



*60 Years*

**IAEA**

*Atoms for Peace and Development*

# **IAEA Coordinated Research Project on Fission Yields of Actinides**

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**IAEA**

International Atomic Energy Agency

**INDC International Nuclear Data Committee**

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**FISSION PRODUCT YIELDS DATA  
Current status and perspectives**

**Summary report of an IAEA Technical Meeting**

IAEA Headquarters, Vienna

23 – 26 May 2016

<https://www-nds.iaea.org/publications/indc/indc-nds-0713.pdf>

**The IAEA TM defined the scope and goals of the proposed CRP  
(see page 33, Conclusions and recommendations)**

**FOCUS:** Many of the evaluated libraries are rather old and date back to the beginning of the 1990s, therefore there is an urgent need to update both the fission yield libraries and the decay data libraries, and to include covariances, consistently.

**Ambition:** re-evaluate major actinides at several energy points from thermal up to 14 MeV



# IAEA Coordinated Research Project On Fission Yields of Actinides (2020-2025)

- ❑ Planned 3 Research Coordination Meetings (RCM) in 4y
- ❑ First RCM held by video conference
  - 31 August – 4 September 2020 (2-5pm, GMT+1)
- ❑ More than 60 participants (16 countries) attended
- ❑ The meeting presentations are available at:

<https://nds.iaea.org/index-meeting-crp/FissionYields2020/>



# First RCM, participants

## IAEA CRP on FY of Actinides

1	ALI	AL-ADILI	EC JRC Geel
2	Todd	Bredeweg	LANL
3	Oscar	Cabellos	UPM, Madrid, Spain
5	Roberto	Capote	IAEA, Scientific Secretary
6	Abdelaziz	Chebboubi	CEA, France
8	Yongjing	Chen	CIAE, China
9	Satoshi	Chiba	TITECH, Tokyo, Japan
10	Timo	Dickel	GSI, Germany
11	Vivian	Dimitriou	INP, Greece
12	Noel	Dubray	CEA< France
13	Andrey	Egorov	IPPE, Russia
14	Sean	Finch	TUNL, Duke University, USA
15	Matthew	Gooden	LANL, USA
16	Stephane	Goriely	ULB, Bruxelles, Belgium
17	Larry	Greenwood	PNNL, USA
18	Dmitrii	Gremiachkin	IPPE, Russia
19	Mathieu	Hursin	PSI, Switzerland
21	Nasser	Kalantar	Netherlands
22	Toshihiko	Kawano	LANL, USA
23	Grégoire	Kessedjian	CEA, France
24	Arjan	Koning	IAEA NDS
25	jean-françois	Lemaître	ULB, Bruxelles, Belgium
26	shilong	LIU	CIAE, China
27	Lile	Liu	CIAE, China
28	Amy	Lovell	LANL, USA
29	Israel	Mardor	Soreq RC, Israel
30	Andrea	Mattera	BNL, USA

31	Elizabeth	McCutchan	BNL, USA
32	Robert	Mills	UKNNL, UK
33	Futoshi	Minato	JAEA, Japan
34	Konstantin	Mitorofanov	IPPE, Russia
35	Nader	Mohamed	AEA, Egypt
36	Matthew	Mumpower	LANL, USA
37	Shin	Okumura	IAEA NDS
38	Stephan	Oberstedt	EC JRC Geel
40	Naohiko	Otsuka	IAEA NDS
41	Bruce	Pierson	PNNL, USA
42	Boris	Pritychenko	BNL, USA
43	Anthony	Ramirez	LLNL, USA
44	David	Regnier	CEA, France
45	Dimitri	Rochman	PSI, Switzerland
46	Karl-Heinz	Schmidt	Germany
47	christelle	schmitt	IPHC, CNRS, France
48	Georg	Schnabel	IAEA NDS
49	Nicolas	Schunck	LLNL, USA
50	Olivier	Serot	CEA, France
51	Nengchuan	Shu	CIAE, China
52	Jack	Silano	LLNL, USA
53	andreas	solders	Upsala University, Sweden
54	Alejandro	Sonzogni	BNL, USA
55	hilaire	stephane	CEA, France
56	Julien	TAIEB	CEA, France
57	Patrick	Talou	LANL, USA
58	Anton	Tonchev	LLNL, USA
59	Werner	Tornow	TUNL, Duke University, USA
60	Anabella	Tudora	University of Bucharest, Romania
61	Ramona	Vogt	LBL, USA
62	Jerry	Wilhelmy	LANL, USA (retired)



# First RCM, presentations

Presentations			
#	Author	Title	Link
1	A. Al-Adili, et al.	Experiments on Fission Yields and neutron multiplicities for enhanced fission modelling	<a href="#">PDF</a>
2	O. Cabellos	Checking, Processing & Verification, Benchmarking & Validation of Fission Yields data	<a href="#">PDF</a>
3	A. Chebboubi, et al.	Fission Fragments observables measured at the LOHENGRIN recoil separator	<a href="#">PDF</a>
4	S. Chiba	Evaluation of FPY and associated covariance data	<a href="#">PDF</a>
5	S.W. Finch, et al.	Experimental results on monoenergetic neutron- and photon-induced fission from the TUNL-LANL-LLNL FPY collaboration	<a href="#">PDF</a>
6	S. Goriely and S. Hilaire	Microscopic determination of fission fragment distributions	<a href="#">PDF</a>
7	T. Kawano, et al.	Energy-Dependent Fission Product Yields Modelling and Evaluation	<a href="#">PDF</a>
8	G. Kessedjian, et al.	$^{235}\text{U}(n,f)$ Fission Yield evaluation - status and perspectives	<a href="#">PDF</a>
9	A. Mattera, et al.	$^{238}\text{U}(n,f)$ induced by fast neutrons, the prototype for a modern and comprehensive database of experimental fission yields	<a href="#">PDF</a>
10	R. Mills	Available Fission Product Yield Experimental data from the UK database and its analysis for evaluations	<a href="#">PDF</a>
11	F. Minato	Present Status and Perspectives of JENDL Fission Product Yield Data	<a href="#">PDF</a>
12	D. Rochman and S. Okumura	Bayesian Monte Carlo for FY evaluation with GEF: example and plan	<a href="#">PDF</a>
13	K.-H. Schmidt, et al.	Fission yields with GEF	<a href="#">PDF</a>
14	O. Serot, et al.	Potential use of the FIFRELIN Monte Carlo code for the future Fission Yield evaluations	<a href="#">PDF</a>
15	A. Sonzogni, et al.	A re-evaluation of the energy released in fission that is converted into heat in a nuclear reactor	<a href="#">PDF</a>
16	R. Vogt	FREYA Capabilities	<a href="#">PDF</a>
17	A. Tudora	Influence of fragment distributions $Y(A,TKE)$ on PbP model results	<a href="#">PDF</a>
18	D.E. Gremyachkin, et al.	Approaches for validation CY databases using delayed neutron macroscopic characteristics	<a href="#">PDF</a>
19	K.V. Mitrofanov, et al.	Cumulative yields of Bromine, Krypton, Rubidium and Iodine isotopes from fission of $^{233}\text{U}$ , $^{235}\text{U}$ , $^{238}\text{U}$ by neutrons in the energy range from thermal to 5 MeV	<a href="#">PDF</a>
20	N.M.A. Mohamed	Fission Yield Applications at ETRR-2	<a href="#">PDF</a>
21	N. Otsuka	Status of Experimental FPY Compilation	<a href="#">PDF</a>
22	B. Pritychenko	Current status of FY Compilations (Area 1)	<a href="#">PDF</a>
23	N. Shu, et al.	Fission yield studies at CNDC	<a href="#">PDF</a>
24	E. McCutchan, et al.	Decay data measurements to aid in FPY determinations	<a href="#">PDF</a>



# Decay data measurements to aid in FPY determinations

E.A. [McCutchan](#), A.A. [Sonzongi](#), S. Zhu, A. [Mattera](#)

*National Nuclear Data Center, Brookhaven National Laboratory*

M.P. Carpenter, J.P. Greene, G. Savard, J. Clark, et al.,

*Argonne National Laboratory*

N. [Scielzo](#), K. [Kolos](#), S. Pagett, et al.,

*Lawrence Livermore National Laboratory*

A. Gula et al.,

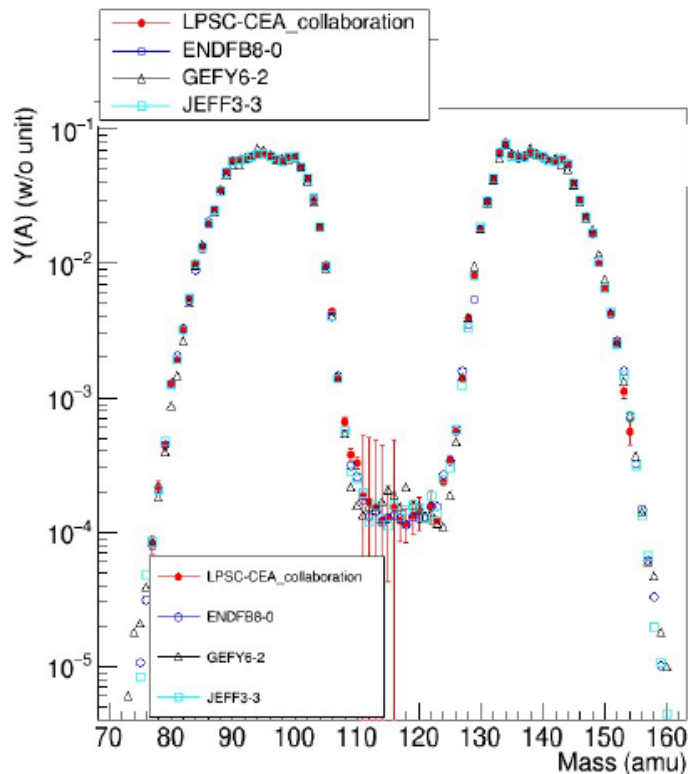
*Notre Dame University*

**BROOKHAVEN**  
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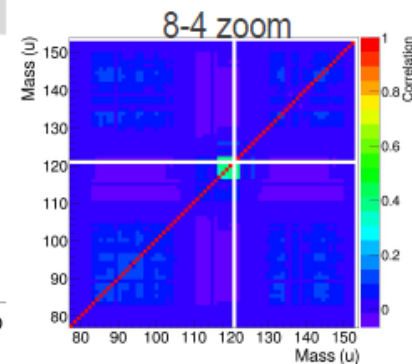
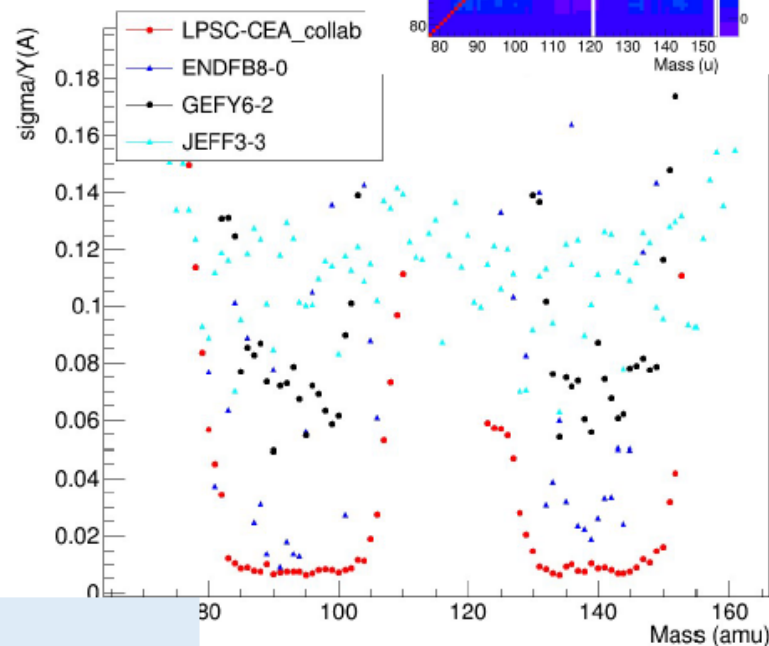


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Preliminary results



$Y(A)$  uncertainties probably under estimated:

- lack of  $N_i(A)$  experimental correlations
- Assess a priori  $N_i(A)$  experimental correlations

## G. Kessedjian et al, non-model evaluation



# IAEA Coordinated Research Project On Fission Yields of Actinides

Four main working groups:

1. Availability of experimental fission product yield data for evaluations;
2. New fission product yield experimental data;
3. Fission product yield evaluation;
4. Fission product yield validation;

Coordinators were nominated in each category:

1. B. Pritychenko (BNL)
2. O. Serot (CEA/DEN)
3. R. Capote (IAEA) and R. Mills (UK), (\*)
4. O. Cabellos (UPM).
5. (\*) F. Minato (JAEA) appointed coordinator of a modelling SG in 3.

