



Status of Important Fission Products

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Reactivity Worth of Fission Products

- Ceres experiment at Dimple reactor:
Dean, Smith, and Perry, ND2007, p. 829
- 12 Important fission products irradiated in two assemblies representing
 1. Soft neutron spectrum
 2. PWR neutron spectrum
- The measured reactivity worth for these nuclei ranged from -9.15 pcm for Mo-95

Reactivity Worth of FP

- to - 47.66 pcm for Sm-147.
- Accuracy of the measurement ~4%.
- Calculated reactivity worth were carried out using JEF3.1 and WPEC23 (ENDFVII.0) evaluated data files
- Discrepancies (Experimental-Predicted) were observed

Reactivity Worth for FP

- This means that relative to measurements:
 - + discrepancy = high evaluated data
 - discrepancy = low evaluated data

Comparison: Integral and Differential Data

FP ISOtOPE		JEF3.1 SOFT	WPEC23 SOFT	JF3.1 PWR	WPEC PWR	WPEC/JEF SOFT	PWR
MO-95	X	+9	+9	0	0	1.0	1.0
TC-99	X	+9	+10	+8	+10	1.1	1.3
RH-103	X	+10	+12	+6	+8	1.2	1.3
AG-109		+5	+5	+2	+2	1.0	1.0
CS-133	X	+11	+11	+10	+10	1.0	1.0
ND-143		-1	-2	-3	-6	2.0	3.0
ND-145	X	+1	+13	+1	+11	13	11
SM-147		+7	+3	+4	0	0.4	0.0
SM-149		+2	0	-4	-6	0.0	1.5
SM-152		0	-1	0	0		
GD155		+4	+4	+3	+3	1.0	1.0

^{99}Tc Differential + Integral Measurements

Author	Year	Cross section (b)
Dean	2007 integral	(20.8 ± 0.8)
WPEC23	+9 %	22.8
JEFF3.1	+10 %	22.8
Furutaka	2004	22.8 ± 1.8
Molnar	2004	26.5 ± 2.8
Harada	1995	22.9 ± 1.3
Lucas	1977	20 ± 2
Tattersall	1960	16 ± 7
Pattenden	1958	23 ± 2
Pomerance	1955	19 ± 2

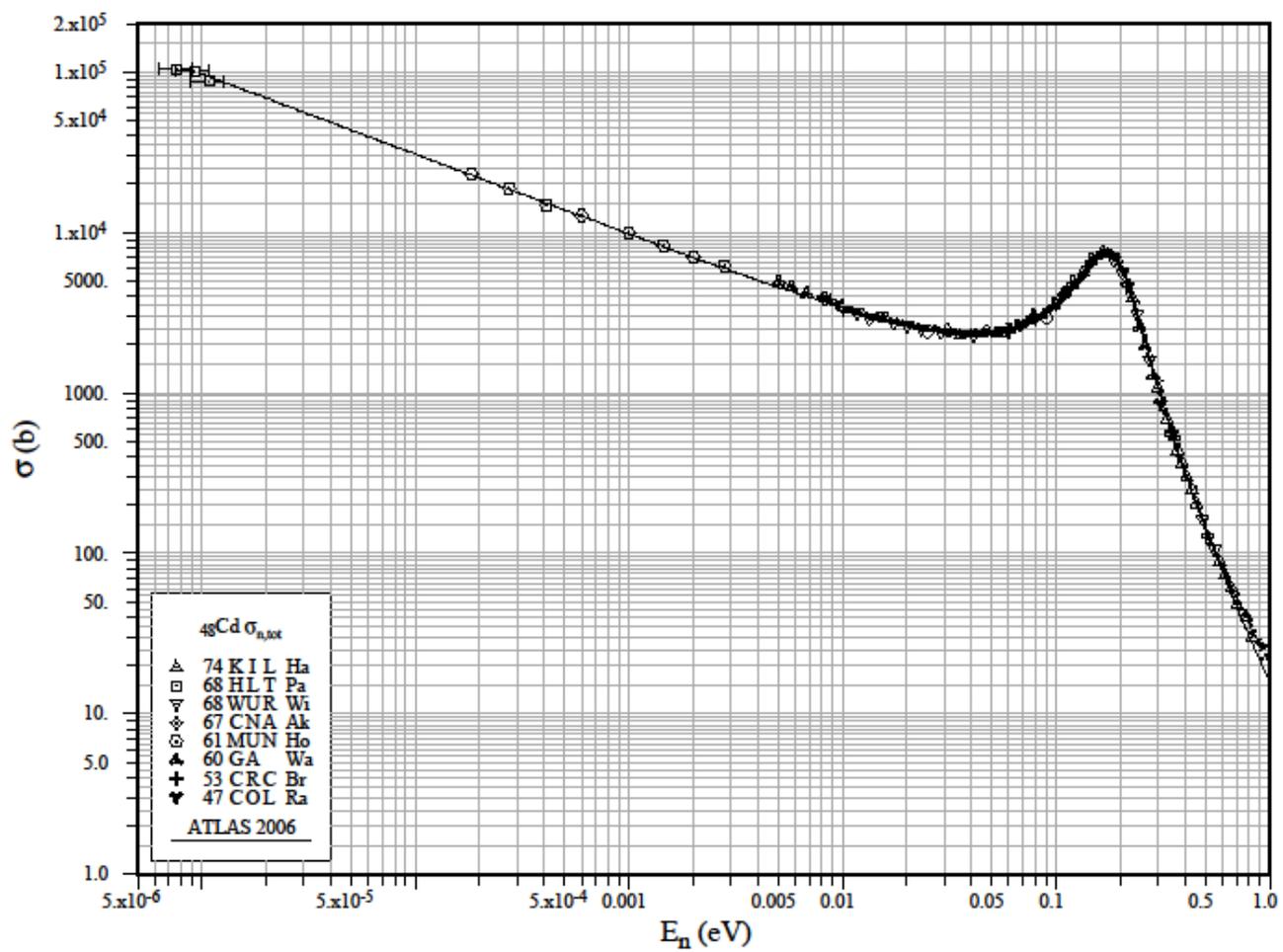
^{145}Nd Differential + Integral Measurement

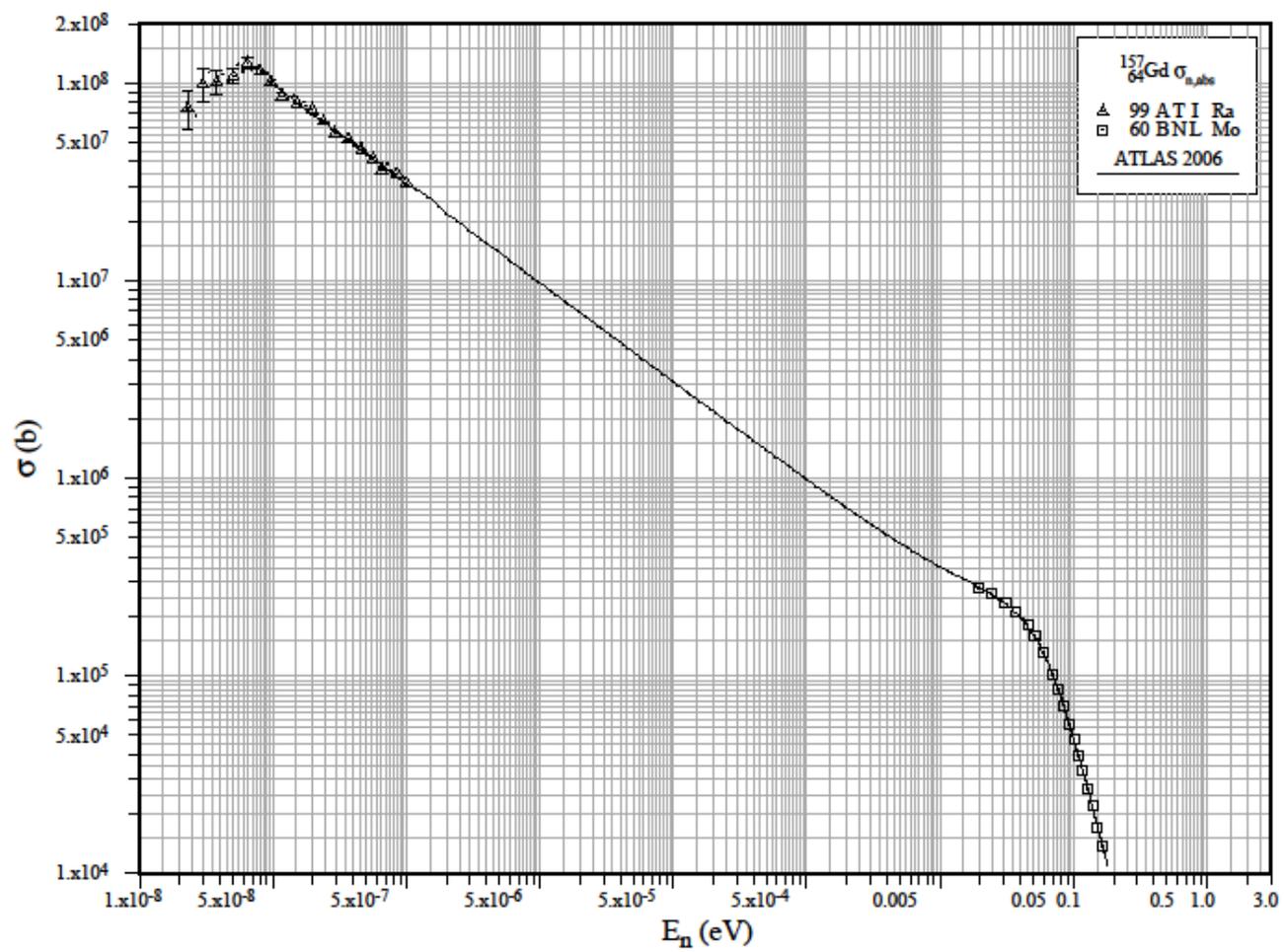
Author	Year	Measurement
Dean	2007	(43.3 ± 1.7)
WPEC23	+13 %	49.8
JEFF3.1	0 %	41.9
Vertebny	1974	51 ± 1
Lucas	1977	46.0 ± 4.0
Cabell	1968	40.5 ± 2.1
Tattersall	1960	40.5 ± 2.1
Pattenden	1958	51 ± 3

Conclusions

- The Dean et al. results show discrepancies between integral and differential measurements for 4 FP nuclei: ^{95}Mo , ^{99}Tc , ^{103}Rh , and ^{133}Cs .
- Present analysis for ^{145}Nd indicate that its thermal capture cross have to be lowered.
- The Dean result for ^{155}Gd is accurate to 4%.
- Other results will be studied in detail for possible ENDFVII improvements.

- THANK YOU FOR YOUR ATTENTION





Cold-Neutron Results

Sample	N	V 10 m/s	1/v ATLAS Extrapolation Mb
Gd in D ₂ O	4	10.9 0.8 +2%	10.7 0.3
¹⁵⁷ Gd in D ₂ O	4	49.7 1.6 -11%	55.9 1.5
Gd metal	2	8.9 0.4 -8.3%	10.7 0.3
Im(b)		10.6 0.6 fm	10.4 fm