

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain		NDS 138, 1 (2016)	15-Oct-2016

Q(β⁻)=7186 29; S(n)=4550 29; S(p)=10052 29; Q(α)=-1194 29 [2012Wa38](#)

S(2n)=8250 30, S(2p)=23010 300, Q(β⁻n)=3442 29 ([2012Wa38](#)).

¹³⁹I first reported by [1949Su14](#) with a half-life of 2.7 s *I*, the isotope formed in the fission process and followed by chemical separation.

Later studies of the decay of ¹³⁹I include [1958Co72](#), [1959Pe28](#), [1971Kr22](#), [1971BrYH](#), [1972Sc48](#), [1973Ad04](#), [1974Ru07](#), [1974Kr21](#), [1974Gr29](#), [1975Kr17](#), [1975As04](#), [1975Al11](#), [1976Lu02](#), [1980Lu04](#), [1980Al15](#), [1981Ho07](#), [1982Al01](#), [1983En05](#), [1985Ro13](#), [1987RoZW](#), [1992Gr06](#), [1993Ru01](#), [1997Gr20](#).

Precise mass measurement: [2013Va12](#) (mass excess=-68470.7 keV *40* CPT mass spectrometer).

Nuclear structure calculations: [2006Ks01](#): pairing plus quadrupole model.

[Additional information 1](#).

¹³⁹I Levels

Cross Reference (XREF) Flags

A ²⁴⁸Cm SF decay

E(level)	J ^π †	T _{1/2}	XREF	Comments
0.0 [‡]	(7/2 ⁺)	2.280 s <i>11</i>	A	$\% \beta^- = 100$; $\% \beta^- n = 10.0$ 3 J ^π : syst of ¹³⁷ I, ¹³⁹ Cs, and ¹⁴¹ Cs. Supported by suggestion of 1980KeZQ that there is no direct feeding of the ¹³⁹ Xe 3/2 ⁻ g.s. based on agreement of E _β from singles and from β-528γ and by <E _β > measurement of 1982Al01 . T _{1/2} : from timing of β and neutrons (1993Ru01). Others: 2.29 s 2 (1980Al15 , timing of β, γ and neutrons); 2.30 s 5 (1976Lu02), 2.4 s 2 (1975As04), 2.47 s 15 (1974Gr29), 2.27 s 27 (1974Kr21), 2.0 s 5 (1971BrXW), 2.0 s 4 (1958Co72), 2.7 s 1 (1949Su14). Weighted average of all the values, except from 1949Su14 , is 2.284 s <i>10</i> with a χ ² =0.5. $\% \beta^- n$: weighted average of 15% 3 (1972Sc48), 10% 3 (1974Kr21), 10.2% 9 (1975As04), 9.5% 6 (1980Lu04 , 1976Lu02 , 1974Ru07), 9.1% 7 (1980Al15 , 1981Ho07), and 10.3% 4 (1993Ru01). Others: 1959Pe28 , 1958Co72 . J ^π : from systematics of neighboring nuclides (2002Ur02).
209.5 <i>10</i>	(5/2 ⁺)		A	
418.6 [#] 9	(9/2 ⁺)		A	
435.0 [‡] 9	(11/2 ⁺)		A	
816.0 [#] 10	(13/2 ⁺)		A	
928.9 [‡] 12	(15/2 ⁺)		A	
1280.5 [#] 12	(17/2 ⁺)		A	
1564.5 [‡] 14	(19/2 ⁺)		A	
1762.0 [#] 14	(21/2 ⁺)		A	
2035.7 [‡] 15	(23/2 ⁺)		A	
2221.2 16	(17/2 to 21/2)		A	J ^π : γ to (17/2 ⁺).
2316.1 17	(19/2 to 23/2)		A	J ^π : γ to (19/2 ⁺).
2392.3 17	(19/2 to 23/2)		A	J ^π : γ to (19/2 ⁺).
2490.8 [#] 17	(25/2 ⁺)		A	
2688.5 [‡] 18	(27/2 ⁺)		A	
3332.3 [‡] 7			A	J ^π : γ to (27/2 ⁺) suggests (27/2 to 31/2); (31/2 ⁺) if band member.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{139}I Levels (continued)

† Above 210 keV excitation, all assignments are based on multiplicities of transitions and associated band structures. Ascending spins are assumed for levels populated in fission fragments following SF decay of ^{248}Cm as the excitation energy rises.

‡ Band(A): g.s. band.

Band(B): Band based on $9/2^+$.

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.†	α^\ddagger	Comments
209.5	(5/2 ⁺)	209.5	100	0.0	(7/2 ⁺)			
418.6	(9/2 ⁺)	209 [#] 418.6	5.0 25 100 5	209.5 0.0	(5/2 ⁺) (7/2 ⁺)	M1+E2	0.0151 9	$\alpha(\text{K})=0.0129$ 9; $\alpha(\text{L})=0.00177$ 4; $\alpha(\text{M})=0.000357$ 10; $\alpha(\text{N})=7.17\times 10^{-5}$ 16; $\alpha(\text{O})=8.19\times 10^{-6}$ 17
435.0	(11/2 ⁺)	435.0	100	0.0	(7/2 ⁺)	E2	0.01277	$\alpha(\text{K})=0.01078$ 15; $\alpha(\text{L})=0.001590$ 23; $\alpha(\text{M})=0.000323$ 5; $\alpha(\text{N})=6.45\times 10^{-5}$ 9; $\alpha(\text{O})=7.16\times 10^{-6}$ 10
816.0	(13/2 ⁺)	381.0 397.4	10.9 16 100 5	435.0 418.6	(11/2 ⁺) (9/2 ⁺)	D E2	0.01670	$\alpha(\text{K})=0.01405$ 20; $\alpha(\text{L})=0.00213$ 3; $\alpha(\text{M})=0.000433$ 6; $\alpha(\text{N})=8.62\times 10^{-5}$ 12; $\alpha(\text{O})=9.50\times 10^{-6}$ 14
928.9	(15/2 ⁺)	493.9	100	435.0	(11/2 ⁺)	E2	0.00886	$\alpha(\text{K})=0.00752$ 11; $\alpha(\text{L})=0.001075$ 15; $\alpha(\text{M})=0.000218$ 3; $\alpha(\text{N})=4.36\times 10^{-5}$ 7; $\alpha(\text{O})=4.89\times 10^{-6}$ 7
1280.5	(17/2 ⁺)	351.5 464.5	21.4 24 100 5	928.9 816.0	(15/2 ⁺) (13/2 ⁺)	E2	0.01055	$\alpha(\text{K})=0.00894$ 13; $\alpha(\text{L})=0.001296$ 19; $\alpha(\text{M})=0.000263$ 4; $\alpha(\text{N})=5.26\times 10^{-5}$ 8; $\alpha(\text{O})=5.87\times 10^{-6}$ 9
1564.5	(19/2 ⁺)	635.5	100	928.9	(15/2 ⁺)	E2	0.00449	$\alpha(\text{K})=0.00384$ 6; $\alpha(\text{L})=0.000521$ 8; $\alpha(\text{M})=0.0001051$ 15; $\alpha(\text{N})=2.11\times 10^{-5}$ 3; $\alpha(\text{O})=2.41\times 10^{-6}$ 4
1762.0	(21/2 ⁺)	197.6	80 8	1564.5	(19/2 ⁺)	M1+E2	0.137 25	$\alpha(\text{K})=0.113$ 16; $\alpha(\text{L})=0.019$ 7; $\alpha(\text{M})=0.0040$ 15; $\alpha(\text{N})=0.0008$ 3; $\alpha(\text{O})=8.5\times 10^{-5}$ 25 Mult.: from $\gamma\gamma(\theta)$ and measured K-conversion coefficient.
		481.6	100 8	1280.5	(17/2 ⁺)	E2	0.00952	$\alpha(\text{K})=0.00807$ 12; $\alpha(\text{L})=0.001160$ 17; $\alpha(\text{M})=0.000235$ 4; $\alpha(\text{N})=4.71\times 10^{-5}$ 7; $\alpha(\text{O})=5.27\times 10^{-6}$ 8
2035.7	(23/2 ⁺)	273.8 471.2	100 11 33 6	1762.0 1564.5	(21/2 ⁺) (19/2 ⁺)	(D+Q) (Q)		
2221.2	(17/2 to 21/2)	940.7	100	1280.5	(17/2 ⁺)			
2316.1	(19/2 to 23/2)	751.6	100	1564.5	(19/2 ⁺)			
2392.3	(19/2 to 23/2)	827.8	100	1564.5	(19/2 ⁺)			
2490.8	(25/2 ⁺)	728.8	100	1762.0	(21/2 ⁺)	(Q)		
2688.5	(27/2 ⁺)	652.7	100	2035.7	(23/2 ⁺)			
3332.3		643.8 [#]	100	2688.5	(27/2 ⁺)			

† From $\gamma\gamma(\theta)$ and directional linear polarization measurements, except where noted.

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

Placement of transition in the level scheme is uncertain.

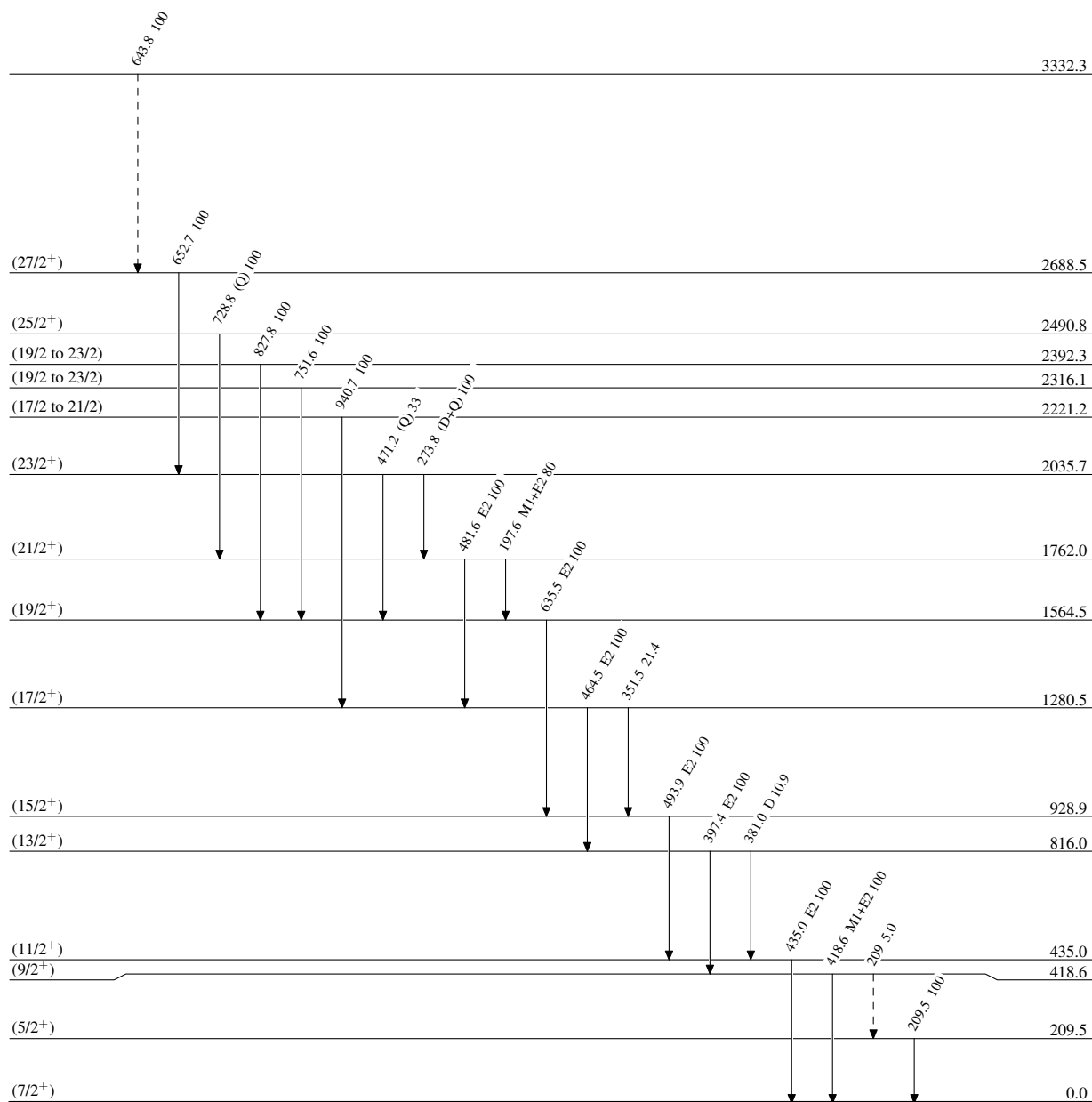
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)



2.280 s 11

$^{139}_{53}\text{I}_{86}$

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