Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 188,1 (2023)	17-Jan-2023

Q(β^-)=−2013 *4*; S(n)=7415.94 *11*; S(p)=8285.5 *14*; Q(α)=−4451.2 *10* 2021Wa16
Q(ε)=232.47 *9*, S(2n)=18948.6 *15*, S(2p)=16066.7 *11* (2021Wa16).
1941Se03: ^{71}Ge produced and identified in ^{71}Ga(d,2n) reaction at E=8 MeV and in ^{70}Ge(d,p) reaction at 16 MeV, measured half-life.
1948Mc32: ^{71}Ge produced in decay of ^{71}As.
Later references for production and identification of ^{71}Ge: 1950Ho26, 1952Br90, 1955Bi96, 1956Ru45, 1959Gl56, 1959Mo98.
Mass measurements: 2016Al30, 2013Fr13: ^{71}Ga − ^{71}Ge mass difference.
Other measurements:
^{71}Ga(^{3}He,t): 1984Ko10.
2022Ba21 (also 2022Ba17): ^{71}Ge(ν,e),E(ν)<1 MeV from ^{51}Cr decay. Measured Eβ, Iβ; deduced yield of ^{71}Ge yields, deficit of electron neutrinos observed in gallium-based radiochemical measurements with high-intensity neutrino sources to address the "gallium anomaly"; Baksan Experiment on Sterile Transitions (BEST).
^{71}Ga(ν,e): 2009Ab16, solar neutrino capture rate measurements, SAGE (Soviet-American Gallium) experiment.
Theoretical calculations:
2022No04: calculated single-particle energies, occupation probabilities, levels, J^π, B(E2), B(M1), (β,γ)-deformation energy surfaces, magnetic dipole moment using constrained self-consistent mean-field (SCMF) method based on the universal relativistic functional DD-PC1.
2015Ka46: calculated level energies of low-lying, low spin states and B(E2) values in odd-A isotopes, neutron $g_{9/2}$ and proton $p_{3/2}$ occupancies for low lying states, magnetic moments and electric quadrupole moments, low- and high-spin levels, J^π, B(E2) using shell-model with a pairing-plus-multipole Hamiltonian and monopole-based universal force interaction (PMMU model) for the $pf_{5/2}g_{9/2}$ shell.
2012Mu09: calculated neutron pairing gaps, ground state energy shell model Monte Carlo method.
2012Lu10: calculated β-decay strength functions, resonance structures.
2009Ho14: calculated two-body matrix elements, monopole matrix elements, single-particle proton and neutron energies, binding energies, magnetic dipole and electric quadrupole moments, levels, J^π, B(E2) using shell-model with JUN45 effective interaction.
2004Br44: calculated levels, J^π, magnetic dipole and electric quadrupole moments, B(M1), B(E2), transition branching ratios using proton-neutron interacting boson-fermion model.
2003Ho02: calculated levels, J^π log *ft* for Gamow-Teller transitions. Discussed implications for solar neutrino detection.
1997Ka73: calculated Gamow-Teller strengths, Ga solar neutrino detector ν capture rates.
1979Pa04: calculated levels, J^π using quasiparticle-vibration coupling, unified nuclear model.
1976Pa08: calculated levels, B(λ), neutron hole clusters coupled to quadrupole vibration using Alaga, Bohr-Mottelson microscopic models.

^{71}Ge Levels

Cross Reference (XREF) Flags

A	^{71}Ge IT decay (20.22 ms)	F	^{70}Ge(d,p),(pol d,p)	K	^{72}Ge(p,d)
B	^{71}As ε decay (65.30 h)	G	^{71}Ga(p,n)	L	^{73}Ge(p,t)
C	^{68}Zn(α,nγ)	H	^{71}Ga(p,nγ)	M	^{74}Ge(α,α3nγ)
D	^{70}Ge(n,γ) E=th	I	^{71}Ga(^{3}He,t),(^{3}He,tγ)	N	^{76}Se(μ^-,4n$p\gamma$)
E	^{70}Ge(n,n),(n,γ):resonances	J	^{71}Ga(^{6}Li,^{6}He)		

E(level)[†]	J$^\pi$	T$_{1/2}$[b]	XREF	Comments
0.0	1/2$^-$	11.43 d *3*	ABCD FGHIJKLMN	%ε=100 μ=+0.547 *5* (2020Ka58) μ: hyperfine spectroscopy at ISOLDE−CERN (2020Ka58). Others: +0.546 *5* (atomic beam, 1966Ch02, 1970Be29, 2019StZV). J$^\pi$: spin from atomic beam (1963Ch12). Parity from L(d,p)=L(p,d)=1 from

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[b]	XREF	Comments
				0^+ targets. $T_{1/2}$: from detection of K X rays and Auger electrons using Ge detector and proportional counters (1985Ha06); the adopted value is the weighted average of six experimental runs covering time span of up to 12 half-lives of ^{71}Ge. The quoted value includes statistical and systematic uncertainties. Others: 11.15 d *15* (1971Ge02), 10.5 d *4* (1956Ru45), 12.5 d *1* (1955Bi96), 11 d (1950Ho26), 11.4 d *1* (1948Mc32), 11 d (1941Se03).
174.954 *6*	$5/2^-$	81 ns *3*	ABCD FGHI K M	μ=+1.018 *10* (1968Mo12,2020StZV) Q=0.18 *4* (1973HaVW,2016St14,2021StZZ) μ: from DPAD (1968Mo12). Q: 2016St14 evaluated quadrupole moment with reference to measured value for ^{73}Ge g.s. by TDPAD method (1993Co17) and using quadrupole interaction frequencies from 1981Vi05. The same value is listed in 2021StZZ compilation. Jπ: L(d,p)=L(p,d)=3 from 0^+; 174.96γ E2 to $1/2^-$. $T_{1/2}$: weighted average of 79 ns *2* (1968Mo12) in (p,nγ), 88 ns *4* (1978Ta08) and 73 ns *11* (1974Iv02) in (n,γ), using $\gamma\gamma$(t). Q(175 level)/Q(^{69}Ge,398)=0.22 *3* (1973HaVW).
198.371[d] *12*	$9/2^+$	20.22 ms *12*	ABCD F H KLMN	%IT=100 μ=−1.039 *2* (1970Be29,2020StZV) Q=0.34 *5* (1975Ri03,2016St14,2021StZZ) μ: from TDPAD (1970Be29). Value of −1.0413 *7* in 1970Be29 evaluated to −1.039 *2* in 2020StZV. Q: from QIR (1975Ri03,1976Br41). Other: 0.28 (1973RiZI). Jπ: L(d,p)=L(p,d)=4 from 0^+; L+1/2 from analyzing power in (pol d,p); L(p,t)=0 from $9/2^+$. $T_{1/2}$: from the decay of 175γ in NaI detectors except as noted in IT decay. Value is weighted average of results listed as follows: 20.082 ms *+71−70* (2014De19, decay curve for 198.4-keV radiation from coincidence summing of 174.95γ and ce of 23.44-keV transition within HPGe detector array GEANIE at LANSC-WNR Los Alamos facility, where the ^{71m}Ge activity by ^{72}Ge(n,2n) reaction by scattered neutrons incident on the HPGe detector system; statistical and fitting uncertainties were included, in averaging procedure uncertainty was increased to 0.105 ms by evaluators to account for possible systematic uncertainties); 20.48 ms *18* (Ge(Li) with NaI anti-Compton,1980Jo11); 21.5 ms *4* (neutron activation of Ge(Li) detector,1974Bu14); 20.4 ms *4* (1976Ga33); 21.5 ms *10* (1971Go21); 22.2 ms *10* (1971Mu14); 20.4 ms *10* (1970Ru08,1969Ru10); 21.2 ms *12* (1966Me02); 20.0 ms *6* (1963Al32); 19.5 ms *5* (conversion electron detection in anthracene detector, 1962Re09); 20 ms *1* (1962Mo19); 19.4 ms *4* (1961Mo06); 20.3 ms *3* (1961Sc11). Values of 21.87 ms *7* (1972Br53), and 16 ms *1* (1959Gl56) were not included in the averaging procedure, as these appear to be outliers.
499.915[f] *8*	$3/2^-$		BCD FGHI KlM	XREF: l(515). Jπ: L(d,p)=L(p,d)=1 from 0^+; L+1/2 from analyzing power in (pol d,p).
525.114 *8*	$5/2^+$		BCD FGH Kl	XREF: l(515). Jπ: L(d,p)=L(p,d)=2 from 0^+; L+1/2 from analyzing power in (pol d,p).
589.775[h] *12*	$7/2^+$		BCD FGH LM	Jπ: 391.4γ M1+E2 to $9/2^+$; spin=5/2,7/2 from $\gamma(\theta)$ in (α,nγ); 7/2 also favored by excitation function in (p,nγ).
620 *10*			F	

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[b]	XREF	Comments
708.196 *7*	3/2⁻	>10.7 ps	BCD FGHI K	Jπ: L(d,p)=(p,d)=1 from 0⁺; L+1/2 from analyzing power in (pol d,p).
747.248[g] *8*	5/2⁻		BCD FGH K M	Jπ: L(d,p)=3 from 0⁺; 247.4γ M1+E2 3/2⁻.
801 *3*			F k	XREF: k(807).
808.196 *19*	1/2⁻		BCD GHI k	XREF: k(807?). Jπ: 1/2 from γ(θ) and γγ(θ) in (α,nγ) and excitation function in (p,nγ); 1/2⁻ from Gamow-Teller excitation in (^{3}He,t). Other: L(p,d)=2 for an uncertain level at 807 *10* is in disagreement.
817 *3*			F	
831.301 *8*	3/2⁻		BCD GH K	Jπ: L(p,d)=1 from 0⁺; 306.2γ D+Q, ΔJ=1 to 5/2⁺.
886.94 *10*	(3/2⁻)		B F	Jπ: γ rays to 1/2⁻ and 5/2⁻ give (1/2⁻,3/2,5/2⁻); possible ε feeding from 5/2⁻ parent (log *ft*= 9.1) disfavours 1/2⁻; L(d,p)=(1) from 0⁺ favors 3/2⁻.
970 *10*			F	
1026.561 *10*	5/2⁻	>1.2 ps	BCD fGH K	XREF: f(1032). Jπ: L(p,d)=3 from 0⁺; 279.4γ D+Q to 3/2⁻.
1037.83[i] *7*	9/2⁺		BC f H LM	XREF: f(1032). Jπ: L(p,t)=0 from 9/2⁺; 9/2 from yield function in (α,nγ) and excitation function in (p,nγ).
1095.511 *7*	3/2⁻	0.62 ps *14*	BCD FgHI K	Jπ: L(d,p)=L(p,d)=1 from 0⁺; L+1/2 from analyzing power in (pol d,p). Excitation function in (p,nγ) gives 3/2⁻, excludes 1/2⁻.
1096.07[f] *10*	7/2⁻		BC gH M	Jπ: γγ(θ)(ADO) and γ(lin pol) in (α,α3nγ); excitation function in (p,nγ) gives 7/2⁻, excludes 7/2⁺.
1139.441 *9*	3/2⁻	4.0 ps *14*	BCD FGH	Jπ: 1139.4γ M1+E2 to 1/2⁻, 964.5γ D+Q to 5/2⁻.
1154 *3*			F	
1171 *3*	5/2⁺		F Kl	XREF: K(1166)l(1183). Jπ: L(d,p)=2 from 0⁺; L+1/2 from analyzing power in (pol d,p). L(p,d)=1 for a group at E=1166 *10* is in disagreement, probably indicating a different level.
1172.54[d] *10*	13/2⁺	<0.104[c] ps	C lM	XREF: l(1183). Jπ: 974.2γ E2, ΔJ=2 to 9/2⁺; 1126.6γ from J=17/2. $T_{1/2}$: from 0.90 ps *18* with no side feeding corrections in (α,nγ).
1192.23[e] *9*	11/2⁺	<0.108[c] ps	BC h lM	XREF: B(?). Jπ: from γ(lin pol) in (α,nγ); excitation function in (p,nγ) also gives 11/2, excludes 9/2. $T_{1/2}$: from 0.90 ps *18* with no side feeding corrections in (α,nγ).
1205.146 *9*	5/2⁺	1.11 ps *28*	BCD FgH l	XREF: g(1207). Jπ: L(d,p)=2 from 0⁺; excitation function in (p,nγ) gives 3/2⁻,5/2⁺ and excludes 3/2⁺,5/2⁻,7/2.
1212.511 *8*	5/2⁻	>1.2 ps	BC gH K	XREF: g(1207)K(1207). Jπ: 1212.5γ ΔJ=2 to 1/2⁻; L(p,d)=3 from 0⁺; excitation function in (p,nγ) gives 3/2⁻,5/2⁻, excludes 3/2⁺,5/2⁺,7/2⁺.
1237 *5*			F	
1288.55 *6*	1/2⁻		CD FGH K	Jπ: L(d,p)=L(p,d)=1 from 0⁺; L-1/2 from analyzing power in (pol d,p). Excitation function in (p,nγ) also gives 1/2⁻, excludes 1/2⁺,3/2,5/2.
1298.75 *4*	3/2⁻	0.42 ps *9*	BCD GHI	Jπ: 1298.5γ D+Q to 1/2⁻; excitation function in (p,nγ) gives 1/2⁺,3/2⁻ and excludes 1/2⁻,3/2⁺,5/2,7/2; 3/2⁻ from Gamow-Teller excitation in (^{3}He,t).
1349.10 *6*	1/2⁺	0.46 ps *11*	CD FGH K	Jπ: L(d,p)=L(p,d)=0 from 0⁺.
1378.53 *5*	(1/2⁻)		BCD gH k	XREF: B(?). Jπ: excitation function in (p,nγ) (1993Fe03) gives 1/2⁻,7/2⁻, excludes 1/2⁺,3/2, 5/2,7/2⁺; γ to 1/2⁻.
1378.71 *5*	5/2⁻		B FgHI k	XREF: H(?).

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[b]	XREF	Comments
				E(level): possible doublet proposed by the evaluators based on very different γ branching ratios observed from 1379 level in ε decay, (α,nγ), (n,γ) and (p,nγ) reactions. L(d,p)=(2,3) level at 1375 *3* is associated with this level, rather than the (1/2⁻) level near this energy, based on spin consideration. Jπ: log *ft*=7.4 from 5/2⁻; γs to 5/2⁻ and 7/2⁺; L(d,p)=(3,2); (L+1/2) from analyzing power in (pol d,p) suggests (5/2⁺,7/2⁻); σ(θ) in (^{3}He,t) gives 5/2⁻.
1406.640 *10*	7/2⁻		BC FgH K	XREF: F(1401)g(1412). Jπ: L(p,d)=3 from 0⁺; excitation function in (p,nγ) gives 7/2⁻, excludes 3/2,5/2,7/2⁺,9/2.
1416.22 *13*	(1/2⁻,3/2,5/2⁻)		D FgH	XREF: g(1412). Jπ: 1416.0γ to 1/2⁻, 1239.7γ to 5/2⁻.
1422.04[g] *9*	9/2⁻	<1.2[c] ps	BC H M	Jπ: from γ(θ,pol) in (α,nγ). $T_{1/2}$: 1.0 ps *2* with no side feeding corrections.
1449.8? *3*			B g	XREF: g(?).
1454.3 *10*	(1/2⁺)		FgH	XREF: g(?). Jπ: L(d,p)=(0) from 0⁺.
1475.9 *3*	(5/2⁻)		D FGH l	XREF: D(?). Jπ: excitation function in (p,nγ) gives 5/2⁻,7/2⁺, excludes 5/2⁺, 7/2⁻, 9/2⁺; L(d,p)=(3) from 0⁺ for a group at E=1470. However, L(d,p)=2 from 0⁺ for a group at E=1474 *3* is inconsistent, which might indicate a different level.
1477.03[h] *7*	11/2⁺	<0.64[c] ps	C lM	XREF: l(1477). $T_{1/2}$: 0.54 ps *10* with no side feeding corrections. Jπ: ΔJ=2, E2 γ to 7/2⁺; ΔJ=1, M1+E2 γ to 9/2⁺.
1485 *3*	(3/2⁺,5/2⁺)		Fg	XREF: g(1477). Jπ: L(p,d)=(2) from 0⁺.
1506.388 *15*	7/2⁻	0.51 ps *16*	B GH K	Jπ: L(p,d)=3 from 0⁺; excitation function in (p,nγ) gives 7/2⁻,9/2, and excludes 5/2,7/2⁺.
1542.48 *8*	(1/2⁺,3/2⁻)		CD FGH	Jπ: primary γ from 1/2⁺ in (n,γ) and γ rays to 5/2⁺ and 1/2⁻; excitation function in (p,nγ) gives 1/2⁺,3/2⁻, excludes 1/2⁻,3/2⁺,5/2. But L(d,p)+(2) from 0⁺ for a group at E=1539 *3* is inconsistent.
1558.757 *15*	5/2⁺		BCD FgH K	Jπ: L(p,d)=2 from 0⁺; L+1/2 from analyzing power in (pol d,p). However, L(p,d)=3 for a group at 1558 *2* is in disagreement, which could indicate a different level.
1566.2 *6*	(5/2⁻,7/2⁺)		C gH	Jπ: excitation function in (p,nγ) gives 3/2⁻,5/2⁻,7/2⁺, excludes 3/2⁺,5/2⁺,7/2⁻,9/2; γ to 7/2⁺ disfavors 3/2⁻.
1598.534 *17*	3/2⁻	0.55 ps *15*	BCD FGHI K	Jπ: L(p,d)=1; log *ft*=6.9 from 5/2⁻.
1629.179 *12*	(3/2⁺,5/2⁻)		B Gh	Jπ: γ rays to 1/2⁻ and 7/2⁺.
1631.2 *4*	(1/2⁻,3/2,5/2⁻)		D h	E(level): this level seems different from the 1629 level, although the energies of the 883.5 and 1632.0 γ rays are close to 881.9 and 1629.1, respectively assigned to the 1629 level. Jπ: γ rays to 1/2⁻ and 5/2⁻.
1698.3 *7*	(9/2)⁺		C FGH	Jπ: L(d,p)=4 from 0⁺; (L+1/2) from analyzing power in (pol d,p).
1743.385 *20*	3/2⁻	0.42 ps *15*	B D FGHI K	XREF: F(1751). Jπ: L(p,d)=1 from 0⁺; 3/2⁻ from Gamow-Teller excitation in (^{3}He,t).
1780.762 *19*	5/2⁻,7/2⁻		B K	Jπ: L(p,d)=3 from 0⁺.
1792.096 *10*	(3/2⁺,5/2⁻)		B D FGH	Jπ: γ rays to 1/2⁻ and 7/2⁺. J^π=(1/2⁻,3/2⁻) from L(d,p)=(1) is inconsistent.
1801.13 *7*	(5/2⁺,7/2)		B	Jπ: γ rays to 9/2⁺ and 5/2⁺; log $f^{1u}t$<8.5 for ε decay from 5/2⁻.

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[b]	XREF	Comments
1814 *3*			F	
1835.81? *9*			D	
1841 *3*			F	
1868 *5*			F	
1891 *3*			F	
1909 *5*			F	
1937.45 *4*	$(3/2^+,5/2^-)$	0.69 ps *28*	B H	Jπ: γ rays to $1/2^-$ and $7/2^+$.
1940.30 *8*	$(1/2,3/2,5/2^-)$		D	E(level),Jπ: γ to $1/2^-$ suggests that level in (n,γ) is different from that in (d,p).
1941 *3*	$(9/2)^+$		F	Jπ: L(d,p)=4 from 0^+; (L+1/2) from analyzing power in (pol d,p).
1949.29[f] *13*	$11/2^-$		C M	Jπ: ΔJ=2, E2 γ to $7/2^-$; ΔJ=1, dipole γ to $9/2^-$.
1959.59[i] *12*	$13/2^+$		C lM	XREF: l(1955). Jπ: ΔJ=2, E2 1138.1γ from $17/2^+$; ΔJ=2, Q γ to $9/2^+$; band member; L=(4) in (p,t) from $9/2^+$.
1961 *5*	$1/2^+$		f	XREF: f(1955). Jπ: L(d,p)=0 from 0^+.
1965.03 *5*	$3/2^-$		B D HI Kl	XREF: l(1955). Jπ: L(p,d)=1 from 0^+; log *ft*=7.2 from $5/2^-$.
1979 *3*			F K	E(level): from (p,d). Other: 1979 *5* from (d,p).
2031.89 *9*	(1/2,3/2)		D F K	Jπ: $1/2^-$,$3/2^-$ from L(p,d)=1 for a group at E=2031 *3* and $3/2^+$,$5/2^+$ from L(d,p)=2 for a group at E=2028 *3* are in disagreement, which may indicate two separate levels near this energy. Strong primary γ from $1/2^+$ in (n,γ) suggests 1/2,3/2.
2041 *1*	$1/2^-$,$3/2^-$		F I K	E(level): from (^{3}He,t). Others: 2041 *3* from (d,p) and 2045 *3* from (p,d). Jπ: L(d,p)=1 from 0^+. Tentative $(3/2^-,5/2^-)$ from σ(θ) in (^{3}He,t).
2075.7 *4*	$(1/2,3/2)$[a]		D F	
2082 *5*			F	
2094 *3*			F	
2139 *5*	$(5/2^-,7/2^-)$		F	Jπ: L(d,p)=(3) from 0^+.
2141.2[‡] *4*	$(1/2,3/2)$[a]		D	
2146.15[‡] *5*	$(3/2^-)$		D I	Jπ: tentative $(3/2^-,5/2^-)$ from σ(θ) in (^{3}He,t), possible primary γ from $1/2^+$ in (n,γ).
2180 *5*			F	
2210 *5*	$(1/2^+,5/2^-,7/2^-)$		F	Jπ: L(d,p)=(0,3) from 0^+.
2224.50 *11*	$1/2^+$		D F K	Jπ: L(d,p)=L(p,d)=0 from 0^+.
2240 *3*			F K	E(level): weighted average of 2236 *5* from (d,p) and 2241 *3* from (p,d).
2257.00 *11*	$(1/2,3/2)$[a]		D K	
2276 *1*	$1/2^-$,$3/2^-$		I K	E(level): from (^{3}He,t). Other: 2279 *3* from (p,d). Jπ: L(p,d)=1 from 0^+. Tentative $(3/2^-,5/2^-)$ from σ(θ) in (^{3}He,t).
2277 *5*	$5/2^+$		F	E(level): this level is most likely different from the 2276 level due to differences in J^π assignments. Jπ: L(d,p)=2 from 0^+ and L+1/2 from analyzing power in (pol d,p).
2297 *5*			F	E(level): this level is probably different from 2299, $17/2^{(+)}$ level from spin consideration.
2298.96[d] *17*	$17/2^+$		C M	Jπ: ΔJ=2, E2 γ to $13/2^+$; spin=17/2 from yield function in (α,nγ); band member.
2313.97[e] *19*	$15/2^+$		C M	Jπ: ΔJ=2, E2 γ to $11/2^+$; ΔJ=1, D+Q γ to $13/2^+$; 15/2

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	XREF	Comments
			from yield function in (α,nγ).
2330 *5*		F	
2345 *3*	5/2+	F	Jπ: L(d,p)=2 from 0+; L+1/2 from analyzing power in (pol d,p).
2348.96[g] *12*	13/2−	C M	Jπ: ΔJ=2, E2 γ to 9/2−; ΔJ=1, dipole γ to 11/2−; band member.
2351.60 *22*	1/2−,3/2−	D I K	XREF: K(2348). Jπ: L(p,d)=1 from 0+. Tentative (3/2−,5/2−) from σ(θ) in (^{3}He,t). This level is probably different from 2345 *3* in (d,p) due to different L-transfers involved.
2364.1 *4*	(1/2+)	D F	Jπ: L(d,p)=(0) from 0+.
2386 *3*	5/2−,7/2−	F K	E(level): weighted average of 2388 *5* from (d,p) and 2384 *4* from (p,d). Jπ: L(p,d)=3 from 0+.
2426.8 *5*	1/2,3/2,5/2+[#]	D	
2435 *1*	(3/2−,5/2−)	I	E(level): this level is likely different from the 2435.2, 1/2+ level. Jπ: tentative assignment from σ(θ) in (^{3}He,t).
2435.2 *5*	1/2+	D F	Jπ: L(d,p)=0 from 0+.
2455 *3*		F	
2462.35 *15*	(1/2,3/2)[a]	D	
2479 *4*		K	
2486 *3*	1/2+	F K	XREF: K(2487). Jπ: L(d,p)=L(p,d)=0 from 0+.
2515.3 *3*	1/2,3/2,5/2+[#]	D	
2518.5[‡] *5*	(1/2,3/2)[a]	D	
2523 *3*	5/2+	F	Jπ: L(d,p)=2 from 0+; L+1/2 from analyzing power in (pol d,p).
2533.97 *7*	(1/2,3/2)[a]	D	
2543 *3*		F	
2572 *5*		F	
2590 *3*		F	
2616 *3*		F	
2642 *1*	5/2+	F I	XREF: F(2644). Jπ: L(d,p)=2 from 0+; L+1/2 from analyzing power in (pol d,p).
2675.8 *4*	1/2−,3/2−	D F K	XREF: F(2669). Jπ: L(p,d)=1 from 0+.
2696 *4*		F K	E(level): weighted average of 2694 *5* from (d,p) and 2697 *4* from (p,d).
2699.0[h] *6*	(15/2+)	M	Jπ: ΔJ=(2), (Q) γ to 11/2+; band member.
2709 *4*	7/2+,9/2+	K	Jπ: L(p,d)=4 from 0+.
2725 *5*		F	
2742 *5*	(1/2−,3/2−)	F	Jπ: L(d,p)=(1) from 0+.
2756 *3*	3/2+,5/2+	F	Jπ: L(d,p)=2 from 0+.
2773 *3*	1/2+	F	Jπ: L(d,p)=0 from 0+.
2778 *1*	1/2−,3/2−	I K	Jπ: L(p,d)=1 from 0+. Tentative (5/2−) from σ(θ) in (^{3}He,t).
2789 *3*		F	
2806 *1*	(5/2−)	F I	XREF: F(2802). Jπ: tentative assignment from σ(θ) in (^{3}He,t).
2830 *3*		F	
2837.20[j] *20*	15/2−	M	Jπ: ΔJ=1, E1 γ to 13/2+; ΔJ=2, Q γ to 11/2−; band member.
2857 *3*	3/2+,5/2+	F	Jπ: L(d,p)=2 from 0+.
2868.3 *4*	1/2+	D K	Jπ: L(p,d)=0 from 0+.
2881 *3*	3/2+	F	Jπ: L(d,p)=2 from 0+; L-1/2 from analyzing power in (pol d,p).
2889 *2*	1/2−,3/2−	F I K	E(level): weighted average of 2896 *3* from (d,p), 2888 *1* from (^{3}He,t), and 2889 *4* from (p,d). Jπ: L(p,d)=1 from 0+. Tentative (5/2−) from σ(θ) in (^{3}He,t).
2890.3[f] *3*	15/2−	M	Jπ: ΔJ=2, E2 γ to 11/2−; ΔJ=1, D γ to 13/2−; band member.
2912 *3*	3/2+,5/2+	F K	E(level): weighted average of 2911 *3* from (d,p) and 2913 *4* from (p,d).

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	XREF	Comments
			Jπ: L(p,d)=2 from 0+.
2924 *1*	(5/2−)	F I	XREF: F(2922). Jπ: tentative assignment from σ(θ) in (^{3}He,t).
2940 *3*		F	
2952.0 *4*	(1/2,3/2)[a]	D K	
2960 *3*	1/2+	F	Jπ: L(d,p)=0 from 0+.
3003 *3*	5/2+	F	Jπ: L(d,p)=2 from 0+; L+1/2 from analyzing power in (pol d,p).
3024.9[‡] *4*	(1/2,3/2)[a]	D	
3035 *3*	5/2+	F	Jπ: L(d,p)=2 from 0+; L+1/2 from analyzing power in (pol d,p).
3065 *3*	3/2+,5/2+	F	Jπ: L(d,p)=2 from 0+.
3075.2 *5*		D	
3087 *3*	1/2+	F	Jπ: L(d,p)=0 from 0+.
3097.49[i] *17*	17/2+	M	Jπ: ΔJ=1, M1 γ to 15/2+; ΔJ=0 γ to 17/2+; band member.
3102 *3*		F K	XREF: K(3100).
3114 *3*		F	
3129 *3*		F	
3154 *3*		F	
3157.6 *4*	(1/2,3/2)[a]	D F	XREF: F(3161).
3183.5 *4*	1/2+	D F	Jπ: L(d,p)=0 from 0+.
3200 *5*	3/2+,5/2+	F K	E(level): weighted average of 3205 *5* from (d,p) and 3195 *5* from (p,d). Jπ: L(d,p)=2 from 0+.
3208.5[‡] *4*	(1/2,3/2)[a]	D	
3214.1 *4*	(1/2,3/2)[a]	D K	
3223.9[‡] *4*	(1/2,3/2)[a]	D	
3232 *3*	(1/2+)	F K	Jπ: L(d,p)=(0) from 0+.
325×10^1 *25*		I	E(level): 3.0-3.5 MeV energy range.
3260.7 *5*		D	
3268 *5*		F K	E(level): weighted average of 3263 *5* from (p,d) and 3273 *5* from (d,p).
3272.39[k] *15*	17/2−	M	Jπ: ΔJ=2, E2 γ to 13/2−; ΔJ=1, D γ to 15/2−; band member.
3286 *3*	(1/2−)	F K	XREF: K(3287). Jπ: L(p,d)=1 from 0+; L(d,p)=(2,1) and (L-1/2) from analyzing power in (pol d,p).
3293 *5*		F	
3311 *5*	(1/2−)	F	Jπ: L(d,p)=(1) from 0+ and (L-1/2) from analyzing power in (pol d,p).
3325.2[g] *4*	17/2−	M	Jπ: ΔJ=2, E2 γ to 13/2−; band member.
3334 *3*	(3/2+,5/2+)	F	Jπ: L(d,p)=(2) from 0+.
3339.5[‡] *4*	(1/2,3/2)[a]	D	
3361 *5*		F k	XREF: k(3369). Jπ: L(p,d)=1 for 3369 *5* suggests 1/2−,3/2− for 3365 and/or 3375 level.
3375 *3*		F k	XREF: k(3369). See comment for 3365 level.
3382.1 *4*	(1/2+)	D F	Jπ: L(d,p)=(3,0) from 0+; γ to 1/2−; primary γ from 1/2+.
3404.6 *4*	(1/2,3/2)[a]	D F	
3407.5[‡] *4*	(1/2,3/2)[a]	D	
3411.59[j] *18*	19/2−	M	Jπ: ΔJ=2, E2 γ to 15/2−; ΔJ=1, E1 γ to 17/2+; band member.
3422 *5*	3/2+,5/2+	F	Jπ: L(d,p)=2 from 0+.
3444 *5*		F	
3462.9[‡] *4*	(1/2,3/2)[a]	D F	
3473 *5*	3/2+,5/2+	F	Jπ: L(d,p)=2 from 0+.
3481.7 *4*	(3/2)+	D F	Jπ: L(d,p)=2 from 0+ and (L-1/2) from analyzing power in (pol d,p).
3496 *5*		F	
3514 *5*	1/2−,3/2−	F K	E(level): weighted average of 3509 *5* from (d,p) and 3518 *5* from (p,d). Jπ: L(p,d)=1 from 0+.

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	XREF	Comments
3533 *5*		K	
3556.1 *4*	$(3/2)^+$	D F K	Jπ: L(d,p)=2 from 0^+; possible γ to $1/2^-$, possible primary γ from $1/2^+$.
3569.9 *4*	$1/2^-,3/2^-$	D F K	Jπ: L(d,p)=1 from 0^+.
3593.07[d] *20*	$21/2^+$	M	Jπ: ΔJ=2, E2 γ to $17/2^+$; band member.
3597 *3*	$3/2^-$	F	Jπ: L(d,p)=1 from 0^+; L+1/2 from analyzing power in (pol d,p).
3599.6[e] *4*	$19/2^+$	M	Jπ: ΔJ=2, Q γ to $15/2^+$; ; band member.
3615 *5*	$(1/2^+)$	F	Jπ: L(d,p)=(0) from 0^+.
3633 *3*		F	
3647 *5*		F	
3661 *3*		F K	E(level): weighted average of 3659 *3* from (d,p) and 3667 *6* from (p,d).
3681 *3*	$(1/2^-,3/2,5/2^+)$	F K	E(level): weighted average of 3682 *3* from (d,p) and 3677 *6* from (p,d). Jπ: L(d,p)=2,(1) from 0^+.
3721 *3*	$1/2^+$	F	Jπ: L(d,p)=0 from 0^+.
3744 *3*		F	
375×10[1] *25*		I	E(level): 3.5-4.0 MeV energy range.
3757.3[f] *6*	$(19/2^-)$	M	Jπ: γ to $15/2^-$; band member.
3767 *3*	$(5/2^+)$	F	Jπ: L(d,p)=(2) from 0^+; (L+1/2) from analyzing power in (pol d,p).
3774 *5*	$5/2^-,7/2^-$	F K	E(level): weighted average of 3778 *5* from (d,p) and 3769 *6* from (p,d). Jπ: L(p,d)=3 from 0^+.
3792 *5*	$1/2^-,3/2^-$	F K	E(level): weighted average of 3793 *5* from (d,p) and 3790 *6* from (p,d). Jπ: L(p,d)=1 from 0^+.
3824 *5*		F	
3843 *3*		F	
3855 *3*		F	
3866.0 *4*	$(1/2,3/2)$[a]	D F	
3884 *5*		F	
3893.5 *4*	$1/2^-,3/2^-$	D K	Jπ: L(p,d)=1 from 0^+.
3899 *3*	$(3/2)^+$	F	Jπ: L(d,p)=2 from 0^+; (L-1/2) from analyzing power in (pol d,p).
3910 *3*	$(5/2^+)$	F	Jπ: L(d,p)=(2) from 0^+; (L+1/2) from analyzing power in (pol d,p).
3924 *3*		F k	XREF: k(3932). Jπ: see comment for 3944 level.
3944 *3*	$1/2^-,3/2^-$	F k	XREF: k(3932). Jπ: L(p,d)=1 for a group at 3932 *6* suggests $1/2^-,3/2^-$ for 3324 and/or 3944 level.
3960 *3*	$1/2^+$	F K	XREF: K(1961). Jπ: L(d,p)=0 from 0^+.
3976 *5*		F k	XREF: k(3986).
3996 *5*		F k	XREF: k(3986).
4014.0?[h] *8*	$(19/2^+)$	M	Jπ: γ to $(15/2^+)$; ; band member.
4050 *10*		F k	XREF: k(4066).
4080 *10*		F k	XREF: k(4066).
4090 *10*		F	
4098.71[k] *25*	$21/2^-$	M	Jπ: ΔJ=2, E2 γ to $17/2^-$; ΔJ=1, M1 γ to $19/2^-$; band member.
4140 *10*		F	
4226.5 *4*	$(1/2,3/2)$[a]	D F K	
425×10[1] *25*		I	E(level): 4.0-4.5 MeV energy range.
4306.8 *5*	$(1/2,3/2)$[a]	D F	
4363.1?[g] *6*	$(21/2^-)$	M	Jπ: γ to $17/2^-$; band member.
4388 *7*		K	
4410 *10*	$(1/2^+)$	F	Jπ: L(d,p)=(0) from 0^+.
4472.8[j] *5*	$23/2^-$	M	Jπ: ΔJ=2, Q γ to $19/2^-$; ΔJ=1, D γ to $21/2^-$; band member.
4.5×10[3] *29*		I	E(level): 1580-7420 energy range.
4520 *10*		F	
4914.8[e] *7*	$23/2^+$	M	Jπ: ΔJ=2, Q γ to $19/2^+$; band member.

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	Jπ	XREF	Comments
5×10³ *3*		J	E(level): wide bump in the range 2-8 MeV with a total G-T strength=3.2 *4*. G-T strengths (1991As05) for different energy regions are: 0.17 *3* for 0-1 MeV, 0.14 *3* for 1-2 MeV, 0.13 *3* for 2-3 MeV, 0.35 *6* for 3-4 MeV, 0.71 *14* for 4-5 MeV, 0.64 *15* for 5-6 MeV, 0.55 *14* for 6-7 MeV, 0.55 *14* for 7-8 MeV.
5009.4[d] *4*	25/2⁺	M	Jπ: ΔJ=2, Q γ to 21/2⁺; band member.
525×10¹ *25*		I	E(level): 5.0-5.5 MeV energy range.
5274.3[k] *6*	25/2⁻	M	Jπ: ΔJ=2, Q γ to 21/2⁻; band member.
5727.2[j] *6*	27/2⁻	M	Jπ: ΔJ=2, Q γ to 23/2⁻; ΔJ=1, D γ to 25/2⁻; band member.
575×10¹ *25*		I	E(level): 5.5-6.0 MeV energy range.
6×10³ *2*		G	E(level): wide bump between 4-8 MeV. B(GT)-strength=4.3 *7* (1985Kr10).
625×10¹ *25*		I	E(level): 6.0-6.5 MeV energy range.
6639.7[d] *7*	29/2⁺	M	Jπ: ΔJ=2, Q γ to 25/2⁺; band member.
675×10¹ *25*		I	E(level): 6.5-7.0 MeV energy range.
7114.0[j] *9*	31/2⁻	M	Jπ: ΔJ=2, Q γ to 27/2⁻; band member.
721×10¹ *21*		I	E(level): 7.0-7.42 MeV energy range.
(7415.957 *16*)	1/2⁺	D	E(level): S(n)=7415.94 *11* from 2021Wa16. Jπ: s-wave neutron capture in ^{70}Ge g.s.
7417.03 *11*	1/2⁺[@]	E	
7417.39 *11*	1/2⁺[@]	E	
7417.85 *11*	(1/2⁻,3/2⁻)[&]	E	
7419.05 *11*	(1/2⁻,3/2⁻)[&]	E	
7420.11 *11*	(1/2⁻,3/2⁻)[&]	E	
7420.28 *11*	1/2⁺[@]	E	
7421.46 *11*	1/2⁺[@]	E	
7422.64 *11*	1/2⁺[@]	E	
7424.52 *11*	1/2⁺[@]	E	
7425.76 *12*	1/2⁺[@]	E	
7426.16 *12*	1/2⁺[@]	E	
7426.83 *12*	1/2⁺[@]	E	
7427.63 *12*	1/2⁺[@]	E	
7429.04 *12*	1/2⁺[@]	E	
7434.28 *12*	1/2⁺[@]	E	
7439.67 *13*	1/2⁺[@]	E	
7441.60 *13*	1/2⁺[@]	E	
7443.44 *14*	1/2⁺[@]	E	
7444.66 *14*	1/2⁺[@]	E	
7451.99 *16*		E	
7455.70 *16*		E	
7.94×10³ *52*		I	E(level): 7420-8460 energy range.
8913 *5*	3/2⁻	G I	%n≈100 (1988Ch25) Additional information 1. E(level): from (^{3}He,t). Jπ: IAS of 3/2⁻ g.s. in ^{71}Ga. 53% *9* decay proceeds through neutron decay to 1.22 MeV state in ^{70}Ge with subsequent observation of 1040γ in ^{70}Ge. The γ decay of IAS to ^{71}Ga through single high-energy γ ray or a cascade of two γ rays is determined to be less than 11%(1988Ch25).

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Adopted Levels, Gammas (continued)

^{71}Ge Levels (continued)

E(level)[†]	XREF	Comments
11.75×10^3	I	Gamow-Teller giant resonance (GTGR), wide structure from 10-16 MeV, peaking at ≈11.75 MeV (2015Fr02,2011Fr15).
18.0×10^3	I	Interpreted as $T_>$ component of the GTGR (2015Fr02,2011Fr15).

[†] From a least-squares fit to Eγ data for levels connected with γ transitions and others are from transfer reactions, unless otherwise noted. Fit to the listed Eγ data for 284 γ rays gave an unacceptable normalized χ^2=3.4 with 17 γ rays outside three standard deviations, as compared to χ^2=1.26 at 95% confidence level. The evaluators have increased the uncertainties, as indicated under comments, resulting in χ^2=1.45 with these adjustments. Uncertainty of 0.5 keV for γ-ray energy is assumed when not stated.

[‡] From 2004Ho25 based on γγ-coin cascade data. This level should be treated as tentative since intensities of γ rays associated with the population and decay of this level are not available.

[#] Primary γ from 1/2$^+$ in (n,γ) E=th.

[@] From assignment of s-wave (L=0) resonance in (n,n),(n,γ):resonances.

[&] From assignment of p-wave (L=(1)) resonance in (n,n),(n,γ):resonances.

[a] Possible γ to 1/2$^-$, possible primary γ from 1/2$^+$.

[b] From DSA in (p,nγ) (1999Iv08), unless otherwise stated. There are values available for 747, 808, 831, 1096, 1379, 1406, 1414, 1422, 1558 and 1566 levels from DSA measurements of 2002Ka51 from (p,nγ). These values are not included here due to problems associated with assignment of γ-ray lines to ^{71}Ge, since a natural Ga target was used in the experiment. See (p,nγ) dataset for details.

[c] From (α,nγ) with DSAM; should be considered an upper limit since no feeding corrections have been made.

[d] Band(A): Band based on 198, 9/2$^+$,α=+1/2.

[e] Band(a): Band based on 11/2$^+$,α=−1/2.

[f] Band(B): Band based on 3/2$^-$,α=−1/2.

[g] Band(b): Band based on 5/2$^-$,α=+1/2.

[h] Band(C): Band based on 7/2$^+$,α=−1/2.

[i] Band(c): Band based on 1038, 9/2$^+$,α=+1/2.

[j] Band(D): Octupole band based on 15/2$^-$,α=−1/2.

[k] Band(d): Octupole band based on 17/2$^-$,α=+1/2.

Adopted Levels, Gammas (continued)

$\gamma(^{71}Ge)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
174.954	5/2$^-$	174.956 *9*	100	0.0	1/2$^-$	E2		0.0915 *13*	B(E2)(W.u.)=2.24 *8* α(K)=0.0808 *11*; α(L)=0.00923 *13*; α(M)=0.001369 *19* α(N)=7.91×10^{-5} *11* E_γ: weighted average of 174.954 *5* from ^{71}As ε decay, 174.9 *1* from (α,nγ), 175.05 *3* from (n,γ) E=th, and 174.9 *1* from (p,nγ) and (α,α3nγ).
198.371	9/2$^+$	23.438 *15*	100	174.954	5/2$^-$	M2		207.5 *30*	B(M2)(W.u.)=0.0607 *10* α(K)=169.5 *24*; α(L)=32.7 *5*; α(M)=5.03 *7* α(N)=0.265 *4* E_γ,Mult.: from ^{71}Ge IT decay with Mult from α(exp) data (1971Mu14).
499.915	3/2$^-$	324.92 *6*	0.48 *11*	174.954	5/2$^-$				E_γ,I_γ: other: Iγ=3.0 *5* for a 324.4 *1* γ in (p,nγ) is in disagreement. This γ not reported in (n,γ), (α,nγ) and (α,α3nγ).
		499.94 *3*	100.0 *20*	0.0	1/2$^-$	M1+E2	−2.3 *1*	2.20×10^{-3} *3*	E_γ: unweighted average of 499.876 *10* from ^{71}As ε decay, 500.0 *1* from (α,nγ), 499.966 *22* from (n,γ) E=th, and 499.9 *1* from (p,nγ), 499.9 *3* in (α,α3nγ). δ: +0.11 *2* or −2.3 *1* from ^{71}As ε decay; +0.18 *20* or −2.8 *+11−36* in (p,nγ); +0.12 *12* or +2.4 *+11−7* in (α,nγ); α(K)exp in (p,nγ) agrees with higher δ.
525.114	5/2$^+$	326.798 *19*	100.0 *22*	198.371	9/2$^+$	E2		0.00955 *13*	E_γ: weighted average of 326.785 *15* from ^{71}As ε decay, 326.8 *1* from (α,nγ), 326.86 *3* from (n,γ) E=th, and 326.7 *1* from (p,nγ). δ(M3/E2)=+0.05 *6* (^{71}As ε decay), −0.08 *+9−11* (α,nγ).
		350.164 *7*	12.50 *30*	174.954	5/2$^-$	E1+M2	−0.19 *3*	0.00216 *13*	E_γ: weighted average of 350.163 *6* from ^{71}As ε decay, 350.0 *2* from (α,nγ), 350.26 *5* from (n,γ) E=th, and 350.2 *1* from (p,nγ). I_γ: weighted average of 12.41 *30* from ^{71}As ε decay, 13.4 *6* from (α,nγ), 12.4 *11* from (n,γ) E=th, and 11.8 *7* from (p,nγ). δ: from $\gamma(\theta$,T) in ^{71}As ε decay. Others: −0.09 *+11−10* or +2.1 *+7−5* in (p,nγ); +0.21 *13* or −2.2 *+4−7* in (α,nγ); α(K)exp in (p,nγ) agrees with dominant E1, also marginally with pure M1.
589.775	7/2$^+$	64.7 *1*	4.7 *3*	525.114	5/2$^+$	[M1+E2]		2.0 *18*	α(K)=1.7 *15*; α(L)=0.26 *24*; α(M)=0.038 *35* α(N)=0.0017 *15* E_γ,I_γ: from (p,nγ). Other: Iγ ≤0.23 deduced from $\gamma\gamma$-coin in ^{71}As decay.
		391.396 *24*	100.0 *8*	198.371	9/2$^+$	M1+E2	−0.21 *+4−3*	0.00257 *5*	E_γ: weighted average of 391.383 *18* from ^{71}As ε decay, 391.4 *1* from (α,nγ), 391.45 *3* from (n,γ)

From ENSDF

$^{71}_{32}Ge_{39}$-11

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
									E=th, 391.2 *1* from (p,nγ), 391.3 *1* in (α,α3nγ). δ: weighted average of −0.23 *4* from ^{71}As ε decay, −0.18 *+4−3* from (p,nγ), and −0.25 *6* from (α,nγ). Higher values of −2.9 *+5−8* in (α,nγ) and −3.7 *+5−6* in (p,nγ) are inconsistent with ce data in (p,nγ).
589.775	7/2$^+$	414.55 *16*	0.54 *14*	174.954	5/2$^-$	[E1]		1.13×10^{-3} *2*	E_γ: unweighted average of 414.39 *10* from ^{71}As ε decay and 414.7 *1* from (p,nγ). I_γ: other: 4.9 *5* from (p,nγ) is in disagreement; this γ not reported in (n,γ) and (α,nγ).
708.196	3/2$^-$	533.2 *1*	4.7 *9*	174.954	5/2$^-$	[M1,E2]		0.0016 *4*	E_γ: from (p,nγ). Others: 533.2 *2* from ^{71}As ε decay and 533.18 *20* from (n,γ) E=th. I_γ: unweighted average of 7.0 *7* from ^{71}As ε decay, 4.7 *8* from (α,nγ), 4.0 *7* from (n,γ) E=th, and 2.90 *20* from (p,nγ). B(M1)(W.u.)<7.4×10^{-4} if M1. B(E2)(W.u.)<3.8 if E2.
		708.193 *8*	100.0 *21*	0.0	1/2$^-$	M1+E2			E_γ: weighted average of 708.195 *5* from ^{71}As ε decay, 708.0 *1* from (α,nγ), 708.14 *3* from (n,γ) E=th, and 708.1 *1* from (p,nγ). I_γ: from (p,nγ). Others: 100.0 *31* from ^{71}As ε decay, 100.0 *8* from (α,nγ), and 100 *7* from (n,γ) E=th. Mult.,δ: +0.27 *11* or −3.1 *+8−14* from γ(θ) in (α,nγ); −2.9 *+8−14* or +0.19 *+10−8* from γ(θ) in (p,nγ); α(K)exp in (p,nγ) gives M1 or E2. B(M1)(W.u.)<0.0056 if M1. B(E2)(W.u.)<16 if E2.
747.248	5/2$^-$	247.352[‡] *5*	75.6 *21*	499.915	3/2$^-$	M1+E2	−0.18 *7*	0.0080 *5*	E_γ: poor fit, energy uncertainty increased three times to 0.015 keV in the fitting procedure. E_γ: weighted average of 247.351 *5* from ^{71}As ε decay, 247.5 *3* from (α,nγ), 247.40 *4* from (n,γ) E=th, 247.3 *1* from (p,nγ), and 247.3 *6* in (α,α3nγ). I_γ: weighted average of 73.8 *19* from ^{71}As ε decay, 75.0 *30* from (α,nγ), 84 *7* from (n,γ) E=th, and 85 *5* from (p,nγ). Other: 117 *20* in (α,α3nγ). δ: −2.1 *+3−5* or −0.18 *7* (p,nγ); −0.07 to −2.14 (α,nγ); α(K)exp in (p,nγ) consistent with lower δ for M1+E2.
		572.259 *15*	100.0 *21*	174.954	5/2$^-$	M1+E2		0.00129 *27*	E_γ: weighted average of 572.255 *15* from ^{71}As ε decay, 572.29 *5* from (n,γ) E=th, and 572.3 *1* from (p,nγ). Other: 572.3 *3* from (α,nγ), 572.1 *6* in (α,α3nγ). I_γ: others: 100 *4* from (α,nγ), 100 *9* from (n,γ) E=th, 100 *4* from (p,nγ), and 100 *17* in (α,α3nγ). Mult.,δ: −0.07 or +2.1 *+4−3* (p,nγ); 0.00 *18* or +1.3 *+4−3* (α,nγ); α(K)exp in (p,nγ) consistent with M1 or E2.
		747.272 *21*	55.4 *28*	0.0	1/2$^-$	(E2)			E_γ: unweighted average of 747.28 *1* from ^{71}As ε decay,

$^{71}_{32}Ge_{39}$-12

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
									747.3 *3* from (α,nγ), 747.09 *5* from (n,γ) E=th, and 747.2 *1* from (p,nγ). Other: 747.3 *6* in (α,α3nγ).
									I_γ: unweighted average of 61.7 *19* from ^{71}As ε decay, 49 *5* from (α,nγ), 58 *5* from (n,γ) E=th, and 53.0 *20* from (p,nγ). Other: 60 *12* in (α,α3nγ).
									Mult.: δ(O/Q)=−0.14 *+14−22* or −1.9 *+7−9* (p,nγ); ΔJ=2, Q from (α,α,3nγ); E2 from level scheme.
808.196	1/2−	308.25[a] *4*	58[a] *12*	499.915	3/2−	(M1+E2)		0.008 *4*	E_γ: weighted average of 308.24 *4* from ^{71}As ε decay, 308.29 *5* from (n,γ) E=th, and 308.2 *1* from (p,nγ). Other: 307.9 *5* from (α,nγ).
									I_γ: unweighted average of 39 *6* from ^{71}As ε decay, 75 *3* from (α,nγ), 34 *3* from (n,γ) E=th, and 82 *4* from (p,nγ).
									Mult.,δ: δ(Q/D)=+0.09 to +2.7 from γ(θ) in (α,nγ); M1+E2 from level scheme.
		633.2 *1*	50 *3*	174.954	5/2−				E_γ: from (p,nγ). Eγ=633.440 *25* from ^{71}As decay is not used since its intensity of 161 *20* is in severe disagreement from those in (p,nγ) and (α,nγ). This γ not reported in (n,γ).
									I_γ: weighted average of 54.0 *30* from (α,nγ) and 48.0 *20* from (p,nγ). Other: 161 *20* from ^{71}As ε decay is in severe disagreement.
		808.21 *4*	100 *3*	0.0	1/2−				E_γ: weighted average of 808.27 *3* from ^{71}As ε decay, 807.8 *4* from (α,nγ), 808.13 *4* from (n,γ) E=th, and 808.1 *1* from (p,nγ).
									I_γ: from (p,nγ). Others: 100 *8* from ^{71}As ε decay, 100 *4* from (α,nγ), and 100 *9* from (n,γ) E=th.
831.301	3/2−	241.77 *13*	2.5 *4*	589.775	7/2+	[M2]		0.0409 *6*	α(K)=0.0362 *5*; α(L)=0.00408 *6*; α(M)=0.000612 *9* α(N)=3.90×10^{-5} *6*
									E_γ: weighted average of 241.75 *13* from (n,γ) E=th and 241.8 *2* from (p,nγ).
									I_γ: weighted average of 2.3 *3* from (α,nγ), 4.8 *9* from (n,γ) E=th, and 2.5 *3* from (p,nγ).
		306.210 *25*	28.7 *18*	525.114	5/2+	(E1+M2)		0.00274 *17*	E_γ: weighted average of 306.217 *25* from ^{71}As ε decay, 306.21 *4* from (n,γ) E=th, and 306.1 *1* from (p,nγ). Other: 306.2 *5* from (α,nγ).
									I_γ: weighted average of 29 *4* from ^{71}As ε decay, 28.5 *18* from (α,nγ), 29.4 *24* from (n,γ) E=th, and 28.5 *19* from (p,nγ).
									Mult.,δ: ΔJ=1, D+Q from γ(θ) in (α,nγ) with δ>+0.19; E1+M2 from level scheme.
		331.42 *5*	22.2 *16*	499.915	3/2−	E2(+M1)	>1.4	0.0082 *9*	E_γ: weighted average of 331.4 *2* from ^{71}As ε decay, 331.4 *3* from (α,nγ), 331.45 *4* from (n,γ) E=th, and 331.2 *1* from (p,nγ).
									I_γ: weighted average of 20.1 *15* from (α,nγ), 23.9 *21* from (n,γ) E=th, and 25.0 *22* from (p,nγ). Other: 19 *10* from ^{71}As ε decay.
									Mult.,δ: from α(K)exp in (p,nγ). Other: δ(Q/D)<−0.19 from γ(θ) in (α,nγ).

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$^{71}_{32}Ge_{39}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{71}Ge)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
831.301	3/2$^-$	831.293 *10*	100.0 *19*	0.0	1/2$^-$	(M1+E2)	−0.6 *+4−7*		E_γ: weighted average of 831.294 *10* from ^{71}As ε decay, 831.3 *3* from (α,nγ), 831.29 *3* from (n,γ) E=th, and 831.2 *1* from (p,nγ). I_γ: from (α,nγ). Others: 100 *3* from ^{71}As ε decay, 100 *8* from (n,γ) E=th, and 100.0 *22* from (p,nγ). Mult.,δ: D+Q with δ from $\gamma(\theta)$ in (p,nγ); M1+E2 from level scheme. Other: δ(Q/D)=0.00 *21* or −1.7 *+5−10* from $\gamma(\theta)$ in (α,nγ).
886.94	(3/2$^-$)	711.6 *3*	100 *25*	174.954	5/2$^-$				
		886.98 *10*	63 *13*	0.0	1/2$^-$				
1026.561	5/2$^-$	195.22 *15*	1.0 *5*	831.301	3/2$^-$	[M1,E2]		0.037 *24*	α(K)=0.033 *21*; α(L)=0.0037 *24*; α(M)=5.E−4 *4* α(N)=3.3×10^{-5} *20* B(M1)(W.u.)<0.021 if M1. B(E2)(W.u.)<811, exceeds RUL=300 if E2.
		279.379[‡] *7*	21.6 *10*	747.248	5/2$^-$	(M1+E2)		0.011 *6*	E_γ: poor fit, energy uncertainty increased four times to 0.028 keV in the fitting procedure. E_γ: others: 279.61 *22* from (n,γ) E=th and 279.2 *2* from (p,nγ). I_γ: weighted average of 21.6 *8* from ^{71}As ε decay, 12 *5* from (n,γ) E=th, and 22.5 *14* from (p,nγ). Mult.,δ: D+Q and δ=−0.12 *+17−19* or +2.5 *+22−8* from $\gamma(\theta)$ in (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)<0.11 if M1. B(E2)(W.u.)<2014 upper limit exceeds RUL=300 if E2.
		501.5[b] *6*		525.114	5/2$^+$				E_γ: from (n,γ) E=th only; treated as questionable by the evaluators due to no intensity reported and γ not seen in other studies.
		526.642[‡] *4*	100.0 *22*	499.915	3/2$^-$	(M1+E2)	−0.16 *3*	1.26×10^{-3} *2*	B(M1)(W.u.)<0.07; B(E2)(W.u.)<13 E_γ: poor fit, energy uncertainty increased two times to 0.008 keV in the fitting procedure. E_γ: weighted average of 526.642 *3* from ^{71}As ε decay, 526.4 *3* from (α,nγ), 526.77 *6* from (n,γ) E=th, and 526.7 *1* from (p,nγ). I_γ: others: 100 *4* from (α,nγ), 100 *7* from (n,γ) E=th, and 100.0 *22* from (p,nγ). Mult.,δ: D+Q and δ from $\gamma(\theta)$ in ε decay; M1+E2 from level scheme. Others: δ(Q/D)=−0.53 *+11−44* or −1.07 *+47−21* (p,nγ), −0.5 *+4−6* (α,nγ).
		828.0[b] *1*	0.4 *2*	198.371	9/2$^+$	[M2]		1.15×10^{-3} *2*	E_γ: γ treated as questionable by the evaluators. B(M2)(W.u.)<13 upper limit exceeds RUL=1.
		851.63 *7*	23.1 *11*	174.954	5/2$^-$	(M1+E2)	+0.8 *7*		B(M1)(W.u.)<0.004; B(E2)(W.u.)<5.7

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$^{71}_{32}Ge_{39}$-14

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
									E_γ: weighted average of 851.63 *7* from ^{71}As ε decay and 851.6 *2* from (p,nγ). Other: 850.98 *10* is discrepant. I_γ: weighted average of 21.0 *20* from ^{71}As ε decay, 27 *4* from (α,nγ), and 23.4 *11* from (p,nγ). Other: 87 *11* from (n,γ) E=th is discrepant. Mult.,δ: D+Q and δ from γ(θ) in ^{71}As ε decay. Others: δ(Q/D)=+0.3 *+12−2* or +1.0 *+4−9* (p,nγ).
1026.561	5/2$^-$	1026.510[‡] *17*	35.7 *12*	0.0	1/2$^-$	(E2)			B(E2)(W.u.)<4.9 E_γ: poor fit, energy uncertainty increased four times to 0.034 keV in the fitting procedure. E_γ: others: 1026.6 *3* from (α,nγ), 1026.73 *23* from (n,γ) E=th, and 1026.5 *2* from (p,nγ). I_γ: weighted average of 36.2 *12* from ^{71}As ε decay, 34 *4* from (α,nγ), and 35.3 *14* from (p,nγ). Other: 29 *9* from (n,γ) E=th. Mult.: from γ(θ,T) in ε decay and RUL.
1037.83	9/2$^+$	448.1 *1*	44 *5*	589.775	7/2$^+$	M1+E2	+0.47 *+5−6*	0.00207 *6*	E_γ: weighted average of 448.1 *1* from (α,nγ), 448.0 *2* from (p,nγ), and 447.9 *3* in (α,α3nγ). Other: 448.52 *10* in ε decay not used in averaging due to Iγ=286 *143* in severe disagreement with others. I_γ: unweighted average of 45 *3* from (α,nγ), 34.8 *19* from (p,nγ), and 51 *8* in (α,α3nγ). Other: 286 *143* from ^{71}As ε decay is in severe disagreement. Mult.: D+Q from γ(θ) in (p,nγ) and (α,nγ); M1+E2 from γ(lin pol) in (α,α,3nγ). δ: weighted average of +0.42 *8* (p,nγ) and +0.49 *+5−6* (α,nγ).
		839.4 *1*	100.0 *19*	198.371	9/2$^+$	(M1(+E2))	+0.10 *18*	4.47×10^{-4} *9*	E_γ: weighted average of 839.3 *3* from ^{71}As ε decay, 839.5 *1* from (α,nγ), 839.2 *2* from (p,nγ), and 839.0 *3* in (α,α3nγ). I_γ: from (p,nγ). Other: 100 *3* from (α,nγ), 100 *43* from ^{71}As ε decay, 100 *19* in (α,α3nγ). Mult.,δ: D+Q and δ from (p,nγ); M1+E2 from level scheme. Other: +0.4 *+1−3* from (α,nγ).
1095.511	3/2$^-$	264.21 *15*	0.20 *10*	831.301	3/2$^-$	[M1,E2]		0.013 *7*	B(M1)(W.u.)=0.0034 *+21−16* if M1, B(E2)(W.u.)=71 *+46−34* if E2.
		287.32 *4*	0.52 *6*	808.196	1/2$^-$	[M1,E2]		0.010 *5*	B(M1)(W.u.)=0.0068 *+22−15* if M1. B(E2)(W.u.)=121 *+39−26* if E2.

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$^{71}_{32}Ge_{39}$-15

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	α[&]	Comments
1095.511	3/2$^-$	348.27 *4*	1.17 *18*	747.248	5/2$^-$	[M1,E2]	0.0055 *22*	I_γ: 0.96 is also possible since 1990Me01 list two different values of relative intensity differing by ≈20%. B(M1)(W.u.)=0.0086 *+29−20* if M1. B(E2)(W.u.)=104 *+35−24* if E2.
		387.31 *4*	0.30 *4*	708.196	3/2$^-$	[M1,E2]	0.0039 *14*	B(M1)(W.u.)=0.0016 *+5−4* if M1. B(E2)(W.u.)=16 *+5−4* if E2.
		570.42 *21*	0.54 *4*	525.114	5/2$^+$	[E1]		B(E1)(W.u.)=1.62×10^{-5} *+49−31*
		595.6 *1*	2.01 *20*	499.915	3/2$^-$	[M1,E2]	0.00116 *23*	B(M1)(W.u.)=0.0030 *+9−6* if M1. B(E2)(W.u.)=12.2 *+38−25* if E2.
		920.553 *7*	9.8 *24*	174.954	5/2$^-$	(M1+E2)		E_γ: other: 920.49 *14* from (n,γ) E=th. I_γ: unweighted average of 7.4 *3* from ^{71}As ε decay and 12.1 *16* from (n,γ) E=th. Mult.,δ: D+Q with δ=+0.36 *14* or >+3.7 from γ(θ,T) in ^{71}As ε decay; δ(Q/D)=+0.11 *+12−13* or −2.1 *+5−8* from γ(θ) in (p,nγ); M1+E2 from level scheme. Other: +0.27 *5* or +22 $^{390-11}$ in ^{71}As ε decay. B(M1)(W.u.)=0.0039 *+15−11* if M1. B(E2)(W.u.)=6.8 *+26−19* if E2.
		1095.486 *12*	100.0 *24*	0.0	1/2$^-$	(M1+E2)		E_γ: weighted average of 1095.490 *10* from ^{71}As ε decay, 1096.1 *5* from (α,nγ), 1095.42 *4* from (n,γ) E=th, and 1095.5 *2* from (p,nγ). I_γ: others: 100 *13* from (α,nγ) and 100 *8* from (n,γ) E=th. Mult.,δ: D+Q and δ=+0.23 *2* or −3.20 *2* from ^{71}As ε decay; δ(Q/D)=+0.11 *+12−13* or −2.1 *+5−8* from (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)=0.024 *+7−4* if M1. B(E2)(W.u.)=29 *+8−5* if E2.
1096.07	7/2$^-$	349.0 *6*	6.1 *10*	747.248	5/2$^-$	D		E_γ,I_γ,Mult.: from (α,α3nγ) only. Mult=M1+E2 from level scheme.
		596.1 *5*	21 *4*	499.915	3/2$^-$	(E2)	1.38×10^{-3} *2*	E_γ: weighted average of 596.1 *5* from (p,nγ), and 596.2 *6* in (α,α3nγ). 596.2 *3* in (α,nγ) not used. I_γ: weighted average of 20.8 *36* from (α,α3nγ), and 20 *6* in (p,nγ). Other: 104 *9* in (α,nγ) in severe disagreement. Mult.: ΔJ=2, Q from γγ(θ)(ADO) in (α,α3nγ). Others: γ(θ) in (p,nγ) with δ(O/Q)=+0.05 *+26−24* or −4.7 to +3.5; E2 from level scheme.
		921.1 *1*	100 *6*	174.954	5/2$^-$	M1		E_γ: weighted average of 921.1 *2* from ^{71}As ε decay, 921.4 *3* from (α,nγ), 921.1 *2* from (p,nγ), and 921.2 *1* in (α,α3nγ). I_γ: from (p,nγ). Others: 100 *13* in (α,α3nγ); 100 *8* in (α,nγ). Mult.: from γγ(θ)(ADO) and γ(lin pol) in (α,α3nγ). Others: D+Q, δ=−2.0 *4* from γ(θ) in (α,nγ); δ(Q/D)=−0.10 *7* or −3.0 *4*; −0.23 *+7−8* or −2.0 *+3−4* from γ(θ) in (p,nγ).
1139.441	3/2$^-$	308.24[a] *4*	1.03[a] *21*	831.301	3/2$^-$	(M1+E2)		Mult.,δ: D+Q from γ(θ) in (α,nγ); M1+E2 from level scheme. B(M1)(W.u.)=0.0015 *+9−5* if M1. B(E2)(W.u.)=23 *+13−7* if E2.
		331.48[‡] *4*	2.6 *4*	808.196	1/2$^-$	[M1,E2]		E_γ: poor fit, energy uncertainty increased four times to 0.16 keV in

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$^{71}_{32}Ge_{39}$-16

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
									the fitting procedure. B(M1)(W.u.)=0.0030 *+17−9* if M1. B(E2)(W.u.)=41 *+23−12* if E2.
1139.441	3/2$^-$	392.16 *5*	4.3 *3*	747.248	5/2$^-$	(M1+E2)		0.0038 *13*	Mult.,δ: D+Q and δ=+0.075 *15* or −4.3 *+11−17* from γ(θ,T) in ε decay. B(M1)(W.u.)=0.0030 *+16−8* if M1. B(E2)(W.u.)=29 *+15−8* if E2.
		431.279 *23*	2.52 *11*	708.196	3/2$^-$	[M1,E2]			E_γ: other: 431.0 *3* from (p,nγ). I_γ: weighted average of 2.56 *11* from ^{71}As ε decay and 2.40 *20* from (p,nγ). B(M1)(W.u.)=0.0013 *+7−4* if M1. B(E2)(W.u.)=11 *+6−3* if E2.
		614.26 *5*	1.7 *3*	525.114	5/2$^+$	[E1]			B(E1)(W.u.)=5.6×10^{-6} *+31−17*
		639.477[‡] *14*	6.2 *3*	499.915	3/2$^-$	[M1,E2]			E_γ: poor fit, energy uncertainty increased two times to 0.028 keV in the fitting procedure. E_γ: others: 639.4 *2* from (n,γ) E=th and 639.5 *2* from (p,nγ). I_γ: weighted average of 6.1 *3* from ^{71}As ε decay, 8.6 *24* from (α,nγ), and 6.3 *7* from (p,nγ). Other: 13.9 *17* from (n,γ) E=th is discrepant. B(M1)(W.u.)=0.0010 *+5−3* if M1. B(E2)(W.u.)=3.6 *+19−10* if E2.
		964.479 *9*	11.0 *13*	174.954	5/2$^-$	(M1+E2)	−0.8 *+9−49*		B(M1)(W.u.)<9.0×10^{-4}; B(E2)(W.u.)<1.4 E_γ: other: 964.3 *2* from (p,nγ). I_γ: unweighted average of 8.5 *3* from ^{71}As ε decay, 12 *3* from (α,nγ), and 12.5 *7* from (p,nγ). Mult.,δ: D+Q and δ from γ(θ) in (p,nγ); M1+E2 from level scheme.
		1139.41 *6*	100.0 *5*	0.0	1/2$^-$	M1+E2			E_γ: unweighted average of 1139.461 *19* from ^{71}As ε decay, 1139.4 *5* from (α,nγ), 1139.19 *4* from (n,γ) E=th, and 1139.3 *2* from (p,nγ). I_γ: from (p,nγ). Others: 100.0 *21* from ^{71}As ε decay, 100 *4* from (α,nγ), and 100 *8* from (n,γ) E=th. Mult.,δ: δ(Q/D)=+0.45 *5* or −6.8 *14* from γ(θ) in ^{71}As ε decay; +0.27 *13* or −3.7 *+13−34* from γ(θ) in (p,nγ); M2 component ruled out by RUL. B(M1)(W.u.)=0.0029 *+15−8* if M1. B(E2)(W.u.)=3.3 *+17−9* if E2.
1172.54	13/2$^+$	974.15 *10*	100	198.371	9/2$^+$	E2			E_γ: average of 974.1 *1* in (α,α3nγ) and 974.2 *1* in (α,nγ). Mult.: γγ(θ)(ADO) and γ(lin pol) in (α,α,3ng); δ(M3/E2)=−0.01 *2*, ΔJ=2 from γ(lin pol) in (α,nγ). B(E2)(W.u.)>355 exceeds RUL=300.

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$^{71}_{32}Ge_{39}$-17

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
1192.23	11/2$^+$	993.9 *1*	100	198.371	9/2$^+$	M1+E2	+1.25 *21*		B(M1)(W.u.)>0.066; B(E2)(W.u.)>161 B(E2)(W.u.)>^{161},Ascompared to RUL=300. E_γ: from (α,nγ). Mult.: from γγ(θ)(ADO) and γ(pol) in (α,α3nγ); γ(θ,pol) in (α,nγ). δ: from γ(θ,pol) in (α,nγ). Other: δ(Q/D)=+1.3 *5* (p,nγ).
1205.146	5/2$^+$	373.837 *12*	16.4 *5*	831.301	3/2$^-$	(E1)		1.49×10^{-3} *2*	B(E1)(W.u.)=0.00081 *+29−16* E_γ: others: 373.8 *3* from (α,nγ), 373.91 *16* from (n,γ) E=th, and 373.7 *3* from (p,nγ). I_γ: weighted average of 16.2 *6* from ^{71}As ε decay, 20 *4* from (α,nγ), 19 *5* from (n,γ) E=th, and 24 *8* from (p,nγ). Mult.,δ: δ(Q/D)=0.00 *14* or <−0.36 (α,nγ), 0.00 *11* or −3.1 *+8−16* (p,nγ); higher δ values excluded by RUL and level scheme; E1 from level scheme.
		457.72 *12*	0.62 *16*	747.248	5/2$^-$	[E1]			B(E1)(W.u.)=1.7×10^{-5} *+8−5*
		615.365 *10*	100.0 *22*	589.775	7/2$^+$	(M1+E2)		0.00107 *20*	E_γ: others: 615.5 *2* from (α,nγ), 615.33 *7* from (n,γ) E=th, and 615.4 *2* from (p,nγ). I_γ: others: 100 *6* from (α,nγ), 100 *9* from (n,γ) E=th, and 100 *6* from (p,nγ). Mult.,δ: D+Q and δ=−0.23 *+8−9* or −2.6 *+5−7* from γ(θ,T) in ε decay, δ(Q/D)=−0.14 *5* or −3.5 *+6−8* (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)=0.062 *+22−13* if M1. B(E2)(W.u.)=2.4×10^2 *+9−5* if E2, upper bound exceeds RUL=300.
		680.035 *9*	17.4 *13*	525.114	5/2$^+$	(M1+E2)			E_γ: other: 680.0 *2* from (p,nγ). I_γ: weighted average of 18.4 *9* from ^{71}As ε decay, 13 *4* from (α,nγ), and 14.4 *17* from (p,nγ). Mult.,δ: D+Q and δ=+0.07 *+33−25* or +1.2 *+13−6* (p,nγ). B(M1)(W.u.)=0.0080 *+29−17* if M1. B(E2)(W.u.)=26 *+9−5* if E2.
		705.1 *3*	0.5 *3*	499.915	3/2$^-$	[E1]			B(E1)(W.u.)=3.7×10^{-6} *+29−19*
		1030.20 *8*	2.03 *16*	174.954	5/2$^-$	[E1]			B(E1)(W.u.)=4.8×10^{-6} *+17−10*
1212.511	5/2$^-$	465.228[‡] *10*	28.4 *8*	747.248	5/2$^-$	(M1+E2)		0.0023 *7*	E_γ: poor fit, energy uncertainty increased two times to 0.020 keV in the fitting procedure. E_γ: other: 465.2 *2* from (p,nγ). I_γ: weighted average of 28.8 *8* from ^{71}As ε decay, 25 *8* from (α,nγ), and 26.3 *19* from (p,nγ).

From ENSDF

$^{71}_{32}Ge_{39}$-18

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. @	α &	Comments
								δ: −0.36 to +5.7 for δ(Q/D) from γ(θ) in (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)<0.017 if M1. B(E2)(W.u.)<118 if E2.
1212.511	5/2−	504.27 *5*	47 *14*	708.196	3/2−	(M1+E2)	0.0018 *5*	E_γ: weighted average of 504.28 *5* from ^{71}As ε decay and 504.1 *2* from (p,nγ). I_γ: weighted average of 53 *15* from ^{71}As ε decay, 42 *17* from (α,nγ), and 47 *14* from (p,nγ). Mult.,δ: D+Q and δ=+0.31 *+27−24* or −4.3 to +3.7 from γ(θ) in (p,nγ). B(M1)(W.u.)<0.026 if M1. B(E2)(W.u.)<152 if E2.
		622.71 *4*	4.04 *25*	589.775	7/2+	[E1]		B(E1)(W.u.)<1.9×10^{-5}
		712.598 *5*	100 *3*	499.915	3/2−	(M1+E2)		E_γ: others: 712.2 *5* from (α,nγ) and 712.7 *2* from (p,nγ). I_γ: others: 100 *14* (α,nγ) and 100 *8* from (p,nγ). Mult.,δ: D+Q and δ=−0.19 *+9−11* or −1.8 *+4−5* from γ(θ,T) in ε decay; δ(Q/D)=−2.5 to −0.12 (α,nγ); −0.21 *+14−15* or −2.4 *+8−23* (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)<0.017 if M1. B(E2)(W.u.)<49 if E2.
		1037.530 *15*	62.5 *15*	174.954	5/2−	(M1+E2)		E_γ: others: 1037.0 *10* from (α,nγ) and 1037.7 *3* from (p,nγ). I_γ: weighted average of 62.1 *15* from ^{71}As ε decay, 64 *14* from (α,nγ), and 70 *7* from (p,nγ). Mult.,δ: D+Q and δ=−0.10 *6* or +2.1 *3* from γ(θ,T) in ε decay; δ(Q/D)=−0.5 to +19 (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)<0.0034 if M1. B(E2)(W.u.)<4.7 if E2.
		1212.500 *23*	84.3 *23*	0.0	1/2−	(E2)		B(E2)(W.u.)<2.9 E_γ: others: 1212.3 *5* from (α,nγ) and 1212.5 *2* from (p,nγ). I_γ: weighted average of 85.6 *23* from ^{71}As ε decay and 82 *3* from (p,nγ). Other: 137 *15* from (α,nγ) is discrepant. Mult.: ΔJ=2, quadrupole from γ(θ,T) in ε decay; δ(O/Q)=−0.12 *+19−24* or −1.9 *+7−12* from γ(θ) in (p,nγ); E2 from level scheme.
1288.55	1/2−	580.16 *14*	11 *3*	708.196	3/2−			E_γ: weighted average of 580.10 *8* from (n,γ) E=th and 580.5 *2* from (p,nγ). I_γ: from (p,nγ). Other: 53 *7* from (n,γ) E=th is discrepant, considering I(580γ)/I(789γ)=0.15 *2* from another work (2002Ka51) in (p,nγ).
		788.66 *6*	100 *3*	499.915	3/2−			E_γ: from (n,γ) E=th. Others: 788.5 *3* from (α,nγ) and 788.7 *2* from (p,nγ). I_γ: from (p,nγ). Other: 100 *10* from (n,γ) E=th.
1298.75	3/2−	551.5 *1*	2.2 *9*	747.248	5/2−	[M1,E2]	0.00143 *31*	B(M1)(W.u.)=0.0054 *+28−22* if M1. B(E2)(W.u.)=26 *+14−11* if E2.
		590.5 *1*	13 *4*	708.196	3/2−	[M1,E2]	0.00119 *23*	B(M1)(W.u.)=0.026 *+10−8* if M1. B(E2)(W.u.)=109 *+43−35* if E2.
		798.4 *3*	11.8 *24*	499.915	3/2−	[M1,E2]		E_γ: weighted average of 797.6 *4* from (α,nγ), 798.3 *2* from (n,γ) E=th, and 798.9 *3* from (p,nγ). γ not reported in ^{71}As decay. I_γ: unweighted average of 14.1 *20* from (n,γ)E=th and 9.4 *9* from (p,nγ). Other: 36 *11* from (α,nγ) is in severe disagreement. B(M1)(W.u.)=0.0095 *+32−23* if M1. B(E2)(W.u.)=22 *+8−5* if E2.

From ENSDF

$^{71}_{32}Ge_{39}$-19

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	Comments
1298.75	3/2$^-$	1123.74 *8*	1.6 *3*	174.954	5/2$^-$	[M1,E2]	B(M1)(W.u.)=0.00046 *+16−11* if M1. B(E2)(W.u.)=0.54 *+19−13* if E2.
		1298.50 *17*	100.0 *9*	0.0	1/2$^-$	(M1+E2)	E_γ: unweighted average of 1298.729 *15* from ^{71}As ε decay, 1298.0 *3* from (α,nγ), 1298.56 *5* from (n,γ) E=th, and 1298.7 *2* from (p,nγ). I_γ: from (p,nγ). Others: 100 *3* from ^{71}As ε decay, 100 *16* from (α,nγ), and 100 *7* from (n,γ) E=th. Mult.,δ: D+Q and δ=+0.034 *25* or −1.87 *11* from ^{71}As ε decay; δ(Q/D)=+0.02 *+19−25* or −1.8 *+7−15* (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)=0.019 *+5−3* if M1. B(E2)(W.u.)=16.3 *+45−29* if E2.
1349.10	1/2$^+$	517.78 *6*	100 *10*	831.301	3/2$^-$	[E1]	B(E1)(W.u.)=0.0041 *+13−8* E_γ,I_γ: from (n,γ) E=th. Others: 517.8 *5* from (α,nγ) and 517.6 *10* with Iγ=100 from (p,nγ).
		824.14 *19*	25 *6*	525.114	5/2$^+$	[E2]	B(E2)(W.u.)=31 *+12−9* E_γ,I_γ: from (n,γ) E=th. Other: 824.2 *10* with Iγ=32 from (p,nγ).
		1349.0 *4*	25 *6*	0.0	1/2$^-$	[E1]	B(E1)(W.u.)=5.8×10^{-5} *+23−16* E_γ,I_γ: from (n,γ) E=th. Other: 1349.2 *10* with Iγ=20 from (p,nγ).
1378.53	(1/2$^-$)	1203.7 *6*	100 *17*	174.954	5/2$^-$		E_γ: unweighted average of 1202.5 *5* from (α,nγ), 1204.5 *2* from (n,γ) E=th, and 1204.2 *10* from (p,nγ). Other: tentative 1202.26 *5* from ^{71}As ε decay. I_γ: from (α,nγ). Others: Iγ(1378)/Iγ(1204)=100 *9*/23 *5* in (n,γ); 61 *28*/100 *50* in ^{71}As decay.
		1378.65 *9*	60 *11*	0.0	1/2$^-$		E_γ: weighted average of 1379.0 *5* from ^{71}As ε decay, 1377.3 *6* from (α,nγ), 1378.66 *7* from (n,γ) E=th, and 1378.7 *10* from (p,nγ). I_γ: from (α,nγ). Others: Iγ(1378)/Iγ(1204)=100 *9*/23 *5* in (n,γ); 61 *28*/100 *50* in ^{71}As decay.
1378.71	5/2$^-$	281.8[b] *1*	120	1096.07	7/2$^-$		E_γ: from (p,nγ) only, Iγ(282)/Iγ(632)=100/84.
		631.52 *15*	100 *17*	747.248	5/2$^-$		E_γ: other: 630.8 *1* from (p,nγ).
		788.92 *5*	4.6 *8*	589.775	7/2$^+$		
1406.640	7/2$^-$	311.15 *15*	6.0 *24*	1095.511	3/2$^-$		
		380.08 *6*	11.9 *24*	1026.561	5/2$^-$		
		659.428 *19*	99 *5*	747.248	5/2$^-$		
		698.44 *2*	28.6 *13*	708.196	3/2$^-$		
		906.696 *11*	64.3 *24*	499.915	3/2$^-$		
		1231.692 *15*	100 *4*	174.954	5/2$^-$	(M1+E2)	Mult.,δ: D+Q and δ=+0.58 *15* or +3.2 *4* from γ(θ) in (p,nγ); M1+E2 from level scheme.
		1406.5[b] *1*	3.1 *7*	0.0	1/2$^-$	[M3]	E_γ: could be a sum line.
1416.22	(1/2$^-$,3/2,5/2$^-$)	916.40 *14*	100 *14*	499.915	3/2$^-$		E_γ,I_γ: from (n,γ) E=th. Other: 914.7 *20* from (p,nγ) with I(915γ)/I(1415γ)=20:100 from (p,nγ) is in disagreement.
		1239.7 *10*		174.954	5/2$^-$		E_γ,I_γ: from (p,nγ) only with Iγ(1240)/Iγ(1415)=40/100.
		1415.9 *3*	74 *13*	0.0	1/2$^-$		E_γ: weighted average of 1416.00 *21* from (n,γ) E=th and 1414.5 *10* from (p,nγ). I_γ: from (n,γ) E=th.

From ENSDF

$^{71}_{32}Ge_{39}$-20

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
1422.04	9/2⁻	326.1 *6*	3.9 *6*	1096.07	7/2⁻	(M1)			B(M1)(W.u.)>0.014 E_γ,I_γ: from (α,α3nγ) only. Mult.: ΔJ=1, dipole from (α,α3nγ), (M1) from level scheme.
		675.0 *2*	18.6 *28*	747.248	5/2⁻	E2			B(E2)(W.u.)>25 E_γ: weighted average of 675.0 *2* in (p,nγ), 675.1 *3* from (α,nγ), and 674.9 *3* in (α,α3nγ). I_γ: weighted average of 23 *3* from (α,nγ), 26 *5* from (p,nγ), 15.7 *19* in (α,α3nγ).
		1247.0 *1*	100 *4*	174.954	5/2⁻	E2			B(E2)(W.u.)>7.1 E_γ: weighted average of 1247.1 *1* in (p,nγ), 1247.3 *3* in (α,nγ), and 1247.0 *1* in (α,α3nγ), 1247.0 *1* in ε decay. I_γ: from (p,nγ). Others: 100 *6* in (α,nγ), 100 *12* in (α,α3nγ). Mult.: γγ(θ)(ADO) and γ(pol) in (α,α3nγ); γ(θ,pol) in (α,nγ). δ: d(M3/E2)=−0.06 *6* from γ(θ,pol) in (α,nγ). Other: δ(O/Q)=+0.15 *10* in (p,nγ).
1449.8?		702.5[b] *3*	100	747.248	5/2⁻				
1454.3	(1/2⁺)	646.1[b] *10*	100	808.196	1/2⁻				E_γ: from (p,nγ) only.
1475.9	(5/2⁻)	886.0 *3*	100	589.775	7/2⁺				E_γ: weighted average of 885.97 *17* from (n,γ) E=th and 887.6 *10* from (p,nγ). It is possible that this γ is the same as 887.4 from 1479, 11/2⁺ level.
		952.4 *10*	36	525.114	5/2⁺				E_γ,I_γ: from (p,nγ).
1477.03	11/2⁺	887.4 *1*	87 *6*	589.775	7/2⁺	E2			B(E2)(W.u.)>39 E_γ: weighted average of 887.4 *1* in (α,nγ), 887.0 *3* in (α,α3nγ). I_γ: weighted average of 86 *6* in (α,nγ), 98 *18* in (α,α3nγ). Mult.: ΔJ=2, Q+O with δ=0.07 *5* from γ(θ) in (α,nγ); γγ(θ)(ADO) and γ(pol) in (α,α3nγ).
		1278.5 *1*	100 *9*	198.371	9/2⁺	M1+E2	+4.8 *10*		B(M1)(W.u.)>2.4×10^{-4}; B(E2)(W.u.)>6.9 E_γ: weighted average of 1278.5 *1* in (α,nγ), 1278.1 *3* in (α,α3nγ). I_γ: from (α,nγ). Other: 100 *17* in (α,α3nγ). Mult.: D+Q with δ=+4.8 *10* from γ(θ) in (α,nγ); ΔJ=1, dipole from γγ(θ)(ADO) in (α,α3nγ); M1+E2 from RUL.
1506.388	7/2⁻	674.33[‡] *8*	7.3 *11*	831.301	3/2⁻	[E2]		0.000975 *14*	B(E2)(W.u.)=15 *+7−4* α(K)=0.000870 *12*; α(L)=9.03×10^{-5} *13*; α(M)=1.347×10^{-5} *19* α(N)=8.69×10^{-7} *12* E_γ: poor fit, energy uncertainty increased five times to 0.40 keV in the fitting procedure.
		759.11 *3*	18.8 *21*	747.248	5/2⁻	[M1,E2]			B(M1)(W.u.)=0.0083 *+40−21* if M1. B(E2)(W.u.)=21 *+10−6* if E2.

From ENSDF

$^{71}_{32}Ge_{39}$-21

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	Comments
1506.388	7/2⁻	798.55 *23*	29.2 *22*	708.196	3/2⁻	[E2]		B(E2)(W.u.)=26 *+12−6*
		1006.466 *17*	55.2 *24*	499.915	3/2⁻	[E2]		B(E2)(W.u.)=15 *+7−4*
		1307.98 *3*	12.0 *7*	198.371	9/2⁺	[E1]		B(E1)(W.u.)=1.9×10^{-5} *+9−5*
		1331.526[‡] *23*	100 *4*	174.954	5/2⁻	[M1,E2]		E_γ: poor fit, energy uncertainty increased two times to 0.046 keV in the fitting procedure. B(M1)(W.u.)=0.0082 *+38−20* if M1. B(E2)(W.u.)=6.8 *+31−16* if E2.
1542.48	(1/2⁺,3/2⁻)	447.6 *10*	29	1095.511	3/2⁻			E_γ,I_γ: from (p,nγ).
		1017.35 *8*	100 *12*	525.114	5/2⁺			E_γ,I_γ: from (n,γ) E=th. Others: 1017.3 *4* from (α,nγ) and 1017.3 *10* from (p,nγ).
		1542.3 *8*	24	0.0	1/2⁻			E_γ: weighted average of 1542.2 *8* from (n,γ) E=th and 1542.9 *20* from (p,nγ). I_γ: from (p,nγ).
1558.757	5/2⁺	727.531[‡] *22*	9.2 *5*	831.301	3/2⁻			E_γ: poor fit, energy uncertainty increased two times to 0.044 keV in the fitting procedure.
		1033.55[‡] *3*	100 *3*	525.114	5/2⁺	(M1+E2)	+1.6 *+14−19*	E_γ: poor fit, energy uncertainty increased two times to 0.06 keV in the fitting procedure. E_γ: weighted average of 1033.542 *17* from ^{71}As ε decay, 1034.2 *2* from (α,nγ), 1033.7 *3* from (n,γ) E=th, and 1033.7 *10* from (p,nγ). Mult.,δ: D+Q and δ from γ(θ,T) in ε decay; M1+E2 from level scheme.
		1058.817 *16*	12.6 *5*	499.915	3/2⁻			E_γ: other: 1058.8 *20* with Iγ=10 from (p,nγ).
		1360.44 *13*	4.37 *21*	198.371	9/2⁺			
		1383.86 *4*	1.77 *17*	174.954	5/2⁻			
1566.2	(5/2⁻,7/2⁺)	976.4 *6*		589.775	7/2⁺			E_γ: weighted average of 976.3 *6* from (α,nγ) and 976.5 *10* from (p,nγ).
		1041.0 *10*		525.114	5/2⁺			E_γ: reported in (α,nγ) only.
1598.534	3/2⁻	851.3 *2*	34 *14*	747.248	5/2⁻	[M1,E2]		B(M1)(W.u.)=0.012 *+6−5* if M1. B(E2)(W.u.)=24 *+12−10* if E2.
		890.0 *2*	2.0 *7*	708.196	3/2⁻	[M1,E2]		B(M1)(W.u.)=0.00060 *+34−23* if M1. B(E2)(W.u.)=1.1 *+6−4* if E2.
		1073.4 *2*	1.5 *3*	525.114	5/2⁺	[E1]		B(E1)(W.u.)=4.6×10^{-6} *+21−13*
		1098.58 *6*	100 *3*	499.915	3/2⁻	[M1,E2]		E_γ: weighted average of 1098.64 *7* from ^{71}As ε decay and 1098.54 *6* from (n,γ) E=th. Other: 1098.5 *5* from (α,nγ). I_γ: other: 100 *9* from (n,γ) E=th. B(M1)(W.u.)=0.016 *+6−4* if M1. B(E2)(W.u.)=20 *+8−4* if E2.
		1423.579 *25*	22.8 *8*	174.954	5/2⁻	[M1,E2]		E_γ: others: 1423.59 *21* from (n,γ) E=th and 1424.1 *20* from (p,nγ). I_γ: other: 21 *5* from (n,γ) E=th. B(M1)(W.u.)=0.0017 *+7−4* if M1. B(E2)(W.u.)=1.22 *+48−27* if E2.

From ENSDF

$^{71}_{32}Ge_{39}$-22

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	α[&]	Comments
1598.534	3/2⁻	1598.50 *3*	28.7 *15*	0.0	1/2⁻	[M1,E2]		E_γ: weighted average of 1598.505 *25* from ^{71}As ε decay, 1598.22 *18* from (n,γ) E=th, and 1599.0 *20* from (p,nγ). I_γ: weighted average of 28.9 *15* from ^{71}As ε decay and 27 *4* from (n,γ) E=th. B(M1)(W.u.)=0.0015 *+6−4* if M1. B(E2)(W.u.)=0.86 *+34−20* if E2.
1629.179	(3/2⁺,5/2⁻)	533.6 *2*	11 *6*	1095.511	3/2⁻			
		798.0 *2*	54 *27*	831.301	3/2⁻			
		881.893 *25*	100 *8*	747.248	5/2⁻			E_γ: other: 882.1 *20* from (p,nγ).
		1039.34 *6*	30 *3*	589.775	7/2⁺			
		1104.162[‡] *26*	38 *3*	525.114	5/2⁺			E_γ: poor fit, energy uncertainty increased two times to 0.052 keV in the fitting procedure.
		1129.37 *5*	19 *3*	499.915	3/2⁻			
		1454.26 *15*	2.4 *8*	174.954	5/2⁻			
		1629.154 *15*	81 *3*	0.0	1/2⁻			E_γ: other: 1629.6 *10* from (p,nγ).
1631.2	(1/2⁻,3/2,5/2⁻)	883.5 *4*	58 *4*	747.248	5/2⁻			E_γ,I_γ: from (n,γ) E=th.
		1632.0 *5*	100 *6*	0.0	1/2⁻			E_γ,I_γ: from (n,γ) E=th.
1698.3	(9/2)⁺	867.4[b] *20*		831.301	3/2⁻	[E3]		E_γ: tentative γ from (p,nγ) only.
		1108.5 *7*		589.775	7/2⁺			E_γ: from (α,nγ).
1743.385	3/2⁻	445.07 *17*	5.4 *27*	1298.75	3/2⁻	[M1,E2]	0.0026 *8*	B(M1)(W.u.)=0.013 *+10−6* if M1. B(E2)(W.u.)=1.0×10^2 *+8−5* if E2.
		935.178 *18*	92 *11*	808.196	1/2⁻	[M1,E2]		E_γ: weighted average of 935.175 *14* from ^{71}As ε decay, 935.38 *11* from (n,γ) E=th, and 935.2 *10* from (p,nγ). I_γ: other: 156 *20* from (n,γ) E=th is discrepant. B(M1)(W.u.)=0.024 *+13−7* if M1. B(E2)(W.u.)=40 *+22−11* if E2.
		996.06 *6*	33 *3*	747.248	5/2⁻	[M1,E2]		I_γ: weighted average of 32 *3* from ^{71}As ε decay and 36 *7* from (p,nγ). B(M1)(W.u.)=0.0070 *+39−20* if M1. B(E2)(W.u.)=10 *+6−3* if E2.
		1218.16 *7*	8.1 *16*	525.114	5/2⁺	[E1]		B(E1)(W.u.)=1.7×10^{-5} *+10−5*
		1243.56 *8*	5.7 *11*	499.915	3/2⁻	[M1,E2]		B(M1)(W.u.)=0.00062 *+37−20* if M1. B(E2)(W.u.)=0.59 *+35−19* if E2.
		1568.4 *2*	5.4 *27*	174.954	5/2⁻	[M1,E2]		B(M1)(W.u.)=0.00029 *+24−14* if M1. B(E2)(W.u.)=0.18 *+14−9* if E2.
		1743.40 *4*	100 *3*	0.0	1/2⁻	(M1+E2)		E_γ: others: 1743.2 *6* from (n,γ) E=th and 1743.7 *10* from (p,nγ). I_γ: other: 100 *34* from (n,γ) E=th. Mult.: D+Q from γ(θ) in (p,nγ); M1+E2 from level scheme. B(M1)(W.u.)=0.0040 *+22−11* if M1. B(E2)(W.u.)=1.9 *+11−5* if E2.
1780.762	5/2⁻,7/2⁻	754.4 *3*	11 *5*	1026.561	5/2⁻			
		1191.18 *9*	35 *12*	589.775	7/2⁺			
		1255.76 *5*	29 *3*	525.114	5/2⁺			
		1280.91 *6*	12 *5*	499.915	3/2⁻			
		1582.33 *7*	21.2 *18*	198.371	9/2⁺			

From ENSDF

$^{71}_{32}Ge_{39}$-23

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	δ[@]	Comments
1780.762	5/2$^-$,7/2$^-$	1605.749 *21*	100 *7*	174.954	5/2$^-$			
1792.096	(3/2$^+$,5/2$^-$)	444.8[b] *1*		1349.10	1/2$^+$			E_γ: reported as tentative in (n,γ) only with an intensity six times that of a 1618γ (presumably the same as 1617.1γ given here). A line with this intensity should have been seen in ε decay. It is possible that 444.8γ defines another level near 1792 keV.
		696.575 *12*	39 *7*	1095.511	3/2$^-$			
		765.89[‡] *7*	25 *4*	1026.561	5/2$^-$			E_γ: poor fit, energy uncertainty increased three times to 0.21 keV in the fitting procedure.
		983.67[‡] *5*	21 *7*	808.196	1/2$^-$			E_γ: poor fit, energy uncertainty increased three times to 0.15 keV in the fitting procedure.
		1044.845 *19*	82 *8*	747.248	5/2$^-$			
		1083.86 *3*	50 *4*	708.196	3/2$^-$			
		1202.26 *5*	42 *3*	589.775	7/2$^+$			
		1267.008 *20*	100 *4*	525.114	5/2$^+$			
		1292.13 *15*	5.7 *18*	499.915	3/2$^-$			
		1617.12 *4*	88.2 *21*	174.954	5/2$^-$			E_γ: weighted average of 1617.12 *3* from ^{71}As ε decay, 1618.0 *5* from (n,γ) E=th, and 1617.4 *20* from (p,nγ).
		1792.0 *4*	1.8 *11*	0.0	1/2$^-$			
1801.13	(5/2$^+$,7/2)	1211.35 *8*	100 *7*	589.775	7/2$^+$			
		1276.0 *4*	30 *10*	525.114	5/2$^+$			
		1602.74 *14*	10.3 *13*	198.371	9/2$^+$			
1835.81?		457.28[b] *7*	100	1378.53	(1/2$^-$)			E_γ: from (n,γ) E=th.
1937.45	(3/2$^+$,5/2$^-$)	1347.7 *5*	3.7 *22*	589.775	7/2$^+$			I_γ: 36 *22* is also possible since in ε decay, values listed in table I and level-scheme figure 1 of 1990Me01 differ by a factor of 10.
		1762.49 *6*	69.3 *22*	174.954	5/2$^-$			
		1937.41 *4*	100.0 *22*	0.0	1/2$^-$			
1940.30	(1/2,3/2,5/2$^-$)	561.86 *5*	100 *10*	1378.53	(1/2$^-$)			E_γ,I_γ: from (n,γ) E=th.
		1941.0[b] *8*	62 *10*	0.0	1/2$^-$			E_γ,I_γ: from (n,γ) E=th.
1949.29	11/2$^-$	527.2 *6*	9.7 *17*	1422.04	9/2$^-$	D		E_γ,I_γ,Mult.: from (α,α3nγ) only.
		853.2 *1*	100 *14*	1096.07	7/2$^-$	E2		E_γ: from (α,α3nγ). Other: 853.1 *3* from (α,nγ). Mult.: γγ(θ)(ADO) and γ(pol) in (α,α3nγ).
1959.59	13/2$^+$	482.6 *6*	74 *10*	1477.03	11/2$^+$	D		E_γ,I_γ,Mult.: from (α,α3nγ) only.
		767.4 *1*	100 *17*	1192.23	11/2$^+$	D+Q	+2.0 *+5−10*	E_γ: weighted average of 767.4 *1* in (α,nγ), 767.1 *3* in (α,α3nγ). I_γ: from (α,α3nγ). Other: 100 *13* in (α,nγ). Mult.: from γ(θ) in (α,nγ), and γγ(θ)(ADO) in (α,α3nγ). δ: from γ(θ) in (α,nγ).
		786.8 *3*	71 *10*	1172.54	13/2$^+$	D+Q		E_γ: weighted average of 786.8 *3* in (α,nγ), 786.9 *6* in (α,α3nγ). I_γ: from (α,α3nγ). Other: 139 *26* in (α,nγ) for an uncertain γ. Mult.: γγ(θ)(ADO) in (α,α3nγ).
		921.8 *6*	26 *5*	1037.83	9/2$^+$	Q		E_γ,I_γ,Mult.: from (α,α3nγ) only.
		1760.9 *6*	36 *7*	198.371	9/2$^+$	Q		E_γ,I_γ,Mult.: from (α,α3nγ) only.

From ENSDF

$^{71}_{32}Ge_{39}$-24

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	Comments
1965.03	3/2$^-$	1965.04 *7*	100	0.0	1/2$^-$		E_γ: others: 1965.01 *11* from (n,γ) E=th and 1965.4 *20* from (p,nγ).
2031.89	(1/2,3/2)	2032.74[‡] *22*	100	0.0	1/2$^-$		E_γ: from (n,γ) E=th. E_γ: poor fit, energy uncertainty increased two times to 0.44 keV in the fitting procedure.
2075.7	(1/2,3/2)	2075.8[#]		0.0	1/2$^-$		
2141.2	(1/2,3/2)	2141.3[#]		0.0	1/2$^-$		
2146.15	(3/2$^-$)	2146.25		0.0	1/2$^-$		E_γ: from (n,γ) E=th.
2224.50	1/2$^+$	2223.7 *4*	100	0.0	1/2$^-$		E_γ: from (n,γ) E=th.
2257.00	(1/2,3/2)	2257.3 *3*	100	0.0	1/2$^-$		E_γ: from (n,γ) E=th.
2298.96	17/2$^+$	1126.45 *15*	100	1172.54	13/2$^+$	E2	E_γ: average of 1126.6 *1* in (α,nγ), 1126.3 *1* in (α,α3nγ). Mult.: γγ(θ)(ADO) and γ(lin pol) in (α,α3nγ); γ(θ) in (α,nγ) with δ(O/Q)=0.00 *7*.
2313.97	15/2$^+$	1121.7 *2*	100 *12*	1192.23	11/2$^+$	E2	E_γ: weighted average of 1122.0 *2* in (α,nγ) and 1121.6 *1* in (α,α3nγ). I_γ: from (α,α3nγ). Other: 100 *14* in (α,nγ). Mult.: γγ(θ)(ADO) and γ(pol) in (α,α3nγ); γ(θ) with δ(O/Q)=−0.06 *5* in (α,nγ).
		1141.2 *6*	9.0 *15*	1172.54	13/2$^+$	D+Q	E_γ: weighted average of 1141.0 *10* in (α,nγ) and 1141.3 *6* in (α,α3nγ). I_γ: from (α,α3nγ). Other: 70 *30* in (α,nγ). Mult.: γγ(θ)(ADO) in (α,α3nγ).
2348.96	13/2$^-$	399.4 *6*	3.8 *8*	1949.29	11/2$^-$	D	E_γ,I_γ,Mult.: from (α,α3nγ) only.
		926.9 *1*	100 *13*	1422.04	9/2$^-$	E2	E_γ: weighted average of 926.8 *3* in (α,nγ) and 926.9 *1* in (α,α3nγ). I_γ: from (α,α3nγ). Mult.: γγ(θ)(ADO) and γ(pol) in (α,α3nγ); γ(θ) in (α,nγ) with δ(O/Q)=0.00 *5*.
2351.60	1/2$^-$,3/2$^-$	2351.41 *24*	100	0.0	1/2$^-$		E_γ: from (n,γ) E=th.
2364.1	(1/2$^+$)	2364.2[#]		0.0	1/2$^-$		
2462.35	(1/2,3/2)	2462.25[#] *15*		0.0	1/2$^-$		
2518.5	(1/2,3/2)	2518.5[#]		0.0	1/2$^-$		
2533.97	(1/2,3/2)	2534.3[#]		0.0	1/2$^-$		
2675.8	1/2$^-$,3/2$^-$	2675.8[#]		0.0	1/2$^-$		
2699.0	(15/2$^+$)	1222.0 *6*	100	1477.03	11/2$^+$	(Q)	
2837.20	15/2$^-$	877.8 *6*	24 *5*	1959.59	13/2$^+$	D	
		887.6 *6*	17.3 *32*	1949.29	11/2$^-$	Q	
		1664.7 *3*	100 *13*	1172.54	13/2$^+$	E1	
2868.3	1/2$^+$	2867.6[#]		0.0	1/2$^-$		
2890.3	15/2$^-$	541.1 *6*	12.5 *21*	2348.96	13/2$^-$	D	
		941.0 *3*	100 *12*	1949.29	11/2$^-$	E2	
2952.0	(1/2,3/2)	2953.4[#]		0.0	1/2$^-$		
3024.9	(1/2,3/2)	3025.6[#]		0.0	1/2$^-$		
3075.2		3078.2[#b]		0.0	1/2$^-$		
3097.49	17/2$^+$	783.4 *3*	100 *12*	2313.97	15/2$^+$	M1	

From ENSDF

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	Comments
3097.49	17/2$^+$	798.8 *6*	11.4 *23*	2298.96	17/2$^+$	D	ΔJ=0 transition.
		1138.1 *3*	100 *11*	1959.59	13/2$^+$	E2	
		1924.5 *6*	3.0 *8*	1172.54	13/2$^+$		
3157.6	(1/2,3/2)	3157.7[#]		0.0	1/2$^-$		
3183.5	1/2$^+$	3183.6[#]		0.0	1/2$^-$		
3208.5	(1/2,3/2)	3208.5[#]		0.0	1/2$^-$		
3214.1	(1/2,3/2)	3214.1[#]		0.0	1/2$^-$		
3223.9	(1/2,3/2)	3223.9[#]		0.0	1/2$^-$		
3272.39	17/2$^-$	435.3 *6*	6.0 *9*	2837.20	15/2$^-$	D	
		923.4 *1*	100 *12*	2348.96	13/2$^-$	E2	
3325.2	17/2$^-$	976.2 *3*	100	2348.96	13/2$^-$	E2	
3339.5	(1/2,3/2)	3338.8[#]		0.0	1/2$^-$		
3382.1	(1/2$^+$)	3381.0[#]		0.0	1/2$^-$		
3404.6	(1/2,3/2)	3404.6[#]		0.0	1/2$^-$		
3407.5	(1/2,3/2)	3407.5[#]		0.0	1/2$^-$		
3411.59	19/2$^-$	139.1 *6*	6.0 *12*	3272.39	17/2$^-$	(D)	
		314.1 *1*	100 *16*	3097.49	17/2$^+$	E1	
		521.1 *6*	19 *4*	2890.3	15/2$^-$	(Q)	
		574.4 *3*	56 *8*	2837.20	15/2$^-$	E2	
		1113.1 *6*	18.0 *30*	2298.96	17/2$^+$	D	
3462.9	(1/2,3/2)	3462.8[#]		0.0	1/2$^-$		
3481.7	(3/2)$^+$	3481.7[#]		0.0	1/2$^-$		
3556.1	(3/2)$^+$	3555.8[#]		0.0	1/2$^-$		
3569.9	1/2$^-$,3/2$^-$	3569.8[#]		0.0	1/2$^-$		
3593.07	21/2$^+$	1294.1 *1*	100	2298.96	17/2$^+$	E2	
3599.6	19/2$^+$	1285.6 *3*	100	2313.97	15/2$^+$	Q	
3757.3	(19/2$^-$)	867.0		2890.3	15/2$^-$		
3866.0	(1/2,3/2)	3865.8[#]		0.0	1/2$^-$		
3893.5	1/2$^-$,3/2$^-$	3893.5[#]		0.0	1/2$^-$		
4014.0?	(19/2$^+$)	1314.9[b]		2699.0	(15/2$^+$)		
4098.71	21/2$^-$	687.2 *3*	62 *5*	3411.59	19/2$^-$	M1	
		826.2 *3*	100 *11*	3272.39	17/2$^-$	E2	
4226.5	(1/2,3/2)	4226.5[#]		0.0	1/2$^-$		
4306.8	(1/2,3/2)	4306.7[#]		0.0	1/2$^-$		
4363.1?	(21/2$^-$)	1037.9[b]		3325.2	17/2$^-$		
4472.8	23/2$^-$	373.9 *6*	100 *15*	4098.71	21/2$^-$	D	

From ENSDF

$^{71}_{32}Ge_{39}$-26

$\gamma(^{71}Ge)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult. @
4472.8	23/2$^-$	1061.3 *6*	38 *10*	3411.59	19/2$^-$	Q
4914.8	23/2$^+$	1315.2 *6*	100	3599.6	19/2$^+$	Q
5009.4	25/2$^+$	1416.3 *3*	100	3593.07	21/2$^+$	Q
5274.3	25/2$^-$	1175.6 *6*	100	4098.71	21/2$^-$	Q
5727.2	27/2$^-$	453.0 *6*	54 *11*	5274.3	25/2$^-$	D
		1254.4 *6*	100 *28*	4472.8	23/2$^-$	Q
6639.7	29/2$^+$	1630.3 *6*	100	5009.4	25/2$^+$	Q
7114.0	31/2$^-$	1386.8 *6*	100	5727.2	27/2$^-$	Q
(7415.957)	1/2$^+$	3189.5#		4226.5	(1/2,3/2)	
		3522.5#		3893.5	1/2$^-$,3/2$^-$	
		3549.7	17.3	3866.0	(1/2,3/2)	
		3845.9	18.2	3569.9	1/2$^-$,3/2$^-$	
		3859.5	23.6	3556.1	(3/2)$^+$	
		3934.3#		3481.7	(3/2)$^+$	
		3953.0	17.3	3462.9	(1/2,3/2)	
		4008.5#		3407.5	(1/2,3/2)	
		4011.4#		3404.6	(1/2,3/2)	
		4032.8	23.6	3382.1	(1/2$^+$)	
		4075.7	13.5	3339.5	(1/2,3/2)	
		4155.1	12.7	3260.7		
		4192.1#		3223.9	(1/2,3/2)	
		4201.9#		3214.1	(1/2,3/2)	
		4207.5#		3208.5	(1/2,3/2)	
		4232.4#		3183.5	1/2$^+$	
		4258.3#		3157.6	(1/2,3/2)	
		4340.6	16.7	3075.2		
		4391.7	27.3	3024.9	(1/2,3/2)	
		4465.2	8.2	2952.0	(1/2,3/2)	
		4546.9	4.5	2868.3	1/2$^+$	
		4740.1#		2675.8	1/2$^-$,3/2$^-$	
		4881.81 *6*	38.0 *24*	2533.97	(1/2,3/2)	
		4900.5 *3*	5.8 *5*	2515.3	1/2,3/2,5/2$^+$	
		4951	7.5 *15*	2462.35	(1/2,3/2)	
		4980.6	11.1	2435.2	1/2$^+$	
		4989	4.2 *6*	2426.8	1/2,3/2,5/2$^+$	
		5051.8#		2364.1	(1/2$^+$)	
		5063.5	18.9	2351.60	1/2$^-$,3/2$^-$	
		5158.80 *11*	15.8 *13*	2257.00	(1/2,3/2)	
		5191.20 *11*	12.9 *9*	2224.50	1/2$^+$	

From ENSDF

$^{71}_{32}Ge_{39}$-27

Adopted Levels, Gammas (continued)

γ(^{71}Ge) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Comments
(7415.957)	1/2+	5269.60 *4*	17.8 *9*	2146.15	(3/2−)	
		5274.7#		2141.2	(1/2,3/2)	
		5340.2#		2075.7	(1/2,3/2)	
		5383.88 *9*	29.5 *13*	2031.89	(1/2,3/2)	
		5450.71 *7*	64 *3*	1965.03	3/2−	
		5672.3 *3*	8.2 *9*	1743.385	3/2−	
		5817.15 *4*	63 *3*	1598.534	3/2−	
		5873.16 *23*	6.5 *4*	1542.48	(1/2+,3/2−)	
		6037.21 *6*	100 *5*	1378.53	(1/2−)	
		6116.86 *4*	96 *4*	1298.75	3/2−	
		6276.25 *5*	48 *3*	1139.441	3/2−	
		6319.99‡ *4*	33.8 *14*	1095.511	3/2−	E_γ: poor fit, energy uncertainty increased two times to 0.08 keV in the fitting procedure.
		6584.32 *4*	20.0 *9*	831.301	3/2−	
		6607.45 *14*	3.6 *2*	808.196	1/2−	
		6707.45 *4*	87 *4*	708.196	3/2−	
		6915.68 *4*	70 *3*	499.915	3/2−	
		7415.58 *4*	35.5 *16*	0.0	1/2−	

† From ^{71}As decay, unless otherwise noted. Weighted averages are taken where data are also available from (n,γ), (p,nγ) and (α,nγ), as noted under comments. Values for γ rays from high-spin levels, above 2500 keV and J≥15/2, are from ^{74}Ge(α,α3nγ) dataset.

‡ Poor fit; uncertainty increased in the fitting procedure.

From γγ cascade study of 2004Ho25 in (n,γ) E=th. This γ should be treated as tentative since no intensity data are available.

@ From α(exp) and/or γ(θ) data in (p,nγ), unless otherwise noted. Multipolarity assignments for γ rays from high-spin levels, above 2500 keV and J≥15/2, are from γγ(θ)(ADO) and γ(pol) data in ^{74}Ge(α,α3nγ) dataset. Mult=Q corresponding to ΔJ=2 are most likely E2, in the absence of levels with long half-lives.

& 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.

[a] Multiply placed with intensity suitably divided.

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

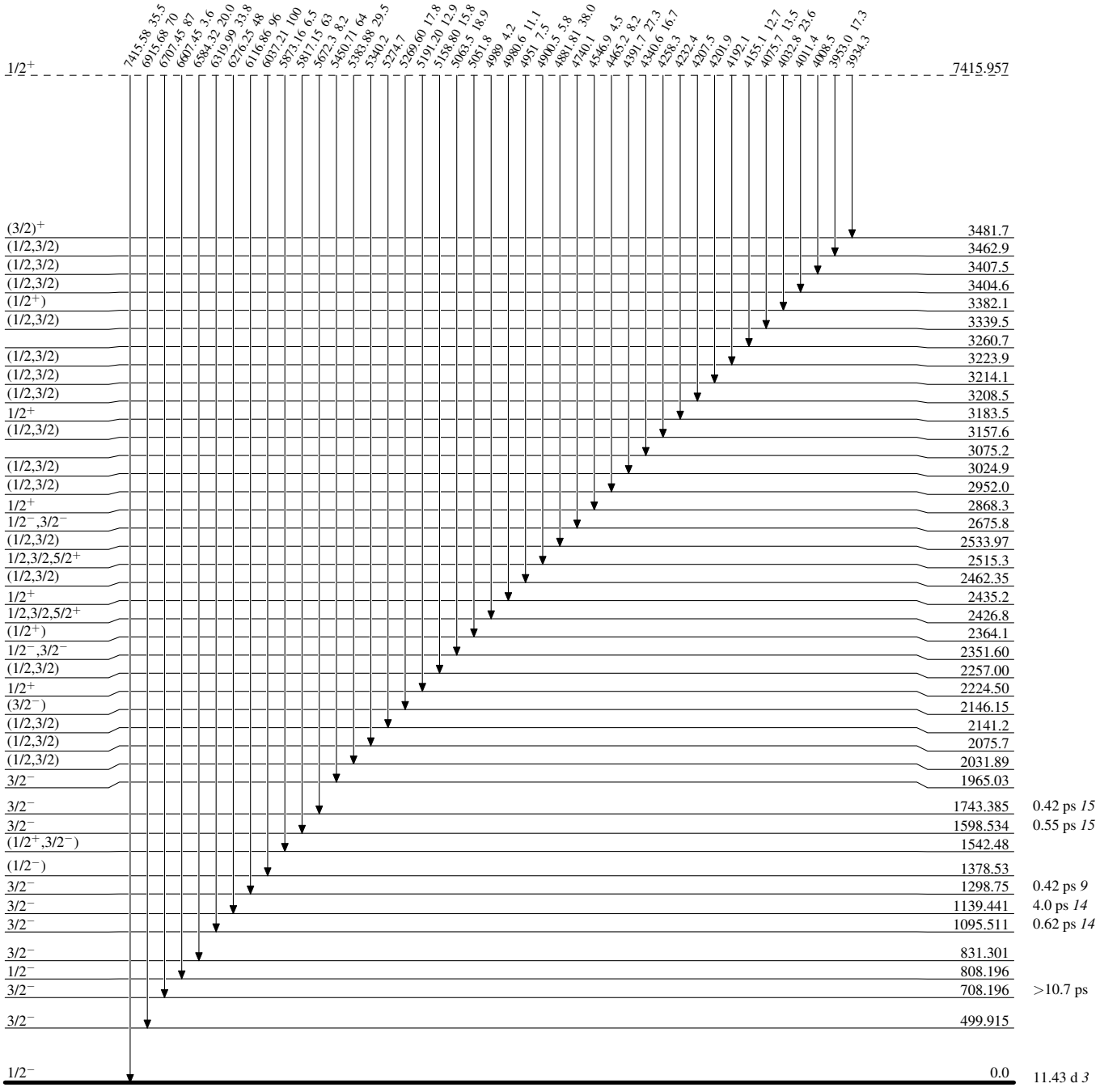
From ENSDF

$^{71}_{32}Ge_{39}$-28

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{71}_{32}Ge_{39}$

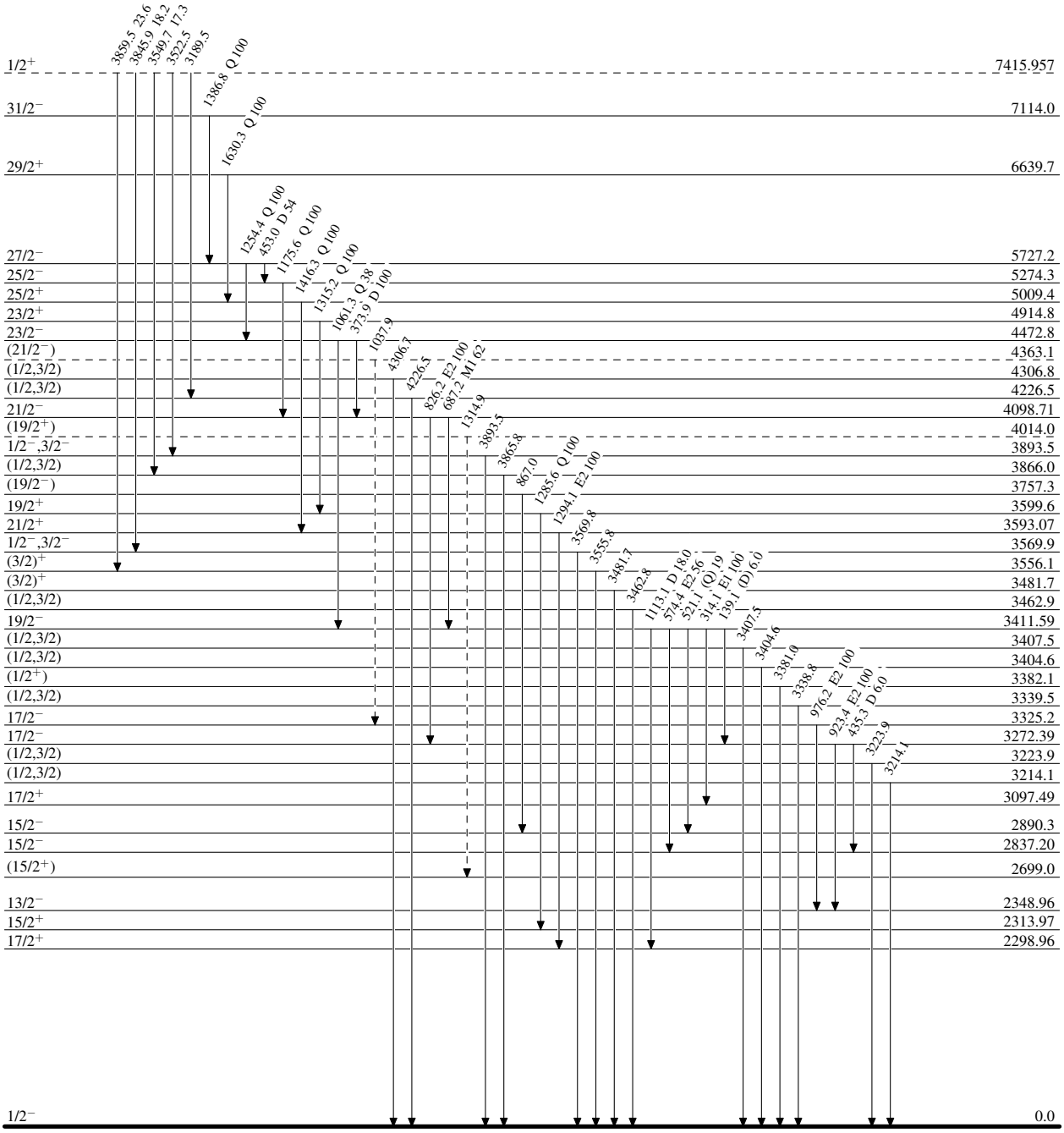
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{71}_{32}Ge_{39}$

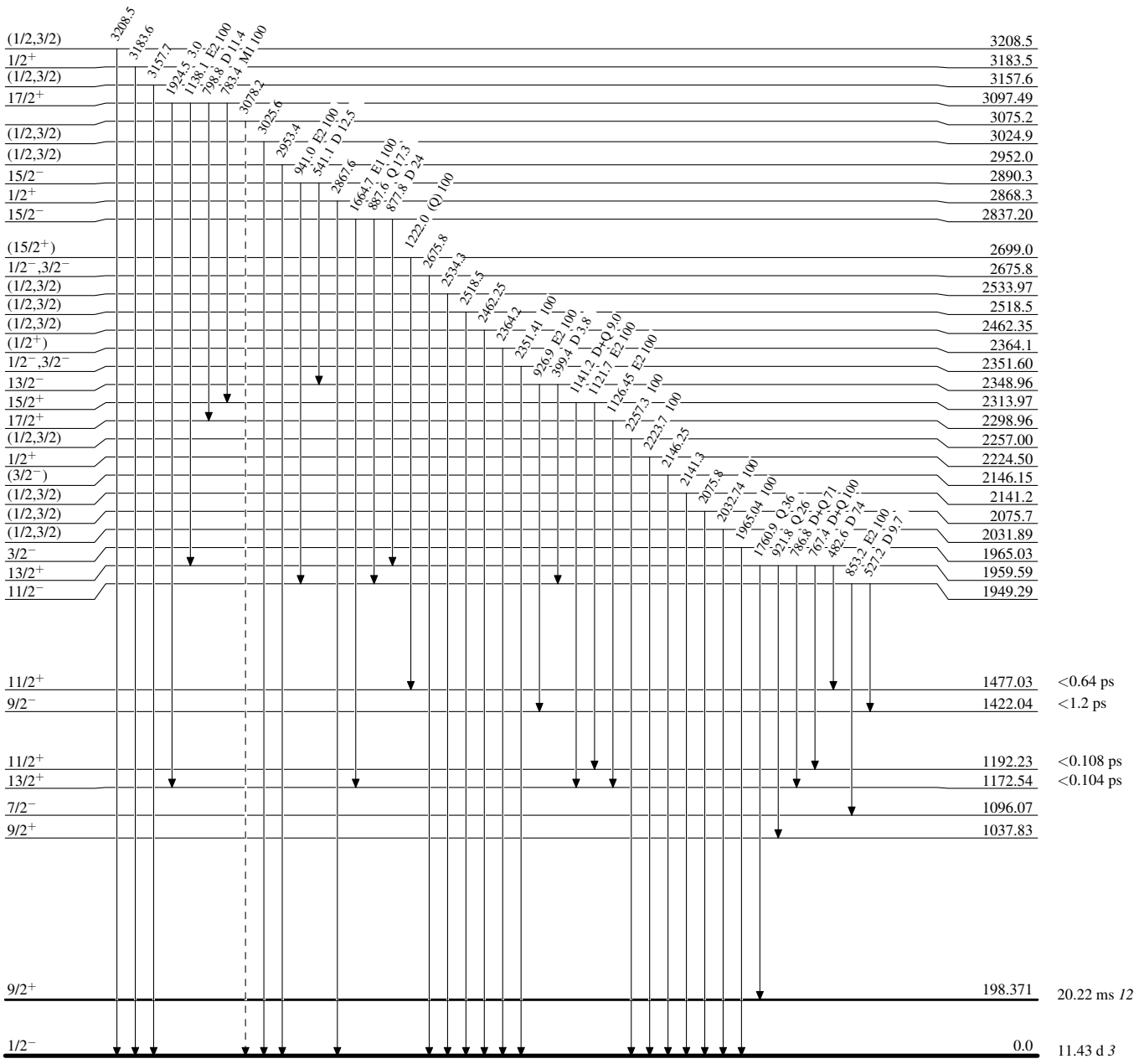
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{71}_{32}Ge_{39}$

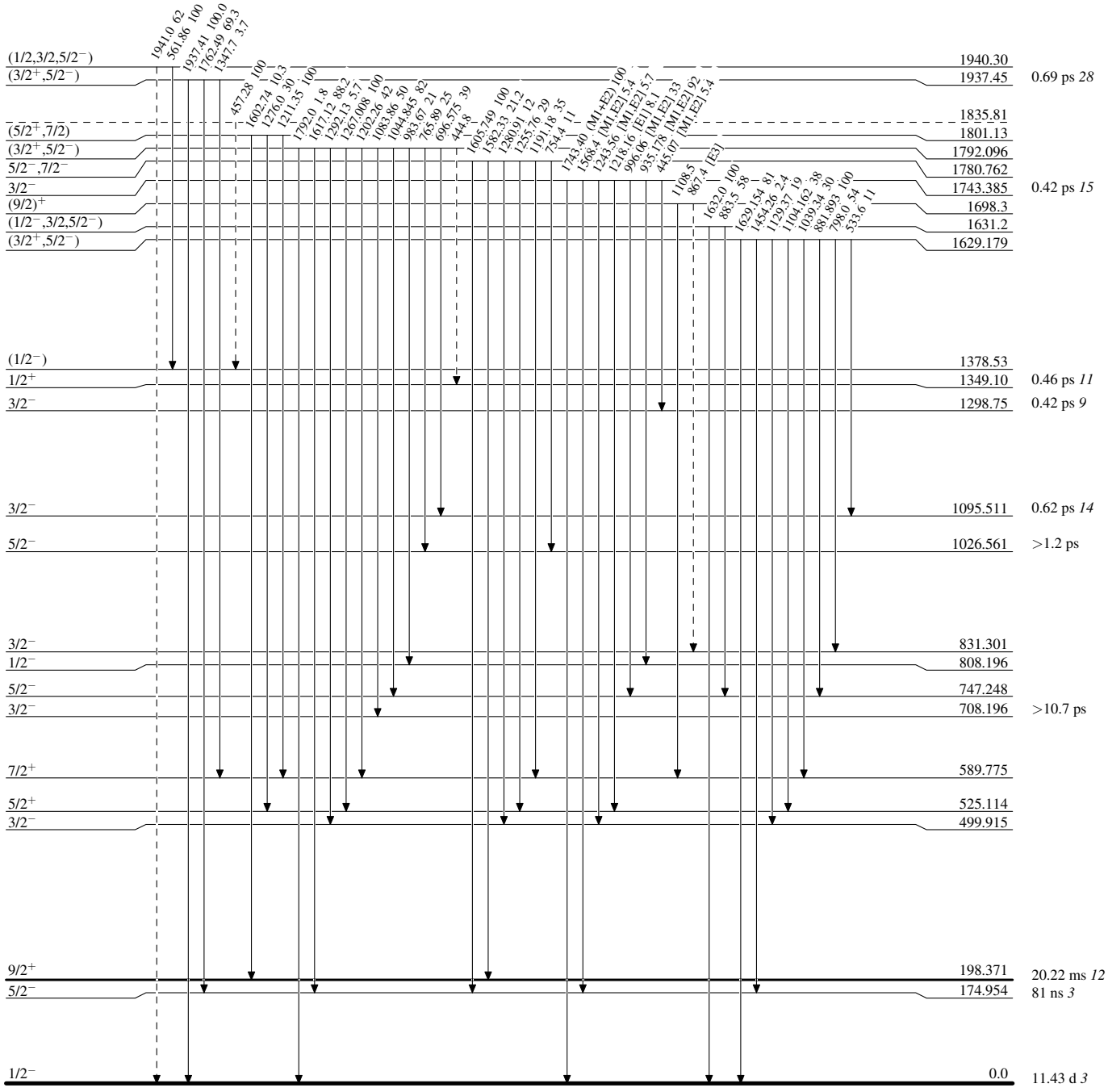
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



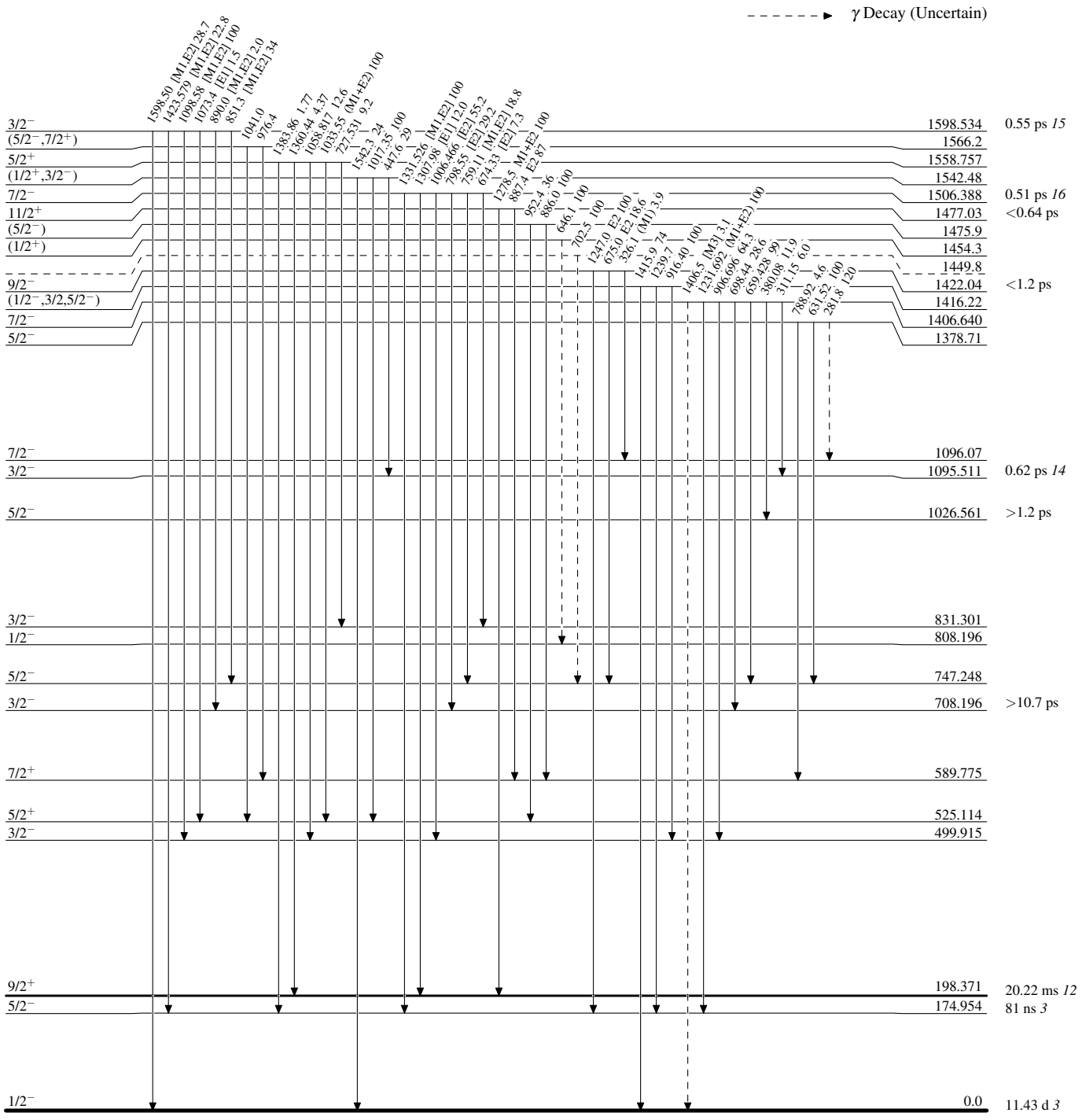
$^{71}_{32}Ge_{39}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

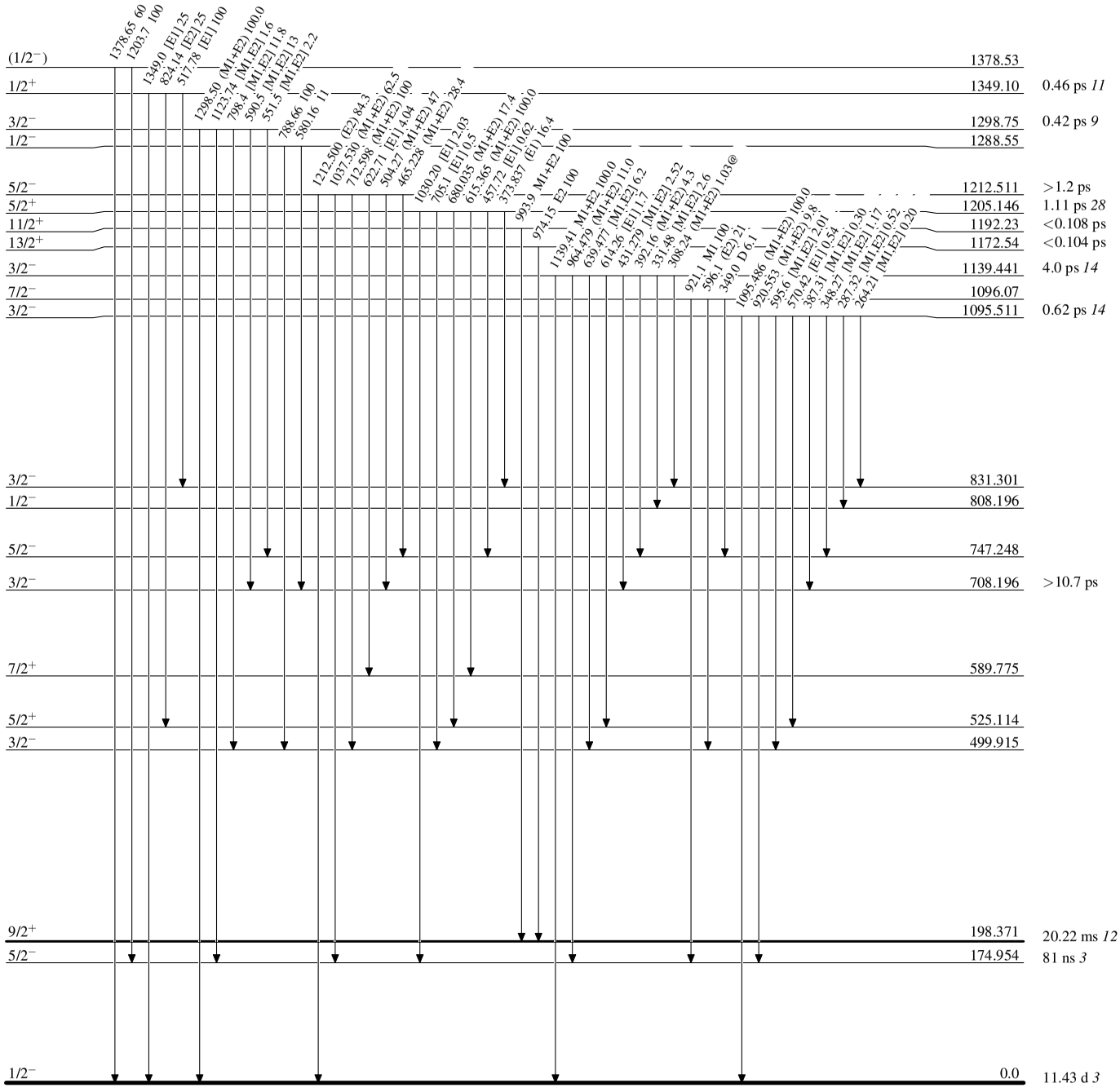


$^{71}_{32}Ge_{39}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



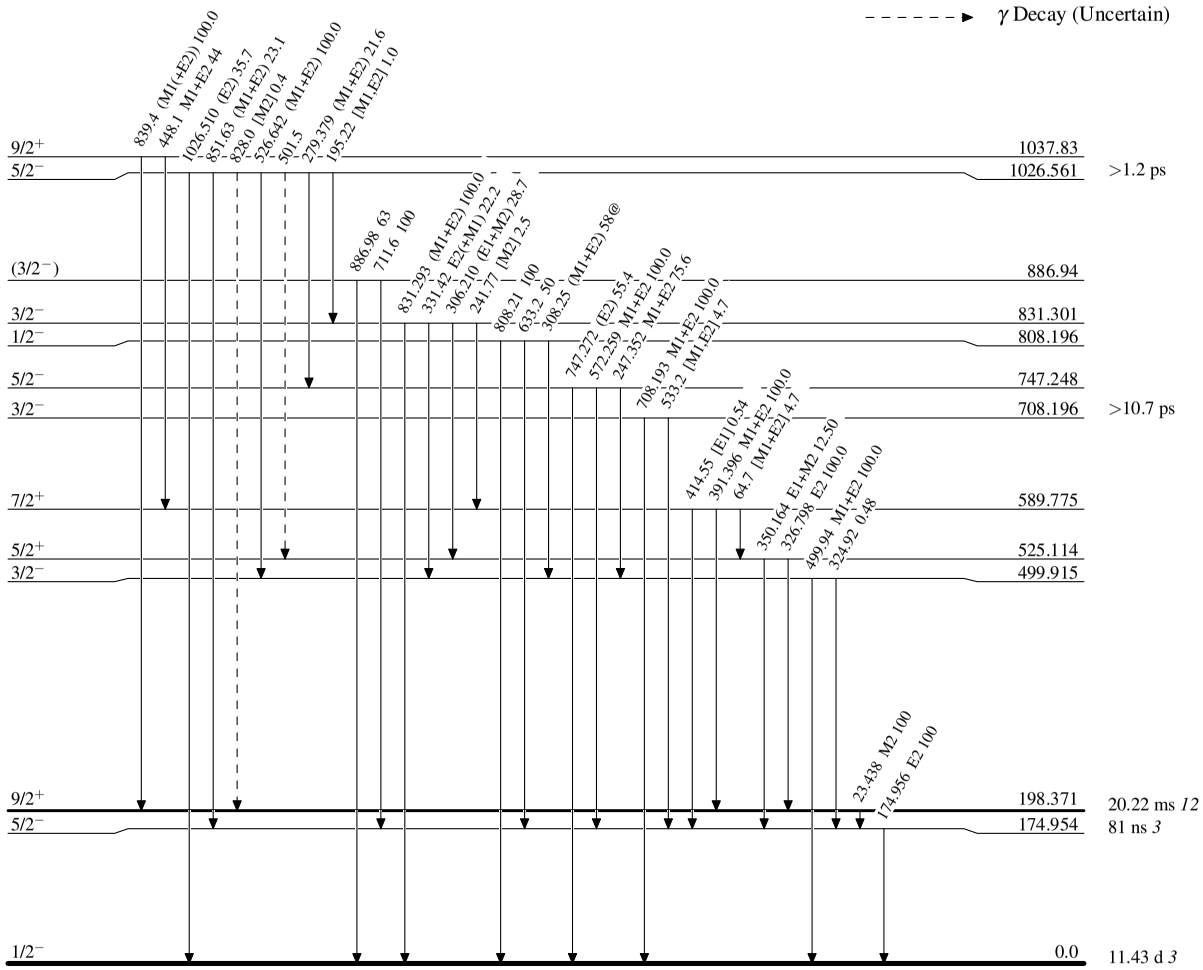
$^{71}_{32}Ge_{39}$

Adopted Levels, Gammas

Level Scheme (continued)

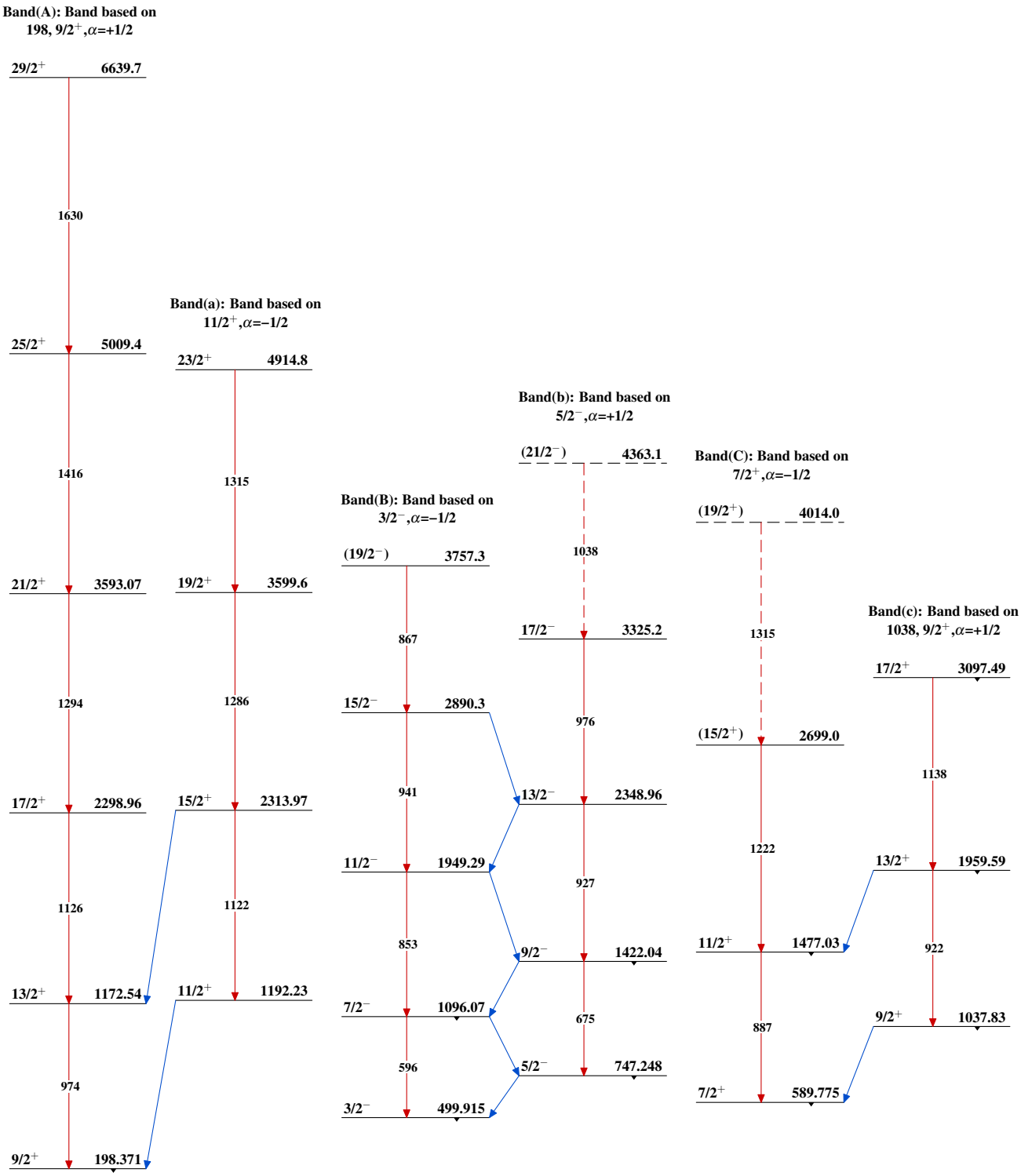
Legend

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



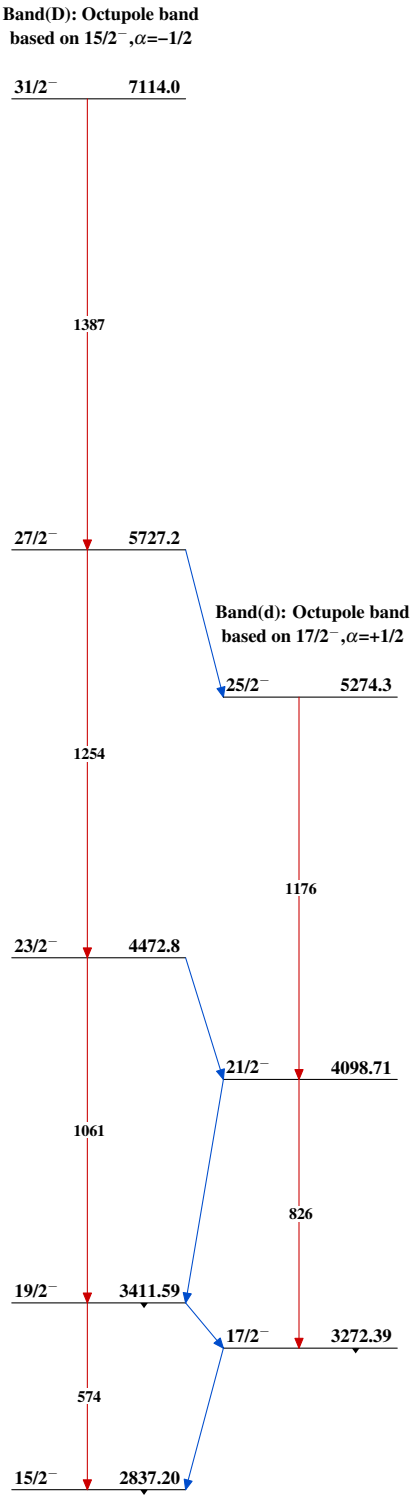
$^{71}_{32}Ge_{39}$

Adopted Levels, Gammas



$^{71}_{32}Ge_{39}$

Adopted Levels, Gammas (continued)



$^{71}_{32}Ge_{39}$