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INIS Section

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In the energy range of 0.1 MeV to 1 MeV of (n, γ) reaction, the experimental data are accorded with each other. In the energy range of 1 MeV to 20 MeV, there are five laboratory's data and a great difference among them. The data are given in Table 1:

Table 1 The experimental data of (n, γ) reaction*

Laboratory	Year	Detector	Data		Monitor
			E_n/MeV	δ ± Δ δ /mb	
USAWIS**[2]	1959	Naphthaline Crystal	1.000	41.0	^{154}Sm(n, γ) relative to thermal capture=5.5b
			1.200	41.5	
			1.410	39.5	
			1.800	34.0	
			2.200	23.0	
			2.500	17.0	
			3.300	9.90	
			4.000	6.10	
			4.750	3.90	
			5.500	3.45	
			6.200	2.45	
SF JYU[3]	1976	Ge(Li)	14.7	0.9±0.3	
HUNDEB[4]	1976	Ge(Li)	3.00	19.0±5.0	^{31}P(n, γ)
INDPU[5]	1984	Ge(Li)	1.07	65.8±8.1	^{53}I(n, γ)
			1.48	62.8±5.9	
			1.89	59.8±5.7	
			2.30	36.9±4.6	
			2.85	31.4±4.3	
CCPRI[6]	1987	Ge(Li)	1.0	47±5	^{197}Au(n,γ)
			2.0	22.5±3.1	

* The activation method was used in all the experiments.

** Data were read out in large plot, so no error data given.

From the measured year, the laboratory, the detector and other factors, the SFJYU, HUNDEB, CCPRI's data are more authentic. The INDPU'data are much higher than the others, and out of their error range. The data of USAWIS were made earlier and read out from plot, but the difference among the data and SFJYU, HUNDEB, CCPRI is not large. So the USAWIS, SFJYU, HUNDEB, CCPRI's data are adopted in the fit. The comparisons among calculation data and experimental data, JENDL-3 data, ENDF/B-6 data are given in Fig.2.

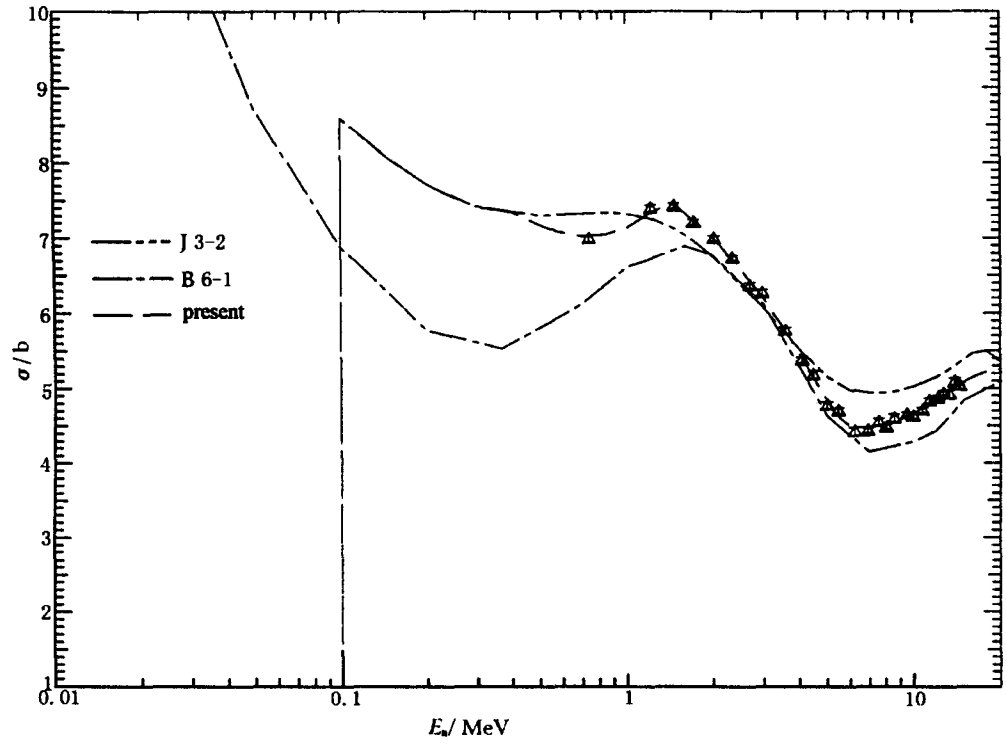

Fig. 1 Total cross section of n+^{148}Sm

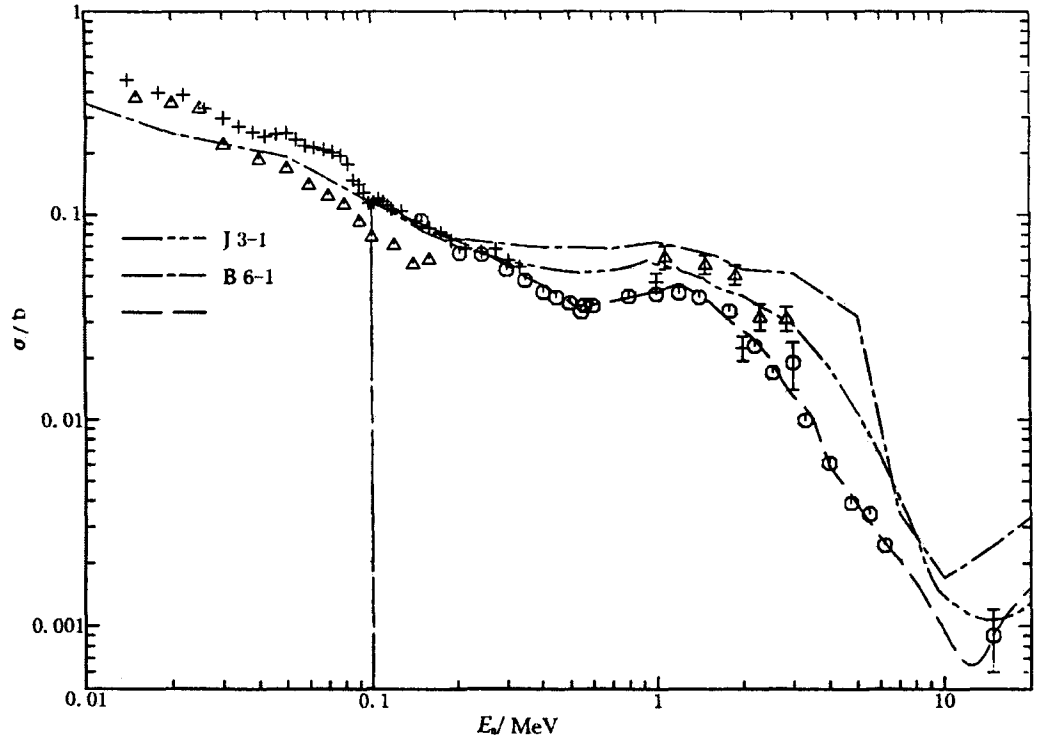

Fig. 2 ^{154}Sm (n,γ) ^{155}Sm cross section

In the end, all of the three nucleus' elastic cross section were revised to make the total section accord with the sum of other cross sections.

References

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[4] G.Peto et al., J, JNE, 21, 797, (1967).

[5] M.Afzal Ansari et al., J, ANE, 13,(5),287,(1986).

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Prompt Gamma-ray Absolute Intensity Calculation and Consistence Check of Thermal Neutron Capture

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Abstract

How to calculate the prompt gamma-ray emission probability (absolute intensity) of thermal-neutron capture is briefly introduced. The examples are given to illustrate their applications. The physical consistent checking and some discussions are also given.

Introduction

A nuclide ${}^{A}_{Z}\mathrm{X}$ (X--element symbol, A--nuclear mass number, Z--nuclear proton number) captures a thermal-neutron and forms a compound nuclide ${}^{A+1}_{Z}\mathrm{X}$ with high-excitation energy S(n) (equil to neutron binding energy); then it decays by