

Development and Testing of a Revised ENDF/B-VII Capture Cross Section for ^{113}Cd

Russell D. Mosteller, Los Alamos National Laboratory
Robert E. MacFarlane, Los Alamos National Laboratory
Said F. Mughabghab, Brookhaven National Laboratory
Soon Sam Kim, Idaho National Laboratory*

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*Current affiliation: Lawrence Livermore National Laboratory



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REVISIONS TO THE THERMAL CAPTURE CROSS SECTION FOR ^{113}Cd

The ENDF/B-VII.0 thermal capture cross section for ^{113}Cd was reviewed, with particular attention to the resonance at 0.178 eV

The ENDF/B-VII.0 2200 m/sec capture cross section for ^{113}Cd is 20615 b, compared to 20726 b for ENDF/B-VI

The ENDF/B-VII.0 value is based on an evaluation by S. Mughabghab that recommends a value of 20615 ± 400 b for the 2200 m/sec capture cross section, consistent with pulsed-neutron measurements

Consistent with more recent measurements, the scattering width of that resonance was decreased from 0.65333 meV to 0.62200 meV

That change reduced the thermal capture cross section from 20751 b to 19800 b and reduced the resonance integral from 391.7 b to 376.6 b

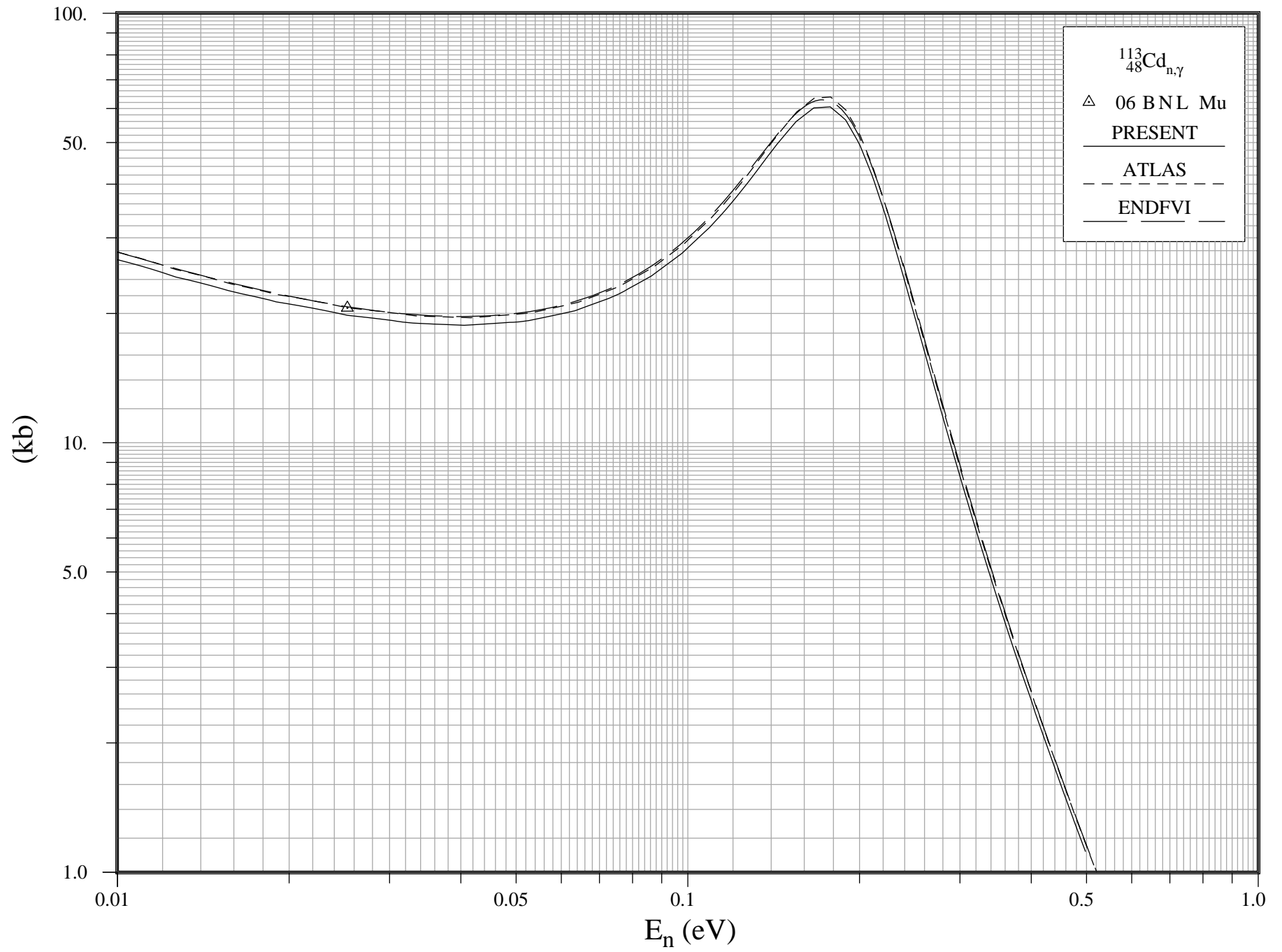
MCNP RESULTS FOR THE BENCHMARKS WITH THE LARGER VESSEL (29.16 cm DIAMETER)

Case	In-Vessel Cd Conc. (mg/g)	Benchmark k_{eff}	Calculated k_{eff}	
			ENDF/B-VII.0	ENDF/B-VII.0 + Revised ^{113}Cd
9	0	1.0012 ± 0.0020	0.9976 ± 0.0001	0.9976 ± 0.0001
10*	0	1.0012 ± 0.0024	0.9891 ± 0.0002	0.9895 ± 0.0002
11*	1.240	1.0012 ± 0.0022	0.9908 ± 0.0001	0.9943 ± 0.0001
12*	2.250	1.0012 ± 0.0021	0.9924 ± 0.0001	0.9971 ± 0.0001
13*	3.362	1.0012 ± 0.0021	0.9919 ± 0.0001	0.9983 ± 0.0001
14*	4.189	1.0012 ± 0.0020	0.9923 ± 0.0001	0.9993 ± 0.0001
15*	4.577	1.0012 ± 0.0021	0.9941 ± 0.0001	1.0018 ± 0.0001
16*	4.897	1.0012 ± 0.0020	0.9921 ± 0.0001	1.0006 ± 0.0001
17*	5.047	1.0012 ± 0.0021	0.9915 ± 0.0001	0.9994 ± 0.0001
18	5.032	1.0012 ± 0.0020	0.9936 ± 0.0001	1.0014 ± 0.0001
19	5.937	1.0012 ± 0.0020	0.9939 ± 0.0001	1.0023 ± 0.0001
20	6.626	1.0012 ± 0.0019	0.9918 ± 0.0001	1.0007 ± 0.0001

* Reflector contained Cd

$$\sigma < |\Delta k| \leq 2\sigma$$

$$|\Delta k| > 2\sigma$$



SUMMARY AND CONCLUSIONS

A new evaluation for the thermal capture cross section of ^{113}Cd has been developed

The resulting cross section has been shown to produce marked improvement in the agreement between calculated and benchmark values of k_{eff} for a series of thermal benchmarks containing Cd

It is anticipated that the new ^{113}Cd evaluation will be included in the next interim release of ENDF/B-VII