Analysis of $^{140}Te \rightarrow {}^{140}I$ β^- - Decay Nuclear Structure

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β-delayed Singles Spectrum

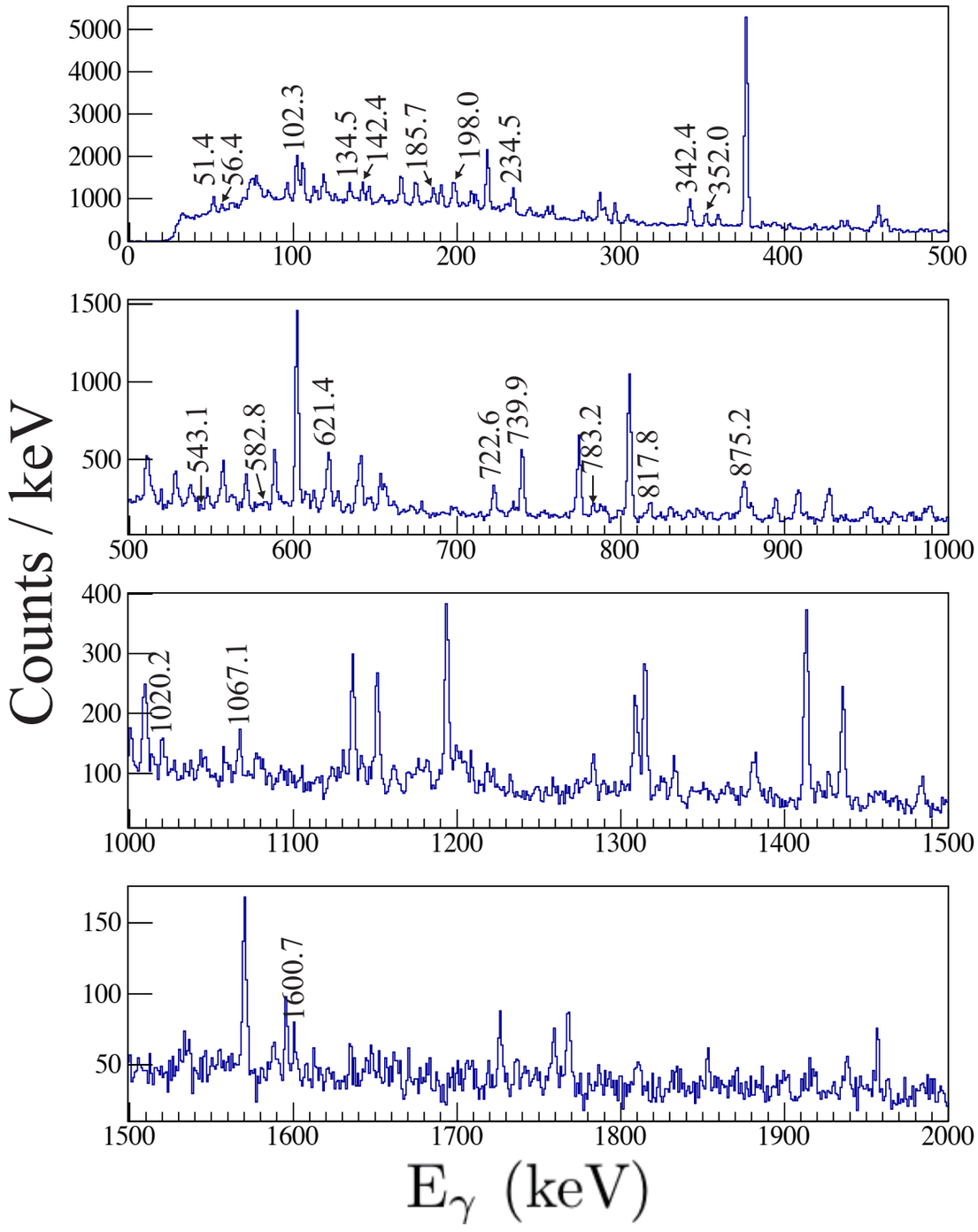


FIG. 1. β-delayed γ-ray singles spectrum for ^{140}I. The singles spectrum has been recorded with the trigger condition of the β-ray emitted from implanted ^{140}Te ions by WAS3ABi system. All γ-ray peaks that belong to γ-decay transitions of ^{140}I are indicated with their values. Other strong peaks are from the daughter nucleus, ^{140}Xe, room-backgrounds, and contaminants in the RI beam. The elimination of the background such as the Compton continuum and the add-back algorithm are not adopted.

Selected Coincidence Spectra

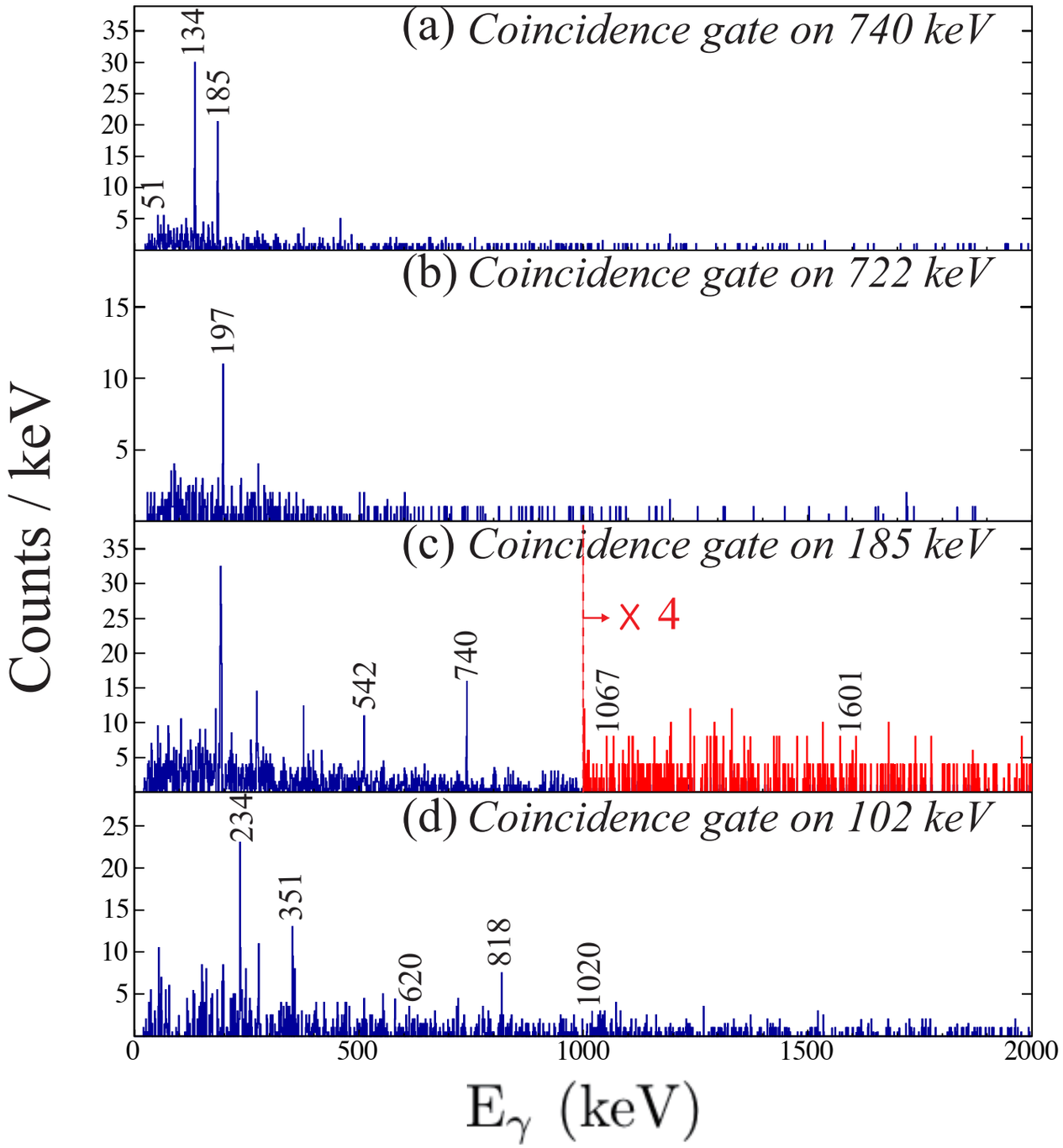
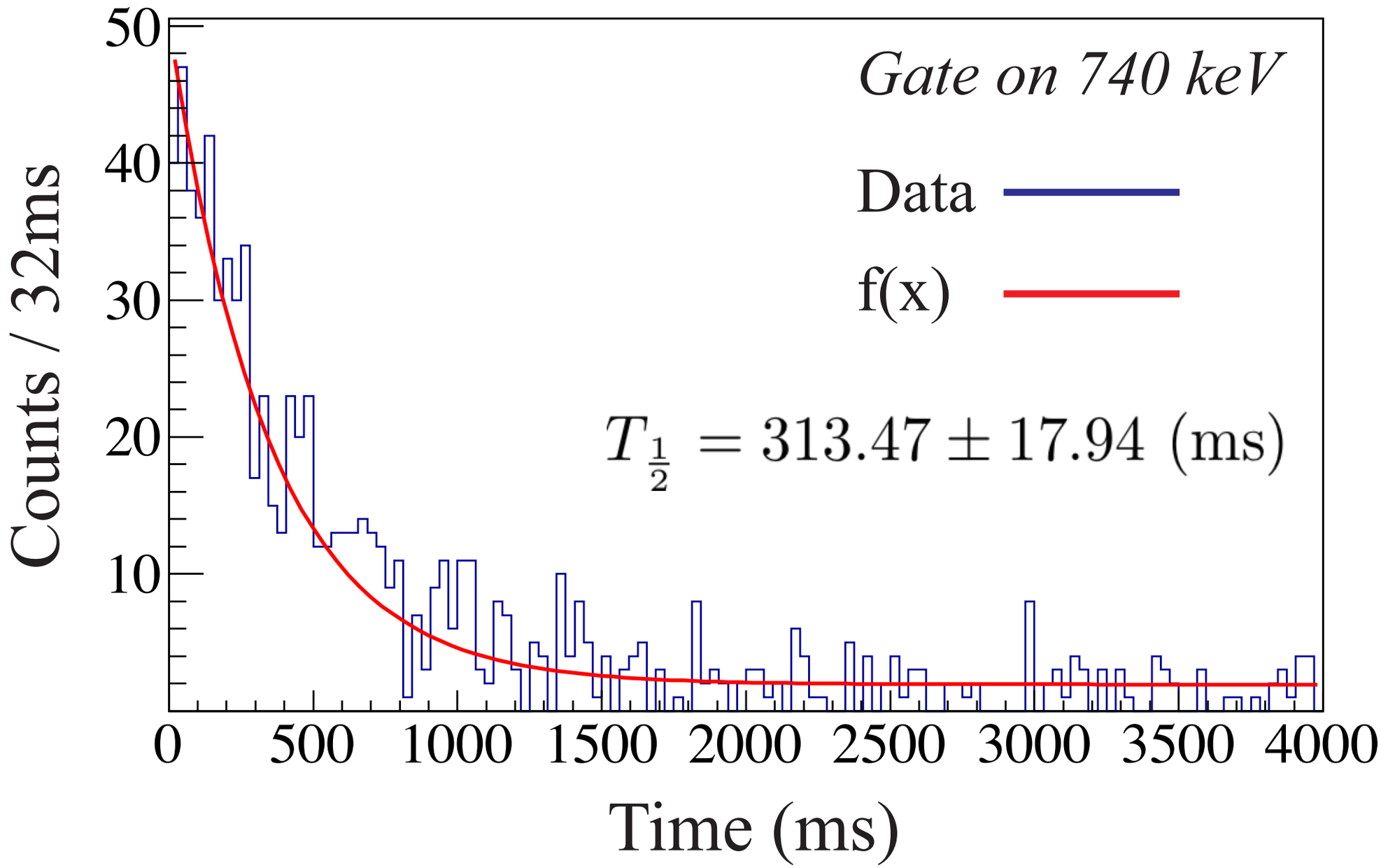


FIG. 2. (Color online) (a)-(d) represent several selected $\beta\gamma\gamma$ coincidence spectra with gated on 740 keV, 722 keV, 185 keV and 102 keV, respectively. The intensity of peaks in the region above 1000 keV is multiplied by factor 4.

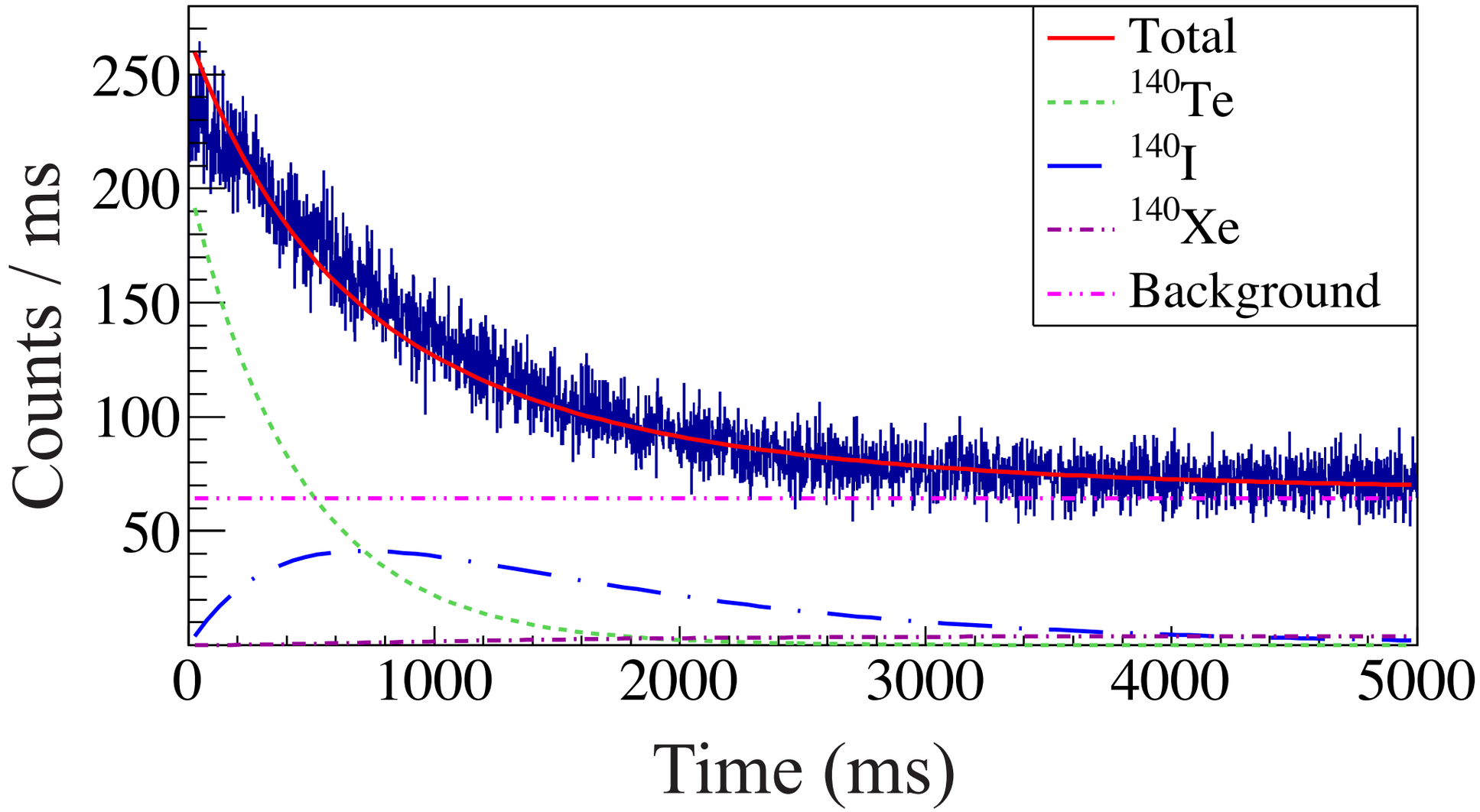
Internal conversion is not applied.

E_γ (keV)	I_γ (%)	E_i (keV)	E_f (keV)	Coincidences (keV)
51.4(1)	47.0	51	0	56, 134, 542, 740, 1067
56.4(1)	4.83	108	51	51, 235, 351, 818
102.3(1)	68.5	108	6	197, 234, 351, 818, 1020
134.5(1)	33.7	185	51	51, 740, 1067
142.4(1)	34.3	925	783	783
185.7(1)	36.8	185	0	542, 740, 1067, 1601
198.0(1)	67.8	925	728	102, 620, 722
234.5(1)	62.4	341	108	56, 102, 583
342.4(1)	79.1	341	0	583
352.0(1)	46.5	458	108	56, 102
543.1(2)	10.4	728	185	51, 134, 185, 197
582.8(2)	5.23	925	341	102, 234, 341
621.4(1)	37.8	728	108	102, 197
722.6(1)	39.3	728	6	197
739.9(1)	100	925	185	51, 134, 185
783.2(1)	17.6	783	0	142
817.8(1)	22.3	925	108	56, 102
875.2(1)	66.5	925	51	51
1020.2(1)	17.4	1128	108	51, 56, 102
1067.1(1)	22.0	1252	185	51, 134, 185
1600.7(1)	9.14	1786	185	51, 134, 185

Half-life Time



Estimation of Emitted β-rays from ^{140}Te



Background elimination is required.(Occurs the poor fitting result)

1.8 E+5 from the fitting result

~2.2 E+5 taking account into the internal conversion

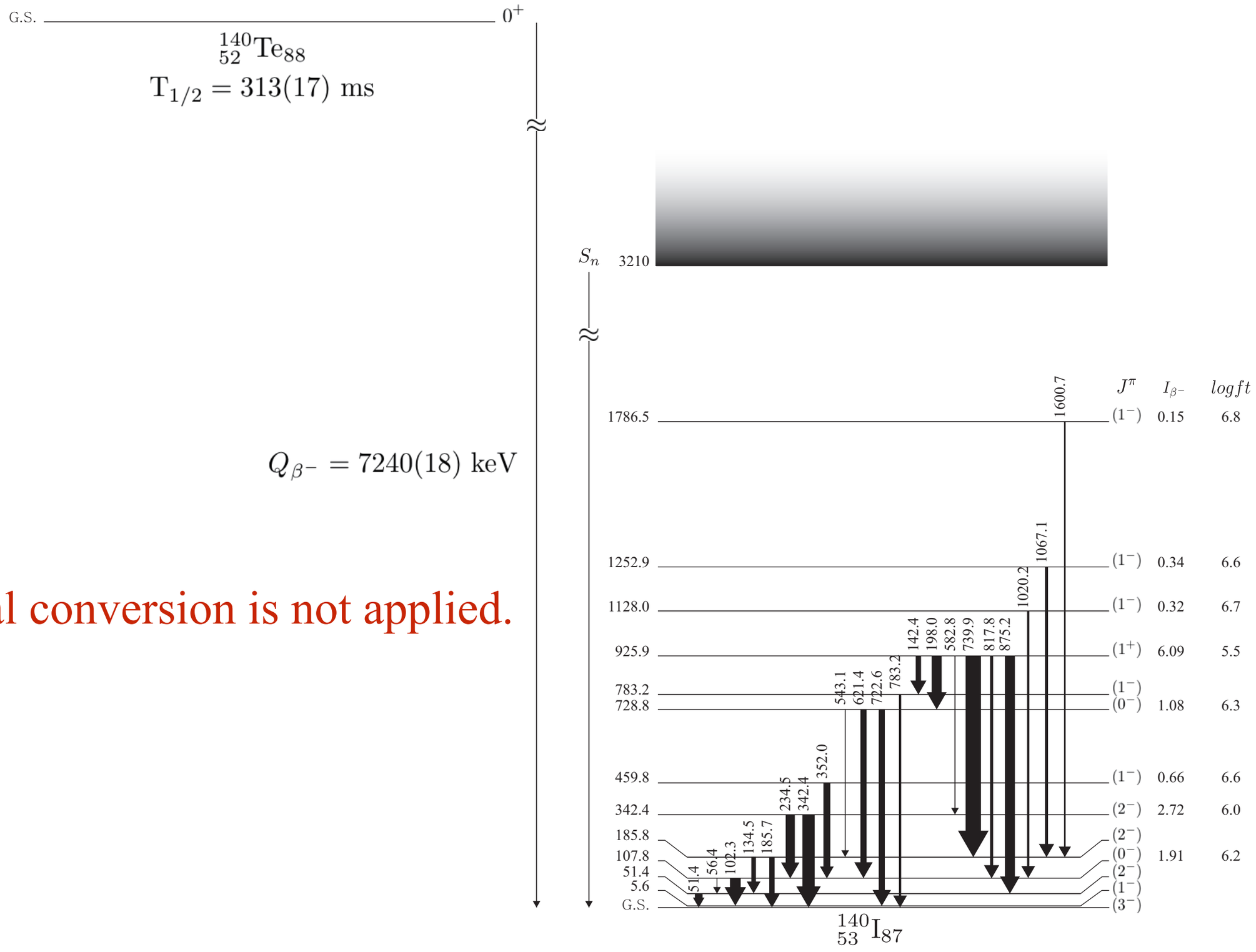
~5.5 E+5 taking account into the probability of β-decay(~40%)

Internal Conversion & Angular Correlation

Energy (keV)	Measeured α_T	Theroretical α_T	Multipolarity assignment
51.4(1)	?	M1 = 5.29 / E2 = 20.3	(M1)
56.4(1)		M1 = 4.03 / E2 = 14.3	(E2)
102.3(1)		M1 = 0.72 / E2 = 1.65	(M1)
134.5(1)		M1 = 0.33 / E2 = 0.63	(M1)
142.4(1)		E1 = 0.07 / M1 = 0.28	(E1)
185.7(1)		M1 = 0.14 / E2 = 0.20	(M1)
198.0(1)		E1 = 0.03 / M1 = 0.11	(E1)

β-ray spectrum is required for the internal conversion.
Angular correlation matrix is required for the exact multipolarity.
After visiting EURICA…

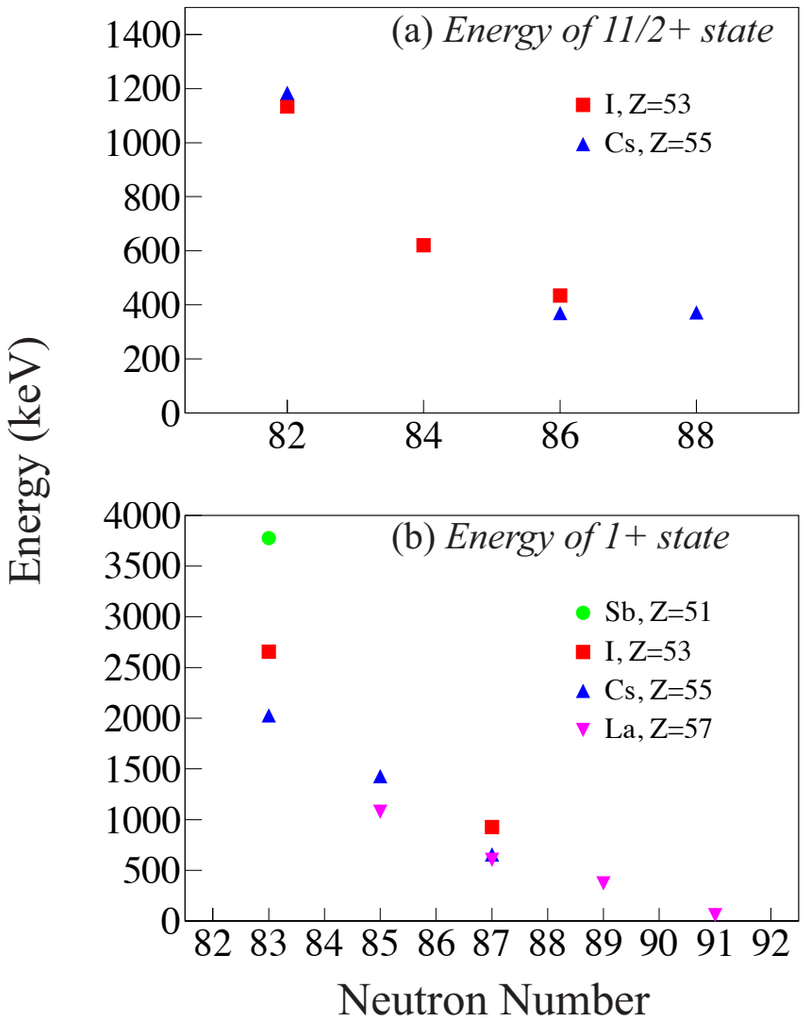
Level Sheme of ^{140}I



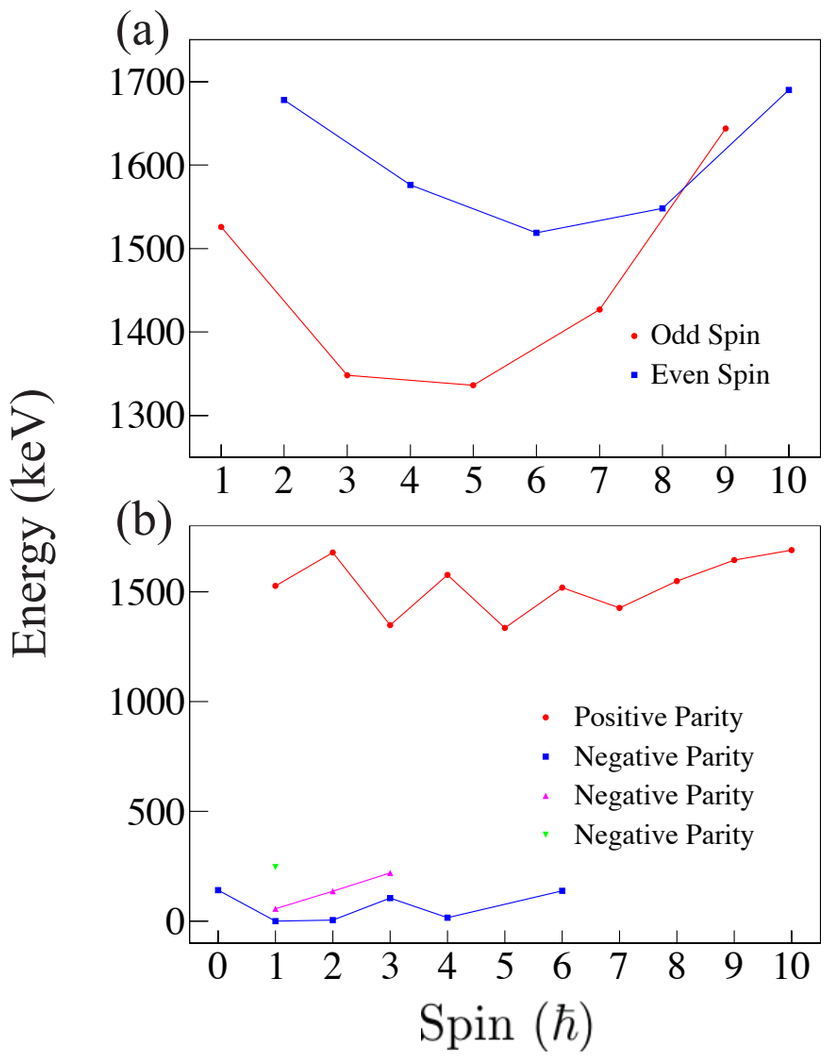
$Q_{\beta-} = 7240(18)$ keV

Internal conversion is not applied.

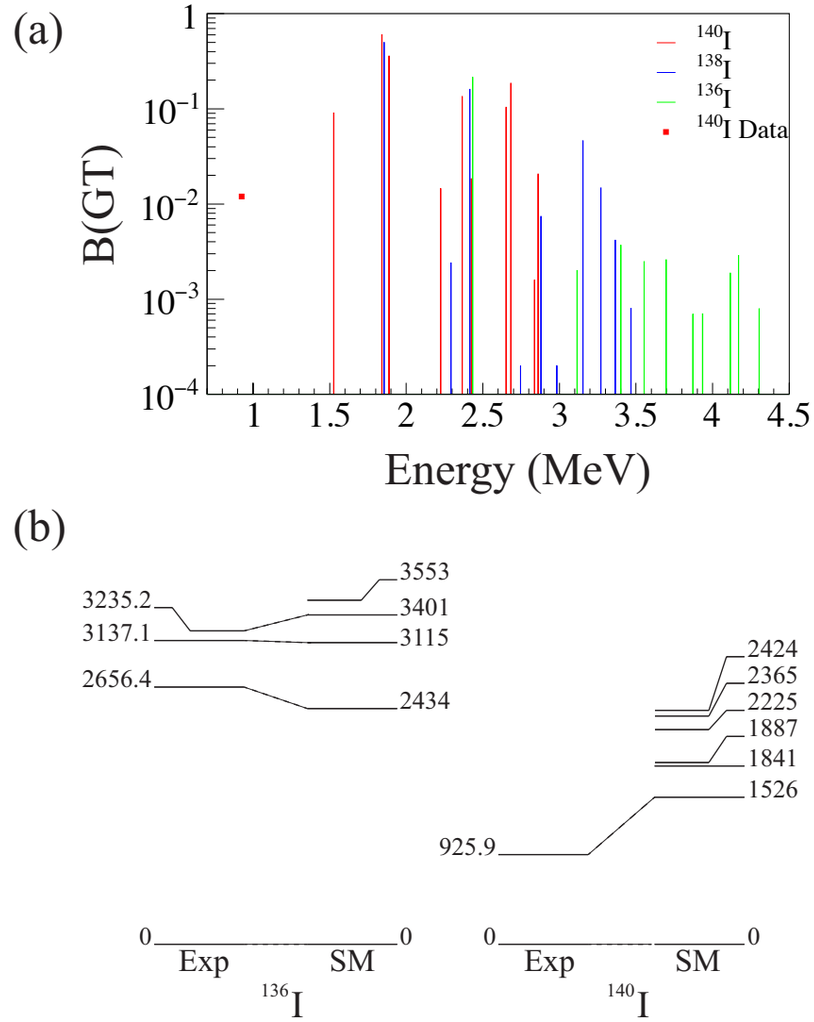
Systematic Analysis & Shell Model Calculation



Systematic analysis of isotopes nearby iodine



SM results about the low-lying and the high-lying states in ^{140}I



B(GT)(GT strength) results by SM