Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Q(β^-)=−695 *4*; S(n)=5871.1 *9*; S(p)=7559 *6*; Q(α)=1871.3 *10* 2021Wa16
S(2n)=14012.5 *9*, S(2p)=13567.0 *10* (2021Wa16).
Mass measurements: 1975Ka25, 1972Ba08, 1970Ma05, 1968De17, 1966Ma05.
Hyperfine structure studies of the ground state: 2003Pa30, 1999Ku26, 1997Ko33, 1994Ji08, 1990Wa25, 1990En01 (also 1984Ea02), 1987Yo05, 1985Al06 (also 1984Al35,1986Al33) (laser spectroscopy), 1975St15 (NMR technique), 1972Ch55, 1972Ch27, 1968Ro16.
Isotope shifts: 1990Wa25, 1990En01, 1987Bo58, 1985Al06, 1980Br15, 1976ClZY, 1973Le16, 1971Le12.
Isomer shifts: 1976Co14, 1972Ei05, 1983St17 (compilation).
2017Wi01: measured isotopic abundances of natural Sm samples using inductively coupled plasma mass spectrometry (ICP-MS) technique.
Other reactions:
2015Ba20: ^{208}Pb(^{136}Xe,Xγ),E=85 MeV; measured Eγ, Iγ, $\gamma\gamma$-coin using Gammasphere at ATLAS-ANL facility. Levels and γ rays in ^{149}Sm populated; deduced cross section.
1993Ge07: measured energies and widths of 22 neutron resonances from 94.9-2955 eV. See ^{148}Sm(n,γ),(n,n):Resonances dataset for details.
2014Fi17: ^{150}Sm(γ,n),E=6-17 MeV; measured E(n), I(n), monochromatic and nonmonochromatic σ(E).
2003Ka23: analyzed neutron resonances.
^{148}Sm(n,γ): 1982Ba15, 1986Wi02.
^{148}Sm(n,n): 1990Ly01 (E=0.01-0.5 eV), 1971KaZS (E<0.5 keV).
^{149}Sm(^{58}Ni,^{58}Ni),E=245 MeV: 1987Va22, measured $\sigma(\theta)$.
Additional information 1.
2017No07: theory: calculated single-particle energies, occupation probabilities of the single-particle orbitals, levels, J^π, B(E2), B(M1), electric quadrupole and magnetic dipole moments using Interacting boson-fermion model (IBFM).
2013Zh28: calculated energies of ground-state band members using several collective rotor and vibrator models.
1983Ma71: calculated levels, rotational characteristics using quasiparticle-rotor model, and variable moments of inertia.
Other theoretical studies: consult the NSR database at www.nndc.bnl.gov/nsr/ for 29 references for structure and six for radioactive decay listed under ‘document records’ which can be accessed through web retrieval of the ENSDF database at www.nndc.bnl.gov/ensdf/.
The statement “in-beam γ-ray” includes the datasets: (α,nγ); and (α,3nγ),(^{3}He,4nγ).

^{149}Sm Levels

The band assignments are from 1977Kl04, 1979Ha19, 1990UrZR and 1994Ba01 in ^{148}Nd(α,3nγ),^{150}Nd(^{3}He,4nγ) dataset. It should, however, be noted that Nilsson-model assignments proposed by 1994Ba01 may not be valid for N=87 nuclide, and the levels are expected to be strongly (Coriolis) mixed.

Cross Reference (XREF) Flags

A	^{149}Pm β^- decay (53.08 h)	H	^{148}Sm(d,p)	O	^{150}Sm(p,d)
B	^{149}Eu ε decay (93.1 d)	I	^{148}Sm(α,^{3}He)	P	^{150}Sm(d,t)
C	Muonic atom	J	^{148}Sm(^{16}O,^{15}O),(^{13}C,^{12}C)	Q	^{150}Sm(^{3}He,α)
D	^{146}Nd(α,nγ)	K	^{149}Sm(γ,γ):Mossbauer	R	^{151}Sm(p,t)
E	^{148}Nd(α,3nγ),^{150}Nd(^{3}He,4nγ)	L	^{149}Sm(d,d′)	S	^{151}Eu(μ^-,2nγ)
F	^{148}Sm(n,γ) E=thermal	M	Coulomb excitation		
G	^{148}Sm(n,γ),(n,n):resonances	N	^{150}Sm(n,2nγ)		

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Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
0.0[b]	7/2⁻	stable	ABCDE HIJKLMNOPQRS	μ=−0.6677 *11* (1990En01,2019StZV) Q=+0.075 *8* (1972Ch55,1992Le09,2021StZZ) Evaluated rms charge radius=5.0134 fm *35* (2013An02). Evaluated difference in charge radius: $\delta<r^2>(^{144}Sm,^{149}Sm)=+0.6125\ fm^2$ *4* (2013An02). Jπ: atomic-beam method; EPR, optical spectroscopy (1962Sp03). Others: 1958Hu17, 1954Mu15, 1952Bo21. Parity from L(p,d)=L(^{3}He,α)=L(α,^{3}He)=3. $T_{1/2}$: >2×10^{15} y from limit on detection of a possible α peak near 2 MeV (1970Gu14). Others: 1968Ko06, 1961Ma05, 1960Ka23. μ: laser resonance fluorescence spectroscopy (1990En01). Others: −0.6717 *7* (atomic beam,1966Wo05); −0.6692 *11* (electron-nuclear double resonance technique (ENDOR),1972Ch27); −0.6708 *10* (collinear fast-beam laser spectroscopy,1985Al06). Q: from atomic beam (1972Ch55), and +0.075 *2* (1992Le09, collinear fast-beam laser spectroscopy, +0.075 *25* in 1985Al06). Others: +0.078 *8* (1990En01,laser resonance fluorescence spectroscopy); +0.075 *8* (atomic beam,1966Wo05), 0.060 *15* (Mossbauer spectroscopy,1970EiZY), 0.094 *24* from muonic atom (1981Ba28). Configuration=$\nu f_{7/2}$. $\delta<r^2>(^{148}Sm,^{149}Sm)=0.080\ fm^2$ *8* (1971Le12,1973Le16), 0.084 fm^2 28 (1979Po04), 0.092 fm^2 *5* (1980Br15), 0.092 fm^2 (1985Al06), 0.080 fm^2 *8* (1986Al33), 0.093 fm^2 *5* (1987Bo58), 0.092 fm^2 *4* (1990Wa25), 0.089 fm^2 (1990En01).
22.5002[f] *8*	5/2⁻	7.33 ns *9*	ABCDE H K MN PQRS	μ=−0.6200 *11* (1970EiZY,2020StZV) Q=+1.01 *9* (1981Ba28,2021StZZ) Jπ: L(p,t)=0 from 5/2⁻. $T_{1/2}$: from ^{149}Eu ε decay. Others: 7.4 ns *12* (2000Ki15), 6.9 ns *5* (1966Be39), 7.6 ns *5* (1963Ki15), 1962Jh04, 1962Al13. From B(E2)=0.229 *17* and δ (22.5γ)=0.0715 *11*, $T_{1/2}$(22.51 level)=5.9 ns *10*. B(E2)=0.229 *17* from muonic atom (1981Ba28). μ: from Mossbauer effect (1970EiZY). Sign from 1967Of01. Q: from muonic atom (1981Ba28). Other: +0.50 *1* from Mossbauer (1970EiZY,1967Of01).
277.071 *7*	5/2⁻	≤0.2 ns	AB DE H MNOP RS	Jπ: M1+E2 γ to 7/2⁻; M1+E2 γ from 3/2⁻. $T_{1/2}$: (x ray)γ(t) in ^{149}Eu ε (1970Ko30). $T_{1/2}$<1.3 ns from B(E2) in Coul. ex.
285.946[c] *10*	9/2⁻	0.22 ns *4*	AB DE HIJ MNOPQ S	Jπ: L(^{3}He,α)=L(α,^{3}He)=5; M1 γ to 7/2⁻. $T_{1/2}$: average of 0.182 ns *7* γγ(t) (1965Cu01) and 0.253 ns *27* βγ(t) (1968Ak02) in ^{149}Pm β⁻. Others: 1960Ma27, 1960Ch15. Configuration=$\nu h_{9/2}$.
350.035 *6*	3/2⁻	9.5 ps *3*	AB DE H LMNOPQRS	Jπ: L(p,d)=L(d,t)=1; M1+E2 γ to 5/2⁻.
399.08 *7*	(1/2⁻,3/2⁻)		B D H OPQ	XREF: Q(422). Jπ: L(p,d)=(1).
528.593 *7*	3/2⁻	24 ps *3*	AB DE H J LM oPQR	XREF: H(535). Jπ: L(d,t)=1; E2 γ to 7/2⁻.
558.373 *7*	5/2⁻	24 ps *8*	AB DE H MN PQR	XREF: H(566). Jπ: L(p,t)=0 from 5/2⁻.

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Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
590.883[f] *10*	9/2⁻	3.0 ps *7*	AB DE H LMNOPQR	XREF: O(583)R(606). Jπ: ΔJ=2 E2 γ to 5/2⁻ from 568γ(θ,pol) in in-beam γ-ray. L(p,d)=(1) is inconsistent with 9/2⁻. Either the level in (p,d) is different from 591 or the L-value is suspect. Dominant configuration=$nh_{9/2}$.
636.459 *18*	7/2⁻	<1.5 ps	AB DE H LMNOPQR	Jπ: L(p,d)=L(^{3}He,α)=L(d,t)=3; ΔJ=0, M1+E2 γ to 7/2⁻ from 636γ(θ); ce data in in-beam γ-ray.
658.66 *4*	(≤7/2)		B o	XREF: o(665). Jπ: γ to 5/2⁻; possible γ to 3/2⁻. L(p,d)=(2) suggests 3/2⁺, 5/2⁺.
664.09[b] *6*	11/2⁻	2.7 ps *3*	A DE H LMNoPQR	XREF: H(675)o(665). Jπ: L(^{3}He,α)=5; ΔJ=2, E2 γ to 7/2⁻. Configuration=$\nu h_{11/2}$.
697 *2*	(3/2)⁻		H L OP	Jπ: L(p,d)=1; possible contribution from $\nu p_{3/2}$.
709.85 *7*	(3/2,5/2⁺)		D H LM PQ	XREF: M(?). Jπ: L(d,t)=1,2. γ(θ) of γ to 3/2⁻ suggests 3/2 or 5/2.
747.39[c] *7*	13/2⁻		DE MN	Jπ: ΔJ=2, E2 γ to 9/2⁻ from γ(θ,pol) in in-beam γ-ray.
785.23 *12*	5/2⁻		A l o R	Jπ: L(p,t)=0 from 5/2⁻. L(p,d)=(0) is inconsistent with Jπ=5/2⁻ for 785 and Jπ=11/2⁺ for 789 level. Either the level in (p,d) is different or the L transfer is suspect.
789.51[&] *6*	11/2⁺		DE lMNo	Jπ: ΔJ=1, E1 γ to 9/2⁻; ΔJ=0, dipole γ to 11/2⁻ from γ(θ); ce in in-beam γ-ray.
830.46 *5*	(5/2⁻,7/2,9/2⁻)		A l r	Jπ: γs to 5/2⁻ and 9/2⁻.
833.23 *5*	(5/2⁻ to 11/2⁻)		A h lM r	Jπ: γs to 7/2⁻ and 9/2⁻.
835.59 *7*	(5/2⁻,7/2,9/2⁻)		A h l r	Jπ: γs to 5/2⁻ and 9/2⁻.
878.80[a] *8*	13/2⁺		DE HIJ LMNoPQ	XREF: I(910). E(level): L(α,^{3}He)=6+5 suggests a doublet with Jπ=11/2⁺,13/2⁺ for one and 9/2⁻,11/2⁻ for the other. The latter level is not listed here. Jπ: L(^{3}He,α)=6; ΔJ=1, E1 γ to 11/2⁻ from γ(θ). L(p,d)=6(+1) is consistent with 13/2⁺ for one component. The other component may correspond to 881.9 level, but L=1 is inconsistent.
881.97 *4*	(5/2,7/2⁻)		A o	Jπ: γs to 3/2⁻ and 7/2⁻; log $f^{1u}t$=6.9 from 7/2⁺. L(p,d)=(1) is inconsistent with the Jπ assignment.
925.47 *10*	(3/2⁺,5/2⁺)		D H L OPQ	XREF: L(914)P(922). Jπ: L(p,d)=L(d,t)=(2).
952.78 *9*	(5/2,7/2,9/2⁻)		A H L	Jπ: γ to 5/2⁻; log $f^{1u}t$=8.0 from 7/2⁺.
967 *2*	(1/2⁺)		OP	Jπ: L(p,d)=(0).
994.65 *10*	(9/2,11/2,13/2⁻)		DE L PQR	XREF: P(988). Jπ: γ to 9/2⁻.
1012 *3*	(1/2⁻,3/2⁻)		H OP	Jπ: L(p,d)=(1).
1038.97 *10*	(5/2⁻)		D L	Jπ: ΔJ=0 γ to 5/2⁻ with dominant quadrupole (E2) component.
1048 *2*	(3/2)⁺		L OPQ	Jπ: L(p,d)=L(^{3}He,α)=L(d,t)=2; probable contribution from $\nu d_{3/2}$.
1083 *2*	(≤7/2)		H L P	XREF: L(1072). Jπ: L≤3 (L from σ(^{3}He,α)/σ(d,t)).
1113 *5*			L PQ	
1123 *2*	(≤7/2)		H L P R	Jπ: L≤3 (L from σ(^{3}He,α)/σ(d,t)).
1132.37 *8*	(9/2⁻,11/2,13/2⁻)		DE	Jπ: γs to 9/2⁻ and 13/2⁻.
1154 *2*	(3/2⁺,5/2,7/2⁻)		H PQ	Jπ: L=2,3 (L from σ(^{3}He,α)/σ(d,t)).

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Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
1173.21 12	(7/2+,9/2,11/2)	D	Jπ: γ to 11/2+; J≤11/2 from excitation function.
1181 10	(3/2,5/2)+	o	Jπ: L(p,d)=0+2. L=0 component corresponds to 1195 level in (d,t), whereas L=2 most probably corresponds to 1181 level.
1187 3	5/2−	h L R	Jπ: L(p,t)=0 from 5/2−.
1192.80[e] 8	13/2+	DE	Jπ: ΔJ=0, dominant M1 to 13/2+; ΔJ=1, M1+E2 γ to 11/2+.
1195 2	1/2+	L oPQ	XREF: o(1181). Jπ: L(d,t)=0.
1207?	(5/2−)	R	Jπ: L(p,t)=(0) from 5/2−.
1226 10		O	
1237.95 10	(9/2−,11/2−)	D L PQ	Jπ: L(^{3}He,α)=(5).
1240.13[&] 11	(15/2)+	DE N	Jπ: ΔJ=1, E1 γ to 13/2−.
1282 10		H L	
1304 10		P	
1308.47[d] 9	11/2−	DE H L OPQ	XREF: O(1285)P(1311). Jπ: L(p,d)=L(^{3}He,α)=5; ΔJ=1, M1+E2 γ to 9/2−.
1325 3		H L R	XREF: H(1316).
1339 3	5/2−	L R	Jπ: L(p,t)=0 from 5/2−.
1343.33[f] 7	(13/2−)	DE	Jπ: γs to 9/2− and 13/2−; possible band assignment (1990UrZR).
1353 2	(5/2−,7/2−)	H OP R	Jπ: L(p,d)=(3).
1360.96[c] 11	17/2−	DE	Jπ: ΔJ=2, E2 γ to 13/2−; γ to (15/2)+.
1362.60[a] 13	17/2+	DE N	Jπ: ΔJ=2, E2 γ to 13/2+.
1378 2	(5/2−,7/2,9/2+)	H L OPQ	Jπ: L=(3,4) (L from σ(^{3}He,α)/σ(d,t)). L(p,d)=(0) is inconsistent.
1393 2	(5/2)−	L OP	XREF: O(1408). Jπ: L(p,d)=3; probable contribution from $νf_{5/2}$ orbital.
1398.70[b] 9	15/2−	DE	Jπ: ΔJ=2, E2 γ to 11/2−; ΔJ=1 γs to 13/2− and 13/2+.
1413.28 11	(13/2+,15/2+)	DE	Jπ: γs to 11/2+ and 13/2−; γ from (17/2+); excitation function of 624γ suggests 11/2, 13/2, 15/2.
1428 4	−	i PQ	XREF: i(1410). E(level),Jπ: L(α,^{3}He)=1+5 suggests a doublet with Jπ=1/2−,3/2− for one and 9/2−,11/2− for the other. L=1,2 from σ(^{3}He,α)/σ(d,t)) is consistent with 1/2−,3/2− for one component in (α,^{3}He).
1442 2	(≤5/2)	i PQ	XREF: i(1410). Jπ: L≤2 (L from σ(^{3}He,α)/σ(d,t)).
1470 2	(3/2,5/2)+	H L OPQR	XREF: O(1456)Q(1474). Jπ: L(p,d)=2. L(^{3}He,α)=(5) from σ(θ) data is inconsistent with the assigned Jπ. There could be two separate levels near this energy.
1483 2	(≤5/2)	H L OPQR	XREF: O(1480)Q(1474). Jπ: L≤2 (L from σ(^{3}He,α)/σ(d,t)). L(p,d)=(1) supports 1/2−, 3/2−.
1505 10		L	
1535 10	(1/2+)	L O	Jπ: L(p,d)=(0).
1549 2	5/2−	L P R	Jπ: L(p,t)=0 from 5/2−.
1558 3		H R	
1571 2	(7/2+,9/2,11/2−)	H L PQ	Jπ: L=(4,5) (L from σ(^{3}He,α)/σ(d,t)).
1574.57[d] 14	(13/2)−	DE	Jπ: ΔJ=1, M1+E2 γ to 11/2−.
1584 2	(3/2,5/2)+	OP R	Jπ: L(p,d)=2.
1617 2	(5/2)−	H L OP	Jπ: L(p,d)=3; probable contribution from $νf_{5/2}$ orbital.
1641 2		L P	
1656 2		h L P	XREF: h(1662).
1670.25[&] 12	(19/2)+	DE	Jπ: ΔJ=2, E2 γ to (15/2)+; ΔJ=1, E1 γ to 17/2−.
1672 3	5/2−	h L OP R	XREF: h(1662). Jπ: L(p,t)=0 from 5/2−.
1684.60 13	(15/2,17/2,19/2−)	D	Jπ: γ to 15/2−.
1685 10		H l Q	XREF: H(1678)l(1690).
1695.7[e] 3	(17/2+)	E	Jπ: ΔJ=2 (E2) γ to 13/2+; γ to 15/2−.

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Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
1699 *3*	$5/2^-$	H l PQR	XREF: H(1705)l(1690). J^{π}: L(p,t)=0 from $5/2^-$.
1731 *10*		L	
1757 *3*	$5/2^-$	H L P R	J^{π}: L(p,t)=0 from $5/2^-$.
1776 *10*	$(7/2^+)$&$(5/2^+)$	H oPQ	XREF: H(1782). J^{π}: L(p,d)=4+2 for a doublet.
1782 *3*	$5/2^-$	R	J^{π}: L(p,t)=0 from $5/2^-$.
1817 *3*	$5/2^-$	H L R	J^{π}: L(p,t)=0 from $5/2^-$.
1837 *10*		L	
1846.87[d] *17*	$(15/2)^-$	DE	J^{π}: ΔJ=(1), M1+E2 γ to $(13/2)^-$; probable band assignment.
1851.2 *6*	$(17/2^+)$[@]	E	
1857 *10*		L	
1880 *10*	$(7/2)^+$	H O	J^{π}: L(p,d)=4.
1891 *3*	$5/2^-$	i l R	XREF: i(1890)l(1903). E(level): L(α,^{3}He)=3+6 suggests a doublet with $J^{\pi}=5/2^-,7/2^-$ for one and $11/2^+,13/2^+$ for the other. The latter level is not listed here, separately. J^{π}: L(p,t)=0 from $5/2^-$.
1917 *4*	$5/2^-$	Hi l R	XREF: i(1890)l(1903). J^{π}: L(p,t)=0 from $5/2^-$.
1924 *10*	$(7/2^+)$&$(5/2^+)$	L o	XREF: o(1946). J^{π}: L(p,d)=4+2 for a doublet.
1925.99[a] *16*	$(21/2)^+$	DE	J^{π}: ΔJ=2, E2 γ to $17/2^+$.
1950 *10*	$(7/2^+)$&$(5/2^+)$	H L o	J^{π}: L(p,d)=4+2 for a doublet.
1979 *10*		H L P	
1993 *3*		H R	
2005 *3*		R	
2026 *10*	$(5/2^+)$&$(11/2^-)$	H oPQ	XREF: Q(2043). J^{π}: L(p,d)=2+5.
2041.0[b] *3*	$(19/2^-)$	E	J^{π}: γs to $15/2^-$, $17/2^-$ and $17/2^+$; band assignment.
2059 *4*	$5/2^-$	H L P R	J^{π}: L(p,t)=0 from $5/2^-$.
2098 *3*	$5/2^-$	H L R	J^{π}: L(p,t)=0 from $5/2^-$.
2117 *4*	$5/2^-$	H L R	XREF: H(2137). J^{π}: L(p,t)=0 from $5/2^-$.
2130.6[d] *3*	$(17/2)^-$	E	J^{π}: M1 γ to $(15/2)^-$; band assignment.
2139 *10*	$(5/2^+)$&$(11/2^-)$	H L o	XREF: o(2174). E(level): from (d,d′). J^{π}: L(p,d)=2+5 for a doublet.
2142.30[c] *24*	$(21/2^-)$	E	J^{π}: ΔJ=(2), (E2) γ to $17/2^-$; γ to $19/2^+$.
2145.5? *4*	$(15/2,17/2,19/2^-)$	E	J^{π}: γ to $15/2^-$.
2159 *15*		H	
2183 *10*	$(5/2^+)$&$(11/2^-)$	H L o Q	J^{π}: L(^{3}He,α)=(5) for 2187 *10* level favors $(11/2^-)$ which implies $(5/2^+)$ for 2139 level.
2192.2[&] *3*	$(23/2)^+$	E	J^{π}: ΔJ=2, E2 γ to $19/2^+$; band assignment.
2210 *10*	$(5/2^+)$&$(11/2^-)$	H o	J^{π}: L(p,d)=2+5 for a doublet.
2242 *10*	$(5/2^+)$&$(11/2^-)$	H o	J^{π}: see 2210 level.
2272 *10*	$(5/2^+)$&$(7/2^+)$	H L o	J^{π}: L(p,d)=2+4.
2280 *15*	$(5/2^+)$&$(7/2^+)$	H o	J^{π}: see 2272 level.
2299 *10*		H L Q	
2332 *15*		H	
2344.5[e] *4*	$(21/2^+)$	E	J^{π}: possible band member.
2358 *13*		H	
2377 *15*		H	
2387 *10*		H	

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Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
2404.4 *7*	(21/2+)[@]		E	
2415 *10*	(5/2+)&(11/2−)		H O Q	Jπ: L(p,d)=2+5 for the doublet. Also L(^{3}He,α)=(2) for a 2412 *10* level.
2427.1[d] *3*	(19/2−)		E	Jπ: ΔJ=0,1 γ to (17/2−); γ to (15/2)−; band assignment.
2442 *10*	(5/2+) & (11/2−)		H O Q	XREF: O(2459). Jπ: L(p,d)=2+5 for a doublet; L(^{3}He,α)=(5).
2487 *10*	(11/2−)		H Q	Jπ: L(^{3}He,α)=(5) from 0+.
2508 *11*			H	
2534 *11*			H	
2537.2[a] *3*	(25/2)+		E	Jπ: ΔJ=2, E2 γ to (21/2)+; band assignment.
2568 *11*			H	
2590 *10*	(5/2)+		H O Q	Jπ: L(p,d)=L(^{3}He,α)=2.
2622 *11*			H	
2640 *11*			H	
2671 *11*			H	
2701.7[b] *5*	(23/2−)[@]		E	
2711 *11*	(5/2+)&(11/2−)		H o	Jπ: L(p,d)=2+5 for a doublet.
2723 *15*	(5/2+)&(11/2−)		H o	Jπ: see 2711 level.
2734.9[d] *4*	(21/2−)		E	Jπ: γ to (19/2−); band assignment.
2737 *12*			H	
2762 *12*			H	
2797 *12*			H	
2828.2 *9*	(25/2−)[@]		E	
2830 *12*			H	
2834.3[&] *4*	(27/2)+		E	Jπ: ΔJ=2, E2 γ to (23/2)+.
2842.2[c] *5*	(25/2−)[@]		E	
2858 *12*			H	
2875.5[e] *4*	(25/2+)[@]		E	
2891 *12*			H	
2923 *12*			H	
2932.9 *4*	(21/2,23/2,25/2−)		E	Jπ: γ to (21/2−).
2949 *12*			H	
2968 *12*			H	
2987.2 *9*	(25/2)[@]		E	
2995 *12*			H	
3008.4 *12*	(25/2+)[@]		E	
3015 *12*			H	
3055.1[d] *5*	(23/2−)		E	Jπ: γs to (19/2−) and (21/2−); band assignment.
3072 *12*			H	
3094 *12*			H	
3159.3 *7*	(25/2)[@]		E	
3160 *12*			H	
3181.3[a] *4*	(29/2+)		E	Jπ: ΔJ=2, (E2) γ to (25/2)+; band assignment.
3181.0+x	(25/2 to 33/2)	4 ns *1*	E	Additional information 2. Jπ: possible decay to (29/2+) level. $T_{1/2}$: from γ(t) of γs from 3181 level and levels below 3181. E(level): x ≤200, since no delayed γs observed above 200 keV.
3194 *12*			H	
3218 *12*			H	
3220.3 *9*	(25/2)[@]		E	
3257 *12*			H	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
3303 *13*		H	
3324 *13*		H	
3328.0[b] *8*	(27/2⁻)[@]	E	
3360		O	E(level): centroid of a bump between 2800 and 4000 in (p,d). A similar wide structure observed in (^{3}He,α) at about 3600. Jπ: L(p,d)=5+2 of the bump from 0⁺ shows contributions from $h_{11/2}$ and $d_{5/2}$. Tail of this bump (4000-7200 range) agrees with L=4 or L=4+2 indicating contribution from $g_{7/2}$ orbit.
3361.2[c] *4*	(29/2⁻)[@]	E	
3364.8[e] *5*	(29/2⁺)[@]	E	
3377 *13*		H	
3384.0[d] *9*	(25/2⁻)[@]	E	
3393 *14*		H	
3419 *14*		H	
3436 *14*		H	
3461 *14*		H	
3478 *14*		H	
3533 *14*		H	
3545 *15*		H	
3564.1 *5*	(29/2⁻)[@]	E	
3575 *15*		H	
3595 *15*		H	
3623 *15*		H	
3636 *15*		H	
3651.8[&] *5*	(31/2⁺)	E	Jπ: ΔJ=2, E2 γ to (27/2⁺).
3661 *15*		H	
3687 *15*		H	
3700 *15*		H	
3734 *15*		H	
3765 *15*		H	
3777.3 *8*	(29/2)[@]	E	
3806 *15*		H	
3859.6[a] *5*	(33/2⁺)	E	Jπ: (E2) γ to (29/2⁺); band assignment.
3880.3 *11*	(31/2⁻)[@]	E	
3953.3[b] *11*	(31/2⁻)[@]	E	
3968.4[c] *6*	(33/2⁻)[@]	E	
4005.9 *5*	(33/2⁻)[@]	E	
4054.7[e] *6*	(33/2⁺)[@]	E	
4486.8 *12*	(33/2)[@]	E	
4543.8[b] *6*	(35/2⁻)[@]	E	
4575.1[&] *9*	(35/2⁺)[@]	E	
4597.3[a] *6*	(37/2⁺)[@]	E	
4606.6 *10*	(37/2⁻)[@]	E	
4686.4[c] *7*	(37/2⁻)[@]	E	
4799.0[e] *10*	(37/2⁺)[@]	E	
5140.6[b] *9*	(39/2⁻)[@]	E	
5173.4 *11*	(39/2⁺)[@]	E	
5325.4 *12*	(39/2)[@]	E	
5361.3[a] *12*	(41/2⁺)[@]	E	
5372.5 *12*	(41/2⁻)[@]	E	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{149}Sm Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
5477.4[c] *12*	(41/2⁻)[@]	E	
5600		O	E(level): centroid of a wide structure between 4000 and 7200.
5791.5 *16*	(43/2)[@]	E	
5801.6[b] *14*	(43/2⁻)[@]	E	
6189.5 *19*	(45/2)[@]	E	

[†] From least-squares fit to Eγ data for levels populated in γ-ray studies. In cases, where ΔEγ is not stated, 0.3 keV is assumed when Eγ is stated to nearest tenth of a keV, and 1 keV when Eγ is stated to nearest keV. Energy uncertainties of 11 γ rays were doubled to obtain an acceptable reduced χ^2=1.9 as compared to critical χ^2=1.4. Without this adjustment reduced χ^2 was 3.7. For levels populated in particle transfer reactions only, weighted averages have been taken of all the available values. In case of unresolved doublets in particle transfer reactions, quoted energy value not included in obtaining average level energy.

[‡] Unless stated otherwise, values are derived from B(E2) values in Coul. ex., adopted branchings and mixing ratios.

[#] When assigned from L(p,d), the following shell-model orbitals are assumed (by 1983Ga07) for the transferred nucleon: $p_{3/2}$ for L(n)=1; $d_{3/2}$ (below≈1.5 MeV excitation) and $d_{5/2}$ (above≈1.5 MeV excitation) for L(n)=2; $f_{5/2}$ for L(n)=3; $g_{7/2}$ for L(n)=4; $h_{11/2}$ for L(n)=5. In in-beam γ-ray study when no γ(θ) and/or ce data are available, it is assumed that in such reactions, levels of ascending J^π are populated with increasing excitation energy. Absence of transitions to levels of low J^π values also supports such a conclusion. Unless otherwise stated, L transfers are from 0^+ targets.

[@] Assignments taken from 1990UrZR and 1990UrZX which are probably based on authors′ γ(θ), γ(lin pol) data. But no details of these data are available. Assignment is considered tentative by evaluators.

[&] Band(A): ν7/2[633] band. Based on $i_{13/2}$ neutron orbital. From observation of interconnecting E1 transitions, 1994Ba01 suggest octupole deformation and propose that this band and the band with configuration $h_{9/2}$ 9/2[505] form an alternating parity band with simplex quantum number s=−i.

[a] Band(B): ν9/2[624] band. Based on $i_{13/2}$ neutron orbital. From observation of interconnecting E1 transitions, 1994Ba01 suggest octupole deformation and propose that this band and the band with configuration $f_{7/2}$ 7/2[514] form an alternating parity band with simplex quantum number s=+i.

[b] Band(C): ν7/2[514] band. Based on $f_{7/2}$ neutron orbital.

[c] Band(D): ν9/2[505] band. Based on $h_{9/2}$ neutron orbital.

[d] Band(E): ν11/2[505] band. Based on $h_{11/2}$ neutron orbital.

[e] Band(F): Band based on $13/2^+$.

[f] Band(G): Band based on $5/2^-$.

Adopted Levels, Gammas (continued)

$\gamma(^{149}Sm)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[b]	δ[c]	α[g]	Comments
22.5002	5/2⁻	22.5002 *8*	100	0.0	7/2⁻	M1+E2	0.0784 *9*	30.0 *5*	B(M1)(W.u.)=0.00846 *17*; B(E2)(W.u.)=56.2 *17* E_γ: from ^{149}Eu ε decay, value is from 2011In01. Others: 22.519 *8* (1982Me10) and 22.494 *11* (1970An17). δ: from subshell ratios in ^{149}Eu ε decay (2011In01).
277.071	5/2⁻	254.566[#] *23*	17.82 *25*	22.5002	5/2⁻	M1+E2	+0.20[f] *+8−6*	0.1242 *20*	B(M1)(W.u.)>0.00083; B(E2)(W.u.)>0.15 I_γ: weighted average of 18.3 *11* from ^{149}Pm β^- decay, 17.93 *23* from ^{149}Eu ε decay, and 16.9 *6* from (α,nγ). Others: 97 *5* from (α,3nγ) and 46 *12* from (μ^-,2nγ) are discrepant. δ: +0.6 *4* from $\gamma(\theta$,T) in ^{149}Eu ε decay.
		277.089[#] *10*	100.0 *5*	0.0	7/2⁻	M1+E2	−0.08[f] *+1−2*	0.0997 *14*	B(M1)(W.u.)>0.0039; B(E2)(W.u.)>0.14 δ: +0.036 *18* from $\gamma(\theta$,T) in ^{149}Eu ε decay.
285.946	9/2⁻	263.23[a@] *4*	0.31 *1*	22.5002	5/2⁻	[E2]		0.0849 *12*	B(E2)(W.u.)=0.123 *+27−19* Poor energy fit, deviates by 0.21 keV.
		285.95[@] *1*	100	0.0	7/2⁻	M1(+E2)	+0.06 *6*	0.0917 *13*	B(M1)(W.u.)=0.0039 *+9−6*; B(E2)(W.u.)<0.46 δ: from $\gamma(\theta$,T) in ^{149}Pm β^- decay. Others: <0.1 from $\gamma(\theta)$ in in-beam γ-ray; <0.8 from ce data in ^{149}Pm β^- decay.
350.035	3/2⁻	72.983[#] *10*	0.347 *17*	277.071	5/2⁻	M1+E2	0.23[d] *4*	4.36 *9*	B(M1)(W.u.)=0.0167 *10*; B(E2)(W.u.)=91 *+32−28* I_γ: other: 26 *8* from (α,3nγ) is discrepant.
		327.526[#] *10*	100.0 *5*	22.5002	5/2⁻	M1+E2	+0.14 *3*	0.0637 *9*	B(M1)(W.u.)=0.0551 *18*; B(E2)(W.u.)=5.5 *+26−21* δ: $\gamma(\theta$,T) data in ^{149}Eu decay. Others: −0.03 *4* from $\gamma(\theta)$ in in-beam γ ray, +0.27 *+30−45* from $\gamma(\theta)$ in Coul. ex.
		350.016[#] *10*	8.95 *14*	0.0	7/2⁻	E2		0.0352 *5*	B(E2)(W.u.)=18.4 *7* I_γ: others: 9.6 *17* from Coulomb excitation; 16.5 *23* from (α,nγ) and 19 *8* from (α,3nγ) are discrepant.
399.08	(1/2⁻,3/2⁻)	122.0[#] *2*	100 *72*	277.071	5/2⁻	[M1,E2]		1.05 *10*	
		376.5[#h] *2*	10 *7*	22.5002	5/2⁻				
528.593	3/2⁻	129.50[#] *7*	0.07 *4*	399.08	(1/2⁻,3/2⁻)	[M1,E2]		0.87 *6*	B(M1)(W.u.)=1.5×10⁻⁴ *+9−7* if M1, B(E2)(W.u.)=4.7 *+30−23* if E2.
		178.580[#] *16*	4.0 *2*	350.035	3/2⁻	M1+E2	+0.5 *2*	0.325 *6*	B(M1)(W.u.)=0.0025 *5*; B(E2)(W.u.)=11 *7* Mult.,δ: ce and $\gamma\gamma(\theta)$ data in ^{149}Eu decay.
		251.510[#] *37*	2.0 *2*	277.071	5/2⁻	[M1,E2]		0.114 *16*	B(M1)(W.u.)=5.7×10⁻⁴ *+10−9* if M1,

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B(E2)(W.u.)=4.9 +9−7 if E2.

$\gamma(^{149}Sm)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[b]	δ[c]	α[g]	Comments
528.593	3/2⁻	506.093[#] *10*	100.0 *8*	22.5002	5/2⁻	E2+M1	+4.9[e] *+31−15*	0.0128 *4*	B(M1)(W.u.)=0.00014 *+15−8*; B(E2)(W.u.)=7.1 *+10−9*
		528.587[#] *10*	93.7 *13*	0.0	7/2⁻	E2		0.01108 *16*	B(E2)(W.u.)=5.6 *+8−6* I_γ: from ^{149}Eu ε decay. Others: 100 *25* from ^{149}Pm β^- decay.
558.373	5/2⁻	208.283[#] *21*	9.6 *6*	350.035	3/2⁻	M1+E2	−0.45[f] *15*	0.210 *4*	B(M1)(W.u.)=0.0033 *+16−9*; B(E2)(W.u.)=8 *+7−4* I_γ: weighted average of 9.6 *6* from ^{149}Pm β^- decay, 23.1 *19* from ^{149}Eu ε decay, 8.3 *17* from (α,nγ), and 8.1 *17* from (α,3nγ). I_γ: weighted average of 9.6 *6* from ^{149}Pm β^- decay, 8.3 *17* from (α,nγ), and 8.1 *17* from (α,3nγ). Other: 23 *2* from ^{149}Eu ε decay seems discrepant.
		272.21[#h] *14*	0.24 *17*	285.946	9/2⁻	[E2]		0.0763 *11*	B(E2)(W.u.)=0.32 *+33−18*
		281.295[#] *16*	46 *4*	277.071	5/2⁻	M1+E2	+0.14 *9*	0.0954 *16*	B(M1)(W.u.)=0.0075 *+36−20*; B(E2)(W.u.)=1.0 *+20−9* δ: γγ(θ) data in ^{149}Eu decay. Other: −0.07 *+22−17* from γ(θ) in in-beam γ-ray.
		535.897[#] *12*	84 *3*	22.5002	5/2⁻	M1+E2	−0.65[e] *+23−43*	0.0159 *18*	B(M1)(W.u.)=0.0014 *+7−6*; B(E2)(W.u.)=1.1 *+12−6* I_γ: weighted average of 76 *4* from ^{149}Pm β^- decay, 85.5 *27* from ^{149}Eu ε decay, 88 *4* from (α,nγ), and 96 *27* from Coulomb excitation. Other: 13.9 *17* from (α,3nγ) is discrepant.
		558.372[#] *10*	100 *6*	0.0	7/2⁻	M1+E2	+1.2[d] *+7−4*	0.0124 *13*	B(M1)(W.u.)=0.0009 *+6−4*; B(E2)(W.u.)=2.2 *+13−9* δ: sign from δ=+1.6 *11* from γ(θ) in in-beam γ-ray.
590.883	9/2⁻	305.22[a@] *8*	3.72 *23*	285.946	9/2⁻	M1(+E2)	+0.15 *15*	0.0767 *18*	B(M1)(W.u.)=0.0072 *+33−22*; B(E2)(W.u.)<5.1 Poor fit, deviates by 0.28 keV. I_γ: from ^{149}Pm β^- decay. Others: 3.5 *8* from Coulomb excitation and 4.5 *18* from (α,3nγ); 2.27 *22* from (α,nγ) is discrepant. Mult.: ce data in in-beam γ-ray. δ: γγ(θ) in ^{149}Pm β^-.
		568.36[@] *7*	25.9 *17*	22.5002	5/2⁻	E2		0.00919 *13*	B(E2)(W.u.)=13.4 *+41−26* I_γ: weighted average of 26.9 *18* from ^{149}Pm β^- decay, 25 *9* from ^{149}Eu ε decay, 24.0 *22* from (α,nγ), 31.3 *18* from (α,3nγ), and 22.7 *14* from Coulomb excitation. Mult.: γ(θ,pol) in in-beam γ-ray.
		590.88[@] *1*	100.0 *22*	0.0	7/2⁻	E2+M1	−1.5 *+9−4*	0.0101 *25*	B(M1)(W.u.)=0.008 *+9−3*; B(E2)(W.u.)=30 *+9−13* I_γ: from (α,3nγ). Others: 100 *4* from ^{149}Pm β^- decay, 100 *9* from ^{149}Eu ε decay, 100 *5* from (α,nγ), 100.0

From ENSDF

γ(^{149}Sm) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[‡]	E$_f$	J$^\pi_f$	Mult.[b]	δ[c]	α[g]	Comments
									26 from Coulomb excitation. Mult.: ce data in in-beam γ-ray. δ: γ(θ) in Coulomb excitation.
636.459	7/2⁻	287[h] *1*		350.035	3/2⁻				Seen in Coul. ex. only.
		350.71[@] *7*	10.0 *6*	285.946	9/2⁻	M1+E2	−0.30 *10*	0.0521 *13*	B(M1)(W.u.)>0.015; B(E2)(W.u.)>2.9 δ: γγ(θ) data in ^{149}Pm β⁻. Mult.: from RUL; E1+M2 not allowed.
		359.57[@] *7*	10.0 *8*	277.071	5/2⁻	M1+E2	+0.9 *5*	0.042 *6*	B(M1)(W.u.)>0.0052; B(E2)(W.u.)>9.0 δ: γγ(θ) data in ^{149}Pm β⁻. Mult.: from RUL; E1+M2 not allowed.
		613.92[@] *2*	100 *4*	22.5002	5/2⁻				
		636.50[@] *5*	60 *4*	0.0	7/2⁻	M1+E2	−0.30 *+16−18*	0.0114 *5*	B(M1)(W.u.)>0.014; B(E2)(W.u.)>0.45 Mult.,δ: from ce and γ(θ) in in-beam γ-ray.
658.66	(≤7/2)	130.10[#h] *4*	90 *23*	528.593	3/2⁻				
		308.0[a#h] *1*	3 *3*	350.035	3/2⁻				Poor energy fit, deviates by 0.6 keV.
		381.7[#] *2*	100 *23*	277.071	5/2⁻				
		636.05[#h] *10*	9	22.5002	5/2⁻				
664.09	11/2⁻	73.3	5.3 *7*	590.883	9/2⁻	[M1]		4.13 *6*	B(M1)(W.u.)=0.83 *+14−12* γ from (α,3nγ), (^{3}He,4nγ) only. δ(E2/M1)<0.025 from RUL(E2)=300.
		378.3[&] *1*	4.74[&] *30*	285.946	9/2⁻	M1(+E2)	0.00 *3*	0.0440 *6*	B(M1)(W.u.)=0.0054 *8*; B(E2)(W.u.)<0.037 I$_\gamma$: weighted average of 4.92 *25* from (α,nγ), 4.6 *7* from (α,3nγ), and 3.5 *7* from Coulomb excitation. Mult.,δ: γ(θ,pol) in in-beam γ-ray.
		664.1[&] *1*	100.0[&] *17*	0.0	7/2⁻	E2		0.00625 *9*	B(E2)(W.u.)=26.1 *+34−27* Mult.: ce and γ(θ,pol) in in-beam γ-ray.
709.85	(3/2,5/2⁺)	359.8[&] *1*	34[&] *2*	350.035	3/2⁻				δ(Q/D)=+0.14 *+38−28* or +2.5 *+38−14* from γ(θ) in in-beam γ-ray.
		432.8[&] *1*	100[&] *5*	277.071	5/2⁻				
747.39	13/2⁻	84[h] *1*		664.09	11/2⁻				γ from (α,3nγ),(^{3}He,4nγ) (1994Ba01) only; treated here as tentative.
		461.9[a&] *1*	100[&]	285.946	9/2⁻	E2		0.01589 *22*	Poor fit, deviates by 0.4 keV.
785.23	5/2⁻	785.23[@] *12*	100	0.0	7/2⁻				
789.51	11/2⁺	125.4[&] *1*	14.9[&] *6*	664.09	11/2⁻	(E1)		0.1490 *21*	Mult.: γ(θ) data consistent with ΔJ=0, dipole; ΔJ$^\pi$ requires E1.
		198.6[&] *1*	100.0[&] *34*	590.883	9/2⁻	E1		0.0431 *6*	δ(M2/E1)=0.09 *+10−15* from ce data, and −0.02 *10* from γ(θ) data (1979Ha19) in ^{148}Nd(α,3nγ),^{150}Nd(^{3}He,4nγ).

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Adopted Levels, Gammas (continued)

$\gamma(^{149}Sm)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[b]	δ[c]	α[g]	Comments
789.51	11/2+	504		285.946	9/2−				E_γ: γ from (n,2n) only.
830.46	(5/2−,7/2,9/2−)	544.27[a@] 6	7.6 4	285.946	9/2−				Poor fit, deviates by 0.24 keV.
		552.92[a@] 9	1.8 1	277.071	5/2−				Poor energy fit, deviates by 0.47 keV.
		808.11[a@]	51 4	22.5002	5/2−				
		830.53[@] 7	100 8	0.0	7/2−				
833.23	(5/2− to 11/2−)	242.10[@] 14	0.6 1	590.883	9/2−				
		547.17[@] 7	4.9 4	285.946	9/2−				
		833.40[@] 7	100 8	0.0	7/2−				
835.59	(5/2−,7/2,9/2−)	550.01[@] 15	17 3	285.946	9/2−				
		812.92[@]	29 3	22.5002	5/2−				
		835.55[@] 11	100 9	0.0	7/2−				
878.80	13/2+	89.3[&] 1	8.5[&] 4	789.51	11/2+				δ(Q/D)=−0.12 11 or −3.6 +27−10 from $\gamma(\theta)$ in in-beam γ-ray.
		131		747.39	13/2−				γ from (α,3nγ),(^{3}He,4nγ).
		214.8[&] 1	100[&] 3	664.09	11/2−	E1		0.0350 5	
881.97	(5/2,7/2−)	323.95[a@] 9	1.40 14	558.373	5/2−				Poor energy fit, deviates by 0.35 keV.
		353.46[@] 11	0.29 3	528.593	3/2−				
		531.61[a@] 6	1.37 12	350.035	3/2−				Poor fit, deviates by 0.33 keV.
		859.46[@] 6	100 3	22.5002	5/2−				
		881.98[@] 5	22 1	0.0	7/2−				
925.47	(3/2+,5/2+)	648.4[&] 1	100[&]	277.071	5/2−				
952.78	(5/2,7/2,9/2−)	930.2[@] 2	68 11	22.5002	5/2−				
		952.8[@] 1	100 11	0.0	7/2−				
994.65	(9/2,11/2,13/2−)	708.7[&] 1	100[&]	285.946	9/2−				
1038.97	(5/2−)	761.9[&] 1	100[&]	277.071	5/2−	D+Q			
1132.37	(9/2−,11/2,13/2−)	385.2[&] 1	10.8[&] 25	747.39	13/2−				
		846.2[&] 1	100[&] 5	285.946	9/2−				
1173.21	(7/2+,9/2,11/2)	383.7[&] 1	100[&]	789.51	11/2+				
1192.80	13/2+	314.0[&] 1	100[&] 5	878.80	13/2+	M1(+E2)	+0.4 5	0.069 7	Mult.: from $\gamma(\theta)$ and pol data in (α,3nγ),(^{3}He,4nγ).
		403.4[&] 1	75[&] 6	789.51	11/2+	M1+E2	−1.1 8	0.030 7	
		528.6[&] 1	<248[&]	664.09	11/2−				I_γ: doublet with undivided intensity, where part of its intensity is from 528.6 level.
1237.95	(9/2−,11/2−)	952.0[&] 1	100[&]	285.946	9/2−				
1240.13	(15/2)+	450.8	17 3	789.51	11/2+				Complex peak.
		492.6[&] 1	100[&] 3	747.39	13/2−	E1		0.00446 6	

$\gamma(^{149}Sm)$ (continued)

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[‡]	E_f	J^{π}_f	Mult.[b]	δ[c]	α[g]	Comments
1308.47	11/2⁻	561.0		747.39	13/2⁻				
		644.9[a&] 1	33[&] 5	664.09	11/2⁻				Poor fit, deviates by 0.5 keV.
		1022.4[&] 1	100[&] 8	285.946	9/2⁻	M1+E2	−2.8 4	0.00253 6	
		1309		0.0	7/2⁻				
1343.33	(13/2⁻)	553.6[&] 1	75[&] 13	789.51	11/2⁺				
		596.1[&] 1	100[&] 3	747.39	13/2⁻				
		752.5[&] 1	73[&] 10	590.883	9/2⁻				
1360.96	17/2⁻	121.0 8	11.4 3	1240.13	(15/2)⁺				E_{γ},I_{γ}: γ from (α,3nγ),(^{3}He,4nγ) with I(121γ)/I(614γ)=0.114 3.
		613.7[&] 1	100[&]	747.39	13/2⁻	E2		0.00758 11	
1362.60	17/2⁺	483.8[&] 1	100[&]	878.80	13/2⁺	E2		0.01401 20	
1398.70	15/2⁻	520.7[&] 1	21.4[&] 14	878.80	13/2⁺	D			Poor energy fit, deviates by 0.8 keV. Uncertainty of 0.3 keV assumed for fitting purpose.
		651.1[&] 1	11[&] 2	747.39	13/2⁻				
		734.7[&] 1	100[&] 5	664.09	11/2⁻	E2		0.00492 7	δ(E2/M1)>2.
1413.28	(13/2⁺,15/2⁺)	623.8[&] 1	13[&] 3	789.51	11/2⁺				
		665.7	100	747.39	13/2⁻				E_{γ}: other: 664.1 1 from (α,nγ) is for a doublet.
1574.57	(13/2)⁻	266.1[&] 1	100[&]	1308.47	11/2⁻	M1+E2	−0.50 5	0.1054 18	
1670.25	(19/2)⁺	309.4[&] 1	100[&] 3	1360.96	17/2⁻	E1		0.01361 19	
		430.0[&] 1	51[&] 3	1240.13	(15/2)⁺	E2		0.01937 27	
1684.60	(15/2,17/2,19/2⁻)	285.9[&] 1	100[&]	1398.70	15/2⁻				
1695.7	(17/2⁺)	283		1413.28	(13/2⁺,15/2⁺)				
		296		1398.70	15/2⁻				
		333	<52	1362.60	17/2⁺				
		455		1240.13	(15/2)⁺				
		503.0	100.0 23	1192.80	13/2⁺	(E2)		0.01262 18	
1846.87	(15/2)⁻	272.3[&] 1	100[&]	1574.57	(13/2)⁻	M1+E2	−0.7 2	0.095 4	
		538		1308.47	11/2⁻				
1851.2	(17/2⁺)	452		1398.70	15/2⁻				
		611		1240.13	(15/2)⁺				
1925.99	(21/2)⁺	563.4[&] 1	100[&]	1362.60	17/2⁺	E2		0.00939 13	
2041.0	(19/2⁻)	641		1398.70	15/2⁻				
		678		1362.60	17/2⁺				
		680.2		1360.96	17/2⁻				
2130.6	(17/2)⁻	283.8	100 43	1846.87	(15/2)⁻	M1		0.0937 13	
		555.9[h]		1574.57	(13/2)⁻				
2142.30	(21/2⁻)	472.0	≈14	1670.25	(19/2)⁺				

From ENSDF

Adopted Levels, Gammas (continued)

$\gamma(^{149}Sm)$ (continued)

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[‡]	E_f	J^{π}_f	Mult.[b]	α[g]
2142.30	(21/2⁻)	781.4	100 *27*	1360.96	17/2⁻	(E2)	0.00427 *6*
2145.5?	(15/2,17/2,19/2⁻)	746.8[h]	100	1398.70	15/2⁻		
2192.2	(23/2)⁺	521.9	100	1670.25	(19/2)⁺	E2	0.01145 *16*
2344.5	(21/2⁺)	304		2041.0	(19/2⁻)		
		419		1925.99	(21/2)⁺		
		493		1851.2	(17/2⁺)		
		649		1695.7	(17/2⁺)		
		674 *1*		1670.25	(19/2)⁺		
2404.4	(21/2⁺)	553		1851.2	(17/2⁺)		
		709		1695.7	(17/2⁺)		
		734		1670.25	(19/2)⁺		
2427.1	(19/2⁻)	296.4	100 *10*	2130.6	(17/2)⁻	D	
		580.2	≈16	1846.87	(15/2)⁻		
2537.2	(25/2)⁺	611.2	100	1925.99	(21/2)⁺	E2	0.00765 *11*
2701.7	(23/2⁻)	661		2041.0	(19/2⁻)		
		776		1925.99	(21/2)⁺		
2734.9	(21/2⁻)	307.5	100	2427.1	(19/2⁻)		
		606		2130.6	(17/2)⁻		
2828.2	(25/2⁻)	636		2192.2	(23/2)⁺		
2834.3	(27/2)⁺	642.0	100	2192.2	(23/2)⁺	E2	0.00678 *9*
2842.2	(25/2⁻)	141		2701.7	(23/2⁻)		
		650		2192.2	(23/2)⁺		
		700		2142.30	(21/2⁻)		
2875.5	(25/2⁺)	174		2701.7	(23/2⁻)		
		339		2537.2	(25/2)⁺		
		531.0		2344.5	(21/2⁺)		
		683		2192.2	(23/2)⁺		
2932.9	(21/2,23/2,25/2⁻)	790.6	100	2142.30	(21/2⁻)		
2987.2	(25/2)	159		2828.2	(25/2⁻)		
		795		2192.2	(23/2)⁺		
3008.4	(25/2⁺)	604		2404.4	(21/2⁺)		
3055.1	(23/2⁻)	320.1		2734.9	(21/2⁻)		
		629		2427.1	(19/2⁻)		
3159.3	(25/2)	325		2834.3	(27/2)⁺		
		967		2192.2	(23/2)⁺		
3181.3	(29/2⁺)	644.0	100	2537.2	(25/2)⁺	(E2)	0.00673 *9*
3220.3	(25/2)	1028		2192.2	(23/2)⁺		
3328.0	(27/2⁻)	626		2701.7	(23/2⁻)		
		791		2537.2	(25/2)⁺		
3361.2	(29/2⁻)	519.0		2842.2	(25/2⁻)		
		526.9		2834.3	(27/2)⁺	E1	0.00383 *5*
3364.8	(29/2⁺)	489.4		2875.5	(25/2⁺)		
		530		2834.3	(27/2)⁺		

Adopted Levels, Gammas (continued)

$\gamma(^{149}Sm)$ (continued)

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[‡]	E_f	J^{π}_f	Mult.[b]	α[g]
3364.8	(29/2+)	828		2537.2	(25/2)+		
3384.0	(25/2−)	329		3055.1	(23/2−)		
		649		2734.9	(21/2−)		
3564.1	(29/2−)	203.1		3361.2	(29/2−)		
		730		2834.3	(27/2)+		
3651.8	(31/2+)	291	<29	3361.2	(29/2−)		
		817.0 *7*	100 *8*	2834.3	(27/2)+	E2	0.00386 *5*
3777.3	(29/2)	557		3220.3	(25/2)		
		618		3159.3	(25/2)		
		943		2834.3	(27/2)+		
3859.6	(33/2+)	678.0	100	3181.3	(29/2+)	(E2)	0.00594 *8*
3880.3	(31/2−)	699		3181.3	(29/2+)		
3953.3	(31/2−)	772		3181.3	(29/2+)		
3968.4	(33/2−)	316.6		3651.8	(31/2+)		
		607		3361.2	(29/2−)		
4005.9	(33/2−)	354.0		3651.8	(31/2+)		
		442.0		3564.1	(29/2−)		
		644		3361.2	(29/2−)		
4054.7	(33/2+)	691		3364.8	(29/2+)		
		875		3181.3	(29/2+)		
4486.8	(33/2)	835		3651.8	(31/2+)		
4543.8	(35/2−)	489.4		4054.7	(33/2+)		
		684.0		3859.6	(33/2+)		
4575.1	(35/2+)	607		3968.4	(33/2−)		
		923		3651.8	(31/2+)		
4597.3	(37/2+)	737.7	100	3859.6	(33/2+)		
4606.6	(37/2−)	601		4005.9	(33/2−)		
4686.4	(37/2−)	718.0		3968.4	(33/2−)	(E2)	0.00519 *7*
4799.0	(37/2+)	744		4054.7	(33/2+)		
5140.6	(39/2−)	543		4597.3	(37/2+)		
		597		4543.8	(35/2−)		
5173.4	(39/2+)	374		4799.0	(37/2+)		
		567		4606.6	(37/2−)		
5325.4	(39/2)	639		4686.4	(37/2−)		
5361.3	(41/2+)	764		4597.3	(37/2+)		
5372.5	(41/2−)	199		5173.4	(39/2+)		
		766		4606.6	(37/2−)		
5477.4	(41/2−)	791		4686.4	(37/2−)		
5791.5	(43/2)	419		5372.5	(41/2−)		
5801.6	(43/2−)	661		5140.6	(39/2−)		
6189.5	(45/2)	398		5791.5	(43/2)		

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γ(^{149}Sm) (continued)

† As indicated, values for γ rays from low-spin (J≤9/2) are from ^{149}Eu and ^{149}Pm decay data, and for higher-spins, values are from (α,nγ) when given with uncertainties, and from ^{148}Nd(α,3nγ),^{150}Nd(^{3}He,4nγ), when given without uncertainties, unless otherwise noted.

‡ Below 953 excitation energy, Iγ data are mainly from ^{149}Pm β^- decay or ^{149}Eu ε decay or weighted average when values from these two datasets have comparable uncertainties; above this energy, values available from (α,nγ) and ^{148}Nd(α,3nγ), ^{150}Nd(^{3}He,4nγ) are considered, unless otherwise noted.

From ^{149}Eu ε decay. Available value from ^{149}Pm β^- decay is nearly the same but slightly less precise in most cases.

@ From ^{149}Pm β^- decay.

& From (α,nγ) or (α,3nγ),(^{3}He,4nγ).

[a] Uncertainty doubled for fitting purpose, as the Eγ value fits poorly.

[b] From ce studies in ^{149}Pm β^-, ^{149}Eu ε and in-beam γ-ray. Above 636 keV level, the assignment is from ce and/or $\gamma(\theta)$ and γ(lin pol) data in in-beam γ-ray studies.

[c] Deduced from ce data in ^{149}Eu decay, $\gamma\gamma(\theta)$ in ^{149}Pm β^-, and ce and $\gamma(\theta)$ data in in-beam γ-ray work. Above 636 level, value is from ce and/or $\gamma(\theta)$ data in in-beam γ-ray studies.

[d] From ce data in ^{149}Eu ε decay.

[e] $\gamma(\theta$,T) data in ^{149}Eu decay.

[f] From $\gamma(\theta)$ in (α,nγ).

[g] 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.

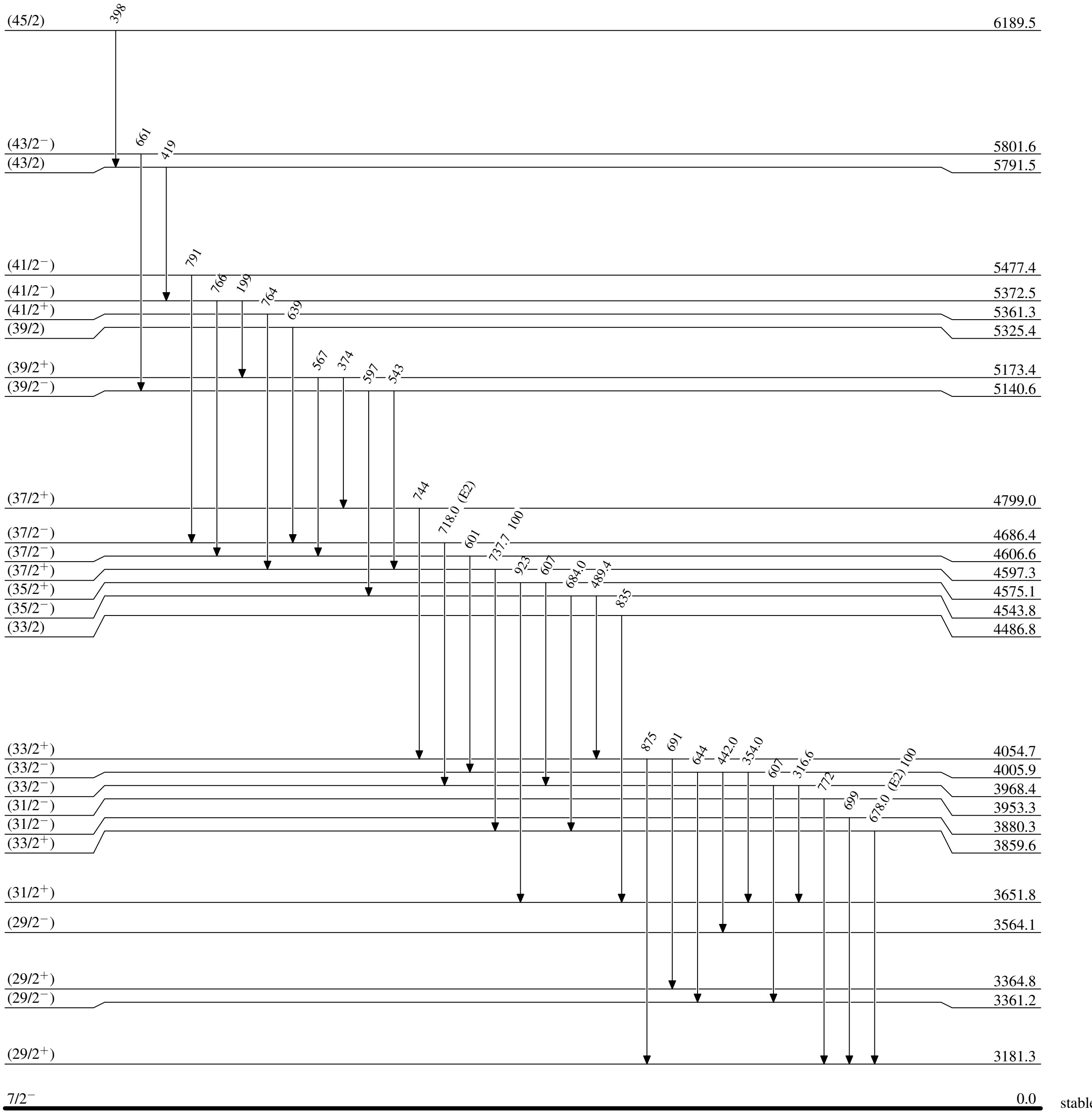
[h] Placement of transition in the level scheme is uncertain.

From ENSDF

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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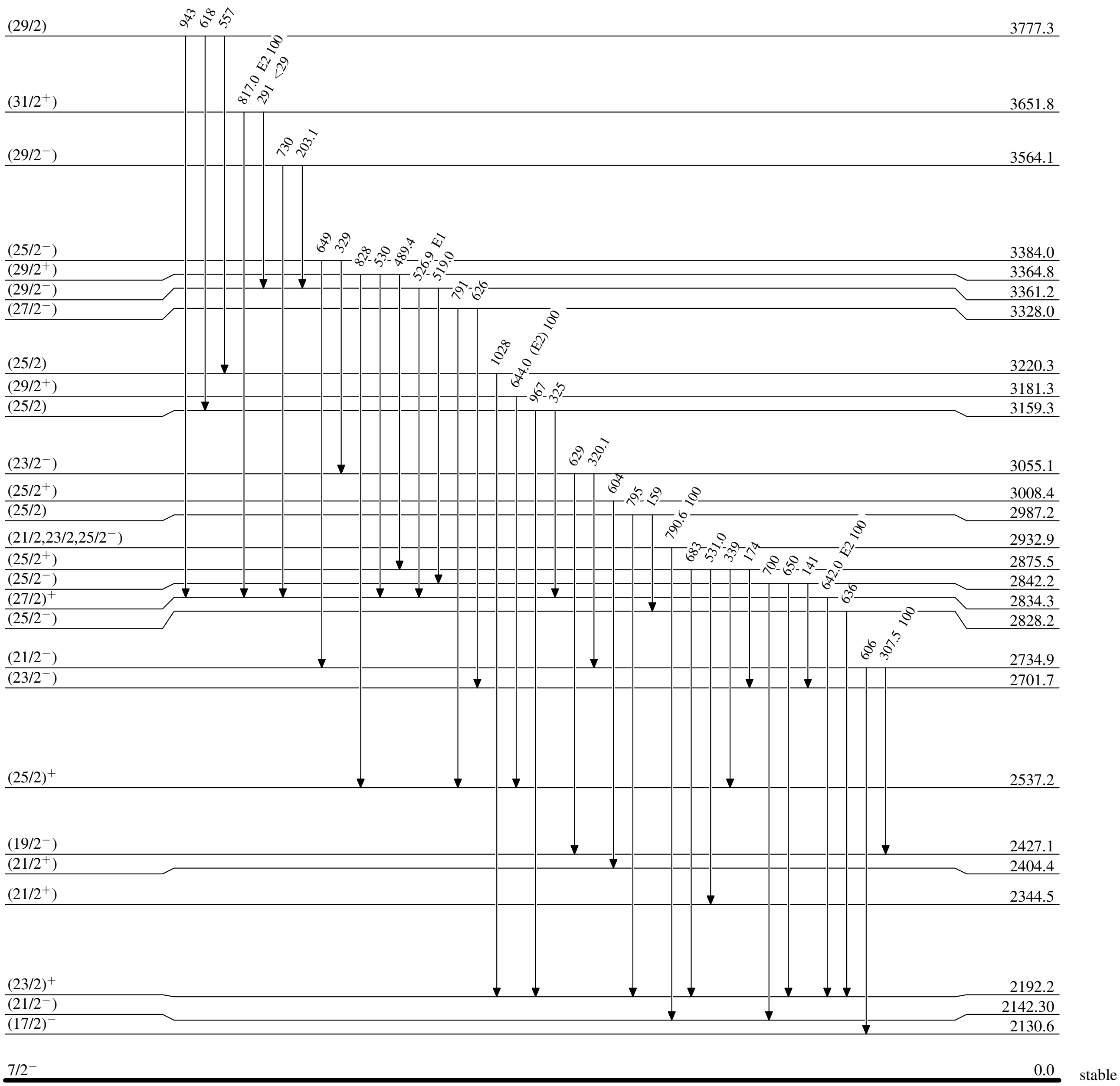
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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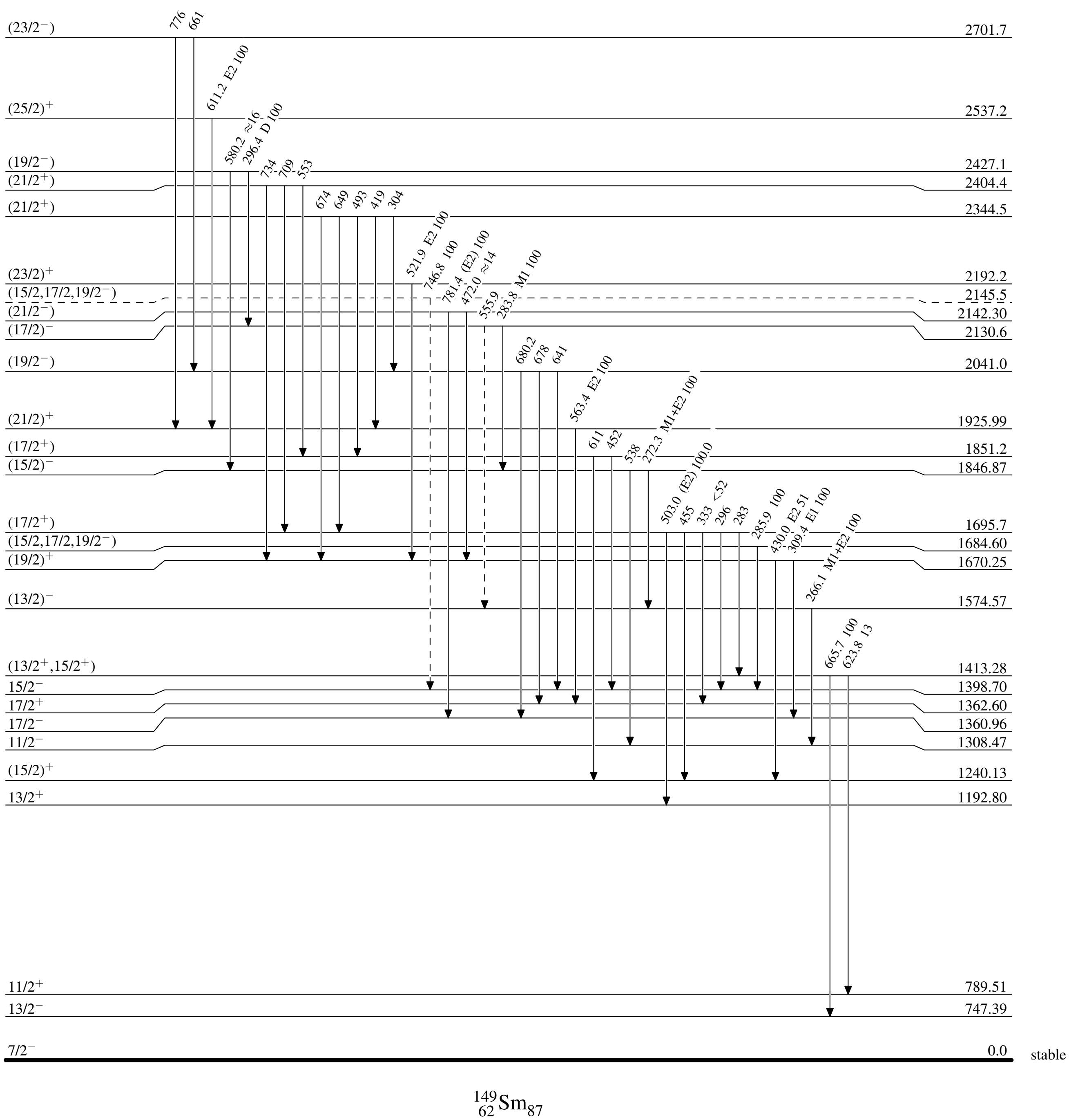
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

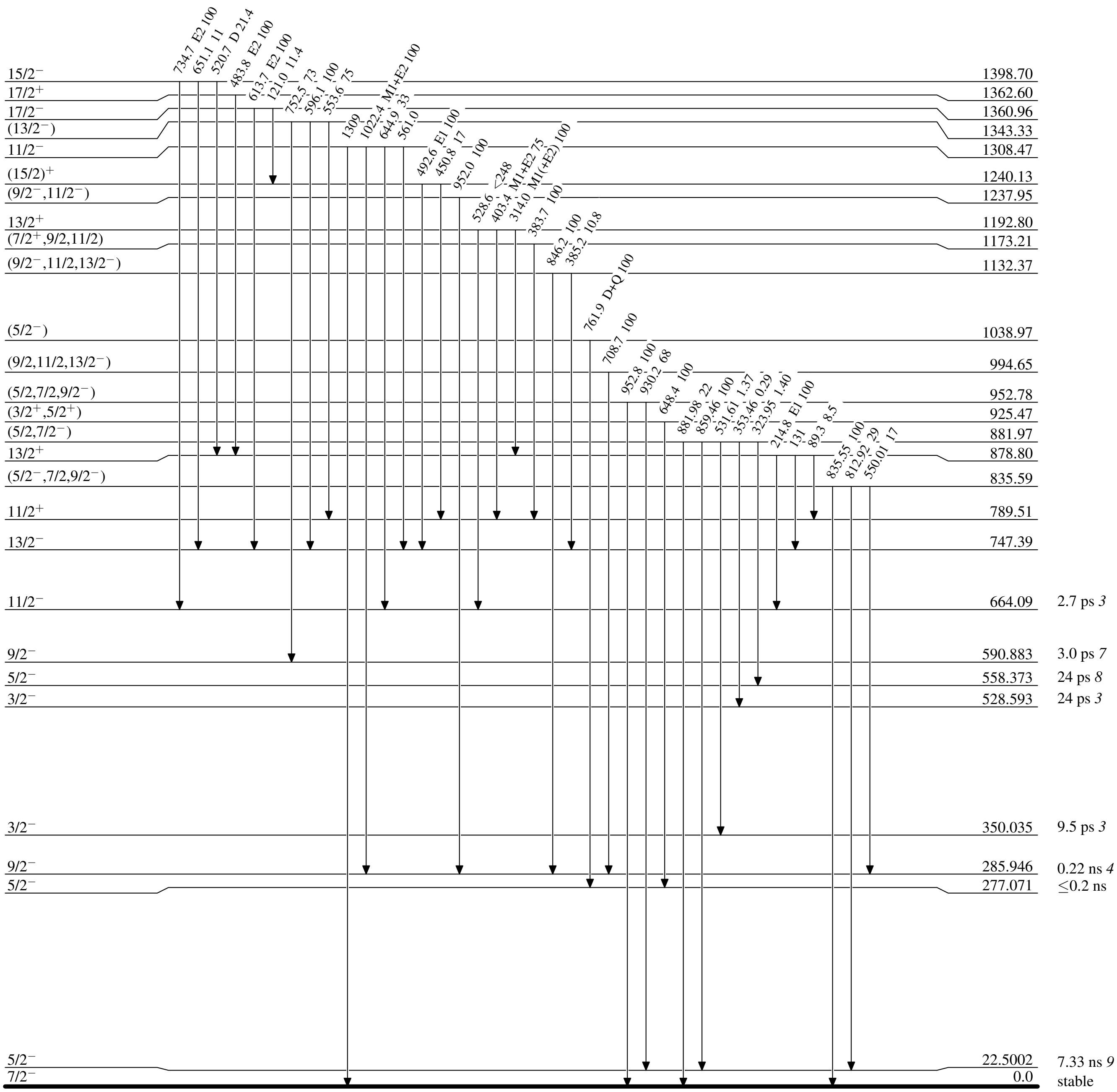
- - - - - - ► γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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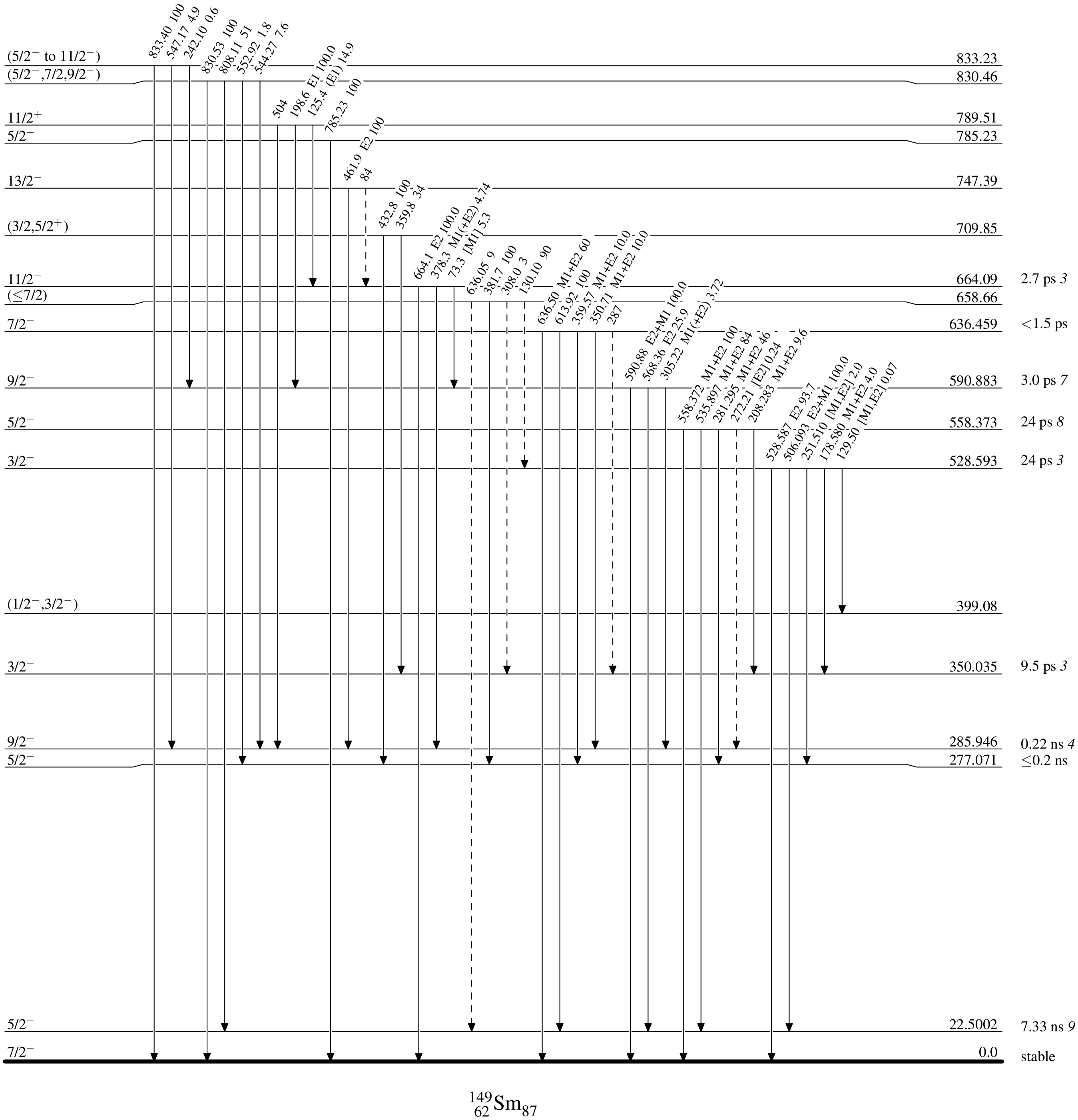
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

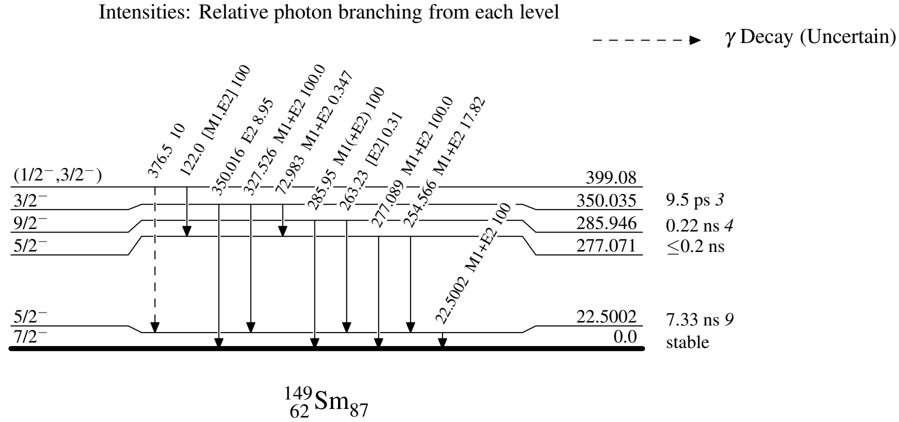


Adopted Levels, Gammas

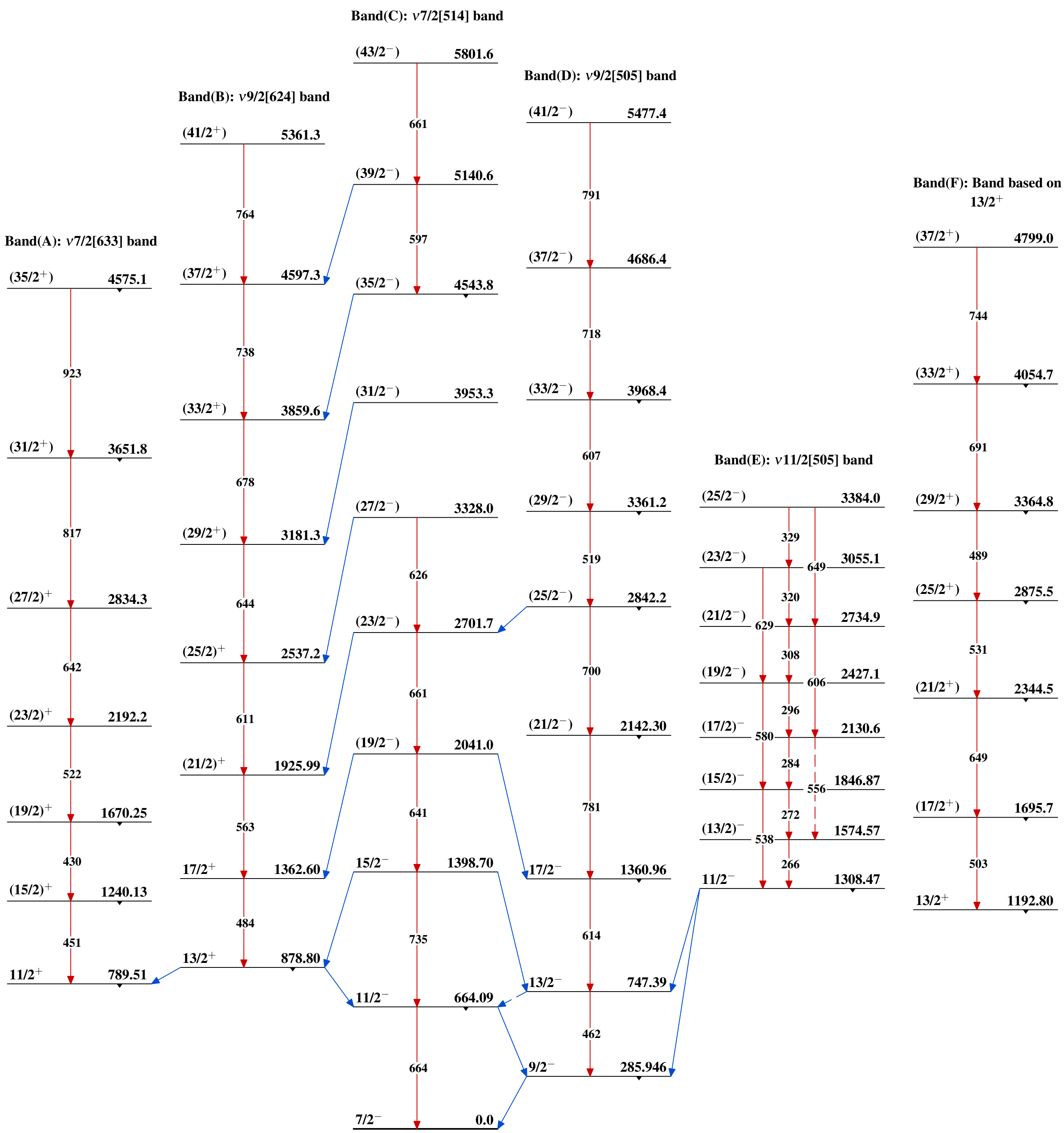
Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas



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Adopted Levels, Gammas (continued)