^{72}As ε decay 1968Ca20,1971Re05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni	NDS 111,1 (2010)	1-May-2009

Parent: ^{72}As: E=0; $J^\pi=2^-$; $T_{1/2}$=26.0 h *1*; Q(ε)=4356 *4*; %ε+%$β^+$ decay=100.0

Compton-suppressed γ's, NaI-Ge(Li) coincidences (1968Ca20).

γ singles, Ge(Li)-Ge(Li) coincidences, Ice (1971Re05), $β^+$ spectral shapes from 1950Me55, 1968Vi05.

The decay scheme is based on 1968Ca20 and 1971Re05.

Others: 1947Mi11, 1948Mc31, 1950Ho26, 1956Br88, 1965He08, 1967Vi07 and 1973ScZW.

α: Additional information 1.

^{72}Ge Levels

E(4041 level): observed by 1968Ca20 only.

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0	0^+	2754.27? *20*	(0^+)	3419.76 *18*	2^+	3872.2 *4*	2^+
691.42 *6*	0^+	2939.95 *5*	1^-	3455.31 *5*	2^-,3^-	3983.76 *16*	
834.01 *3*	2^+	2943.43 *6*	3^-	3550.66 *17*	$(1)^-$	3985.92 *15*	
1463.99 *3*	2^+	2950.4? *3*	1^+,2^+,3^+	3619.2? *5*	2^+	3995.22 *22*	1^+,2^+
1728.29 *4*	4^+	3035.73 *7*	2^-	3667.3? *3*	$^+$	4041.0 *4*	
2064.87 *4*	3^+	3094.29 *12*	2^+	3678.04 *11*	2^-,3^-	4090.4 *5*	$^+$
2402.31 *5*	2^+	3325.10 *8*	$(3)^-$	3708.62 *15*	2^+		
2463.83 *8*	4^+	3337.9? *3*	$(1,2^+)$	3803.55 *7*	$1,2^+$		
2514.76 *4*	3^-	3341.83 *8*	$(2)^-$	3815.9 *5*	2^-,3^-		

† From least-squares fit to Eγ.

ε,$β^+$ radiations

E(decay)	E(level)	Iβ+ †	Iε†	Log *ft*	I(ε+β+)†	Comments
(266 *4*)	4090.4		0.0056 *7*	7.74 *6*	0.0056 *7*	εK=0.8750 *2*; εL=0.10510 *11*; εM+=0.019862 *24*
(315 *4*)	4041.0		0.025 *3*	7.25 *6*	0.025 *3*	εK=0.8764 *1*; εL=0.10401 *8*; εM+=0.01963 *2*
(361 *4*)	3995.22		0.0644 *24*	6.959 *19*	0.0644 *24*	εK=0.8773; εL=0.10327 *6*; εM+=0.01947 *2*
(370 *4*)	3985.92		0.064 *6*	6.98 *5*	0.064 *6*	εK=0.8774; εL=0.10315 *6*; εM+=0.01944 *2*
(372 *4*)	3983.76		0.091 *12*	6.84 *6*	0.091 *12*	εK=0.8774; εL=0.10312 *6*; εM+=0.01944 *2*
(484 *4*)	3872.2		0.0052 *10*	8.31 *9*	0.0052 *10*	εK=0.8788; εL=0.10201 *3*; εM+=0.019197 *7*
(540 *4*)	3815.9		0.013	8.0	0.013	εK=0.8793; εL=0.10163 *3*; εM+=0.019114 *6*
(552 *4*)	3803.55		0.200 *12*	6.85 *3*	0.200 *12*	εK=0.8793; εL=0.10155 *3*; εM+=0.019099 *5*
(647 *4*)	3708.62		0.084 *4*	7.362 *22*	0.084 *4*	εK=0.8799; εL=0.10109 *2*; εM+=0.018998 *4*
(678 *4*)	3678.04		0.102 *9*	7.32 *4*	0.102 *9*	εK=0.8801; εL=0.10096 *2*; εM+=0.018972 *4*
(689‡ *4*)	3667.3?		0.017 *2*	8.11 *6*	0.017 *2*	εK=0.8801; εL=0.10092 *2*; εM+=0.018964 *4*
(737‡ *4*)	3619.2?		0.014 *2*	8.25 *7*	0.014 *2*	εK=0.8803; εL=0.10076 *2*; εM+=0.018928 *3*
(805 *4*)	3550.66		0.078 *7*	7.59 *4*	0.078 *7*	εK=0.8806; εL=0.10056 *1*; εM+=0.018885 *3*
(901 *4*)	3455.31		1.00 *4*	6.577 *18*	1.00 *4*	εK=0.8808; εL=0.1003; εM+=0.01884
(936 *4*)	3419.76		0.105 *19*	7.59 *8*	0.105 *19*	εK=0.8809; εL=0.1003; εM+=0.01882
(1014 *4*)	3341.83		0.369 *12*	7.114 *15*	0.369 *12*	εK=0.8811; εL=0.1001; εM+=0.01879
(1018‡ *4*)	3337.9?		0.015 *3*	8.51 *9*	0.015 *3*	εK=0.8811; εL=0.1001; εM+=0.01879
(1031 *4*)	3325.10		0.073 *4*	7.832 *24*	0.073 *4*	εK=0.8811; εL=0.1001; εM+=0.01878
(1262 *4*)	3094.29	0.00126 *14*	0.231 *21*	7.51 *4*	0.232 *21*	av Eβ=107.2 *17*; εK=0.8767 *4*; εL=0.09924 *5*; εM+=0.018616 *8*
(1320 *4*)	3035.73	0.0066 *4*	0.508 *20*	7.206 *18*	0.515 *20*	av Eβ=131.7 *17*; εK=0.8703 *6*; εL=0.09845 *7*; εM+=0.01847 *2*

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^{72}As ε decay 1968Ca20,1971Re05 (continued)

ε,β+ radiations (continued)

E(decay)	E(level)	Iβ+ †	Iε†	Log *ft*	I(ε+β+)†	Comments
(1406‡ *4*)	2950.4?	<0.0010	<0.031	>8.5	<0.032	av Eβ=167.5 *17*; εK=0.8528 *11*; εL=0.09638 *13*; εM+=0.018078 *25*
(1413 *4*)	2943.43	0.0203 *10*	0.563 *15*	7.221 *13*	0.583 *16*	av Eβ=170.5 *17*; εK=0.8509 *12*; εL=0.09616 *14*; εM+=0.01804 *3*
(1416 *4*)	2939.95	0.063 *3*	1.70 *4*	6.744 *11*	1.76 *4*	av Eβ=171.9 *17*; εK=0.8499 *12*; εL=0.09604 *14*; εM+=0.01801 *3*
(1602‡ *4*)	2754.27?	<0.015	<0.095	>8.1	<0.11	av Eβ=250.5 *17*; εK=0.7654 *25*; εL=0.0864 *3*; εM+=0.01619 *6*
(1841 *4*)	2514.76	0.466 *18*	0.92 *3*	7.237 *17*	1.39 *5*	av Eβ=353.4 *18*; εK=0.586 *4*; εL=0.0661 *4*; εM+=0.01239 *7*
(1954 *4*)	2402.31	0.17 *1*	0.21 *1*	7.924 *24*	0.38 *2*	av Eβ=402.3 *18*; εK=0.497 *4*; εL=0.0559 *4*; εM+=0.01048 *7*
(2291 *4*)	2064.87	0.032 *10*	0.015 *5*	9.22 *14*	0.047 *15*	av Eβ=551.6 *18*; εK=0.2815 *20*; εL=0.03165 *22*; εM+=0.00593 *5*
(2628 *4*)	1728.29	0.056 *14*	0.039 *10*	10.34[1u] *11*	0.095 *24*	av Eβ=730.5 *18*; εK=0.3650 *20*; εL=0.04133 *22*; εM+=0.00775 *5*
(2892 *4*)	1463.99	5.82 *18*	0.80 *3*	7.692 *14*	6.62 *20*	av Eβ=824.3 *19*; εK=0.1070 *7*; εL=0.01200 *7*; εM+=0.002249 *14*
(3522 *4*)	834.01	64.2 *14*	3.63 *9*	7.208 *11*	67.8 *15*	av Eβ=1117.0 *19*; εK=0.04727 *22*; εL=0.005298 *25*; εM+=0.000993 *5*
(3665 *4*)	691.42	0.7 *4*	0.09 *4*	10.56[1u] *22*	0.8 *4*	av Eβ=1205.3 *19*; εK=0.0978 *5*; εL=0.01102 *5*; εM+=0.002066 *10*
(4356 *4*)	0	16.3 *17*	0.94 *10*	9.84[1u] *5*	17.2 *18*	av Eβ=1528.5 *19*; εK=0.04806 *18*; εL=0.005407 *21*; εM+=0.001013 *4*

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

γ(^{72}Ge)

Iγ normalization: From Iβ(834)/Iβ(g.s.)=3.9 *4* (1968Vi05) and theoretical ε/β+ ratios.

E_γ†	I_γ†#	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α	$I_{(\gamma+ce)}$#	Comments
112.54 *14*	0.0337 *31*	2514.76	3−	2402.31	2+	[E1]	0.0484		α(K)=0.0433 *7*; α(L)=0.00446 *7*; α(M)=0.000662 *10*; α(N)=4.11×10−5 *6*; α(N+..)=4.11×10−5 *6*
142.5 *1*	0.018 *6*	834.01	2+	691.42	0+	E2	0.197		α(K)=0.1732 *25*; α(L)=0.0205 *3*; α(M)=0.00303 *5*; α(N)=0.0001691 *24*; α(N+..)=0.0001691 *24*
428.45 *14*	0.087 *6*	2943.43	3−	2514.76	3−				
479.6‡ *3*	0.028 *2*	2943.43	3−	2463.83	4+				
600.92 *5*	0.396 *10*	2064.87	3+	1463.99	2+				
629.92‡ *5*	9.96 *17*	1463.99	2+	834.01	2+				α(K)exp=13.5×10−4 *4*
691		691.42	0+	0	0+	E0		2.0 *4*	Eγ: 680-keV ce has been observed by 1971Re05.
772.6 *3*	0.013 *1*	1463.99	2+	691.42	0+				
786.44 *4*	0.564 *23*	2514.76	3−	1728.29	4+				
833.99 *3*	100	834.01	2+	0	0+				
878.8 *4*	0.022 *4*	2943.43	3−	2064.87	3+				
894.26 *3*	0.975 *15*	1728.29	4+	834.01	2+				

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^{72}As ε decay 1968Ca20,1971Re05 (continued)

γ(^{72}Ge) (continued)

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Comments
905.22 *22*	0.037 *7*	3419.76	2^+	2514.76	3^-	
x911.89 *17*	0.076 *6*					
938.6 *2*	0.070 *15*	2402.31	2^+	1463.99	2^+	
939.4‡ *2*	0.008 *1*	3341.83	$(2)^-$	2402.31	2^+	
940.7 *4*	0.026 *3*	3455.31	2^-,3^-	2514.76	3^-	
950.2‡ *4*	0.007 *4*	3985.92		3035.73	2^-	
970.6‡ *2*	0.022 *3*	3035.73	2^-	2064.87	3^+	
999.85 *7*	0.031 *4*	2463.83	4^+	1463.99	2^+	
1029.3 *5*	0.0313 *19*	3094.29	2^+	2064.87	3^+	
1050.75 *4*	1.238 *26*	2514.76	3^-	1463.99	2^+	
1148.4‡ *3*	0.015 *4*	3550.66	$(1)^-$	2402.31	2^+	
1163.1‡ *2*	0.017 *2*	3678.04	2^-,3^-	2514.76	3^-	
1193.85 *15*	0.106 *4*	3708.62	2^+	2514.76	3^-	
1215.14 *5*	0.262 *10*	2943.43	3^-	1728.29	4^+	
1230.82 *4*	0.089 *9*	2064.87	3^+	834.01	2^+	
1276.80 *14*	0.050 *4*	3341.83	$(2)^-$	2064.87	3^+	
1390.44 *5*	0.30 *1*	3455.31	2^-,3^-	2064.87	3^+	
1464.00 *6*	1.393 *24*	1463.99	2^+	0	0^+	
1475.90 *6*	0.637 *12*	2939.95	1^-	1463.99	2^+	
1522.7 *6*	0.016 *4*	3985.92		2463.83	4^+	
1568.20 *7*	0.165 *8*	2402.31	2^+	834.01	2^+	
1571.7‡ *2*	0.024 *2*	3035.73	2^-	1463.99	2^+	
1581.25 *21*	0.031 *7*	3983.76		2402.31	2^+	
1596.8‡ *2*	0.030 *2*	3325.10	$(3)^-$	1728.29	4^+	
1680.72 *9*	0.147 *4*	2514.76	3^-	834.01	2^+	
1710.90 *7*	0.312 *14*	2402.31	2^+	691.42	0^+	
1861.1‡ *1*	0.025 *2*	3325.10	$(3)^-$	1463.99	2^+	
1920.23 *20*	0.09 *3*	2754.27?	(0^+)	834.01	2^+	I_γ: unweighted average of 0.118 *3* (1968Ca20), and 0.06 *2* (1971Re05).
1939.0‡@ *4*	0.010 *1*	3667.3?	$^+$	1728.29	4^+	
1991.15 *8*	0.440 *26*	3455.31	2^-,3^-	1463.99	2^+	
2086.4‡ *3*	0.018 *1*	3550.66	$(1)^-$	1463.99	2^+	
2105.90 *17*	0.80 *3*	2939.95	1^-	834.01	2^+	
2109.59 *17*	0.334 *16*	2943.43	3^-	834.01	2^+	
2116.5@ *3*	0.035 *2*	2950.4?	1^+,2^+,3^+	834.01	2^+	
2201.72 *8*	0.609 *19*	3035.73	2^-	834.01	2^+	
2214.16 *17*	0.0382 *27*	3678.04	2^-,3^-	1463.99	2^+	
2248.5 *1*	0.397 *15*	2939.95	1^-	691.42	0^+	
2339.72 *18*	0.0459 *26*	3803.55	$1,2^+$	1463.99	2^+	
2402.2 *4*	0.020 *1*	2402.31	2^+	0	0^+	
2402.86 *12*	0.127 *5*	3094.29	2^+	691.42	0^+	
2491.00 *14*	0.0365 *19*	3325.10	$(3)^-$	834.01	2^+	
2507.86 *9*	0.406 *10*	3341.83	$(2)^-$	834.01	2^+	
2515.2 *3*	0.040 *7*	2514.76	3^-	0	0^+	
2521.83 *17*	0.058 *3*	3985.92		1463.99	2^+	
2577.6‡ *8*	0.023 *3*	4041.0		1463.99	2^+	
2585.3 *3*	0.095 *22*	3419.76	2^+	834.01	2^+	
2621.46 *12*	0.486 *11*	3455.31	2^-,3^-	834.01	2^+	
2716.7‡ *4*	0.015 *3*	3550.66	$(1)^-$	834.01	2^+	
2785.1‡@ *5*	0.018 *2*	3619.2?	2^+	834.01	2^+	
2833.2@ *6*	0.011 *2*	3667.3?	$^+$	834.01	2^+	
2843.96 *18*	0.073 *10*	3678.04	2^-,3^-	834.01	2^+	

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^{72}As ε decay 1968Ca20,1971Re05 (continued)

γ(^{72}Ge) (continued)

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Comments
2859.9 *6*	0.024 *5*	3550.66	$(1)^-$	691.42	0^+	
x2863.8 *6*	0.014 *7*					
x2897.9 *8*	0.030 *6*					
2940.07 *12*	0.374 *23*	2939.95	1^-	0	0^+	
2950.0‡@ *5*	0.006 *1*	2950.4?	$1^+,2^+,3^+$	0	0^+	
2981.8 *5*	0.016 *3*	3815.9	$2^-,3^-$	834.01	2^+	I_γ: from 1968Ca20.
x3067.0 *6*	0.007 *1*					
3094.10 *27*	0.133 *24*	3094.29	2^+	0	0^+	
3112.04 *5*	0.080 *12*	3803.55	$1,2^+$	691.42	0^+	
3149.91 *24*	0.083 *12*	3983.76		834.01	2^+	
3161.2 *5*	0.010 *1*	3995.22	$1^+,2^+$	834.01	2^+	
3206.7‡ *5*	0.008 *1*	4041.0		834.01	2^+	
x3220.5 *5*	0.009 *2*					
3256.0‡ *8*	0.0030 *5*	4090.4	$^+$	834.01	2^+	
x3275.1 *8*	0.005 *1*					
3304.5 *8*	0.009 *2*	3995.22	$1^+,2^+$	691.42	0^+	
3337.85@ *28*	0.020 *4*	3337.9?	$(1,2^+)$	0	0^+	
3399.1 *7*	0.0040 *6*	4090.4	$^+$	691.42	0^+	
3550.4 *5*	0.0258 *21*	3550.66	$(1)^-$	0	0^+	
3803.40 *21*	0.126 *7*	3803.55	$1,2^+$	0	0^+	
3872.1 *4*	0.0066 *12*	3872.2	2^+	0	0^+	
3995.00 *26*	0.071 *9*	3995.22	$1^+,2^+$	0	0^+	

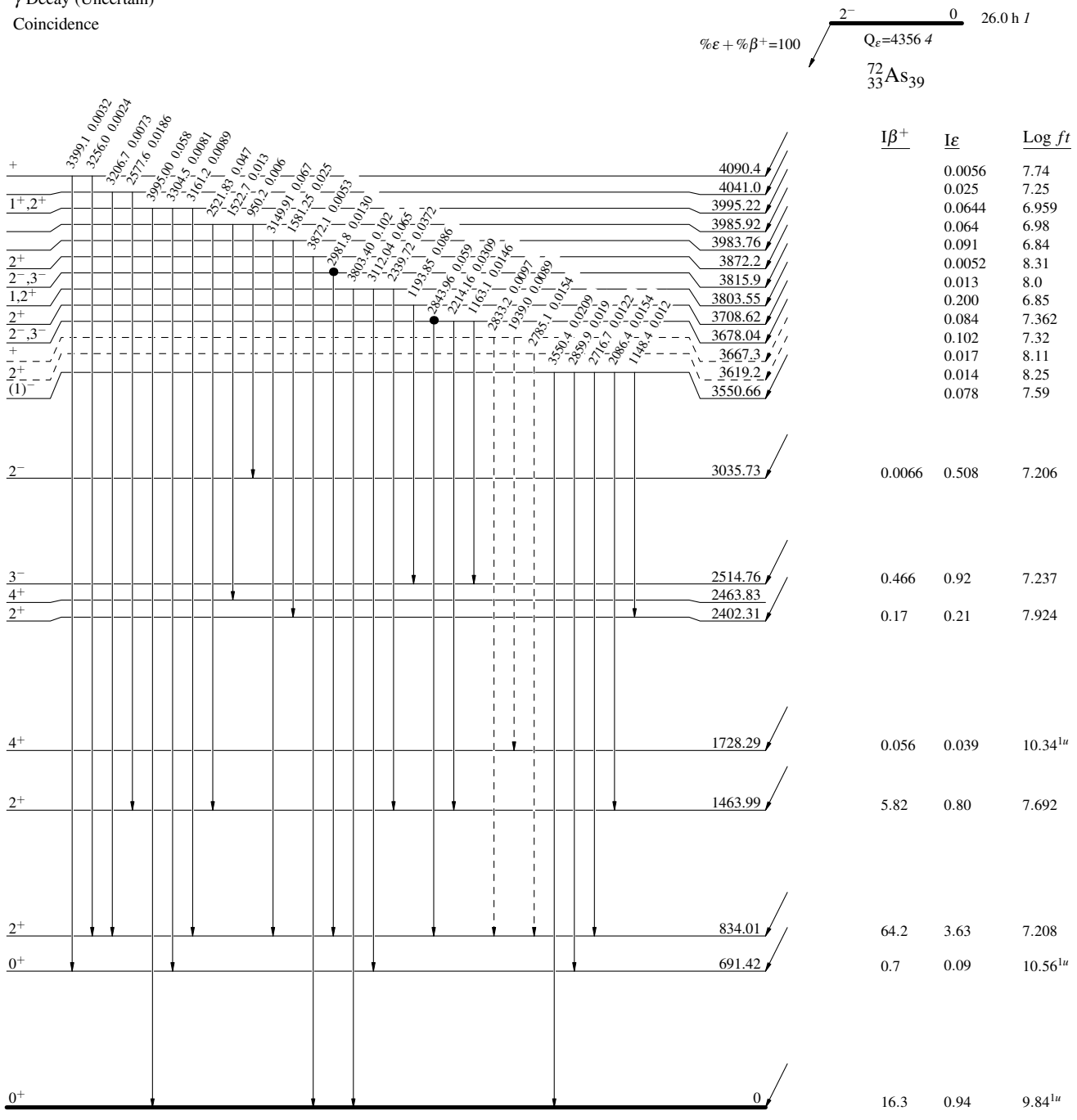
† Average of values in 1968Ca20 and 1971Re05, except where noted.
‡ Observed by 1968Ca20 only.
# For absolute intensity per 100 decays, multiply by 0.81 *2*.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{72}As ε decay 1968Ca20,1971Re05

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

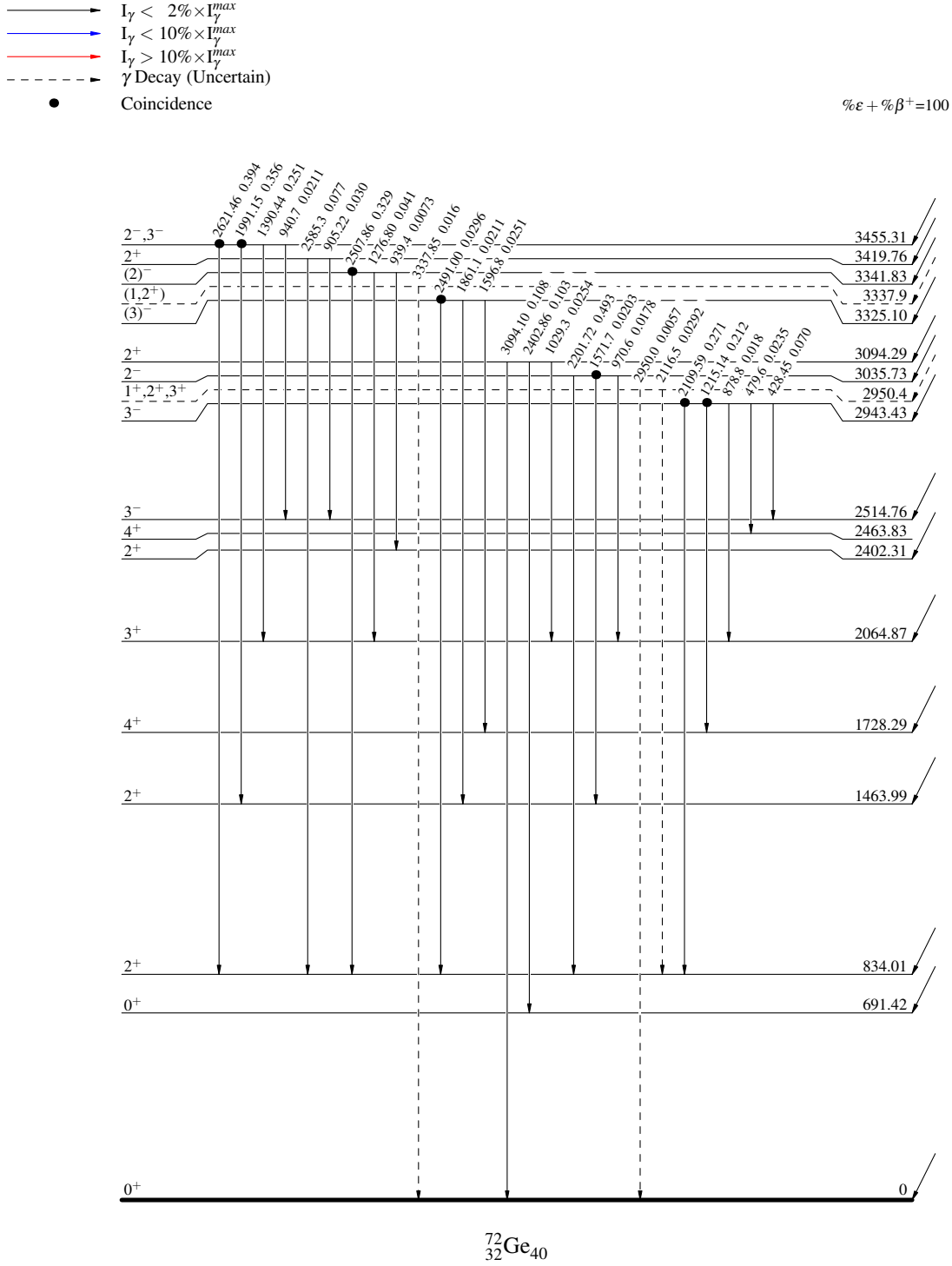


$^{72}_{32}Ge_{40}$

^{72}As ε decay 1968Ca20,1971Re05

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



	Iβ⁺	Iε	Log *ft*
3455.31		1.00	6.577
3419.76		0.105	7.59
3341.83		0.369	7.114
3337.9		0.015	8.51
3325.10		0.073	7.832
3094.29	0.00126	0.231	7.51
3035.73	0.0066	0.508	7.206
2950.4	<0.0010	<0.031	>8.5
2943.43	0.0203	0.563	7.221
2514.76	0.466	0.92	7.237
2463.83			
2402.31	0.17	0.21	7.924
2064.87	0.032	0.015	9.22
1728.29	0.056	0.039	10.34 1u
1463.99	5.82	0.80	7.692
834.01	64.2	3.63	7.208
691.42	0.7	0.09	10.56 1u
0	16.3	0.94	9.84 1u

^{72}As ε decay 1968Ca20,1971Re05

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays