^{131}Ce ε decay (10.3 min) 1996Ge12,1983ViZU

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, I. Mitropolsky, A. Rodionov	NDS 107, 2715 (2006)	17-Jul-2006

Parent: ^{131}Ce: E=0.0; $J^\pi=7/2^+$; $T_{1/2}$=10.3 min *3*; Q(ε)=4.05×10^3 *4*; %ε+%$β^+$ decay=100.0

1983ViZU, 1983AkZZ: ^{131}Ce ε decay [from Ta(p,X), 1000 MeV]; measured γ, γγ, $T_{1/2}$. Mass separation.

1996Ge12: ^{131}Ce ε decay [from ^{94}Mo(^{40}Ca,xpynγ), E=255 MeV, decay of ^{131}Nd,^{131}Pr precursors]; measured Eγ, Iγ, γγ, xγ. He-jet transport, Ge, Si(Li) detectors. β-feeding, log *ft* calculated; IBM calculations.

1998Fo01: ^{131}Ce from ^{115}In(^{20}Ne,xpynγ), E=95 MeV; measured γ, γγ, xγ. Pulsed beam.

Others: 1966No05, 1973De25.

^{131}La Levels

The level scheme is that of 1983ViZU, 1996Ge12 and 1998Fo01. (^{131}La is obtained also from 5.0-min ^{131}Ce isomer and percentage of population by each isotope is unknown).

E(level)[†]	J^π	$T_{1/2}$	Comments
0.0	$3/2^+$	59 min *2*	
26.21 *4*	$5/2^+$	0.85 ns *10*	$T_{1/2}$: from ceγ(t) (1981An17).
145.39 *4*	$(5/2^+,7/2^+)$	≤0.3 ns	$T_{1/2}$: from ceγ(t) (1981An17).
195.65 *4*	$7/2^+$	0.20 ns *8*	$T_{1/2}$: from ceγ(t) (1981An17).
231.23 *15*	$(7/2^+)$		
416.81 *13*	$(9/2^+)$	≤30[‡] ns	
421.53 *7*	$(5/2,7/2^+)$	≤30[‡] ns	
440.45 *6*	$(9/2^+)$	≤30[‡] ns	
459.88 *11*	$(5/2,7/2^+)$	≤30[‡] ns	
588.04 *5*	$(7/2^+,9/2^+)$	≤30[‡] ns	
671.46 *12*	$(11/2^+)$	≤30[‡] ns	
743.24 *5*		≤30[‡] ns	
911.15 *16*	$(5/2,7/2^+)$	≤30[‡] ns	
946.11 *17*		≤30[‡] ns	E(level): the level was established by 1998Fo01.
1024.41 *10*	$(11/2^+)$	≤30[‡] ns	
1774.53 *19*	$(5/2,7/2^+)$	≤30[‡] ns	
1781.91 *19*			E(level): the level was established by 1998Fo01.
1889.95 *14*		≤30[‡] ns	
1910.05 *13*		≤30[‡] ns	

[†] From least-squares fit to Eγ′s assuming ΔEγ=0.5 by evaluators, except as noted.

[‡] From ^{131}Ce ε decay (γ(t) 1983ViZU).

γ(^{131}La)

Iγ normalization: Normalization can not be derived since the ^{131}Ce source feeds the ^{131}La levels partly from the 5.4-min isomer too.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ	α[c]	Comments
26.20 *5*	44.5 *4*	26.21	5/2$^+$	0.0	3/2$^+$	M1(+E2)	<0.05	8.6 *6*	α(L)=6.8 *5*; α(M)=1.42 *11*; α(N+..)=0.363 *25* α(N)=0.310 *22*; α(O)=0.050 *3*; α(P)=0.00359 *6* I_γ: weighted average of 43 *9* (1973De25) and 45 *5* (1996Ge12). δ: from 1973De25. Mult.: from 1973De25. M1 from comparison to RUL.
[x]78.7[@] *2*	2.8[@] *5*								
[x]79.9[@] *2*	1.5[@] *5*								
119.18 *5*	45.2 *16*	145.39	(5/2$^+$,7/2$^+$)	26.21	5/2$^+$	M1		0.657	α(K)exp=0.55 *15* (1973De25) α(K)=0.561 *8*; α(L)=0.0759 *11*; α(M)=0.01577 *23*; α(N+..)=0.00407 *6* α(N)=0.00347 *5*; α(O)=0.000563 *8*; α(P)=4.37×10^{-5} *7* Mult.: M1,E2 or M1+E2 from 1973De25. D from comparison to RUL. Δπ=no from level scheme.
145.41 *5*	9.2 *9*	145.39	(5/2$^+$,7/2$^+$)	0.0	3/2$^+$	(M1,E2)		0.45 *8*	α(K)=0.35 *3*; α(L)=0.08 *4*; α(M)=0.018 *9*; α(N+..)=0.0044 *21* α(N)=0.0038 *18*; α(O)=0.00057 *25*; α(P)=2.36×10^{-5} *15* Mult.: D,E2 from comparison to RUL. Δπ=no from level scheme.
147.67[@a] *21*	2.5[@] *8*	588.04	(7/2$^+$,9/2$^+$)	440.45	(9/2$^+$)	D,E2			Mult.: from comparison to RUL.
155.20[@a] *2*	1.8[@] *7*	743.24		588.04	(7/2$^+$,9/2$^+$)				
169.42 *5*	100	195.65	7/2$^+$	26.21	5/2$^+$	M1,E2		0.28 *4*	α(K)exp=0.23 *5* (1973De25) α(K)=0.222 *12*; α(L)=0.046 *18*; α(M)=0.010 *4*; α(N+..)=0.0025 *10* α(N)=0.0021 *9*; α(O)=0.00032 *12*; α(P)=1.52×10^{-5} *12*
186.74[d] *17*	1.7 *6*	416.81	(9/2$^+$)	231.23	(7/2$^+$)				E_γ: level-energy difference=185.58 *19*. Mult.: D,E2 from comparison to RUL. I_γ: from 1983ViZU, Iγ≈1 from 1996Ge12.
195.60 *6*	4.7 *9*	195.65	7/2$^+$	0.0	3/2$^+$	[E2]		0.192	α(K)=0.1466 *21*; α(L)=0.0356 *5*; α(M)=0.00770 *11*; α(N+..)=0.00191 *3* α(N)=0.001651 *24*; α(O)=0.000246 *4*; α(P)=9.09×10^{-6} *13* Mult.: D,E2 from comparison to RUL. Δπ=no from level scheme.
202.0		946.11		743.24					E_γ: from 1998Fo01. E_γ: poor fit; level-energy difference=202.82 *17*.
205.0[&] *2*	8.0[&] *8*	231.23	(7/2$^+$)	26.21	5/2$^+$				
226.1[&] *3*	2.5[&] *5*	421.53	(5/2,7/2$^+$)	195.65	7/2$^+$				Mult.: D,E2 from comparison to RUL.

^{131}Ce ε decay (10.3 min) 1996Ge12,1983ViZU (continued)

γ(^{131}La) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[c]	Comments
231.0[&] 3	1.5[&] 5	671.46	(11/2$^+$)	440.45	(9/2$^+$)	M1	0.107	Mult.: from A_2/A_0=0.0 *1*, A_4/A_0≡0 from ^{116}Cd(^{19}F,4nγ).
231.2[&] 3	2.0[&] 5	231.23	(7/2$^+$)	0.0	3/2$^+$			
244.84 9	23.9 16	440.45	(9/2$^+$)	195.65	7/2$^+$			Mult.: D,E2 from comparison to RUL.
257.0[&d] 2	4.8[&] 6	671.46	(11/2$^+$)					E_γ: poor fit; level-energy difference=254.65 *17*.
264.2[@a] 2	8[@] 2	459.88	(5/2,7/2$^+$)	195.65	7/2$^+$			Mult.: D,E2 from comparison to RUL.
271.46 19	11.0 7	416.81	(9/2$^+$)	145.39	(5/2$^+$,7/2$^+$)			Mult.: D,E2 from comparison to RUL.
276.1[@a] 2	2.8[@] 8	421.53	(5/2,7/2$^+$)	145.39	(5/2$^+$,7/2$^+$)			Mult.: D,E2 from comparison to RUL.
302.90 21	3.8 7	743.24		440.45	(9/2$^+$)			
[x]326.9[@] 2	5.5[@] 16							
353.2[@‡] 3	3.0[@] 10	1024.41	(11/2$^+$)	671.46	(11/2$^+$)			
390.3 3	6 3	416.81	(9/2$^+$)	26.21	5/2$^+$			I_γ: from 1983ViZU, Iγ=30.8 *20* from 1996Ge12. Mult.: D,E2 from comparison to RUL.
392.35 3	15 2	588.04	(7/2$^+$,9/2$^+$)	195.65	7/2$^+$	(M1,E2)		I_γ: from 1983ViZU. Iγ=23.2 *18* from 1996Ge12. Mult.: from A_2/A_0=−0.60 *6*, A_4/A_0=+0.10 *6* from ^{116}Cd(^{19}F,4nγ).
395.31 8	42 3	421.53	(5/2,7/2$^+$)	26.21	5/2$^+$			Mult.: D,E2 from comparison to RUL.
[x]403.6[@b]	8.4[@] 8							
414.24 7	53 5	440.45	(9/2$^+$)	26.21	5/2$^+$			Mult.: D,E2 from comparison to RUL.
421.53 13	13.1 9	421.53	(5/2,7/2$^+$)	0.0	3/2$^+$			Mult.: D,E2 from comparison to RUL.
433.70[@‡] 12	11.6[@] 12	459.88	(5/2,7/2$^+$)	26.21	5/2$^+$			Mult.: D,E2 from comparison to RUL.
440.4[@] 4	2.6[@] 5	671.46	(11/2$^+$)	231.23	(7/2$^+$)			
442.75 10	16 2	588.04	(7/2$^+$,9/2$^+$)	145.39	(5/2$^+$,7/2$^+$)			I_γ: from 1983ViZU. Iγ=8.5 *9* from 1996Ge12.
459.8[@‡] 3	3.0[@] 12	459.88	(5/2,7/2$^+$)	0.0	3/2$^+$			Mult.: D,E2 from comparison to RUL.
470.6[@] 2	4.1[@] 15	911.15	(5/2,7/2$^+$)	440.45	(9/2$^+$)			
475.83 14	18 2	671.46	(11/2$^+$)	195.65	7/2$^+$			I_γ: from 1983ViZU. Iγ=12.1 *13* from 1996Ge12.
489.7[@‡] 3	≈2[@]	911.15	(5/2,7/2$^+$)	421.53	(5/2,7/2$^+$)			I_γ: main part of intensity relates to 5-min ^{131}Ce decay (1983ViZU).
547.7 4	11.8 12	743.24		195.65	7/2$^+$			I_γ: from 1983ViZU. Iγ=7.1 *8* from 1996Ge12.
562.2[@‡] 2	2.9[@] 4	588.04	(7/2$^+$,9/2$^+$)	26.21	5/2$^+$			
564.2[@‡d]	≈2[@]	1024.41	(11/2$^+$)	459.88	(5/2,7/2$^+$)			
584.02[b] 26	8 1	1024.41	(11/2$^+$)	440.45	(9/2$^+$)			
588.4[@‡d] 2	2.8[@] 6	588.04	(7/2$^+$,9/2$^+$)	0.0	3/2$^+$			
598.44[d] 18	11.8 12	743.24		145.39	(5/2$^+$,7/2$^+$)			E_γ: level-energy difference=597.85 *6*. I_γ: from 1983ViZU. Iγ=5.1 *6* from 1996Ge12.
602.85 10	15.0 15	1024.41	(11/2$^+$)	421.53	(5/2,7/2$^+$)			I_γ: from 1983ViZU. Iγ=8.2 *7* from 1996Ge12.
607.60[@] 19	7.7[@] 9	1024.41	(11/2$^+$)	416.81	(9/2$^+$)			
[x]614.6[@] 2	5.3[@] 8							
[x]616.4[@]	≈2[@]							
[x]625.9[@] 2	2.9[@] 4							
[x]634.93[@] 12	5.0[@] 7							

$^{131}_{57}La_{74}$-3

^{131}Ce ε decay (10.3 min) 1996Ge12,1983ViZU (continued)

γ(^{131}La) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
x638.0@ 3	2.5@ 6					
x644.7@ 2	5.3@ 7					
x657.24@ 15	7.2@ 10					
x683.6@ 3	≈2@					
x694.8@ 3	2.7@ 9					
x702.7@ 4	≈3@					
715.7b@a‡	4.1@ 12	911.15	(5/2,7/2+)	195.65	7/2+	I_γ: main part of intensity relates to 5-min ^{131}Ce decay (1983ViZU).
742.20d 24	2.8 8	743.24		0.0	3/2+	E_γ: level-energy difference=743.24 5. I_γ: main part of intensity relates to 5-min ^{131}Ce decay (1983ViZU).
750.6@a 2	7.0@ 14	946.11		195.65	7/2+	
792.7& 5	1.0& 5	1024.41	(11/2+)	231.23	(7/2+)	
800.7@a 3	2.7@ 7	946.11		145.39	(5/2+,7/2+)	
835.8@a 1	24@ 2	1781.91		946.11		
x866.4@ 1	8.8@ 16					
885.7 7	11.9 17	1910.05		1024.41	(11/2+)	
911.3@‡ 5	4.9@ 12	911.15	(5/2,7/2+)	0.0	3/2+	
x912.9@ 5	4.0@ 12					
x930.2@ 2	3.6@ 10					
x950.0@	≈2@					
x964.9@ 2	7.6@ 15					
x979.7@ 3	1.6@ 6					
x1050.0@b	3.1@ 10					
x1058.2@ 4	3.3@ 12					
x1060.6@ 2	6.3@ 12					
x1070.9@ 4	≈3@					
x1075.2@ 3	≈3@					
x1115.5@	≈2@					
x1119.7@ 5	≈2@					
x1131.2@ 2	6.8@ 10					
1166.5 6	11.1 6	1910.05		743.24		
x1174.0@	≈1.6@					
1186.7@‡ 5	2.0@ 8	1774.53	(5/2,7/2+)	588.04	(7/2+,9/2+)	
1238.5 5	8.0 8	1910.05		671.46	(11/2+)	
x1295.3@ 3	2.0@ 7					
x1302.4@ 2	8.0@ 12					

$^{131}_{57}La_{74}$-4

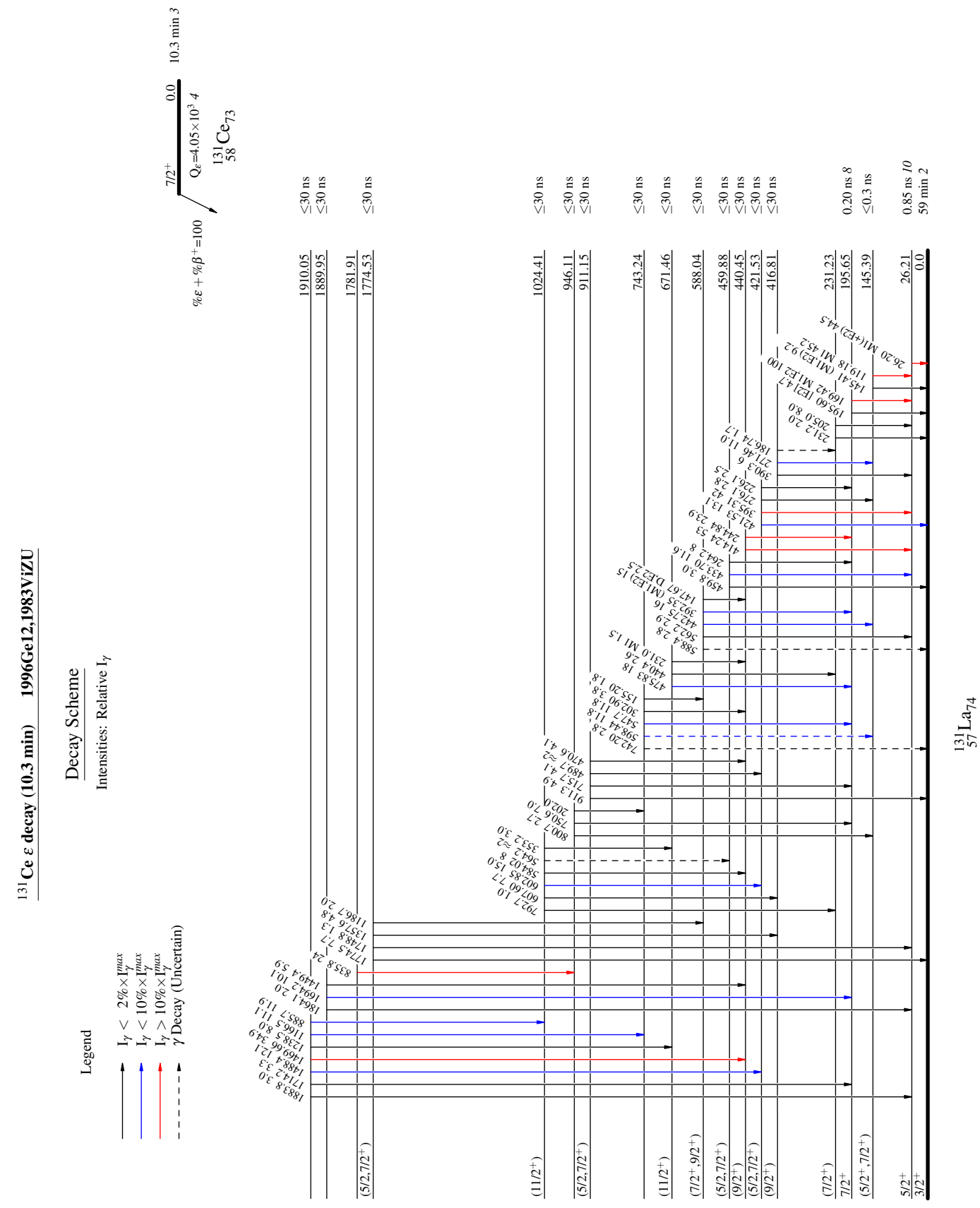
^{131}Ce ε decay (10.3 min) 1996Ge12,1983ViZU (continued)

γ(^{131}La) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
1357.6@‡ 2	4.8@ 7	1774.53	(5/2,7/2+)	416.81	(9/2+)	
x1382.0@ 2	3.6@ 6					
x1417.9@ 3	2.6@ 5					
1449.4@‡ 2	5.9@ 9	1889.95		440.45	(9/2+)	
1469.66 16	34.9 19	1910.05		440.45	(9/2+)	
x1481.0@ 2	3.8@ 7					
1488.4 4	12.1 15	1910.05		421.53	(5/2,7/2+)	
x1529.8@b	4.1@ 8					
x1561.5@ 4	1.9@ 7					
1694.2@‡ 2	10.1@ 15	1889.95		195.65	7/2+	
1714.2 4	3.3 7	1910.05		195.65	7/2+	
1748.8@‡ 5	1.3@ 4	1774.53	(5/2,7/2+)	26.21	5/2+	
1774.5b‡	7.7 10	1774.53	(5/2,7/2+)	0.0	3/2+	
x1807.3@ 3	2.8@ 10					
1864.1@‡ 3	2.0@ 5	1889.95		26.21	5/2+	
1883.8 4	3.0 7	1910.05		26.21	5/2+	I_γ: from 1983ViZU. Iγ=1.0 5 from 1996Ge12.
x2039.4@ 2	4.3@ 7					
x2146.9@ 3	2.6@ 5					

† Weighted average from 1983ViZU and 1996Ge12, except as noted.
‡ The transition was introduced into level scheme using energy relationship only.
# From α(exp) besides as noted.
@ From 1983ViZU.
& From 1996Ge12.
a γ was confirmed by 1998Fo01.
b Doublet.
c Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
d Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{131}_{57}La_{74}$-5


131Ce ε decay (10.3 min) 1996Ge12,1983ViZU
Decay Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
%ε + %β+=100
7/2+ 0.0 10.3 min 3
Qε=4.05×10³ 4
131 58 Ce 73
131 57 La 74
1910.05 ≤30 ns
1889.95 ≤30 ns
1781.91 ≤30 ns
1774.53 ≤30 ns
1024.41 ≤30 ns
946.11 ≤30 ns
911.15 ≤30 ns
743.24 ≤30 ns
671.46 ≤30 ns
588.04 ≤30 ns
459.88 ≤30 ns
440.45 ≤30 ns
421.53 ≤30 ns
416.81 ≤30 ns
231.23 0.20 ns 8
195.65 ≤0.3 ns
145.39 0.85 ns 10
26.21 59 min 2
0.0
(5/2,7/2+)
(11/2+)
(7/2+,9/2+)
(9/2+)
7/2+
(5/2+,7/2+)
5/2+
3/2+