(HI,xnγ)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 1745 (2009)	31-Dec-2008

1997Pe25 (also 1996Pe13): ^{58}Ni(^{50}Cr,α2pγ) E=261 MeV. Measured Eγ, Iγ, $\gamma\gamma$, and $\gamma\gamma(\theta)$ using the NORDBALL Ge detector array in conjunction with 11 liquid scintillator detectors, a silicon ball comprised of 21 silicon detectors, and BaF2 crystals as a time reference for the events in NORDBALL.

2001Li24: ^{58}Ni(^{50}Cr,α2pγ) E=205 MeV. Measured Eγ, Iγ, $\gamma\gamma$, and lifetimes using the GASP array consisting of 40 Compton-suppressed Ge detectors. Lifetime measurements were determined using recoil distance Doppler shift technique.

2007Bo17: ^{92}Mo(^{12}C,2nγ).E=41 MeV. Measured Eγ, $\gamma\gamma$, lifetimes using Euroball cluster detector of seven Ge detectors at 0° relative to the beam axis, and 5 HPGe detectors at a polar angle of 143°.Target 99%enriched with ^{92}Mo. Shell-Model calculations. A recoil distance Doppler shift (RDDS) experiment was performed with the Cologne coincidence plunger device in order to obtain lifetimes of low-lying states. Lifetimes were obtained using the differential decay curve method (DDCM) for $\gamma\gamma$ coincidences.

1981TrZZ: ^{92}Mo(^{12}C,2nγ), E(^{12}C)=44-65 MeV.

1982Tr04: ^{102}Pd(^{3}He,3nγ), E(^{3}He)=25-40 MeV; ^{92}Mo(^{12}C,2nγ), E(^{12}C)=44-65 MeV. Measured: Eγ, $\gamma\gamma$(t), $\gamma(\theta)$, $T_{1/2}$. Deduced ^{102}Cd levels, J^{π}, mult.

1992Al17: ^{48}Ti(^{58}Ni,2n2p), E(^{58}Ni)=231 MeV. Measured: Eγ, Iγ, pnγ, $\gamma\gamma\gamma$, n$\gamma\gamma$. Deduced: ^{102}Cd levels, J^{π}.

1996Ra23: ^{50}Cr(^{56}Fe,2p2nγ), E(^{56}Fe)=195 MeV. Isotope identification by recoil separator. Measured: Eγ, Iγ, $\gamma\gamma$. Deduced: ^{102}Cd levels.

Unless noted otherwise, all γ data given here are from 1997Pe25 and/or 2001Li24.

^{102}Cd Levels

All band information from 1997Pe25 and 2001Li24.

E(level)[@]	J^{π}[†]	$T_{1/2}$[‡#]	Comments
0.0[&]	0^+		
776.71[&] *3*	2^+	3.5 ps *6*	$T_{1/2}$: from RDDS method (2007Bo17). $T_{1/2}$: Other: 5.8 ns<2001Li24.
1637.81[&] *6*	4^+	<5.6 ps	
1649.3?	(0^+)		E(level): Only observed by 1996Ra23.
2230.94[&] *8*	6^+	19.4 ps *14*	
2482.6?	(2^+)		E(level): Only observed by 1996Ra23.
2561.41 *8*	6^+		
2676.78[b] *15*	(6^+)		
2718.84 *10*	8^+	39 ns *3*	$T_{1/2}$: 2001Li24 quote from 1992Al17. Also 38.8 ns 28 2007Bo17).
3052.97[&] *9*	8^+	3.1 ps *7*	
3187.49?[b] *19*			
3577.67 *11*	8^+		
3810.44 *14*	(9^+)		
3908.65[&] *10*	10^+	1.2 ps *4*	
4008.03 *10*	10^+	0.62 ps *14*	
4036.50?[b] *20*			
4277.15[c] *10*	11^+	1.04 ps *14*	
4349.78[a] *11*	$9^{(-)}$		
4518.27[c] *10*	12^+	1.73 ps *14*	
4736.57 *15*	(13)		
4960.53? *15*	(12)		
4988.97?[b] *20*			
5196.75?[a] *11*	$11^{(-)}$		
5308.77[c] *11*	13^+	0.28 ps *7*	

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(HI,xnγ) (continued)

^{102}Cd Levels (continued)

E(level)[@]	J^{π}[†]	$T_{1/2}$[‡#]	Comments
5407.21?[b] *21*			
5769.24 *11*	14		
5926.23[c] *11*	14^+	1.52 ps *14*	$T_{1/2}$: effective lifetime.
6069.71?[b] *19*	(12)		
6080.65[a] *11*	$13^{(-)}$		
6287.11? *19*	(15)		
6323.54 *13*	$13^{(-)}$		
6563.18 *13*	$14^{(-)}$		
6712.38? *24*	(16)		
6746.16[b] *15*	$14^{(-)}$	>5.5 ps	
6773.21[c] *14*	15		
6827.49 *12*	14		
7011.10[a] *12*	$15^{(-)}$		
7261.96 *13*	15		
7332.00[c] *14*	16		
7788.93?[b] *18*	$16^{(-)}$	>5.5 ps	
7943.66 *15*	16		
8099.66[a] *13*	$17^{(-)}$	>1.25 ps	
8367.42[c] *21*	17		
8508.34 *18*	17		
8845.38?[b] *23*	$18^{(-)}$	1.80 ps *14*	$T_{1/2}$: effective lifetime.
8942.69[a] *18*	$18^{(-)}$	>1.25 ps	
9233.43[a] *21*	$19^{(-)}$	1.59 ps *14*	$T_{1/2}$: effective lifetime.
10513.7?[b] *3*	(20)		

† From 1997Pe25 and 2001Li24 based on R values from $\gamma\gamma(\theta)$, a_{22} a_{44} and observed band structure. Numerical values are the same as the adopted ones.

‡ Unless noted otherwise, from differential decay method (2001Li24).

\# For some levels the effective lifetime was obtained.This half-life is obtained assuming 100% side-feeding into the top of the band via a cascade of transitions with the same moment of inertia as the in-band transitions.The highest γ ray for which a line shape was observed was then fitted and the extracted life time is called effective lifetime. This lifetime was used as input parameter to extract the lifetimes of the states lower in the cascade(see also 2005Si23).

@ From least-squares fit to Eγ's (by evaluator). The uncertainties assigned by 1997Pe25 give a poor fit with about 20 transitions outside 3 or more standard deviations. The evaluator has adjusted Δ(Eγ)'s as follows: minimum Δ(Eγ)=0.05 keV for Iγ>20, 0.10 keV for 10<Iγ<20, and 0.15 keV for 1<Iγ<10. This choice gives an acceptable fit.

& Band(A): g.s. band.

[a] Band(B): band based on $9^{(-)}$.

[b] Band(C): Band based on 6^+. Ordering of the 1081-952-849-511 cascade is not certain.

[c] Band(D): Band based on $11^{(+)}$ continuation of g.s. band.

γ(^{102}Cd)

R=Iγ(θ=143°)/ Iγ[(θ=79°) or (θ=101°)] values from 1997Pe25.

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(HI,xnγ) (continued)

γ(^{102}Cd) (continued)

E_γ[‡]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
99.40 4	3.6 2	4008.03	10^+	3908.65	10^+	M1+E2	R=1.62 11.
157.22 5	9.5 3	2718.84	8^+	2561.41	6^+	E2	B(E2)(W.u.)=3.1 3 R=1.26 3.
183.42 4	6.9 2	7011.10	$15^{(-)}$	6827.49	14		R=0.98 13.
197.59 4	5.6 2	4008.03	10^+	3810.44	(9^+)	M1+E2	R=1.32 10.
218.46[@] 4	3.1 1	4736.57	(13)	4518.27	12^+	M1+E2	R=0.80 4.
239.24[@] 7	1.3 1	6563.18	$14^{(-)}$	6323.54	$13^{(-)}$	M1+E2	R=0.84 5.
241.12 3	88 3	4518.27	12^+	4277.15	11^+	M1	Mult.: Other: d (1997Pe25). R=0.75 1. A_{22}=−0.16 4; a_{44}=−0.07 4; Pol=−0.25 12.
242.93 4	8.6 3	6323.54	$13^{(-)}$	6080.65	$13^{(-)}$	M1+E2	R=1.14 8.
264.04 3	6.9 2	6827.49	14	6563.18	$14^{(-)}$	D	R=0.75 3.
269.11 3	58.1 18	4277.15	11^+	4008.03	10^+	D	R=0.79 1. A_{22}=+0.06 4; a_{44}=−0.27 5; Pol=+0.28 12. Mult.: ΔJ=0,−2 (1988Tr04).
290.74 3	11.5 4	9233.43	$19^{(-)}$	8942.69	$18^{(-)}$	M1+E2	Mult.: Other: d (1997Pe25). R=0.52 2.
330.51 5	3.5 2	2561.41	6^+	2230.94	6^+	M1+E2	R=1.26 9.
360.88[@] 4	4.9 2	6287.11?	(15)	5926.23	14^+	D	R=0.82 5.
368.51 3	45.4 14	4277.15	11^+	3908.65	10^+	M1	R=0.80 2. A_{22}=−0.21 8; a_{44}=−0.02 10; Pol=−0.35 10.
418.23[†] 5	2.3 1	5407.21?		4988.97?			
422.70 5	4.2 2	6746.16	$14^{(-)}$	6323.54	$13^{(-)}$	D	B(E1)(W.u.)<0.00023 R=0.78 10.
425.27[@] 4	5.2 2	6712.38?	(16)	6287.11?	(15)	D	R=0.83 5.
433.92[@] 6	2.4 1	8942.69	$18^{(-)}$	8508.34	17		
435.02 4	5.9 3	7261.96	15	6827.49	14		E_γ: 434.47 from level energy difference.
460.43 4	10.4 4	5769.24	14	5308.77	13^+	D	R=0.66 3.
487.43 4	6.8 3	2718.84	8^+	2230.94	6^+	E2	B(E2)(W.u.)=0.0078 8 R=1.16 4. A_{22}=+0.09 4; a_{44}=+0.03 5; Pol=−0.06 6. Mult.: A_{22}, A_{44} and Pol for multiplet.
492 1	<3	3052.97	8^+	2561.41	6^+		E_γ,I_γ: From 2001Li24.
504.20 4	6.6 3	6827.49	14	6323.54	$13^{(-)}$	D	R=0.67 5.
510.70[†] 4	6.2 2	3187.49?		2676.78	(6^+)		R=1.09 7.
558.81 4	9.9 3	7332.00	16	6773.21	15	D	R=0.72 4.
564.25 4	7.2 3	8508.34	17	7943.66	16	D	R=0.68 7.
593.12 3	72.7 24	2230.94	6^+	1637.81	4^+	E2	B(E2)(W.u.)=14.0 11 R=1.35 3. A_{22}=+0.33 3; a_{44}=−0.11 3; Pol=0.62 20.
617.45 3	27.0 9	5926.23	14^+	5308.77	13^+	M1+E2	R=0.61 2. Mult.: Other: d (1997Pe25).
662.50[†] 7	1.9 1	6069.71?	(12)	5407.21?			
665.43 8	3.4 2	6746.16	$14^{(-)}$	6080.65	$13^{(-)}$	M1+E2	
676.44 5	5.9 2	6746.16	$14^{(-)}$	6069.71?	(12)	E2	B(E2)(W.u.)<11 R=1.17 7.
681.64 5	5.8 3	7943.66	16	7261.96	15		
683.61[@] 5	6.7 3	4960.53?	(12)	4277.15	11^+	M1	R=0.68 4.
746.92 6	4.5 2	6827.49	14	6080.65	$13^{(-)}$		R=1.15 15.
767.77 5	3.9 2	8099.66	$17^{(-)}$	7332.00	16	E1	B(E1)(W.u.)<9.4×10^{-5} R=0.53 8.
772.08 4	20.5 8	4349.78	$9^{(-)}$	3577.67	8^+	E1	R=0.77 3.
776.71 3		776.71	2^+	0.0	0^+	E2	B(E2)(W.u.)=20 4

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(HI,xnγ) (continued)

γ(^{102}Cd) (continued)

E_γ[‡]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
							R=1.35 *2*. A_{22}=+0.28 *3*; a_{44}=−0.04 *4*; Pol=+0.16 *10*.
790.51 *3*	45.1 *14*	5308.77	13$^+$	4518.27	12$^+$	M1+E2	R=0.90 *3*. Mult.: Other: d (1997Pe25).
808.94[@] *5*	5.3 *3*	5769.24	14	4960.53?	(12)	E2	R=1.24 *10*.
822.03 *3*	62.9 *20*	3052.97	8$^+$	2230.94	6$^+$	E2	B(E2)(W.u.)=17 *4* R=1.43 *3*. A_{22}=+0.35 *5*; a_{44}=−0.14 *5*.
833.3[@]		2482.6?	(2$^+$)	1649.3?	(0$^+$)		
837.98[@] *8*	3.0 *2*	8099.66	17$^{(-)}$	7261.96	15		
843.46 *4*	7.8 *3*	8942.69	18$^{(-)}$	8099.66	17$^{(-)}$	M1+E2	R=0.74 *6*. Mult.: Other: d (1997Pe25). E_γ: poor fit, level energy difference=843.03.
846.95 *3*	29.6 *10*	5196.75?	11$^{(-)}$	4349.78	9$^{(-)}$	E2	R=1.30 *5*.
847.07 *4*	11.2 *4*	6773.21	15	5926.23	14$^+$		R=0.86 *3*.
849.00[†] *5*	5.9 *4*	4036.50?		3187.49?			R=0.89 *35*.
855.66 *3*	40.6 *13*	3908.65	10$^+$	3052.97	8$^+$	E2	B(E2)(W.u.)=25 *9* R=1.44 *4*. A_{22}=+0.26 *6*; a_{44}=−0.29 *16*.
858.99 *5*	11.4 *6*	3577.67	8$^+$	2718.84	8$^+$	M1+E2	R=1.40 *12*.
861.09 *3*	100 *3*	1637.81	4$^+$	776.71	2$^+$	E2	B(E2)(W.u.)>7.5 R=1.22 *4*. A_{22}=+0.29 *3*; a_{44}=−0.08 *4*; Pol=+0.39 *10*.
873[@]		1649.3?	(0$^+$)	776.71	2$^+$		
883.89 *3*	29.0 *10*	6080.65	13$^{(-)}$	5196.75?	11$^{(-)}$	E2	R=1.37 *6*.
923.61 *3*	20.4 *8*	2561.41	6$^+$	1637.81	4$^+$	E2	R=1.23 *3*. A_{22}=+0.19 *5*; a_{44}=−0.03 *6*; Pol=0.12 *6*.
930.30 *4*	16.7 *6*	7011.10	15$^{(-)}$	6080.65	13$^{(-)}$	E2	R=1.29 *11*.
932.18 *5*	7.7 *4*	7943.66	16	7011.10	15$^{(-)}$		R=0.76 *19*.
952.46[†] *4*	5.3 *3*	4988.97?		4036.50?		D	R=0.73 *8*.
955.07 *4*	13.1 *5*	4008.03	10$^+$	3052.97	8$^+$	E2	B(E2)(W.u.)=9.5 *22* R=1.44 *5*.
1003.91 *9*	2.8 *2*	6773.21	15	5769.24	14		R=0.98 *19*.
1016.29 *4*	9.6 *5*	3577.67	8$^+$	2561.41	6$^+$	E2	R=1.30 *11*.
1035.42 *6*	3.9 *2*	8367.42	17	7332.00	16	D	R=0.70 *7*.
1038.96 *5*	7.3 *5*	2676.78	(6$^+$)	1637.81	4$^+$	E2	R=1.58 *15*.
1042.76 *4*	11.7 *4*	7788.93?	16$^{(-)}$	6746.16	14$^{(-)}$	E2	B(E2)(W.u.)<2.9 R=1.43 *9*.
1056.45 *4*	9.6 *4*	8845.38?	18$^{(-)}$	7788.93?	16$^{(-)}$	E2	B(E2)(W.u.)=8.4 *7* R=1.34 *11*.
1080.72[†] *8*	1.9 *1*	6069.71?	(12)	4988.97?			R=1.6 *5*.
1085.12 *7*	3.6 *2*	7011.10	15$^{(-)}$	5926.23	14$^+$	E1	R=0.74 *7*.
1088.56 *4*	15.8 *6*	8099.66	17$^{(-)}$	7011.10	15$^{(-)}$	E2	B(E2)(W.u.)<7.3 R=1.13 *5*.
1091.88 *5*	8.1 *7*	3810.44	(9$^+$)	2718.84	8$^+$	D	R=0.79 *7*.
1190.20 *4*	19.3 *7*	3908.65	10$^+$	2718.84	8$^+$	E2	B(E2)(W.u.)=2.2 *8* R=1.38 *5*.
1241.81 *4*	11.3 *4*	7011.10	15$^{(-)}$	5769.24	14	E1	R=0.76 *4*.
1250.95 *4*	20.5 *7*	5769.24	14	4518.27	12$^+$	E2	R=1.36 *4*.
1254.36 *7*	3.2 *2*	6563.18	14$^{(-)}$	5308.77	13$^+$		R=0.98 *13*.
1289.44 *3*	33.8 *12*	4008.03	10$^+$	2718.84	8$^+$	E2	B(E2)(W.u.)=5.4 *13* R=1.48 *4*. A_{22}=+0.32 *8*; a_{44}=−0.17 *10*; Pol=+0.03 *5*. Mult.: ΔJ=0,−2 (1988Tr04).

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(HI,xnγ) (continued)

γ(^{102}Cd) (continued)

E_γ‡	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
1296.95 *7*	4.6 *2*	4349.78	$9^{(-)}$	3052.97	8^+	E1	R=0.55 *19*.
1335.70 *15*	1.3 *1*	7261.96	15	5926.23	14^+		
1405.38 *15*	1.3 *1*	7332.00	16	5926.23	14^+	E2	
1492.43 *8*	3.3 *2*	7261.96	15	5769.24	14	E1	R=0.56 *7*.
1519.02 *10*	2.4 *2*	6827.49	14	5308.77	13^+	E1	R=0.50 *15*.
1562.15 *8*	3.5 *2*	6080.65	$13^{(-)}$	4518.27	12^+		
1563.86 *23*	1.2 *2*	7332.00	16	5769.24	14		E_γ: 1562.75 from level energy difference. R=0.8 *4*.
1631.26 *8*	5.3 *3*	4349.78	$9^{(-)}$	2718.84	8^+	E1	R=0.76 *8*.
1668.27 *11*	2.1 *2*	10513.7?	(20)	8845.38?	$18^{(-)}$	E2	R=1.8 *4*.
1805.17 *8*	2.7 *1*	6323.54	$13^{(-)}$	4518.27	12^+	E1	R=0.60 *12*.
1826.76@ *8*	1.9 *1*	6563.18	$14^{(-)}$	4736.57	(13)		R=1.30 *25*.

† Ordering of 1081-952-849-511 cascade is not certain (1997Pe25).

‡ From 1997Pe25.

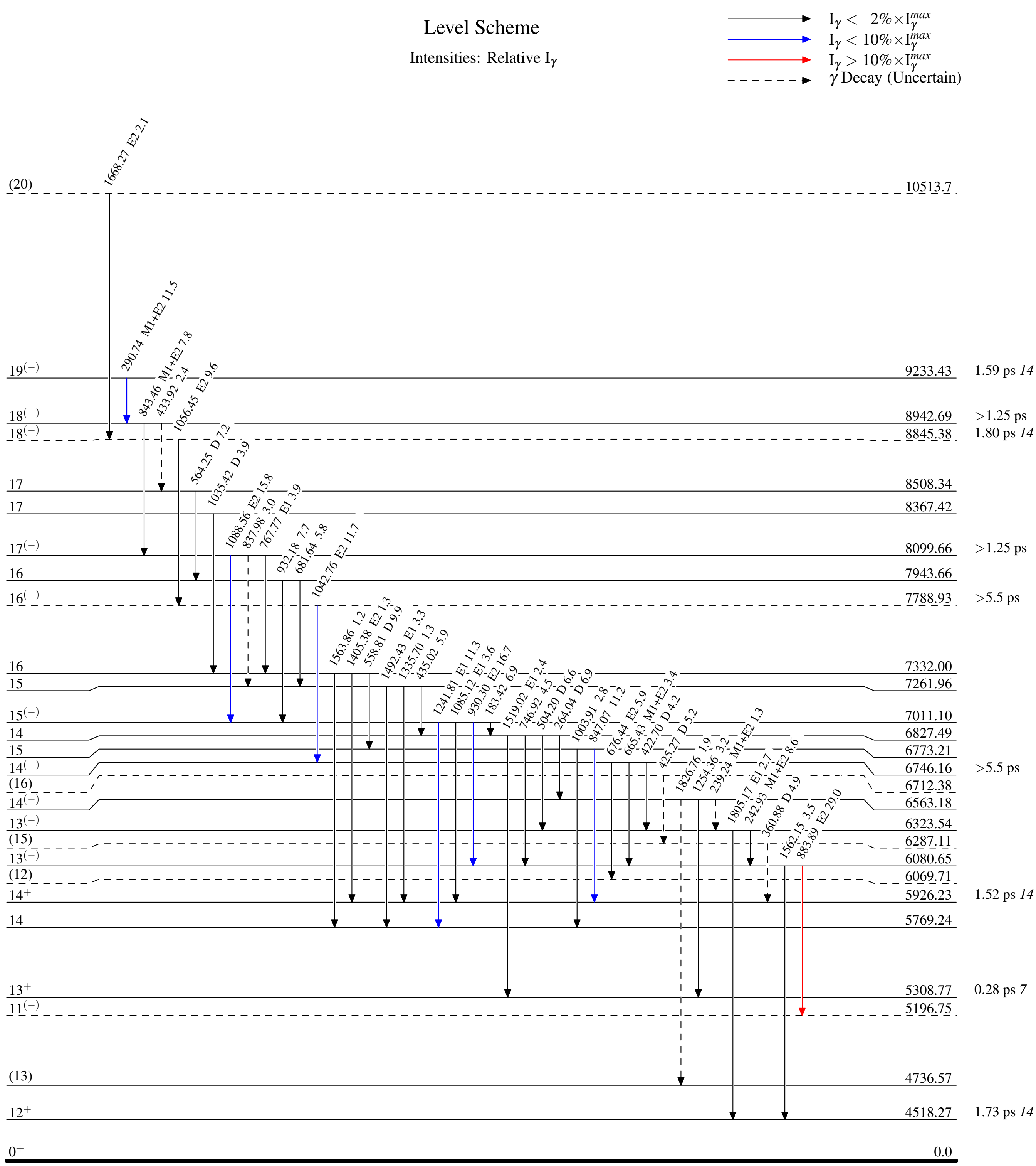
From 1997Pe25 and 2001Li24. Dipole transitions are considered E1 due to its large energy in connection with a R value characteristic of a stretched dipole (1997Pe25). No δ given for mixed transitions.

@ Placement of transition in the level scheme is uncertain.

(HI,xnγ)

Level Scheme

Intensities: Relative I_γ

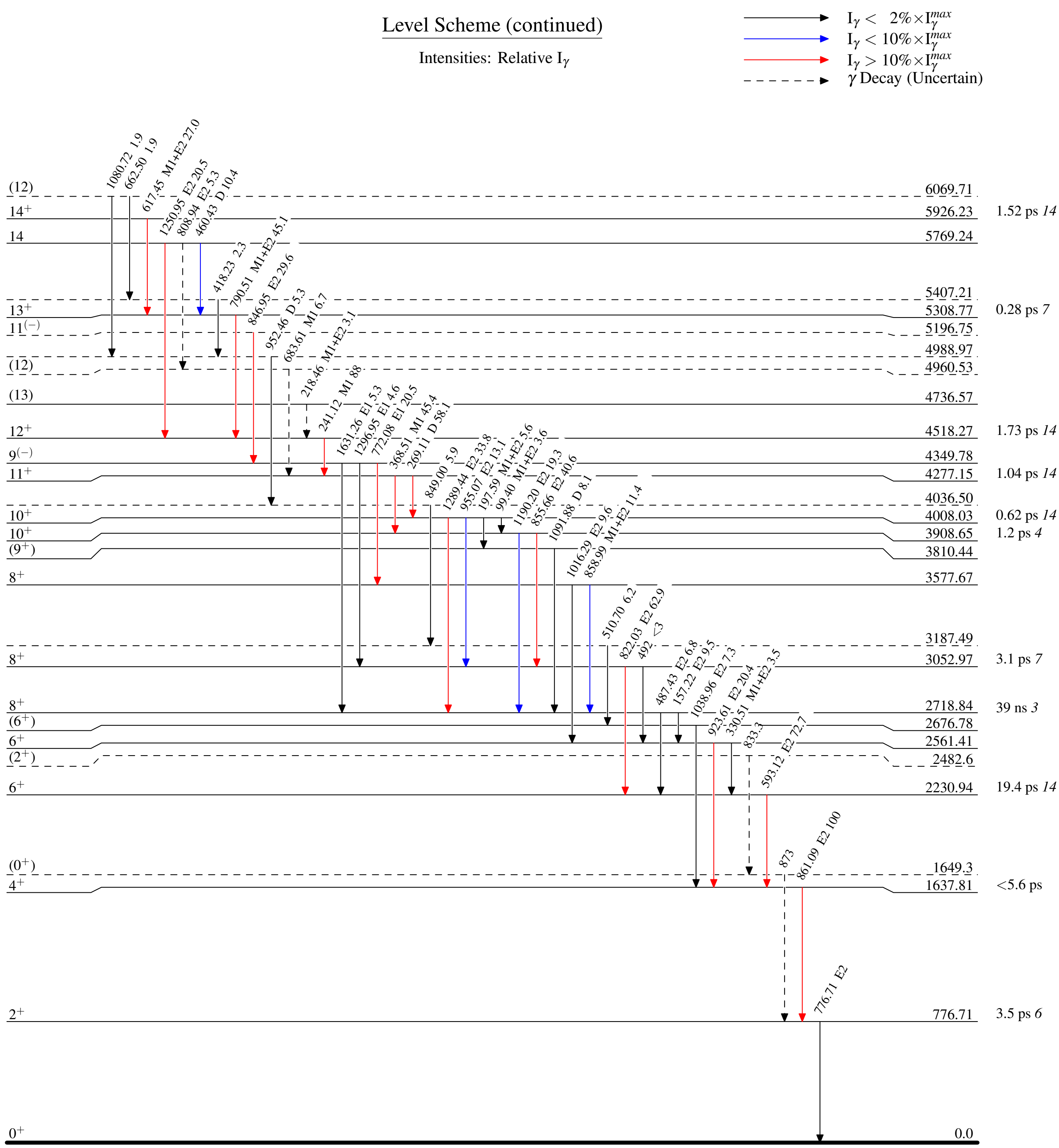


$^{102}_{48}Cd_{54}$

(HI,xnγ)

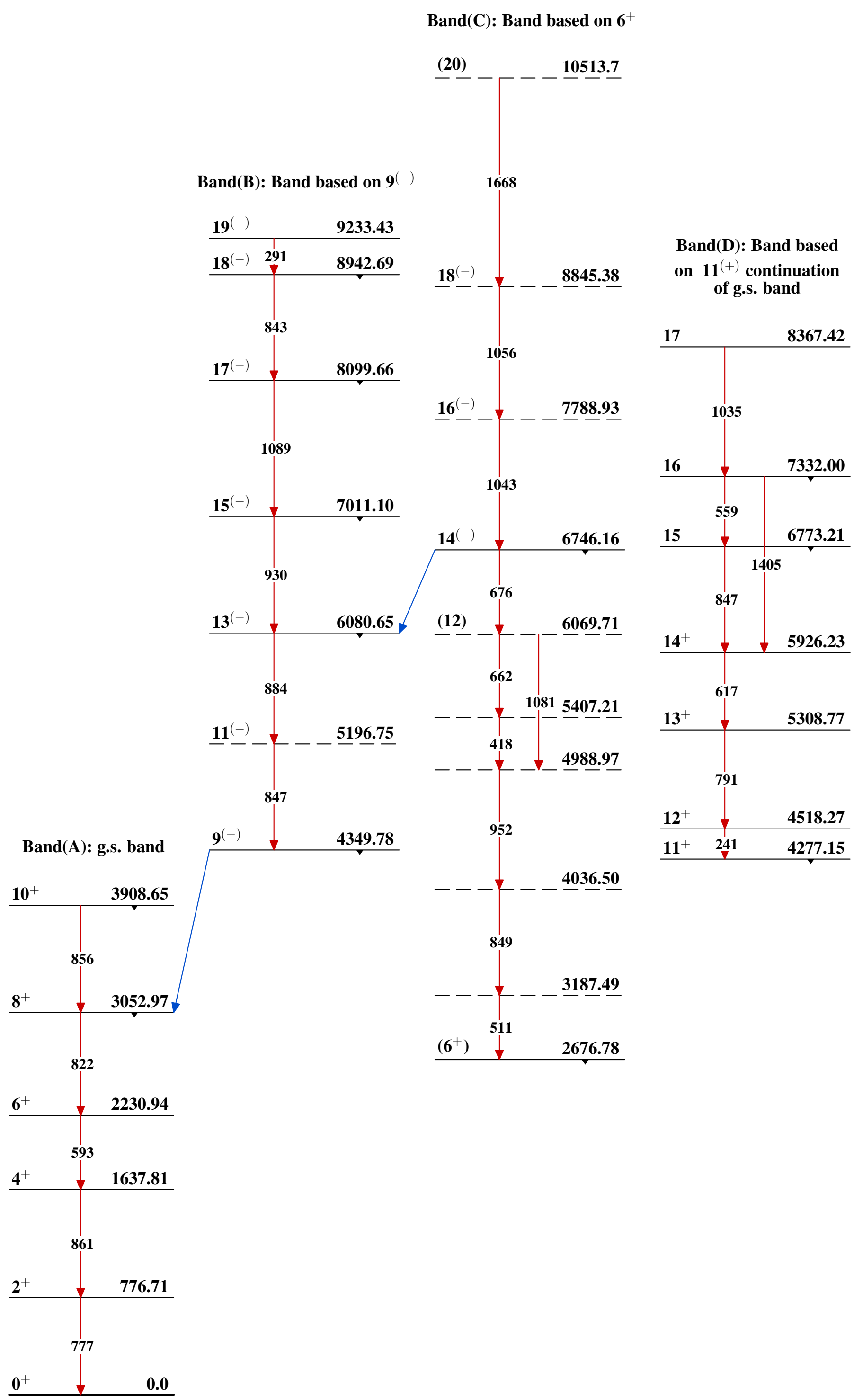
Level Scheme (continued)

Intensities: Relative I_γ



$^{102}_{48}Cd_{54}$

(HI,xnγ)



$^{102}_{48}Cd_{54}$