Coulomb excitation **1993Sr01,2006Mu04,2009Co24**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Zoltan Elekes and Janos Timar	NDS 129,191 (2015)	28-Feb-2015

1993Sr01: ^{208}Pb(^{128}Xe,^{128}Xe′)^{208}Pb E(^{128}Xe)=4.3 MeV/a; avalanche gas counter; GE with BGO γ, γγ.

2006Mu04: ^{58}Ni(^{128}Xe,^{128}Xe′γ) E=553 MeV. Measured Eγ, Iγ using six HPGe detectors from the MSU-SeGA array.

Others: 1958Pi05, 1975EdZY, 1975Go18, 2008KoZX.

2009Co24: Beam of 404 MeV ^{128}Xe ions from the ATLAS accelerator at Argonne was pulsed (12MHz) and impinged on a natural ^{12}C target of 1 mg/cm^2. Emitted γ rays were detected by Gammasphere array, consisting of 98 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, γγ with multiplicity one or higher. The observed relative γ yields used to deduce the Coulomb excitation cross sections relative to the 2$^+$ state. Evaluator notes that in several cases γ ray branching ratio have been taken by 2009Co24 from ENSDF database (2001Ka61), but the values do not match. It is possible that E2 probabilities listed in 2009Co24 for such cases may be affected by the discrepant branching ratios.

2011Ro53: E=525 MeV; ^{128}Xe beam on 2.1 mg/cm^2 ^{nat}Fe target with a 4 mg/cm^2 ^{93}Nb degrader and a 20.4 mg/cm^2 ^{nat}Au foil. Measured Eγ, Iγ, lifetimes using a plunger device and Differential Decay Curve Method. The JUROGAM array consisting of 43 Compton-suppressed HPGe at University of Jyvaskyla, Finland was used.

^{128}Xe Levels

E(level)	J$^\pi$	T$_{1/2}$[†]	Comments
0.0	0$^+$	stable	
443.0 *4*	2$^+$	18[‡] ps *4*	B(E2)=0.817 *16*. The value is weighted average of 0.90 *10* (1993Sr01), 0.69 *5* (1975Go18), 0.89 *23* (1958Pi05), 0.79 *4* (1975EdZY) and 0.825 *+11−12* (2006Mu04). T$_{1/2}$: from B(E2) 20.7 ps *4* can be derived.
969.5 *4*	2$^+$	4.78[‡] ps *28*	B(E2)(0$^+$: 0 level)=0.012 *1*, B(M1)(2$^+$: 443 level)=0.0023 *+20−11*, B(E2)(2$^+$: 443 level)=0.19 *2*; Iγ(526γ):Iγ(969γ)=11.2 *6*:3.1 *4* (1993Sr01). B(E2) values from 2009Co24 were not used since the branching ratios are uncertain. T$_{1/2}$: from B(E2) and γ branching 5.7 ps *5* can be derived.
1033.2 *5*	4$^+$	3.33[‡] ps *14*	B(E2)(2$^+$: 443 level)=0.429 *24*. Weighted average of 0.41 *4* (1993Sr01) and 0.44 *3* (2009Co24). T$_{1/2}$: from B(E2) 3.33 ps *16* can be derived.
1429.6 *6*	3$^+$	1.59[‡] ps *21*	
1583.0 *6*	0$^+$		
1603.5 *4*	4$^+$	2.43[‡] ps *14*	B(E2)(4$^+$: 1033 level)=0.114 *10* (weighted average of 0.11 *2* (1993Sr01) and 0.115 *12* (2009Co24)), B(M1)(4$^+$: 1033 level)=0.009 *2* (1993Sr01), B(E2)(2$^+$: 969 level)=0.210 *19* (weighted average of 0.22 *4* (1993Sr01) and 0.207 *21* (2009Co24)), B(E2)(2$^+$: 443 level)=0.0036 *3* (weighted average of 0.0036 *5* (1993Sr01) and 0.0036 *4* (2009Co24)). T$_{1/2}$: from B(E2) 2.28 ps *23* can be derived.
1737.4 *6*	6$^+$	1.39[‡] ps *7*	B(E2)(4$^+$: 1033 level)=0.47 *7*. Weighted average of 0.43 *4* (1993Sr01) and 0.59 *7* (2009Co24). T$_{1/2}$: from B(E2) 1.00 ps *9* can be derived.
1877.5 *5*	0$^+$	0.18 ps *3*	T$_{1/2}$: from B(E2).
2127.0 *5*	1$^+$,2$^+$,3$^+$	0.16 ps *5*	
2138.7 *5*	(3$^-$)		B(E3)↑=0.083 *11* (2006Mu04)
2165.9 *7*	(4)		
2229.3 *7*	5$^-$		
2281.5 *8*	(6)$^+$		B(E2)(6$^+$: 1737 level)=0.03 *2*, B(M1)(6$^+$: 1737 level)=0.5 *2*, B(E2)(4$^+$: 1603 level)=0.53 *6* (1993Sr01).
2361.6 *6*	(3)		
2430.7 *6*	(1,2$^+$)		
2512.4 *12*	8$^+$	0.55 ps *6*	B(E2)(6$^+$: 1737 level)=0.48 *5* (1993Sr01).
2547.5 *8*			B(E2)(6$^+$: 2281 level)<0.08, B(E2)(6$^+$: 1737 level)= 0.16 *5*, B(M1)(6$^+$: 1739 level)<0.08, B(E2)(4$^+$ to 6$^+$)=0.07 *3* (1993Sr01).
2591.6 *11*	(1,2$^+$)		

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Coulomb excitation 1993Sr01,2006Mu04,2009Co24 (continued)

^{128}Xe Levels (continued)

E(level)	J^π	$T_{1/2}$ †	Comments
2718.6 *11*	$(1,2^+)$		
3196.4 *15*	10^+		
3364.4 *15*	10^+	0.9 ps *3*	B(E2)(8^+: 2512 level)=0.51 *15* (1993Sr01).

† From B(E2), unless otherwise noted.
‡ From DSAM and Differential Decay Curve Method (2011Ro53).

$\gamma(^{128}Xe)$

B(E2)(W.u.): from 2009Co24 unless otherwise noted.

E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Mult.	δ	Comments
443.0	2^+	442.9 *5*	100	0.0	0^+			
969.5	2^+	526.5 *5*	100.0 *7*	443.0	2^+			B(E2)(W.u.)=50 *10*
		969.5 *5*	25.51 *22*	0.0	0^+			E_γ: doublet. The branching ratio was determined by the authors of 2009Co24 using ENSDF database (2001Ka61) however the data do not match. B(E2)(W.u.) uncertain.
1033.2	4^+	590.2 *5*	100	443.0	2^+			B(E2)(W.u.)=64 *5*
1429.6	3^+	460.1 *5*		969.5	2^+			
		986 *5*		443.0	2^+			E_γ: from 1993Sr01, not observed in 2009Co24.
1583.0	0^+	613.5 *5*		969.5	2^+			
1603.5	4^+	570.4 *5*	71.8 *16*	1033.2	4^+			B(E2)(W.u.)=30 *3*
		634.0 *5*	100.0 *16*	969.5	2^+			B(E2)(W.u.)=30 *3*
		1160.6 *5*	36.1 *14*	443.0	2^+			B(E2)(W.u.)=0.52 *6*
1737.4	6^+	704.2 *5*	100	1033.2	4^+			B(E2)(W.u.)=106 *13*
1877.5	0^+	908.2 *5*	19 *3*	969.5	2^+			B(E2)(W.u.)=22 *5*
		1434.4 *5*	100 *11*	443.0	2^+			B(E2)(W.u.)=10.4 *23*
2127.0	$1^+,2^+,3^+$	1157.5 *5*	6.3 *6*	969.5	2^+			B(E2)(W.u.)≤0.74 *113*
								E_γ: doublet. The branching ratio was determined by the authors of 2009Co24 using ENSDF database (2001Ka61).
		1684.1 *10*	100 *17*	443.0	2^+			B(E2)(W.u.)=0.035 *54*; B(M1)↓=0.042 *12*
								E_γ: doublet. The branching ratio was determined by the authors of 2009Co24 using ENSDF database (2001Ka61).
		2127.1 *10*	12.2 *14*	0.0	0^+			B(E2)(W.u.)=0.21 *7*
2138.7	(3^-)	1105.4 *5*		1033.2	4^+			
		1695.8 *10*		443.0	2^+			E_γ: doublet.
		2138.7 *10*		0.0	0^+			I_γ: intensity is not given in 2009Co24.
2165.9	(4)	1132.7 *5*	100	1033.2	4^+			E_γ: doublet.
2229.3	5^-	1196.1 *5*	100	1033.2	4^+			
2281.5	$(6)^+$	544 *1*		1737.4	6^+	M1+E2	0.11 *+1−4*	E_γ,Mult.,δ: from 1993Sr01.
		678 *1*		1603.5	4^+			E_γ: from 1993Sr01.
2361.6	(3)	1392.1 *5*	100	969.5	2^+			
2430.7	$(1,2^+)$	1461.2 *5*		969.5	2^+			B(E2)(W.u.)≤2.3 *9*
								B(E2)(W.u.): if pure E2.
2512.4	8^+	775		1737.4	6^+			E_γ: from 1993Sr01.
2547.5		266		2281.5	$(6)^+$			E_γ: from 1993Sr01.
		810		1737.4	6^+			E_γ: from 1993Sr01.

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Coulomb excitation 1993Sr01,2006Mu04,2009Co24 (continued)

$\gamma(^{128}Xe)$ (continued)

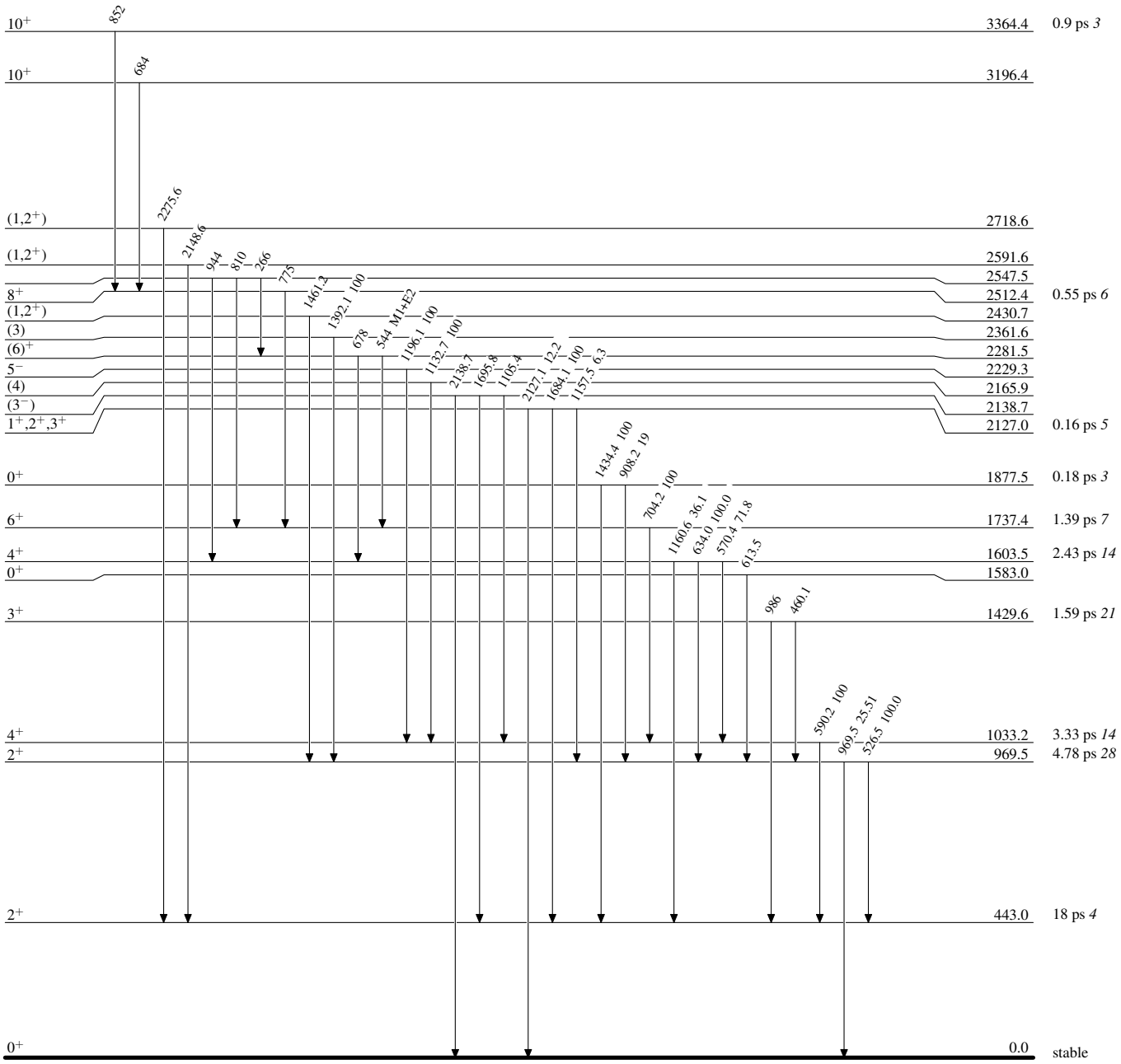
E_i(level)	J_i^π	E_γ[†]	E_f	J_f^π	Comments
2547.5		944	1603.5	4^+	E_γ: from 1993Sr01.
2591.6	$(1,2^+)$	2148.6 *10*	443.0	2^+	B(E2)(W.u.)≤5.3 *13* B(E2)(W.u.): if pure E2.
2718.6	$(1,2^+)$	2275.6 *10*	443.0	2^+	B(E2)(W.u.)≤13.8 *36* B(E2)(W.u.): if pure E2.
3196.4	10^+	684	2512.4	8^+	E_γ: from 1993Sr01.
3364.4	10^+	852	2512.4	8^+	E_γ: from 1993Sr01.

[†] From 2009Co24 unless otherwise noted.

Coulomb excitation 1993Sr01,2006Mu04,2009Co24

Level Scheme

Intensities: Relative photon branching from each level



$^{128}_{54}Xe_{74}$