard value of 2.373(29).

New ^{235}U evaluations will be produced in 2021 by including in the analysis the latest data measured at n_TOF, which are not yet available in EXFOR:

- two sets of fission cross sections reported by Amaducci et al. [3], measured relatively to Lithium and Boron,
- α-ratio, neutron capture and fission cross sections reported by Balibrea-Correa et al. [2].

I. Duran indicates that he will provide the ^{235}U(n,f) data measured during the PhD work of Esther Leal Cidoncha. The participants of INDEN are also expecting the public release of two new fission cross section sets from Olivier Serot et al. (CEA/DES Cadarache), of the point-wise n_TOF data by Amaducci et al (only group-wise data have been published), and neutron multiplicity data from Gook et al. [7] measured in the resonance range at JRC-Geel.

I. Duran also proposes to define the ^{235}U resonance energy at 8.773(3) eV as standard (beside the thermal point) for neutron energy calibration purposes.

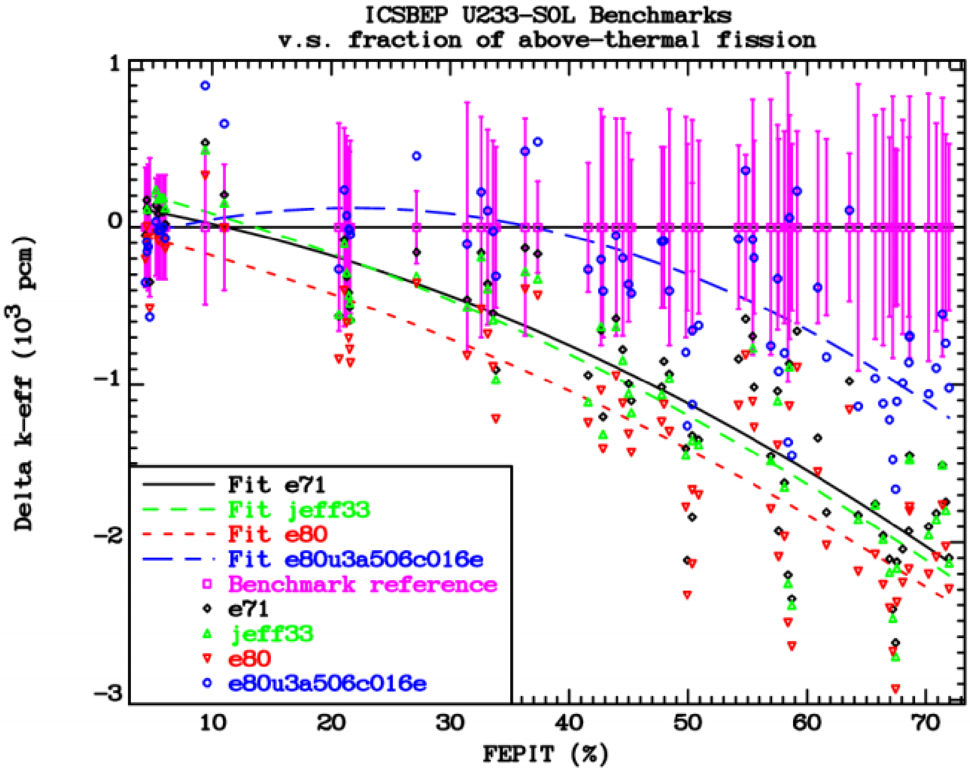


FIG. 1: ^{233}U evaluations and benchmark performances (see presentation of: A. Trkov)

2.2. ^{233}U evaluation

The new version of the ^{233}U evaluation (M. Pigni, ORNL) was also produced with the SAMMY code in the framework of the collaboration between ORNL and IAEA. A consistent description was achieved between the new standards values and the cross sections measured at ORELA and n_TOF. Future evaluation work should aim at achieving consistency between the resolved and unresolved resonance ranges via the statistical analysis of the average resonance parameters.

Improved C/E trends on solution Benchmarks of the ICSBEP data base were shown by A. Trkov (Fig. 1). These results were obtained thanks to the new ^{233}U evaluation based on ENDF/B-VIII.0 as template, in which the resonance parameters were replaced by those produced by ORNL and the IAEA thermal PFNS evaluation was used. These results highlight the major role of the thermal PFNS and the needs of improving PFNS for ^{233}U. In addition, A. Trkov pointed out possible issues with the ^{16}O evaluation of ENDF/B-VIII.0. The new $^{13}C(\alpha,n)^{16}O$ cross section measurement of Febbraro et al. [8], which is close to the JENDL-4 trend, could solve such a longstanding issue.

As already discussed in the previous INDEN meeting, L. Leal (IRSN) reminded us that his ^{233}U is ready for further benchmarking tests.

The participants of INDEN are also expecting the public release of the new point-wise capture and fission cross sections measured at n_TOF [9] (So far only the groupwise values were published).

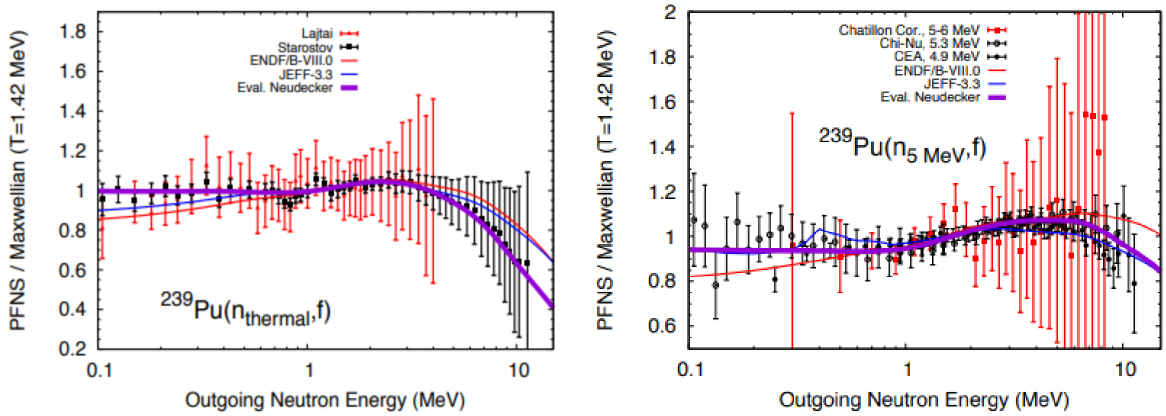


FIG. 2: New evaluation of PFNS(^{239}Pu) (see presentation of: D. Neudecker).

2.3. ^{239}Pu evaluation

The latest evaluation of the ^{239}Pu resonance parameters dates back to the work performed in the framework of the working group WPEC/SG-34 (2014). The institutes (ORNL, IRSN and CEA/DES Cadarache) are involved in the production of new evaluations of the resonance parameters, whose main objectives are (*i*) to account for the latest standard values, (*ii*) to use the latest capture cross section measured by Mosby Shea at LANL [10] and (*iii*) to describe effects of a few broad fission clusters by extending the resonance range up to 5 keV. One of the issues is the normalization of the LANL data. A solution was proposed at the latest meeting, which consisted in normalizing the LANL data between 37 and 100 eV as 39(1) barns, via the C/E trends provided by the PROFIL experiments carried out in the PHENIX fast reactor.

The benchmark results shown during the JEFF meetings confirm that the ^{239}Pu of JEFF-3.3 fails to accurately reproduce ISCBEP benchmarks. A working version of the ^{239}Pu has been erroneously introduced in the official release of JEFF-3.3. The JEFF-3.2 evaluation was selected as starter file for JEFF-4T0.

Future ^{239}Pu evaluation will take advantage of the experimental work performed on PFNS in the framework of the Chi-Nu and CEA collaboration [4, 5]. For the analysis of the data reported in Ref. [4], a modified MCNP version including the FREYA code was used in order to account for correlations via an analogue fission treatment of the fission process. Experimental results were used by D. Neudecker for producing a new set of PFNS as a function of the incident neutron energy (Fig. 2). Her results were transmitted to IAEA and JSI for further benchmarking tests.

In addition to that, ^{239}Pu(n,f)/^{235}U(n,f) cross section ratios by the fission TPC [11] were recently included by. D. Neudecker (and counter-checked by V. Pronyaev) in the database underlying the Neutron Data Standards evaluation [12, 6]. The resulting evaluated data and input decks were reported to the Neutron Data Standards committee. While these data were released after this particular meeting took place, they are currently being tested by LANL, the IAEA and JSI with various validation responses.

In view of solving the normalization issue of the capture cross section, a new ambitious experimental program was presented by D. Cano Ott. The measurements of the α-ratio, (n,γ) and (n,f) cross sections will take place at EAR1 and EAR2 of the n_TOF facility in the framework of the SANDA project. The expected accuracy will be close to $\pm$3%. The need of having new transmission data, especially at low neutron energy, was reminded during the meeting.

TABLE 2: REFERENCE INTEGRAL LIMITS DEFINITION (provided by I. Duran).

Isotope	I1 [meV]	I3 [eV]
^{233}U	20.0 – 60.0	8.1 – 14.7
^{235}U	20.0 – 60.0	7.8 – 11.0
^{239}Pu	20.0 – 60.0	9.0 – 20.0
^{241}Pu	20.0 – 60.0	11.7 – 19.5
^{10}B(n,α)	20.0 – 60.0	

2.4. ^{241}Pu evaluation

The ^{241}Pu evaluation was not selected as a prior isotope in the 1st phase of the INDEN project. However, it is worth emphasizing the need of producing a new evaluation for the ENDF/B and JEFF projects with objectives similar to those of ^{239}Pu: (*i*) use the latest standard values of the thermal neutron cross sections, (*ii*) extend the resonance parameters up to the keV energy range and (*iii*) add fluctuations in the neutron multiplicity. The latest item would require more theoretical work for explaining the origin of those fluctuations. For instance, they are theoretically described thanks to the two-step (n,γf) process alone.

3. DEFINITION OF THE REFERENCE INTEGRALS

Connecting the (n,f) measurements around the thermal point with those around the RRR, for the major fissile actinides, will help users of the nuclear data standards when normalizing their experimental datasets. After some discussions along the virtual meeting, Table 2 reports the limits of the integrals to be used as reference.

For the integrals around the thermal point, the bounds 20 – 60 meV have been chosen to be the same for each actinide, in order to easily compare it with the same integral in the ^{10}B(n,a) reaction, which is often used as monitor in different experiments.

For the I3 integrals in the RRR, these limits have been defined for each actinide, looking for two valleys having in-between resonances high enough to get a very low statistical uncertainty when integrating the experimental data-points. Note that for ^{235}U, the interval [7.8 eV – 11.0 eV] corresponds to the one used in the framework of the neutron cross section standard group of IAEA.

There are few experimental datasets, retrieved from EXFOR, covering the whole energy range from thermal to RRR, and having high energy resolution, allowing so to get accurate integral values. The ratios of these integrals will be analyzed in a separate document.

4. CONCLUSION

The various items discussed during the meeting highlighted the evaluation efforts that are still required for improving the description of the resolved resonance range of the major actinides. Evaluation work undertaken at French institutes (IRSN, CEA Cadarache) and by the ORNL/IAEA collaboration raise questions on the accurate description of the capture and fission cross sections in the energy range between the thermal energy and the first resonance, which is of utmost importance for nuclear reactor applications.

For ^{235}U, the latest experimental results measured at the RPI facility provide a unique set of capture and fission cross sections that cover the thermal and epithermal energy ranges. For ^{233}U, the ongoing experimental work at the n_TOF facility will provide the required information in a few years. For ^{239}Pu, the future experiments planned at n_TOF in the framework of the SANDA project will also provide the required information, but in a longer time scale.

The discussions about the experimental and theoretical programs devoted to PNFS clearly confirm the scientifically sound results achieved this last decade. Improved PFNS will help to solve long-standing issues observed in ICSBEP benchmarks.

References:

[1] Y. Danon, et al., Nucl. Sci. Eng. **187** (2017) 291.

[2] J. Balibrea-Correa, et al., Phys. Rev. C **102** (2020) 044615.

[3] S. Amaducci, et al., Eur. Phys. J. A **55** (2019) 120.

[4] K.J. Jelly, et al., Phys. Rev. C **102** (2020) 034615.

[5] P. Marini, et al., Phys. Rev. C **101** (2020) 044614.

[6] A.D. Carlson, et al., Nucl. Data Sheets **148** (2018) 143.

[7] A. Gook, et al., EPJ Web of Conferences **146** (2017) 04007.

[8] M. Febbraro, et al., Phys. Rev. Lett. **125** (2020) 06250.

[9] M. Bacak, et al., EPJ Web of Conferences **239** (2020) 01043.

[10] S. Mosby, et al., Phys. Rev. C **97** (2018) 041601(R).

[11] L. Snyder, et al. (NIFFTE collaboration), Measurement of the ^{239}Pu(n ,f)/^{235}U(n ,f) cross section ratio from threshold to 30 MeV with the NIFFTE fission Time Projection Chamber, submitted (2021).

[12] D. Neudecker, et al., Los Alamos National Laboratory Report LA-UR-21-24093 (2021).

APPENDIX: PRESENTATION SUMMARIES

A.1. Status of the RRR evaluations for $^{233,235}U$, ^{239}Pu, M.T. Pigni

The R-matrix evaluations of the reaction cross sections for fissile actinides such as $^{233,235}U$ and ^{239}Pu are in progress. Several updates to the resonance parameters including thermal constants as well as neutron multiplicities were presented.

^{233}U

- Particular focus is devoted to resolve the strong negative gradient in the critical assemblies (as pointed out in Nuclear Data Sheets 148, 1, 2018).
- The *(n,f)* cross sections were increased and fitted to the ORELA measured data. In previous evaluations only the shape of these data was used.
- Exclusive updates to the thermal values recommended by the Standards evaluations together with the Prompt Fission Neutron Spectra were implemented.
- The impact of these updates on the benchmark calculations were tested (parabolic fit of the thermal solutions for increasing Above Thermal Fission Fraction shown in Trkov's presentation).
- The presented results were based on a RRR evaluation up to 600 eV. Additional work is in progress to extend the RRR evaluation up to about 2.5 keV with proper statistical constraints (see slides 5 and 6 in presentation of: M.T. Pigni) and average resonance parameters to define the URR evaluation up to 40 keV. As discussed in previous INDEN meetings, the work to extend the RRR is devoted to identifying the need of including fluctuating excitation functions where self-shielding corrections are important.
-

^{235}U

- Updates to the RRR evaluation in the thermal and resonance region up to a few ten of eVs was presented. This was motivated by aiming to improve the fit of newly measured RPI capture and fission data with particular focus on the 0.1—1 eV.
- The absorption rate below 1 eV was particularly important to understand the sensitivity of the capture cross section to the VERA depletion benchmark results and the related negative gradient of the Δk_{eff} related to ENDF/B-VII.1.
- After achieving an improved agreement to RPI measured data, almost no difference (about 50 pcm at the beginning of the depletion) was observed (see slide 9 in presentation of: M.T. Pigni).

^{239}Pu

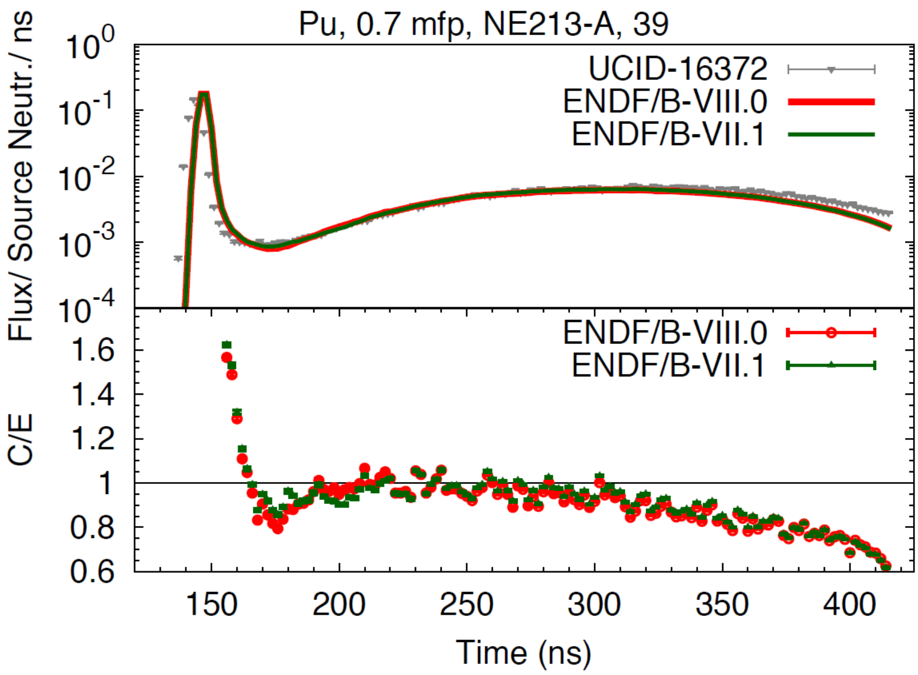
- Results focusing on coupling the thermal and the resolved resonance region to the newly evaluated prompt neutron fission spectra (PFNS) were presented. The recently released ENDF/B-VIII.0 was based on evaluations performed within the international collaboration CIELO aiming to improve nuclei of fundamental importance such as ^{235}U and ^{239}Pu. The ^{235}U R-matrix evaluation (ORNL) was updated with the latest thermal constants and PFNS improving the benchmark performance of the thermal solutions. However, for ^{239}Pu evaluation the focus was in the high energy range and the prediction on the thermal solution benchmarks was underpredicted. Within IAEA coordinated research activities, newly evaluated PFNS showed a reduction of 1.8% on the average energy: PFNS(⟨Eav⟩=2.08 MeV). These changes were combined with recent work on ^{239}Pu R-matrix evaluation (ORNL) aimed to update the thermal constants. This led to improved benchmark performance in the thermal solutions.
- Negative slope as a function of the temperature is not understood yet (bias over 2s lower than measured).

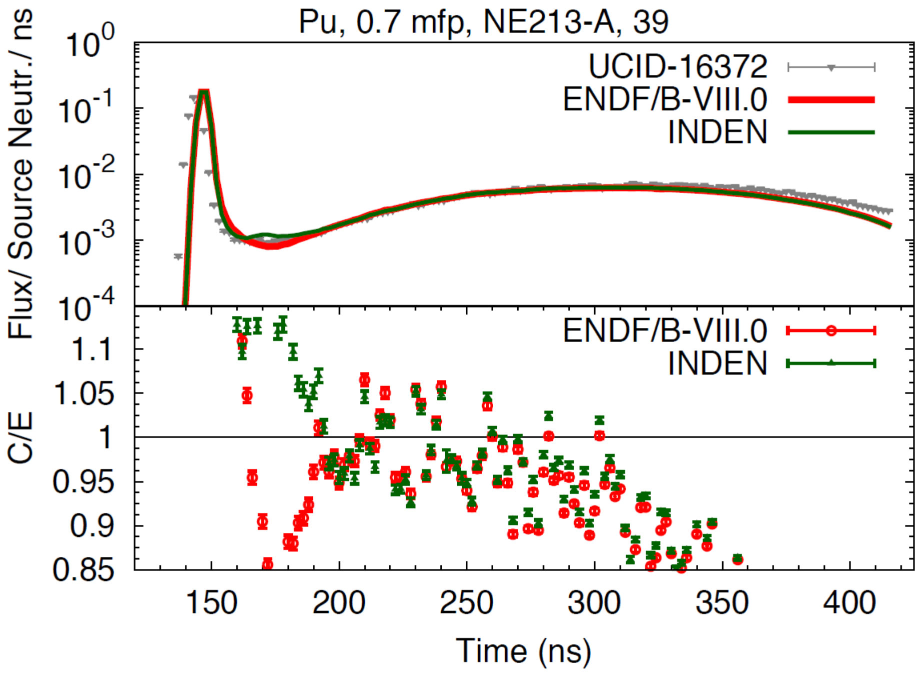
A.2. ^{239}Pu PFNS Evaluation Including Recent Chi-Nu and CEA Experimental Data, D. Neudecker

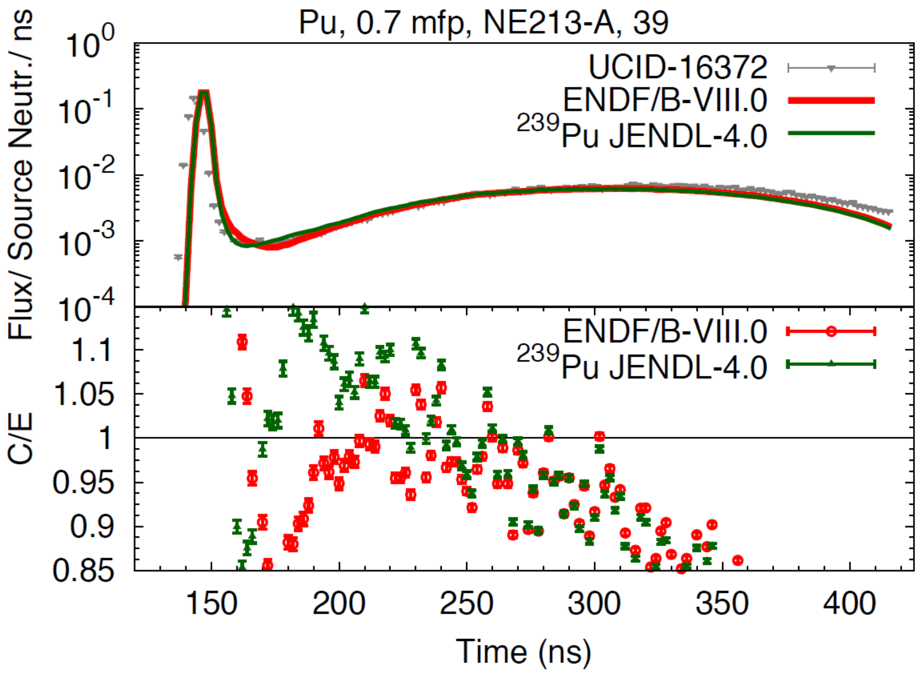
This talk covered a recent ^{239}Pu PFNS (prompt-fission neutron spectrum) evaluation at LANL including recent data of Chi-Nu (K. Kelly, Phys. Rev. C **102**, 034615 (2020)) and CEA (P. Marini et al., Phys. Rev. C **101**, 044614 (2020)). These new experiments triggered a new evaluation as they significantly extend the incident- and outgoing-neutron energy range of the evaluation (E_{inc}: 1-27 MeV, E_{out}: 10 keV-12 MeV) and provide high-precision data which allow to better define the evaluated PFNS. In the previous evaluation (D. Neudecker et al., Nucl. Data Sheets 148, 293 (2018)), only data sets from two groups (Starostov et al. and Lestone et al.) influenced the evaluated PFNS distinctly; all other experimental data were too uncertain to impact the resulting PFNS noticeably. Only the experimental database was expanded for the evaluation, the modeling (Los Alamos model by Madland and Nix, exciton model) and evaluation technique (generalized least squares) stayed the same.

New evaluated PFNS are considerably softer below 12 MeV than ENDF/B-VIII.0. However, the mean energy and PFNS agree well with a recent evaluation of the PFNS CRP using the Neutron Data Standard code GMA and experimental data at thermal. This agreement highlights not only that the evaluated PFNS at thermal is realistic but also that the experimental data of Chi-Nu and CEA at higher incident-neutron energies agree with that trend. The evaluated PFNS also change distinctly at 2nd and 3rd chance-fission thresholds, re-defining their incident-neutron energy of occurrence and their strength. This could only be modeled before but can now be better described thanks to Chi-Nu and CEA experimental data.

The criticality of fast assemblies drops slightly (approximately 100 pcm for PMI001 - Jezebel) given these new PFNS. This effect needs to be counter-balanced by changing other nuclear data within the space spanned by their differential experimental data. LLNL pulsed-sphere neutron-leakage spectra of three Pu spheres also changed noticeably. The question arose how to fix small biases in simulating these spectra. To explore that four different ^{239}Pu input files were run: ENDF/B-VII.1, ENDF/B-VIII.0, JENDL-4.0, and the new INDEN Pu-239 file (pu239p16 that uses these new PFNS). The results of these test runs are shown in the three figures below compared to ENDF/B-VIII.0 results:







A.3. Indications from integral benchmarks on ^{235}U, ^{238}U and ^{239}Pu evaluations, O. Cabellos

The aim of this work is to show, trough different examples, the necessity of a broad collection of integral experiments which could give valuable and clear indications and trends in the nuclear data evaluation process.

In the first example, Big Ten benchmark is used to show the differences in ^{238}U/URR evaluation between JEFF-3.3 and ENDF/B-VIII.0. Reaction rates (RRs) and criticality values are compared with measurements. C/E values for k_{eff} show a good agreement both in JEFF-3.3 and ENDF/B-VIII.0.

However, JEFF-3.3 gives an underestimation of 8% and 10% in the reaction rates of C28/F25 and F28/F25, respectively. It can be attributed to the different compensation in criticality and RRs for each cross-section channel in these experimental values.

For the second example, PST-034 benchmark is used to show the impact of different evaluations for the ^{239}Pu in the energy range between 0.1eV and 1eV. The sensitivity to the ^{239}Pu cross-sections is very large due to the large amount of ^{239}Pu, the thermal energy range is also controlled with different amounts of Gd in the Benchmark. JEFF-3.3 shows an overestimation in k_{eff} between 500-750pcm for the cases PST-0034-007 to 015. However, ENDFB/B-VIII.0 shows an underestimation in k_{eff} between 250-500 pcm. These large deviation in JEFF-3.3 respect to ENDF/B-VIII.0 is justified because of the differences around the first resonance in the JEFF-3.3 evaluation. This benchmark was also used to justify the differences in reactivity predicted in LWRs using JEFF-3.3 which can give a loss of reactivity along the burnup, of around 450 pcm per 10 GWD/MTU.

As a third example, the neutron transmission experiment in ^{235}U, that can be found at ICSBEP/FUND-JINR-1/E-MULT-TRANS-001, is also analysed in this work. This type of experiments can show some trends in the α-value ($\alpha = \sigma_g/\sigma_f$) characterized by different self-shielded and unshielded experiments.

In summary, the necessity of an extended validation suite to identify problems in nuclear data evaluations has been demonstrated. Different benchmarks with different sensitivities to cross-section channels can give a better insight to different trends in nuclear data. For instance, reaction rates sensitivities differ from criticality sensitivities. For the case of depletion benchmarks, the prediction of isotopic content will also depend on sensitivities and correlations which change over time, and in the case of transmission experiments sensitivities differ from criticality (even null sensitivities for nubar) with big changes depending on the self-shielding. This information could be used to avoid compensations in the evaluation of nuclear data.

Finally, the necessity of new methodologies able to deal with large amount of data is pointed out which could correctly identify trends and/or unknown issues in the nuclear data evaluation process. Here, new developments based on Machine Learning techniques could play an important role in the future.

IAEA Consultancy Meeting of the International Nuclear Data Evaluation Network (INDEN) on Actinide Evaluation in the Resonance Region

17-19 November 2020
Virtual Event

ADOPTED AGENDA

Tuesday 17 November (starting 2pm, open 1:45pm Vienna time)

2:00-2:05	Opening of the meeting
2:05-2:15	Election of Chair and Rapporteur(s), discussion of the Agenda
2:15-2:30	Introduction, R. Capote
2:30-3:10	(10min disc) Oscar Cabellos (UPM, Spain) "A comparison of ENDF/B-VIII.0 to some other evaluations"
3:10-3:50	(10min disc) Gilles Noguere (CEA-Cadarache, France) "Status of the U-235 evaluation for JEFF"
3:50-4:00	short break
4:00-4:40	(10min disc) Daniel Cano-Ott (CIEMAT, Spain) "A new measurement of ^{239}Pu(n,gamma), ^{239}Pu(n,f) cross sections and alpha-ratio at n_TOF"
4:40-5:00	Discussions

Wednesday 18 November (starting 2pm, open 1:45pm Vienna time)

2:00-2:40	(10min disc) Marco Pigni (ORNL, USA) "Status of the RRR evaluations for ^{233,235}U and ^{239}Pu"
2:40-3:20	(10 min disc) Andrej Trkov (JSI, Slovenia) "Integral performance and data feedback: ^{235}U, ^{233}U, ^{16}O"
3:20-4:00	Ignacio Duran (USC, Spain) "On the thermal and integral standards for neutron induced fission on major actinides"
4:00-4:15	short break
4:15-5:00	Discussions

Thursday 19 November (starting 2pm, open 1:45pm Vienna time)

2:00-3:00	Discussions
3:00-3:45	(15min disc) Denise Neudecker (LANL, USA) "^{239}Pu PFNS evaluation including recent Chi-Nu and CEA experimental data"
3:45-16:15	Roberto Capote "Evaluation challenges for fissile actinides in the resolved/unresolved RR"
4:15-4:30	Short break
4:30-5:00	Wrap-up of discussions. List of actions.

ANNEX II

IAEA Consultancy Meeting of the International Nuclear Data Evaluation Network (INDEN) on Actinide Evaluation in the Resonance Region

17-19 November 2020
Virtual Event

PARTICIPANTS

Country	Name	Surname	Affiliation	Email
FRANCE	David	BERNARD	CEA Cadarache	david.bernard@cea.fr
	Gilles	NOGUERE	CEA Cadarache	gilles.noguere@free.fr
	Luiz	LEAL	Institut de radioprotection et de sûreté nucléaire	luiz.leal@irsn.fr
JAPAN	Nobuyuki	IWAMOTO	Japan Atomic Energy Agency	iwamoto.nobuyuki@jaea.go.jp
SLOVENIA	Andrej	TRKOV	Jozef Stefan Institute	andrej.trkov@ijs.si
SPAIN	Oscar	CABELLOS	Universidad Politécnica de Madrid	oscar.cabellos@upm.es
	Daniel	CANO	Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas	daniel.cano@ciemat.es
	Ignacio	DURAN	Universidad de Santiago de Compostela	ignacio.duran@usc.es
SWITZERLAND	Dimitri	ROCHMAN	Paul Scherrer Institut	dimitri-alexandre.rochman@psi
USA	David	BROWN	Brookhaven National Laboratory	dbrown@bnl.gov
	Mark	CHADWICK	Los Alamos National Laboratory	mbchadwick@lanl.gov
	Marco	PIGNI	Oak Ridge National Laboratory	pignimt@ornl.gov
	Yaron	DANON	Rensselaer Polytechnic Institute	danony@rpi.edu
INT. ORGANIZATION	Stefan	KOPECKY	European Commission, Joint Research Centre	stefan.kopecky@ec.europa.eu
	Peter	SCHILLEBEECKX	European Commission, Joint Research Centre	peter.schillebeeckx@ec.europa.eu
	Michal	FLEMING	OECD Nuclear Energy Agency	michael.fleming@oecd-nea.org
	Roberto	CAPOTE	International Atomic Energy Agency	r.capotenoy@iaea.org
	Arjan	KONING	International Atomic Energy Agency	a.koning@iaea.org

PARTICIPANTS' PRESENTATIONS

#	Author	Title	Link
1	O. Cabellos	A comparison of ENDF/B-VIII.0 to some other evaluations	PDF
2	R. Capote	Evaluation challenges for fissile actinides in the resolved/unresolved RR	PDF
3	D. Cano Ott	A new measurement of ^{239}Pu(n,gamma), ^{239}Pu(n,f) cross sections and alpha-ratio at n_TOF	PDF
4	Y. Danon	Comparing the IAEA ^{235}U evaluation to RPI measured yields	PDF
5	I. Duran	On the thermal and integral standards for neutron induced fission on major actinides	PDF
6	D. Neudecker	^{239}Pu PFNS Evaluation Including Recent Chi-Nu and CEA Experimental Data	PDF
7	G. Noguere	Status of the ^{235}U evaluation for JEFF	PDF
8	M. Pigni	Status of the RRR evaluations for ^{233,235}U and ^{239}Pu	PDF
9	A. Trkov	Integral performance and data feedback: ^{235}U, ^{233}U and ^{16}O	PDF

Nuclear Data Section
International Atomic Energy Agency
Vienna International Centre, P.O. Box 100
A-1400 Vienna, Austria

E-mail: nds.contact-point@iaea.org
Fax: (43-1) 26007
Telephone: (43-1) 2600 21725
Web: https://nds.iaea.org