^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 158, 1 (2019)	16-May-2019

Includes ^{72}Ge(d,nγ) from 1972ReZN and ^{74}Ge(p,2nγ) from 1977KeZY where g factor of 428 level was measured.

1997So08 (also 1995Fe15,1984Fe05): E=1.92-4.0 MeV. Measured Eγ, Iγ, γγ, ce, excitation functions. Level scheme studied up to 1344 keV. Comparison of level scheme and γ-ray branching ratios with structure calculations based on interacting boson-fermion model.

1980Te01 (also 1978TeZY): E=1.6-3.1 MeV. γ excitation.

1975Va03: E=2.1-3.3 MeV. γ excitation, γ(θ), nγ coin, neutrons by tof with FWHM≈30 keV.

1999Bu05: E=3.15, 4.0, 4.5 MeV. Measured γ spectra, lifetimes by Doppler-shift attenuation method (DSAM). Comparison of levels and γ-ray branching ratios with detailed nuclear structure calculations using multi-shell interacting boson-fermion model.

2004Si28: E=2.5-4.3 MeV. Measured Eγ, Iγ, γ(θ), excitation functions using a natural Ge target (7.76% abundance of ^{73}Ge). Deduced level lifetimes by Doppler shift attenuation (DSA), J^π, and mixing ratios from γ(θ) data. No data are used from this paper for several reasons: 1. authors used natural Ge target that contained only 7.76% ^{73}Ge, due to which the spectrum shown in authors′ Fig. 1 is dominated by γ-ray peaks from (p,nγ) reaction in ^{70,72,74}Ge isotopes, making it difficult to extract reliable intensities and angular distributions of peaks belonging to ^{73}As, for example a strong peak at 164.2 keV in Fig. 1, and listed in Table 2 with γ(θ) data and deduced δ(M2/E1), most likely, belongs to ^{76}As, not ^{73}As. 2. most of the γ(θ) data listed in Table 2 are isotropic within the uncertainties, yet quite definite δ values are deduced, while some give unrealistic admixture of M3 component in E2 transitions e.g. for 860.5, $7/2^-$ to $3/2^-$ transition. 3. for level lifetimes, listed in Table 1, there is no discussion about side feedings, and their values differ by large factors (of 2 to 3) as compared to those in 1999Bu05. 4. no γγ-coin data were obtained. The A_2, A_4, deduced J^π and δ values, and level lifetimes from this paper are listed in this dataset as document records, but none used in the present evaluation.

2003Al12: detailed model calculations of level scheme including branching ratios.

1991ZaZY: E=2-3.8 MeV. Measured Eγ, Iγ.

1977KeZY: ^{74}Ge(p,2nγ). Measured γ(θ,H,t).

1975Re06: measured γ(θ,H,t).

1974Pr14: E=3-8 MeV. Measured Eγ, γ(θ), γγ.

1972ReZN, 1970Be23: ^{72}Ge(d,nγ). Measured γ(θ,H,t).

1971LiZN: E=3.0 MeV. Measured ce.

1958Ch34: E=3.7 MeV; 67.03γ reported.

The level scheme is from 1975Va03 and 1997So08.

^{73}As Levels

Population of a 1975-level in (p,nγ) proposed in 2004Si28 is rejected by the evaluators, as the three γ rays deexciting this level have only been reported in ^{73}Se decay (1980Te01), not in any of the previous (p,nγ) studies.

Additional information 1.

E(level)†	J^π‡	$T_{1/2}$#	Comments
0.0	$3/2^-$		
67.040 *8*	$5/2^-$		
84.365 *25*	$1/2^-$		
254.009 *14*	$1/2^-$		
393.432 *13*	$3/2^-$		
427.898 *22*	$9/2^+$	5.7 μs *2*	g=+1.163 *3* (1972ReZN) $T_{1/2}$: weighted average of 5.8 μs *2* (1972ReZN), 5.66 μs *23* (1977KeZY).
510.071 *17*	$5/2^+$		
574.595 *25*	$1/2^-$		
577.899 *16*	$5/2^-$		
655.485 *17*	$3/2^-$		
674.0? *4*			E(level): level proposed by 1975Va03 from neutron tof spectrum. This level is also listed in

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

^{73}As Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	Comments
			2004Si28 with $J^\pi=5/2^-$.
769.839 *12*	$5/2^-$		Additional information 2.
850.516 *20*	$5/2^-$		
860.545 *14*	$7/2^-$		Additional information 3.
886.13 *5*	$1/2^+$		
993.771 *12*	$7/2^-$	0.57 ps *+26−18*	$T_{1/2}$: from DSA of 926.7γ (1999Bu05). Additional information 4.
1013.58 *5*	$1/2^{(-)}$		
1037.12 *3*	$(13/2^+)$		
1077.97 *6*	$3/2^{(-)}$		
1087.02 *3*	$5/2^-$	0.28 ps *+28−12*	$T_{1/2}$: from DSA of 1019.9γ (1999Bu05). Additional information 5.
1178.049 *21*	$7/2^{(-)}$		Additional information 6.
1188.84 *15*	$1/2,3/2^{(-)}$		Additional information 7.
1217.97 *4*	$3/2^+$		
1221.293 *15*	$7/2^-$	0.35 ps *+10−8*	$T_{1/2}$: from DSA of 1154.3γ (1999Bu05). Additional information 8.
1275.36 *10*	$7/2^+$		Additional information 9.
1293.33 *16*	$11/2^+$		
1293.41 *3*	$7/2^+$		
1299.35 *6*	$1/2^{(-)},3/2$		
1302.26 *4*	5/2		
1324.198 *24*	5/2	0.69 ps *+36−24*	$T_{1/2}$: from DSA of 1324.2γ (1999Bu05).
1328.91 *3*	$7/2^+$	0.090 ps *21*	Additional information 10. $T_{1/2}$: from DSA of 901.0γ (1999Bu05).
1344.526 *21*	$7/2^{(-)}$		Additional information 11.
1489.48 *20*	$(5/2^+)$	0.29 ps *+14−9*	$T_{1/2}$: from DSA of 979.4γ (1999Bu05). Additional information 12.
1557.32 *9*			Additional information 13.
1588.73 *18*	$5/2^-$		Jπ: $7/2^-$ not supported by 1334γ to $1/2^-$.
1612.76 *17*	$5/2^-,7/2^-$		Additional information 14.
1649.7 *3*		0.30 ps *+16−10*	$T_{1/2}$: from DSA of 1565.3γ (1999Bu05).
1796.5 *3*			
1851.26 *15*	$(9/2)^+$	0.27 ps *+10−7*	$T_{1/2}$: from DSA of 1423.0γ (1999Bu05).
1876.75 *20*		0.065 ps *14*	$T_{1/2}$: from DSA of 1483.3γ (1999Bu05).
1903.7 *3*		0.26 ps *6*	$T_{1/2}$: from DSA of 1903.7γ (1999Bu05).
1962.25 *17*		0.50 ps *+15−12*	$T_{1/2}$: from DSA of 1452.7γ (1999Bu05).
1977.55 *20*		0.22 ps *6*	$T_{1/2}$: from DSA of 1584.1γ (1999Bu05).

† From a least-squares fit to γ-ray energies.

‡ From comparison of relative σ(p,nγ) with Hauser-Feshbach calculations (1997So08,1975Va03), combined with ce data (1997So08), γ(θ) data (1975Va03) for selected transitions and decay modes, up to 1344.5 level. These assignments are placed in brackets by evaluators when considered in Adopted Levels. Spin-parities above 1344.5 level are from Adopted Levels.

From DSAM (1999Bu05), unless otherwise noted.

^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As)

α(K)exp values are from 1997So08 and A_2 and A_4 values are from 1975Va03, unless otherwise noted.

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
67.030 *10*	867 *89*	67.040	5/2⁻	0.0	3/2⁻			E_γ: from 1958Ch34, who originally assigned this γ to ^{73}Ge. Eγ=67.06 *3* from 1997So08 is in agreement.
77.6[b]		655.485	3/2⁻	577.899	5/2⁻			Iγ(77.6)/Iγ(401.5)<0.07 (1999Bu05).
84.36 *4*	5.0 *9*	84.365	1/2⁻	0.0	3/2⁻			
116.59 *14*	0.50 *10*	510.071	5/2⁺	393.432	3/2⁻			Iγ(116.6)/Iγ(510.0)=0.03 *1*.
133.2[b]		993.771	7/2⁻	860.545	7/2⁻			Iγ(133.2)/Iγ(993.8)<0.01 (1999Bu05).
139.44 *4*	0.29 *12*	393.432	3/2⁻	254.009	1/2⁻			Iγ(139.4)/Iγ(393.4)=0.03 *1*.
164[b]		674.0?		510.071	5/2⁺			E_γ: from 1975Va03. A_2=−0.034 *5*, A_4=−0.001 *5*; δ(M2/E1)=+1.39 *+8−6* (2004Si28). Such a large mixing ratio for E1+M2 transition is highly unlikely. Strong 164.2γ in spectral Fig.1 of 2004Si28 most likely belongs to ^{76}As.
169.64 *8*	0.22 *4*	254.009	1/2⁻	84.365	1/2⁻			Iγ(169.6)/Iγ(254.0)=0.03 *1*.
181.15 *4*	0.19 *9*	574.595	1/2⁻	393.432	3/2⁻	(M1)		α(K)exp=0.0137 *27* (1971LiZN) Mult.: α(K)exp gives M1 or E1(+M2) with δ<0.24. Iγ(181.1)/Iγ(320.6)=0.33 *8*.
184.44 *20*	0.08 *4*	577.899	5/2⁻	393.432	3/2⁻			Additional information 15. Iγ(184.4)/Iγ(577.9)=0.01 *1*.
191.92 *15*	0.09 *6*	769.839	5/2⁻	577.899	5/2⁻			Iγ(191.9)/Iγ(769.8)=0.02 *1*.
195.07 *18*	0.09 *5*	850.516	5/2⁻	655.485	3/2⁻			Iγ(195.1)/Iγ(850.5)=0.01 *1*.
223.93 *5*	0.52 *7*	993.771	7/2⁻	769.839	5/2⁻			Iγ(223.9)/Iγ(993.8)=0.05 *1*.
226.56 *17*	0.09 *6*	1087.02	5/2⁻	860.545	7/2⁻	M1(+E2)	<0.3	α(K)exp=0.0092 *20* Iγ(226.6)/Iγ(1002.6)=0.12 *4*.
254.02 *2*	7.7 *8*	254.009	1/2⁻	0.0	3/2⁻	M1+E2	0.22 *8*	α(K)exp=0.0077 *6* Other α(K)exp=0.00765 *17* (1971LiZN) gives δ(E2/M1)=0.21 *2*. I_γ: 9.5 *5* (1991ZaZY), 10.2 *4* (1980Te01), 11.0 *7* (1975Va03).
256.20 *20*	0.44 *6*	1293.33	11/2⁺	1037.12	(13/2⁺)			Iγ(256.2)/Iγ(865.5)=0.03 *1*.
262.06 *3*	0.28 *12*	655.485	3/2⁻	393.432	3/2⁻	M1(+E2)	<0.6	α(K)exp=0.0078 *23* Iγ(262.1)/Iγ(401.5)=0.10 *2*. I_γ: 0.9 *2* (1980Te01).
282.66 *9*	0.10 *2*	860.545	7/2⁻	577.899	5/2⁻			Iγ(282.7)/Iγ(860.6)=0.01 *1*.
299.68 *20*	0.43 *7*	1293.41	7/2⁺	993.771	7/2⁻			Iγ(299.7)/Iγ(783.3)=0.06 *1*.
309.10 *5*	0.93 *10*	393.432	3/2⁻	84.365	1/2⁻	M1(+E2)	<0.55	α(K)exp=0.0045 *15* Iγ(309.1)/Iγ(393.4)=0.10 *1*. I_γ: 0.5 *2* (1991ZaZY), 1.0 *1* (1980Te01), 0.9 *2* (1975Va03).
311.45 *15*	0.06 *2*	886.13	1/2⁺	574.595	1/2⁻			Iγ(311.4)/Iγ(492.7)=0.26 *7*.
317.18 *6*	0.20 *8*	1087.02	5/2⁻	769.839	5/2⁻			Iγ(317.18)/Iγ(1002.6)=0.25 *10*.
317.50 *15*	0.30 *25*	1178.049	7/2(−)	860.545	7/2⁻			Iγ(317.5)/Iγ(1111.0)=0.02 *1*.
320.59 *3*	0.60 *7*	574.595	1/2⁻	254.009	1/2⁻	M1		α(K)exp=0.0041 *7* Mult.: α(K)exp gives M1(+E2) with δ<0.4, but ΔJ^π consistent with M1. I_γ: 0.8 *1* (1980Te01).
323.95 *10*	0.12 *6*	577.899	5/2⁻	254.009	1/2⁻			Iγ(323.9)/Iγ(577.9)=0.01 *1*.

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
326.4[b]		393.432	3/2⁻	67.040	5/2⁻			Iγ(326.4)/Iγ(393.4)<0.006 (1999Bu05).
331.92 *12*	0.28 *5*	1217.97	3/2⁺	886.13	1/2⁺	M1(+E2)	<0.8	α(K)exp=0.0040 *16* Iγ(331.9)/Iγ(707.9)=0.51 *8*.
350.77 *3*	0.85 *10*	1344.526	7/2(⁻)	993.771	7/2⁻			Iγ(350.8)/Iγ(1277.5)=0.27 *4*. I_γ: 1.7 *9* (1991ZaZY), 1.3 *1* (1980Te01), 0.5 *2* (1975Va03).
358.09 *4*	0.11 *3*	1013.58	1/2(⁻)	655.485	3/2⁻			
360.86 *2*	100.0 *10*	427.898	9/2⁺	67.040	5/2⁻	M2		α(K)exp=0.0118 *14* α(K)exp gives δ(E3/M2)<0.15. Other α(K)exp=0.0154 *16* (1971LiZN) gives δ(E3/M2)=0.45 *18*. I_γ: 100.0 *5* (1991ZaZY), 100 *2* (1980Te01), 100 *5* (1975Va03).
376.08 *7*	0.10 *6*	886.13	1/2⁺	510.071	5/2⁺			Iγ(376.1)/Iγ(492.7)=0.46 *14*.
376.42 *4*	0.51 *7*	769.839	5/2⁻	393.432	3/2⁻			Iγ(376.4)/Iγ(769.8)=0.09 *2*. I_γ: 0.8 *1* (1980Te01), 1.3 *2* (1975Va03).
393.42 *2*	8.4 *9*	393.432	3/2⁻	0.0	3/2⁻	M1(+E2)	<0.45	α(K)exp=0.0025 *3* A_2=+0.019 *12*; A_4=−0.018 *15* I_γ: 10.8 *2* (1980Te01), 10.9 *6* (1975Va03).
401.47 *2*	2.8 *3*	655.485	3/2⁻	254.009	1/2⁻	M1(+E2)	<0.7	α(K)exp=0.0024 *6* I_γ: 4.4 *1* (1980Te01), 4.4 *3* (1975Va03).
408.19 *20*	0.27 *3*	1178.049	7/2(⁻)	769.839	5/2⁻			Iγ(408.2)/Iγ(1111.0)=0.02 *1*.
415.85 *5*	1.02 *11*	993.771	7/2⁻	577.899	5/2⁻	M1(+E2)	<0.65	α(K)exp=0.0022 *5* Iγ(415.8)/Iγ(993.8)=0.13 *2*. I_γ: 1.3 *1* (1980Te01), 0.9 *2* (1975Va03).
431.59 *20*	0.10 *7*	1087.02	5/2⁻	655.485	3/2⁻			Iγ(431.59)/Iγ(1002.6)=0.08 *4*.
441.68 *20*	0.18 *11*	1302.26	5/2	860.545	7/2⁻			Iγ(441.7)/Iγ(1302.2)=0.17 *7*.
443.04 *2*	4.1 *4*	510.071	5/2⁺	67.040	5/2⁻	E1		α(K)exp=0.00091 *13* α(K)exp gives δ(M2/E1)<0.15. Iγ(443.0)/Iγ(510.0)=0.19 *2*. I_γ: 4.5 *6* (1991ZaZY), 5.3 *2* (1980Te01), 5.2 *3* (1975Va03).
451.45 *2*	0.97 *10*	1221.293	7/2⁻	769.839	5/2⁻			Iγ(451.4)/Iγ(1154.2)=0.12 *2*. I_γ: 0.9 *2* (1991ZaZY), 1.2 *1* (1980Te01), 1.2 *2* (1975Va03). Placement from γγ data of 1997So08. 1975Va03 proposed this γ tentatively from 1489 level.
457.04 *12*	0.13 *2*	850.516	5/2⁻	393.432	3/2⁻			Iγ(457.0)/Iγ(850.5)=0.02 *1*.
467.15 *5*	0.66 *7*	860.545	7/2⁻	393.432	3/2⁻			Iγ(467.1)/Iγ(860.6)=0.05 *1*. I_γ: 4.1 *5* (1991ZaZY), 4.2 *2* (1980Te01), 4.6 *3* (1975Va03) for 468.3γ.
479.7[@b] *2*	2.5[@] *2*	1557.32		1077.97	3/2(⁻)			I_γ: 2.2 *4* (1991ZaZY), 3.8 *3* (1975Va03).
483.72 *3*	0.76 *15*	993.771	7/2⁻	510.071	5/2⁺			Iγ(483.7)/Iγ(993.8)=0.08 *2*.
483.94 *20*	0.28 *10*	1344.526	7/2(⁻)	860.545	7/2⁻			Iγ(483.9)/Iγ(1277.5)=0.09 *3*.
490.23 *12*	0.06 *2*	574.595	1/2⁻	84.365	1/2⁻			Iγ(490.2)/Iγ(320.6)=0.11 *3*.
492.71 *8*	0.23 *3*	886.13	1/2⁺	393.432	3/2⁻			
493.5[b]		577.899	5/2⁻	84.365	1/2⁻			Iγ(493.5)/Iγ(577.9)<0.006 (1999Bu05).
503.39 *15*	0.15 *9*	1077.97	3/2(⁻)	574.595	1/2⁻			Iγ(503.4)/Iγ(1077.9)=0.34 *7*.
510.03 *10*	21 *3*	510.071	5/2⁺	0.0	3/2⁻			
510.86 *10*	6.0 *17*	577.899	5/2⁻	67.040	5/2⁻			Iγ(510.9)/Iγ(577.9)=0.71 *10*.
512.45 *10*	0.10 *7*	1087.02	5/2⁻	574.595	1/2⁻			Iγ(512.45)/Iγ(1002.6)=0.12 *6*.
515.84 *3*	0.90 *10*	769.839	5/2⁻	254.009	1/2⁻	E2		α(K)exp=0.0020 *4* α(K)exp gives E2(+M1) with δ>0.8 or

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	δ [‡]	Comments
								E2(+M3) with δ<0.2. ΔJ^π consistent with E2. Iγ(515.8)/Iγ(769.8)=0.15 *2*.
558.0[#] *3*	0.5 *1*	1851.26	(9/2)$^+$	1293.33	11/2$^+$			Placement from Adopted Gammas.
565.86 *20*	0.30 *10*	1221.293	7/2$^-$	655.485	3/2$^-$			Iγ(565.9)/Iγ(1154.2)=0.04 *1*.
571.09 *6*	0.55 *12*	655.485	3/2$^-$	84.365	1/2$^-$			Iγ(571.1)/Iγ(401.5)=0.16 *3*.
574.72 *20*	0.95 *12*	1344.526	7/2$^{(-)}$	769.839	5/2$^-$			Iγ(574.7)/Iγ(1277.5)=0.31 *5*.
577.89 *2*	8.4 *10*	577.899	5/2$^-$	0.0	3/2$^-$	M1+E2	+0.5 *+5−2*	α(K)exp=0.00099 *14* A_2=−0.035 *10*; A_4=+0.015 *13* δ: +0.5 *+5−2* or +5 *+52−3* (1975Va03); lower δ value supported by α(K)exp. I_γ: 11.0 *9* (1991ZaZY), 13.9 *3* (1980Te01), 15.0 *8* (1975Va03). Tentative double placement from 1087 level by 1975Va03 not supported by γγ data of 1997So08.
588.39 *15*	0.23 *5*	655.485	3/2$^-$	67.040	5/2$^-$			Iγ(588.4)/Iγ(401.5)=0.07 *2*.
596.57 *12*	0.11 *6*	850.516	5/2$^-$	254.009	1/2$^-$			Iγ(596.6)/Iγ(850.5)=0.02 *1*.
600.13 *15*	0.8 *4*	1178.049	7/2$^{(-)}$	577.899	5/2$^-$			Iγ(600.1)/Iγ(1111.0)=0.08 *2*.
600.31 *3*	3.3 *4*	993.771	7/2$^-$	393.432	3/2$^-$			Iγ(600.3)/Iγ(993.8)=0.36 *4*.
609.22 *2*	17.8 *19*	1037.12	(13/2$^+$)	427.898	9/2$^+$	E2		I_γ: 4.7 *6* (1991ZaZY), 5.1 *1* (1980Te01), 6.7 *4* (1975Va03). α(K)exp=0.00125 *14* A_2=+0.145 *15*; A_4=+0.025 *20* Mult.: α(K)exp gives E2(+M1) with δ>1.2 or E2(+M3) with δ<0.15. δ(O/Q)=−0.02 *3* or +13 *4* from γ(θ) (1975Va03). I_γ: 18.4 *9* (1991ZaZY), 20.8 *4* (1980Te01), 22.3 *12* (1975Va03). A_2=+0.096 *6*, A_4=+0.001 *6*; δ(M3/E2)=+10.6 *+2−3* (2004Si28). Such admixture of M3 is highly unlikely.
632.14 *11*	0.04 *3*	886.13	1/2$^+$	254.009	1/2$^-$			Iγ(632.1)/Iγ(492.7)=0.12 *4*.
643.38 *3*	0.82 *15*	1221.293	7/2$^-$	577.899	5/2$^-$	M1(+E2)	<1.0	α(K)exp=0.00073 *20* Iγ(643.4)/Iγ(1154.2)=0.10 *2*. I_γ: 1.5 *3* (1991ZaZY), 1.5 *1* (1980Te01), 1.7 *2* (1975Va03).
643.96 *20*	0.05 *3*	1299.35	1/2$^{(-)}$,3/2	655.485	3/2$^-$			Iγ(643.96)/Iγ(724.7)=0.18 *7*.
646.82 *20*	0.02 *1*	1302.26	5/2	655.485	3/2$^-$			Iγ(646.8)/Iγ(1302.2)=0.02 *1*.
655.50 *11*	0.27 *8*	655.485	3/2$^-$	0.0	3/2$^-$			Iγ(655.5)/Iγ(401.5)=0.10 *2*.
^{x}663.9[@] *2*	1.0[@] *1*							I_γ: 0.9 *1* (1975Va03).
684.4[b]		1077.97	3/2$^{(-)}$	393.432	3/2$^-$			Iγ(684.4)/Iγ(1077.9)<0.09 (1999Bu05).
685.5[b]		769.839	5/2$^-$	84.365	1/2$^-$			Iγ(685.5)/Iγ(769.8)<0.01 (1999Bu05).
689.03 *2*	1.58 *16*	1344.526	7/2$^{(-)}$	655.485	3/2$^-$			Iγ(689.0)/Iγ(1277.5)=0.49 *7*. I_γ: 1.7 *3* (1991ZaZY), 2.3 *2* (1980Te01), 1.6 *2* (1975Va03).
693.59 *8*	0.32 *6*	1087.02	5/2$^-$	393.432	3/2$^-$			Iγ(693.59)/Iγ(1002.6)=0.40 *14*. I_γ: 4.0 *2* (1980Te01) for doublet.
696.7[@] *1*	8.5[@] *3*	1557.32		860.545	7/2$^-$			I_γ: 9.0 *7* (1991ZaZY), 7.3 *5*

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
								(1975Va03). A_2=−0.023 *50*, A_4=+0.003 *50*; δ(E2/M1)=+0.5 *1*; Iγ(480):Iγ(697):Iγ(787)=17.1: 55.7:27.2 (2004Si28).
702.77 *2*	3.2 *3*	769.839	5/2−	67.040	5/2−	D+Q		A_2=−0.014 *20*; A_4=+0.014 *24* δ: −0.25 *+44−56* or +1.2<δ<−5.7 from γ(θ) (1975Va03). Iγ(702.8)/Iγ(769.8)=0.60 *5*. I_γ: 11.9 *8* (1991ZaZY), 11.4 *3* (1980Te01), 10.3 *6* (1975Va03) for doublets.
707.89 *3*	0.53 *10*	1217.97	3/2+	510.071	5/2+	M1,E2		α(K)exp=0.00068 *20*
724.35 *20*	0.25 *12*	1302.26	5/2	577.899	5/2−			Iγ(724.3)/Iγ(1302.2)=0.23 *8*.
724.69 *20*	0.31 *14*	1299.35	1/2(−),3/2	574.595	1/2−			I_γ: 2.3 *9* (1991ZaZY), 1.5 *1* (1980Te01), 1.4 *2* (1975Va03) for doublet.
x752.0[@] *2*	0.7[@] *1*							I_γ: 0.7 *2* (1975Va03).
765.25 *20*	5.2 *5*	1275.36	7/2+	510.071	5/2+	M1+E2	−0.31 *+12−28*	α(K)exp=0.00052 *8* A_2=+0.094 *12*; A_4=+0.014 *15* δ: −0.31 *+12−28* or −1.6 *6* from γ(θ) (1975Va03); α(K)exp gives d(E2/M1)<1.0, supporting lower value from γ(θ). I_γ: 9.1 *7* (1991ZaZY), 8.6 *2* (1980Te01), 7.8 *5* (1975Va03). A_2=−0.013 *53*, A_4=−0.008 *54*; δ(E2/M1)=−1.80 *+12−6*; Iγ(765)/Iγ(847)=59.4/40.6 (2004Si28).
766.65 *20*	1.3 *4*	1344.526	7/2(−)	577.899	5/2−			Iγ(766.6)/Iγ(1277.5)=0.42 *13*.
769.85 *2*	5.4 *6*	769.839	5/2−	0.0	3/2−	M1(+E2)	<2.0	α(K)exp=0.00056 *8* A_2=−0.013 *9*; A_4=+0.013 *11* δ: others: +5.1<δ<−6.3 (1975Va03) and −0.74 *160* (2004Si28) from g(θ). I_γ: 8.3 *6* (1991ZaZY), 9.2 *2* (1980Te01), 9.1 *5* (1975Va03). A_2=+0.065 *23*, A_4=+0.009 *24*; δ(E2/M1)=−0.74 *160*; Iγ(770)/Iγ(703)=60.5/39.5 (2004Si28).
783.33 *2*	7.0 *7*	1293.41	7/2+	510.071	5/2+	M1,E2		α(K)exp=0.00057 *9* A_2=+0.004 *12*; A_4=+0.015 *15* I_γ: 6.9 *6* (1991ZaZY), 7.7 *2* (1980Te01), 8.5 *5* (1975Va03).
787.4[@] *2*	3.5[@] *1*	1557.32		769.839	5/2−			I_γ: 4.2 *5* (1991ZaZY), 3.5 *3* (1975Va03).
792.12 *20*	0.22 *7*	1302.26	5/2	510.071	5/2+			Iγ(792.1)/Iγ(1302.2)=0.20 *7*.
793.47 *2*	9.0 *9*	860.545	7/2−	67.040	5/2−	M1+E2		α(K)exp=0.00049 *15* A_2=+0.001 *8*; A_4=−0.013 *9* δ: +0.21 *+15−18* or +3.5<δ<−4.0 from γ(θ) (1975Va03). Iγ(793.5)/Iγ(860.6)=0.62 *5*. I_γ: 14.0 *7* (1991ZaZY), 11.7 *2* (1980Te01), 11.6 *6* (1975Va03).

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
[x]797.4[@] *2*	3.3[@] *1*							I_γ: 4.4 *4* (1991ZaZY), 3.9 *3* (1975Va03).
814.06 *7*	0.58 *8*	1324.198	5/2	510.071	$5/2^+$			Iγ(814.1)/Iγ(1324.2)=0.80 *14*.
818.76 *15*	1.40 *20*	1328.91	$7/2^+$	510.071	$5/2^+$			Iγ(818.8)/Iγ(901.0)=0.30 *5*. I_γ: 2.7 *5* (1991ZaZY), 3.3 *1* (1980Te01), 2.7 *3* (1975Va03). Placement from γγ data of 1997So08. 1975Va03 proposed this γ from 1589 level.
823.99 *8*	0.12 *5*	1077.97	$3/2^{(-)}$	254.009	$1/2^-$			Iγ(823.99)/Iγ(1077.9)=0.22 *7*.
827.83 *15*	0.31 *20*	1221.293	$7/2^-$	393.432	$3/2^-$			Iγ(827.8)/Iγ(1154.2)=0.04 *1*.
833.07 *23*	0.64 *32*	1087.02	$5/2^-$	254.009	$1/2^-$			A_2=+0.155 *12*; A_4=−0.061 *14* Iγ(833.07)/Iγ(1002.6)=0.80 *31*. I_γ: 5.8 *4* (1991ZaZY), 1.4 *1* (1980Te01). Placement from γγ data of 1997So08. 1975Va03 proposed this γ from 1344 level.
[x]836.0[#] *3*	2.8 *1*							
[x]843.5[&] *4*	6.4 *5*							
847.52 *12*	3.3 *3*	1275.36	$7/2^+$	427.898	$9/2^+$	M1,E2		α(K)exp=0.00047 *15* Iγ(847.5)/Iγ(765.2)=0.65 *7*. I_γ: 8.9 *5* (1991ZaZY), 6.3 *1* (1980Te01), 10.6 *6* (1975Va03).
850.51 *2*	6.3 *6*	850.516	$5/2^-$	0.0	$3/2^-$	M1+E2	+0.19 *+19−17*	α(K)exp=0.00043 *6* A_2=−0.008 *11*; A_4=+0.005 *14* δ: +0.19 *+19−17* or +5.1<δ<−6.3 from γ(θ) (1975Va03); lower value is consistent with α(K)exp. I_γ: 13.2 *7* (1991ZaZY), 9.2 *2* (1980Te01), 10.4 *6* (1975Va03). A_2=−0.003 *16*, A_4=0.000 *16*; δ(E2/M1)=+0.2 *+1−2* (2004Si28).
860.56 *2*	14.4 *15*	860.545	$7/2^-$	0.0	$3/2^-$	E2		α(K)exp=0.00054 *6* A_2=−0.025 *10*; A_4=+0.013 *12* δ: −0.09 *+35−75* or +3.7<δ<−1.2 from γ(θ) (1975Va03). α(K)exp gives E2(+M1) with δ>1.6 or E2(+M3) with δ<0.25. I_γ: 29.1 *9* (1991ZaZY), 19.4 *3* (1980Te01), 18.7 *10* (1975Va03). A_2=+0.004 *37*, A_4=0.004 *42*; δ(M3/E2)=−1.0 *3*; Iγ(861)/Iγ(793)=66.0/34.0 (2004Si28). Such admixture of M3 is highly unlikely.
865.5[a] *3*	23.3[a] *28*	1293.33	$11/2^+$	427.898	$9/2^+$	M1,E2		α(K)exp=0.00044 *9* A_2=−0.053 *6*; A_4=+0.025 *7* δ: −0.06 *+6−5* or −5.1 *5* from γ(θ) (1975Va03). I_γ: 38.0 *2* (1991ZaZY), 31.7 *5* (1980Te01), 32.0 *16* (1975Va03) for doublet.
865.5[a] *3*	1.8[a] *15*	1293.41	$7/2^+$	427.898	$9/2^+$			Iγ(865.5)/Iγ(783.3)=0.26 *11*.
873.8[@b] *3*	1.5[@] *1*	1962.25		1087.02	$5/2^-$			E_γ: level-energy difference=875.2.

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
901.01 *2*	4.6 *5*	1328.91	$7/2^+$	427.898	$9/2^+$	M1,E2		I_γ: 4.6 *6* (1991ZaZY), 1.9 *2* (1975Va03). α(K)exp=0.00038 *11* I_γ: 8.7 *5* (1991ZaZY), 8.1 *2* (1980Te01), 6.9 *4* (1975Va03). Iγ(901)/Iγ(819)=77.2/22.8 (2004Si28).
908.86 *20*	0.28 *11*	1302.26	5/2	393.432	$3/2^-$			Iγ(908.9)/Iγ(1302.2)=0.26 *9*.
926.72 *2*	7.1 *8*	993.771	$7/2^-$	67.040	$5/2^-$	M1+E2	+1.0 *+11−5*	I_γ: 1.1 *9* (1991ZaZY), 0.5 *1* (1980Te01). α(K)exp=0.00035 *6* A_2=−0.039 *14*; A_4=−0.027 *17* δ: from γ(θ) in 1975Va03, α(K)exp gives M1,E2. Iγ(926.7)/Iγ(993.8)=0.82 *8*.
930.77 *4*	0.44 *22*	1324.198	5/2	393.432	$3/2^-$			I_γ: 10.8 *6* (1991ZaZY), 8.4 *2* (1980Te01), 7.3 *4* (1975Va03). Iγ(930.8)/Iγ(1324.2)=0.63 *18*.
934.82 *15*	0.23 *8*	1188.84	$1/2,3/2^{(-)}$	254.009	$1/2^-$			I_γ: 0.3 *1* (1980Te01). Isotropic γ(θ) in 2004Si28.
951.02 *16*	0.21 *10*	1344.526	$7/2^{(-)}$	393.432	$3/2^-$			Iγ(951.0)/Iγ(1277.5)=0.07 *3*.
979.4[@] *2*	3.9[@] *1*	1489.48	$(5/2^+)$	510.071	$5/2^+$			I_γ: 4.0 *3* (1991ZaZY), 3.5 *2* (1975Va03). A_2=+0.018 *72*, A_4=+0.001 *73*; δ(E2/M1)=−1.8 *1* or −0.2 *1*; Iγ(452)/Iγ(979)=32.1/67.9 (2004Si28). Note that 452γ is placed from a 1221 level based on γγ-coin data in 1997So08.
993.63 *10*	0.07 *4*	1077.97	$3/2^{(-)}$	84.365	$1/2^-$			Iγ(993.6)/Iγ(1077.9)=0.13 *5*.
993.78 *2*	9.1 *15*	993.771	$7/2^-$	0.0	$3/2^-$	(E2)		α(K)exp=0.00037 *10* Mult.: α(K)exp gives M1,E2 or E2(+M3) with δ<0.34. ΔJ^π consistent with E2. I_γ: 12.3 *6* (1991ZaZY), 10.6 *2* (1980Te01), 9.3 *5* (1975Va03). A_2=−0.033 *35*, A_4=+0.003 *36*; δ(M3/E2)=+0.5 *1* or +3.0 *+6−7*; Iγ(994):Iγ(927):Iγ(600):Iγ(416):39.7:31.9:23.9:4.5 (2004Si28). Such admixtures of M3 are highly unlikely.
1002.59 *7*	0.8 *4*	1087.02	$5/2^-$	84.365	$1/2^-$	(E2)		α(K)exp=0.00034 *13* Mult.: α(K)exp gives M1 or E2, or E2(+M3) with δ<0.35. ΔJ^π consistent with E2. I_γ: 4.3 *3* (1991ZaZY), 1.8 *1* (1980Te01), 2.0 *2* (1975Va03). A_2=−0.035 *58*, A_4=−0.007 *58*; δ(M3/E2)=+1.50 *1*; Iγ(1087):Iγ(1020):Iγ(1003):Iγ(833):Iγ(694)=12.4:25.8:29.5:23.4:9.0 (2004Si28). Such admixture of M3 is highly unlikely.
1011.5[@] *3*	0.5[@] *1*	1588.73	$5/2^-$	577.899	$5/2^-$			I_γ: 7.7 *8* (1991ZaZY), 1.1 *3* (1975Va03). E_γ: level-energy difference=1010.8.
1019.87 *13*	0.30 *5*	1087.02	$5/2^-$	67.040	$5/2^-$			Iγ(1019.87)/Iγ(1002.6)=0.39 *13*. I_γ: 0.7 *1* (1980Te01).

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	δ [‡]	Comments
[x]1039.3[&] *7*	2.8 *7*							
1045.33 *6*	0.07 *5*	1299.35	$1/2^{(-)},3/2$	254.009	$1/2^-$			Iγ(1045.3)/Iγ(724.7)=0.25 *8*.
1077.91 *20*	0.53 *6*	1077.97	$3/2^{(-)}$	0.0	$3/2^-$			I_γ: 2.5 *4* (1991ZaZY), 2.1 *1* (1980Te01), 1.6 *3* (1975Va03).
1086.99 *5*	0.44 *5*	1087.02	$5/2^-$	0.0	$3/2^-$			Iγ(1086.99)/Iγ(1002.6)=0.53 *17*. I_γ: 1.0 *4* (1991ZaZY), 0.9 *1* (1980Te01), 0.7 *1* (1975Va03).
1102.7[@] *3*	0.7[@] *1*	1612.76	$5/2^-,7/2^-$	510.071	$5/2^+$			I_γ: 1.4 *3* (1991ZaZY), 0.9 *2* (1975Va03).
1111.00 *2*	12.9 *16*	1178.049	$7/2^{(-)}$	67.040	$5/2^-$			A_2=+0.002 *10*; A_4=+0.006 *13* I_γ: 24.5 *3* (1991ZaZY), 23.3 *4* (1980Te01), 20.0 *10* (1975Va03). A_2=+0.002 *16*, A_4=−0.003 *16*; δ(E2/M1)=+0.5 *+2−1* (2004Si28).
1133.8[@] *3*	0.2[@] *1*	1903.7		769.839	$5/2^-$			I_γ: 2.6 *2* (1991ZaZY), <0.5 (1975Va03).
1154.25 *2*	8.3 *9*	1221.293	$7/2^-$	67.040	$5/2^-$	(M1+E2)	−0.8 *+4−6*	A_2=+0.085 *13*; A_4=+0.042 *16* Mult.,δ: from γ(θ) in 1975Va03. I_γ: 8.6 *7* (1991ZaZY), 11.3 *2* (1980Te01), 9.7 *5* (1975Va03). A_2=+0.027 *30*, A_4=+0.006 *30*; δ(E2/M1)=−0.3 *1*; Iγ(1154):Iγ(643):Iγ(451)=79.6:11.0:9.4 (2004Si28).
[x]1161.5[@] *2*	1.2[@] *1*							E_γ: placed from 1557 level by 1975Va03, but is inconsistent with level- energy difference by at least 3 keV. I_γ: 1.3 *6* (1991ZaZY), 0.7 *2* (1975Va03).
1208.0[#] *3*	0.7 *1*	1275.36	$7/2^+$	67.040	$5/2^-$			Placement from ^{73}Se decay.
1214.97 *20*	0.05 *4*	1299.35	$1/2^{(-)},3/2$	84.365	$1/2^-$			Iγ(1214.97)/Iγ(724.7)=0.16 *6*.
1229.7[@b] *2*	2.8[@] *1*	1903.7		674.0?				I_γ: 3.3 *4* (1991ZaZY), 3.5 *3* (1975Va03). Additional information 16.
1232.30 *15*	0.07 *5*	1299.35	$1/2^{(-)},3/2$	67.040	$5/2^-$			Iγ(1232.3)/Iγ(724.7)=0.22 *8*.
1277.47 *20*	3.1 *3*	1344.526	$7/2^{(-)}$	67.040	$5/2^-$			I_γ: 4.4 *7* (1991ZaZY), 5.3 *1* (1980Te01), 5.8 *6* (1975Va03). A_2=−0.032 *50*, A_4=+0.001 *51*; δ(E2/M1)=+1.3 *+5−4*; Iγ(1277)/Iγ(689)=73.1/26.9 (2004Si28).
1302.25 *4*	1.12 *13*	1302.26	5/2	0.0	$3/2^-$			I_γ: 2.6 *4* (1991ZaZY), 2.1 *1* (1980Te01), 2.6 *2* (1975Va03).
1324.19 *3*	0.73 *9*	1324.198	5/2	0.0	$3/2^-$			I_γ: 1.7 *3* (1991ZaZY), 1.3 *1* (1980Te01), 1.4 *2* (1975Va03).
1333.8[@] *3*	1.1[@] *1*	1588.73	$5/2^-$	254.009	$1/2^-$			I_γ: 1.1 *2* (1975Va03). E_γ: level-energy difference=1334.7.
1341.2[@] *3*	0.7[@] *1*	1851.26	$(9/2)^+$	510.071	$5/2^+$			I_γ: 1.0 *2* (1975Va03).
1344.57 *12*	0.28 *5*	1344.526	$7/2^{(-)}$	0.0	$3/2^-$			Iγ(1344.6)/Iγ(1277.5)=0.09 *2*.
1423.3[@] *2*	1.6[@] *1*	1851.26	$(9/2)^+$	427.898	$9/2^+$			I_γ: 2.7 *4* (1991ZaZY), 1.6 *2* (1975Va03).

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^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03 (continued)

γ(^{73}As) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
1452.8[@] *2*	1.3[@] *1*	1962.25		510.071	$5/2^+$	I_γ: 3.1 *5* (1991ZaZY), 1.1 *3* (1975Va03). E_γ: level-energy difference=1452.2.
1483.3[@] *2*	1.3[@] *1*	1876.75		393.432	$3/2^-$	I_γ: 3.7 *4* (1991ZaZY), 2.1 *3* (1975Va03).
1521.9[b] *3*	0.7 *1*	1588.73	$5/2^-$	67.040	$5/2^-$	E_γ: average from 1991ZaZY, 1980Te01 and 1975Va03. I_γ: 1.1 *4* (1991ZaZY), 0.8 *2* (1975Va03).
1545.7[@] *2*	2.5[@] *1*	1612.76	$5/2^-$,$7/2^-$	67.040	$5/2^-$	I_γ: 8.2 *9* (1991ZaZY), 3.5 *7* (1975Va03). A_2=−0.045 *60*, A_4=+0.001 *60*; δ(E2/M1)=−1.3 *+10−6*; Iγ(1546)/Iγ(1103)=79.5/20.5 (2004Si28).
1565.3[@] *3*	0.1[@] *1*	1649.7		84.365	$1/2^-$	I_γ: <0.5 (1975Va03). Placement tentative in 1975Va03, but supported by 1999Bu05.
1584.1[@] *2*	0.9[@] *1*	1977.55		393.432	$3/2^-$	I_γ: 1.4 *3* (1991ZaZY), 0.6 *2* (1975Va03).
[x]1633.8[@] *2*	1.4[@] *1*					I_γ: <1.0 (1975Va03).
1712.1[@b] *3*	0.6[@] *1*	1796.5		84.365	$1/2^-$	I_γ: 1.5 *9* (1991ZaZY), <0.5 (1975Va03).
[x]1739.2 *2*	1.8 *1*					E_γ: from 1975Va03, 1991ZaZY. Eγ=1739.9 *2* (1980Te01). I_γ: 5.0 *4* (1991ZaZY), 2.1 *2* (1975Va03).
[x]1850.5[&] *8*	1.6 *8*					

[†] From 1997So08 at E(p)=2.75 MeV, unless otherwise stated. Branching ratios from 1997So08 are given under comments and are also considered in Adopted Gammas. These are weighted averaged values from data at E(p)=1.92, 2.27, 2.45, 2.75 and 4.0 MeV. For comparison, relative intensities from 1991ZaZY (at E(p)=3.6 MeV), 1980Te01 (E(p)=3.1 MeV) and 1975Va03 (E(p)=3.1 MeV) are given under comments. Branching ratios quoted by 1999Bu05 and 2003Al12 are from the literature (mostly from 1997So08).

[‡] From α(K)exp values in 1997So08, unless otherwise noted.

[#] γ from 1980Te01 only.

[@] γ not reported by 1997So08. The values are from 1980Te01 but placements are from 1999Bu05, unless otherwise stated.

[&] γ from 1991ZaZY only.

[a] Multiply placed with intensity suitably divided.

[b] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03

Level Scheme

Intensities: Relative I_γ

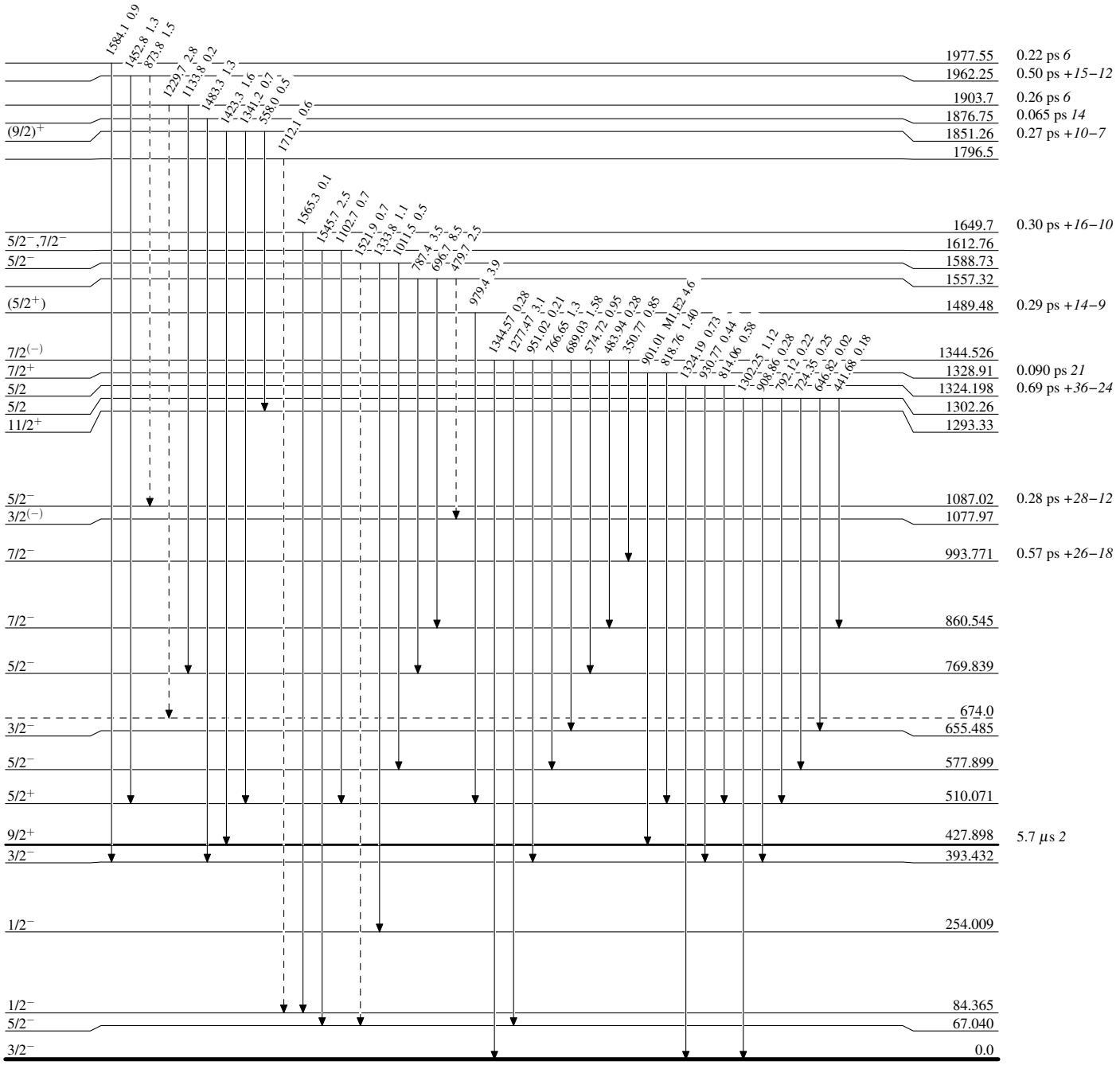
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



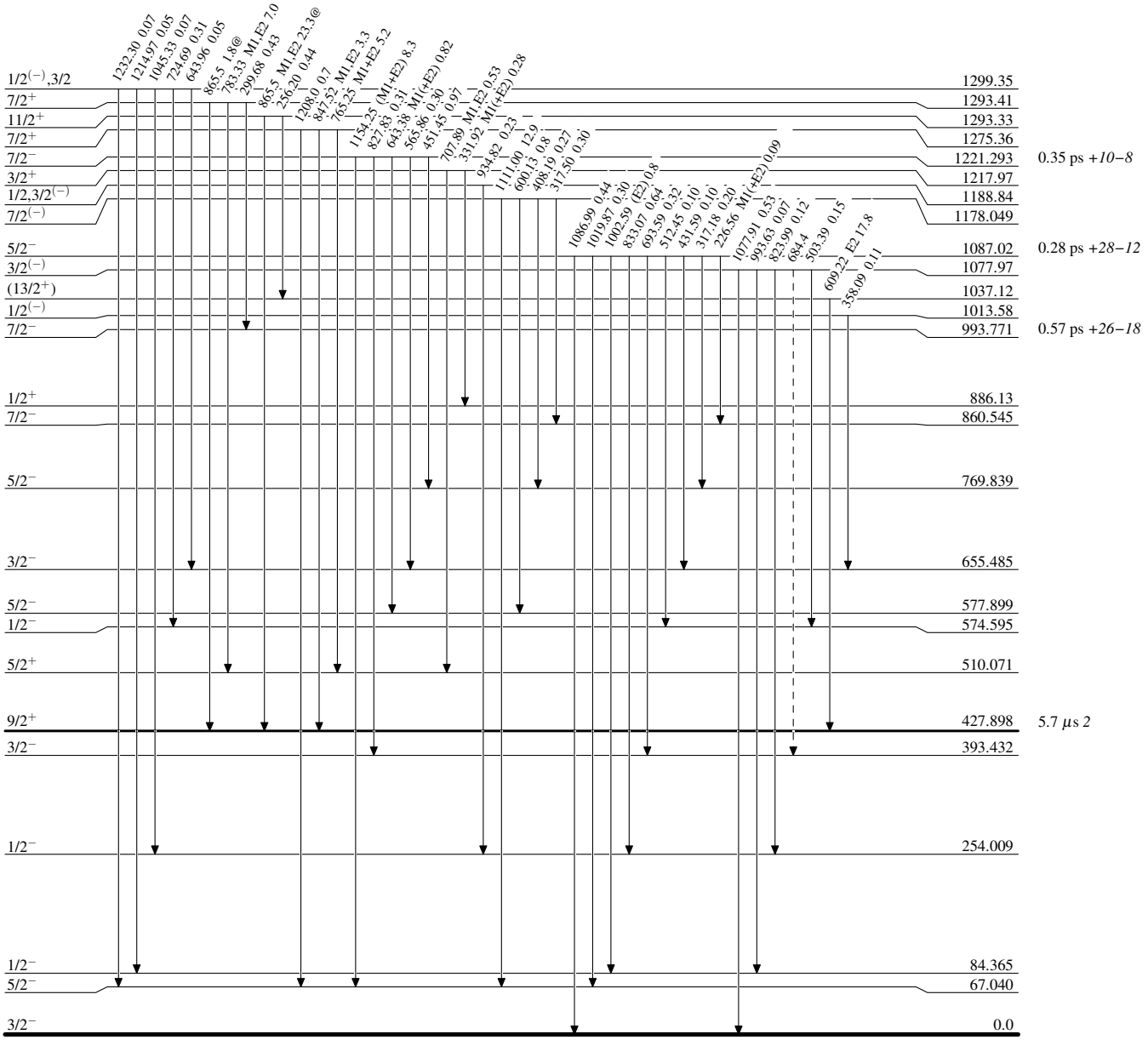
$^{73}_{33}As_{40}$

^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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)



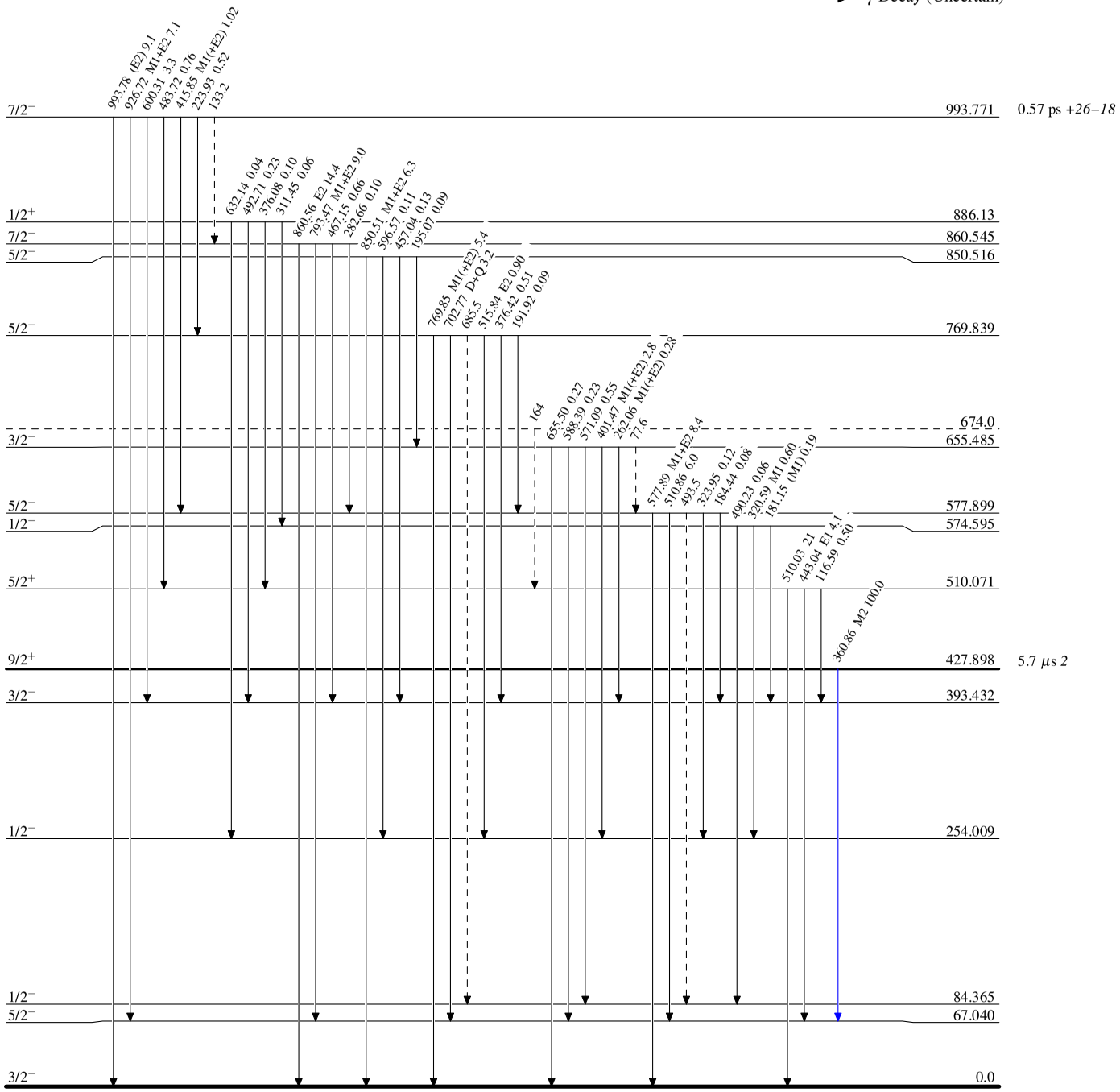
$^{73}_{33}As_{40}$

^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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)



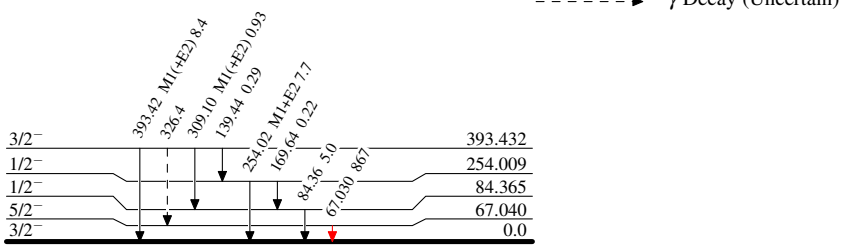
$^{73}_{33}As_{40}$

^{73}Ge(p,nγ) 1997So08,1980Te01,1975Va03

Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



$^{73}_{33}As_{40}$