Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

Q(β^-)=970.9 *8*; S(n)=5943.21 *8*; S(p)=8595 *10*; Q(α)=−795.5 *9* 2017Wa10
S(2n)=13880.60 *8*; S(2p)=16462 *10* 2017Wa10
Additional information 1.
Additional information 2.

Model calculations of interest include μ (1974Ba18), configurations (1973Ga29,1983So01), and ΔN=2 mixing (1971Ka06). 2004Gr26, as part of the interpretation of their data, present the results of calculations based on the quasiparticle-phonon and quasiparticle-rotor models.

The band and configuration assignments depend in large measure on the agreement between the measured (d,p) and (d,t) cross sections ("fingerprint") with theoretical expectations for the various Nilsson orbitals, as well as the usual energy spacings within rotational bands. The relative population of a given state in (d,p) and (d,t) frequently makes it possible to distinguish between particle and hole states.

2004Gr26 propose (tentative) configurations for several states. These are pointed out in the various source data sets but are not given here.

^{159}Gd Levels

1965Gr27 report a level with a half-life of 0.46 ms and decaying with a 170-keV M2 γ ray. This level has not been verified and is not included here.

Cross Reference (XREF) Flags

A	^{159}Eu β^- decay	F	^{159}Gd IT decay (26.2 ns)
B	^{158}Gd(d,p)	G	^{158}Gd(n,γ) E=2.0 keV
C	^{160}Gd(d,t),(pol d,t)	H	^{158}Gd(n,γ) E=24.3 keV
D	^{158}Gd(n,γ) E=resonance	I	^{157}Gd(t,p)
E	^{158}Gd(n,γ) E=thermal		

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0[‡]	3/2$^-$	18.479 h *4*	ABCDEFGHI	%β^-=100 μ=−0.44 *3* T$_{1/2}$: From 1989Ab05. Others: 18.56 h *8* (1966Da19), 18.0 h *3* (1960Wi10), 1948Kr03 and 1949Bu01. J$^\pi$: J from atomic-beam magnetic resonance (1961Ca07), π from L=0 in ^{157}Gd(t,p), and L=1 in ^{160}Gd(d,t). μ: From 2005St24 compilation, based on data of 1971Kr19.
50.627[‡] *9*	5/2$^-$		ABCDEF I	XREF: I(53). J$^\pi$: L=3 in (d,p) and expected band structure.
67.829[#] *24*	5/2$^+$	26.2 ns *8*	ABCDEFGH	%IT=100 J$^\pi$: E1 γ to 3/2$^-$, L=2 in (d,p) and expected ν5/2[642] bandhead. T$_{1/2}$: From ^{159}Gd isomeric decay (1968Bo10).
118.686[#] *28*	7/2$^+$		A C E i	XREF: C(119.2)i(121). J$^\pi$: γ to 5/2$^+$ level and expected band structure.
121.899[‡] *24*	7/2$^-$		ABC E i	XREF: i(121). J$^\pi$: L=3 in (d,p), intensity pattern in (d,p), (d,t) and expected band structure.
146.316[@] *6*	5/2$^-$		ABC E HI	XREF: I(151). J$^\pi$: L=3 in (d,p), intensity pattern in (d,p), (d,t). Expected ν5/2[523] bandhead.
185.0[#] *4*	9/2$^+$		ABC I	J$^\pi$: L=4 in (d,p), intensity pattern in (d,p), (d,t) and expected band structure.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	Jπ	XREF	Comments
212.6[‡] *6*	9/2⁻	ABC i	XREF: i(220). Jπ: L=5 in (d,p), intensity pattern in (d,p), (d,t) and expected band structure.
227.412[@] *21*	7/2⁻	ABC E i	XREF: i(220). Jπ: L=3 in (d,p), intensity pattern in (d,p), (d,t) and expected band structure.
273.9[#] *6*	11/2⁺	BC	Jπ: L=6 in (d,p), weak population in (d,p), (d,t), and expected band structure.
324.9[‡] *5*	11/2⁻	BC	Jπ: L=5 in (d,p) and expected band structure.
330.479[@] *13*	9/2⁻	BC E	Jπ: L=5 in (d,p), intensity pattern in (d,p), (d,t), and expected band structure.
372.7[#] *4*	13/2⁺	BC	Jπ: L=6 in (d,p) and expected band structure.
456.4[@] *5*	11/2⁻	BC	Jπ: L=5 in (d,p), intensity pattern in (d,p), (d,t), and expected band structure.
507.724[&] *16*	1/2⁻	BCDE GHI	Jπ: L=1 in (d,p), intensity pattern in (d,p), (d,t). Expected *ν*1/2[521] bandhead, supported by particle-state nature from relative population in (d,p) and (d,t).
558.211[&] *12*	3/2⁻	BCDE GHI	Jπ: L=1 in (d,p), intensity pattern in (d,p), (d,t) and expected band structure.
588.51[&] *27*	5/2⁻	BCDE HI	Jπ: L=3 in (d,p), intensity pattern in (d,p), (d,t), and expected band structure.
601.977[e] *9*	3/2⁺	ABCDE GH	Jπ: L=2 in (d,p), population by primary γ in resonance-averaged n-capture. Weak population in (d,p), (d,t) consistent with assignment as the *ν*3/2[651] bandhead.
633.60[i] *12*	7/2⁺	BC E	Jπ: From L=4 in (d,p), 2004Gr26 report Jπ=7/2⁺ and interpret this as the bandhead of *ν*7/2[633]. The presence of a γ transition to the g.s. is not consistent with this value. Note, however, that the placement of this γ is problematic.
646.697[e] *23*	5/2⁺	CDE GH	Jπ: γ′s to 3/2⁻ and 7/2⁻ levels. From intensity of primary γ in resonance-averaged n-capture, Jπ=5/2⁺.
684.16[a] *25*	11/2⁻	BC	Jπ: From L=(5) in (d,p) and expected presence of assigned Nilsson state.
705.3[&] *4*	7/2⁻	BC i	XREF: i(706). Jπ: From L=3 in (d,t). 7/2⁻ indicated in (pol d,t).
710.38[e] *8*	7/2⁺	A E i	XREF: i(706). Jπ: γ′s to 5/2⁻ and 9/2⁻ levels. Assigned as the 7/2⁺ member of *ν*3/2[651] by 2004Gr26 from expected band structure.
732.87 *5*		A E	Jπ: γ′s to 3/2⁻,5/2⁻,5/2⁺,7/2⁺. Assigned as (5/2⁻,7/2⁻) by 2004Gr26.
744.378[b] *16*	3/2⁺	ABCDE GH	Jπ: From L=2 in (d,p), Jπ=3/2⁺, 5,2⁺. From (pol d,t) 3/2⁺ is indicated.
759.8[&] *8*	9/2⁻	B I	Jπ: L=5 in (d,p). From intensity pattern in (d,p) and expected band structure.
781.556[c] *17*	1/2⁺	BCDE GH	Jπ: From L=0 in (d,p), (d,t). Strong population in (d,t) indicates presence of a component of *ν*1/2[400].
800.45[b] *4*	5/2⁺	C E GH	Jπ: L=2 in (d,t) indicates Jπ=3/2⁺,5/2⁺. From intensity of primary γ in resonance-averaged n-capture and γ to 7/2⁻, 5/2⁺ is indicated.
818.89[c] *7*	5/2⁺	C E GH	XREF: C(819.4). Jπ: L=2 in (d,t) indicates Jπ=3/2⁺,5/2⁺. From intensity of primary γ in resonance-averaged n-capture, Jπ=5/2⁺ is indicated.
819.5 *8*	11/2⁺,13/2⁺	B	Jπ: L=6 in (d,p).
835.5 *8*	(7/2⁺,9/2⁺)	B	Jπ: From L=(4) in (d,p). 2004Gr26 quote 9/2⁺ but give no reasons for this choice.
858.51[c] *7*	3/2⁺	BCDE GH	XREF: D(860.0). Jπ: L=2 in (d,p),(d,t) gives Jπ=3/2⁺,5/2⁺. 3/2⁺ indicated by (pol d,t).
872.64[d] *5*	5/2⁻	A E HI	Jπ: γ′s to 3/2⁻,7/2⁻,5/2⁺,7/2⁺ indicate 3/2⁻,5/2,7/2⁻. From expected occurrence of *ν*5/2[512] and population of excited band members in (d,p), 2004Gr26 propose this as the bandhead of this orbital.
874.5 *11*	(1/2⁺)	B	Jπ: From L=(0) in (d,p).
876.5[b] *4*	7/2⁺	BC	Jπ: From L=(4) in (d,t). 2004Gr26 propose 7/2⁺ based on expected band structure and population strength in (d,t).
880.63 *24*	1/2⁺,3/2⁺,5/2⁺	E GH	Jπ: From intensity of primary γ in resonance-averaged n-capture.
915.828 *10*	1/2,3/2	E G	Jπ: From intensity of primary γ in resonance-averaged n-capture.
926.6 *3*	7/2⁻	C	Jπ: L=3 in (d,t) indicates Jπ=5/2⁻,7/2⁻. (pol d,t) selects 7/2⁻.
938.7[&] *5*	11/2⁻	BC	Jπ: From L=(5) in (d,p). 11/2⁻ selected from expected band structure.
948.35[d] *28*	7/2⁻	ABC I	Jπ: From L=3 in (d,p),(d,t), Jπ=5/2⁻,7/2⁻. From (pol d,t), 7/2⁻ is indicated. From

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
			intensity pattern in (d,p) assigned as the $7/2^-$ member of the indicated rotational band.
962.4 *6*	$3/2^+$	C E	XREF: E(960). J^π: From L=2 in (d,t), $J^\pi=3/2^+,5/2^+$. (pol d,t) selects $3/2^+$.
974.29[h] *3*	$1/2^+$	BCDE GH	XREF: D(972.0). J^π: From L=0 in (d,p),(d,t). Strength of peak in (d,t) indicates (dominant) conf is $\nu 1/2[400]$.
1001.62[h] *13*	$3/2^+$	BCDE GH	XREF: D(1003.3). J^π: From L=2 in (d,p),(d,t), $J^\pi=3/2^+,5/2^+$. (pol d,t) selects $3/2^+$.
1014.9 *8*	$1/2^+$	C	J^π: From L=0 in (d,t).
1043.2[d] *5*	$9/2^-$	BC	J^π: From L=5 in (d,p), $J^\pi=9/2^-,11/2^-$. J=9/2 chosen from expected band structure.
1059.6[h] *5*	$5/2^+$	BC i	XREF: B(1060.8)i(1054). J^π: From L=2 in (d,p),(d,t), $J^\pi=3/2^+,5/2^+$. (pol d,t) selects $5/2^+$.
1061.70 *7*	$1/2^-,3/2^-$	DE GHi	XREF: i(1054). J^π: From population intensity of primary γ in resonance-averaged n-capture.
1079.39 *4*	$1/2^-$	BCDE GH	J^π: L=1 in (d,p),(d,t) indicates $J^\pi=1/2^-,3/2^-$. (pol d,t) selects $1/2^-$.
1082.54		E	J^π: 2004Gr26 assign $J^\pi=3/2^-$ but give no basis for it.
1093.0[i] *7*	$13/2^+$	B	J^π: From L=6 in (d,p). Assigned as the $13/2^+$ member of the $\nu 7/2[633]$ band by 2004Gr26.
1110.25[f] *7*	$3/2^-$	BCDE GHI	J^π: From L=1 in (d,p),(d,t). From (pol d,t), $3/2^-$ is indicated. Also, from L=0 in (t,p).
1120.3[h] *5*	$7/2^+$	C	
1128.73 *6*	$3/2^+$	A CDE GH	XREF: C(1128.8). E(level): 2004Gr26 list two levels near this energy (1128.73 and 1128.8) and assign them as $J^\pi=1/2^+$ and $3/2^+$, respectively. The evaluator has chosen $3/2^+$, not $1/2^+$, for the former level, which seems to indicate that the two levels are the same. The evaluator has assumed that this is the case. J^π: From population by primary (M1) γ in (n,γ) resonances and resonance-averaged n-capture, $J^\pi=1/2^+,3/2^+$. γ to $5/2^-$ rules out $1/2^+$. 2004Gr26, however, give $1/2^+$. configuration: 2004Gr26 propose that this level (assigned by them as $1/2^+$) consists predominantly of $K^\pi=2^-$ and 3^- octupole vibrations built on the g.s. ($\nu 3/2[521]$).
1134.7[m] *4*	$7/2^-$	BC	J^π: From L=3 in (d,p), $J^\pi=5/2^-,7/2^-$. (pol d,t) seems to suggest $7/2^-$.
1139.84[g] *4*	$1/2^-$	CDE GH	J^π: From population via primary E1 transition in (n,γ) resonances, $J^\pi=1/2^-,3/2^-$. (pol d,t) selects $1/2^-$.
1145.60[g] *6*	$3/2^-$	BCDE GHI	J^π: From L=1 in (d,p),(d,t), and population by primary E1 in (n,γ) resonances, $J^\pi=1/2^-,3/2^-$. (pol d,t) selects $3/2^-$.
1151.0 *9*	$(1/2^+)$	B	J^π: From L=(0) in (d,p).
1159.90 *8*	$5/2^+$	BC E GH	J^π: From L=2 in (d,p),(d,t), $J^\pi=3/2^+,5/2^+$. (pol d,t) indicates $5/2^+$. configuration: 2004Gr26 propose that this level consists predominantly of a $K^\pi=1^-$ octupole vibration built on the g.s. ($\nu 3/2[521]$).
1162.66 *18*	5/2,7/2	A	J^π: γ's to $5/2^-,5/2^+,7/2^-,7/2^+$ levels.
1170.9 *4*	$1/2^+$	C	J^π: L=0 in (d,t).
1178.4 *6*	$1/2^+,3/2^+,5/2^+$	GH	
1178.6[f] *5*	$5/2^-$	C	J^π: L=3 in (d,t) and (pol d,t).
1190.5 *6*	$5/2^+$	C I	J^π: L=2 in (d,t) and (pol d,t).
1194.2 *8*	$7/2^+,9/2^+$	B	J^π: From L=4 in (d,p).
1202.6 *5*	$9/2^+$	C	J^π: From L=4 in (d,t) and (pol d,t).
1203.5[m] *7*	$9/2^-$	B	J^π: From L=5 in (d,p), $J^\pi=9/2^-,11/2^-$. From population in (d,p) and expected band structure, $9/2^-$ is chosen.
1216.9 *8*	$1/2^-$	C	J^π: From L=1 in (d,p) and (pol d,t).
1229.3[h] *5*	$9/2^+$	BC	J^π: From L=4 in (d,p),(d,t), $J^\pi=7/2^+,9/2^+$. (pol d,t) indicates $9/2^+$.
1239.4[f] *4*	$7/2^-$	BC	J^π: From L=(3) in (d,p),(d,t), $J^\pi=(5/2^-,7/2^-)$. (pol d,t) prefers $7/2^-$. Assigned as the

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	Jπ	XREF	Comments
			7/2⁻ member of the indicated band.
1253.1[g] 5	5/2⁻	C	Jπ: From L=3 in (d,t), Jπ=5/2⁻,7/2⁻. (pol d,t) suggests 5/2⁻. Assigned as the 5/2⁻ member of the indicated band.
1283.8 6	(7/2⁺,9/2⁺)	B i	XREF: i(1281). Jπ: From L=(4) in (d,p), band structure.
1284.38 12	3/2⁻	C E GHi	XREF: i(1281). Jπ: From L=1 in (d,t), Jπ=1/2⁻,3/2⁻. (pol d,t) indicates 3/2⁻.
1296.5 5	3/2⁻	BC	Jπ: From L=1 in (d,p),(d,t), Jπ=1/2⁻,3/2⁻. (pol d,t) indicates 3/2⁻.
1303.4[g] 4	7/2⁻	BC	Jπ: From L=3 in (d,p),(d,t), Jπ=5/2⁻,7/2⁻. (pol d,t) indicates 7/2⁻.
1315.80 28	1/2⁺	C	Jπ: L=0 in (d,t).
1322.2 11	(3/2⁺,5/2⁺)	B	Jπ: L=(2) in (d,p).
1325.12 27	5/2⁻	C GHI	XREF: I(1327). Jπ: From L=3 in (d,t), Jπ=5/2⁻,7/2⁻. From intensity of populating primary γ in resonance-averaged n-capture, Jπ=1/2,3/2,5/2.
1343.82 21	5/2⁻	BC GH	Jπ: From L=3 in (d,t); (pol d,t).
1356.6 9	(3/2⁺)	C	Jπ: From L=(2) in (d,t); (pol d,t).
1365.9[f] 6	9/2⁻	C	Jπ: From L=5 in (d,t); (pol d,t).
1373.0 8	9/2⁻	C	Jπ: From L=5 in (d,t); (pol d,t).
1379.2 10	1/2⁺	C	Jπ: L=0 in (d,t).
1392.3 6	(1/2⁺)	CDE	XREF: E(1389). Jπ: L=0 in (d,t).
1394.1 6	(5/2⁻,7/2⁻)	B	Jπ: L=(3) in (d,p).
1394.45 15	1/2⁺,3/2⁺	GH	Jπ: From intensity of populating primary transition in resonance-averaged n-capture.
1400.2 5	1/2⁻,3/2⁻	D G	XREF: D(1399.3). Jπ: From intensity of populating primary transition in resonance-averaged n-capture.
1406.9 10	5/2⁻	C	Jπ: From L=3 in (d,t); (pol d,t).
1414.8 5	5/2⁺	C	Jπ: From L=2 in (d,t); (pol d,t).
1418.4 4	1/2⁺,3/2⁺	D	XREF: D(1416.9). E(level): From Summary Values of 2004Gr26. 2003Gr13 list 1416.9. Jπ: From population by primary γ's in (n,γ) resonances.
1419.3 5	9/2⁺	BC	Jπ: L=4 in (d,t); (pol d,t).
1430.95 16	3/2⁺,5/2⁺	BCDE GHI	XREF: D(1429.6). Jπ: From L=2 in (d,p),(d,t). From population by primary γ's in resonance-averaged n-capture, Jπ=1/2⁺,3/2⁺. 2004Gr26 propose 3/2⁺,5/2⁺.
1442.8[g] 5	9/2⁻	C	Jπ: From L=(5) in (d,t); (pol d,t). Assigned as the 9/2⁻ member of the indicated band by 2004Gr26.
1446.5 6	1/2⁺,3/2⁺	D G	XREF: D(1447.8). Jπ: From intensity of populating primary transition in resonance-averaged n-capture.
1454.4 9	1/2⁺	C	E(level): Shown as 1554.4 in 2004Gr26. Probably a misprint. Jπ: L=0 in (d,t).
1468.31 17	3/2⁺	B D GHi	XREF: i(1471). Jπ: From L=2 in (d,p), Jπ=3/2⁺,5/2⁺. From intensity of populating primary γ in resonance-averaged n-capture, Jπ=1/2⁺,3/2⁺.
1468.9 7	(1/2⁻)	C i	XREF: i(1471). Jπ: L=(1) in (d,t); (pol d,t).
1477.79 11	3/2⁺	BCD GHi	XREF: i(1471). Jπ: From L=2 in (d,t); (pol d,t), Jπ=3/2⁺,5/2⁺. From intensity of populating primary γ in resonance-averaged n-capture, Jπ=1/2⁺,3/2⁺.
1488.2 5	7/2⁺	C	Jπ: L=4 in (d,t); (pol d,t).
1491.8 7	7/2⁺,9/2⁺	B	Jπ: L=4 in (d,p).
1493.8 10	5/2⁻,7/2⁻	C	Jπ: L=3 in (d,t).
1505.1 7	1/2⁽⁺⁾,3/2⁽⁺⁾	D G I	XREF: I(1502). Jπ: From intensity of populating primary γ in resonance-averaged n-capture.
1508.6 4	5/2⁺	BC	Jπ: From L=2 in (d,p), Jπ=3/2⁺,5/2⁺. (pol d,t) selects 5/2⁺.
1520.86 11	1/2⁻	ABCD GHI	XREF: C(1522).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
			J^π: From L=1 in (d,p) and population by primary E1 γ in (n,γ) resonances. (pol d,t) prefers $1/2^-$. γ to $5/2^+$ is problematic.
1532.4 *4*	$7/2^+$	C	J^π: L=4 in (d,t); (pol d,t). Assigned as the bandhead of ν7/2[404] by 2004Gr26.
1540.46 *26*	$5/2^+$	BC GH	J^π: L=2 in (d,t); (pol d,t).
1545.5 *3*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1548.5 *9*	$(3/2^+)$	C	J^π: L=(2) in (d,t); (pol d,t).
1557.1 *10*	$1/2^+,3/2^+$	De	XREF: e(1558).
			J^π: Population by primary M1 γ in (n,γ) resonances.
1560.4 *7*	$7/2^+,9/2^+$	B	J^π: L=4 in (d,p).
1560.62 *10*	$3/2^-$	CDe GH	XREF: D(1561.3)e(1558).
			J^π: From L=1 in (d,t); (pol d,t).
1571.2 *7*	$7/2^+,9/2^+$	B	J^π: L=4 in (d,p).
1571.91 *12*	$1/2^+$	C GH	J^π: L=0 in (d,t).
1579.21 *19*	$1/2^+,3/2^+$	b d GH	XREF: b(1579.6)d(1577.0).
			J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1579.6[k] *6*	$1/2^-$	b d GH	XREF: b(1579.6)d(1577.0)G(?)H(?).
			J^π: From L=1 in (d,p), $J^\pi=1/2^-,3/2^-$. From band assignment, $J^\pi=1/2^-$ is chosen.
1580.2 *7*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
1582.3 *9*	$1/2^{(-)},3/2^{(-)}$	D	J^π: Population by primary (E1) γ in (n,γ) resonances.
1584.51 *17*	$3/2^+$	B GHI	XREF: I(1585).
			J^π: From L=2 in (d,p), $J^\pi=3/2^+,5/2^+$. From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^+,3/2^+$.
1593.12 *19*	$1/2^+,3/2^+$	D GH	XREF: D(1594.6).
			J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1593.2 *6*	$5/2^+$	BC	J^π: From L=2 in (d,p),(d,t), $J^\pi=3/2^+,5/2^+$. (pol d,t) selects $5/2^+$.
1603.30[k] *10*	$3/2^-$	BCDE GHi	XREF: E(1608)i(1600).
			J^π: From L=1 in (d,p),(d,t), $J^\pi=1/2^-,3/2^-$. (pol d,t) selects $3/2^-$. L=(0) in (t,p).
1611.1 *8*	$5/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
1615.1 *6*	$1/2^+,3/2^+$	D	J^π: Population by primary M1 γ in (n,γ) resonances.
1621.6 *7*	$3/2^+,5/2^+$	B	J^π: L=2 in (d,p).
1622.3 *4*	$11/2^-$	C	J^π: From L=(5) in (d,t), $J^\pi=(9/2^-,11/2^-)$. From population intensity in (d,t), 2004Gr26 choose $11/2^-$ and tentatively assign it as the $11/2^-$ member of the ν9/2[514] band.
1627.2 *4*	$5/2^+$	B H	XREF: B(1628.5).
			J^π: From L=2 in (d,p), $J^\pi=3/2^+,5/2^+$. From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=5/2$.
1631.4 *5*	$(9/2^+)$	C	J^π: From L=(4) in (d,t); (pol d,t). Assigned as the $9/2^+$ member of ν7/2[404] by 2004Gr26.
1635.0 *10*	$1/2^+,3/2^+$	D	J^π: Population by primary M1 γ in (n,γ) resonances.
1637.8[l] *5*	$(3/2^-)$	BC	J^π: From L=(1) in (d,p),(d,t),(pol d,t), $J^\pi=(3/2^-)$. Tentatively assigned as the bandhead of ν3/2[512] by 2004Gr26.
1642.50 *10*	$1/2^-,3/2^-$	DE GH	XREF: E(1637).
			J^π: Population by primary E1 γ in (n,γ) resonances.
1644.1 *8*	$5/2^-$	C	J^π: From L=3 in (d,t); (pol d,t).
1646.2 *8*	$3/2^+,5/2^+$	B	J^π: From L=2 in (d,p).
1656.6 *4*	$3/2^+$	BC G	J^π: L=2 in (d,p),(d,t); (pol d,t).
1668.3 *5*	$5/2^+$	BC i	XREF: i(1671).
			J^π: L=2 in (d,p),(d,t); (pol d,t).
1669.8 *15*	$1/2^{(+)},3/2^{(+)}$	D	J^π: Population by primary (M1) γ in (n,γ) resonances.
1672.9 *7*	$(7/2^+)$	C	J^π: From L=(4) in (d,t); (pol d,t).
1673.31 *11*	$1/2^-,3/2^-$	D GHi	XREF: D(1674.2)i(1671).
			J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1675.5 *10*	$3/2^+,5/2^+$	B	J^π: L=2 in (d,p).
1682.9 *6*	$5/2^-,7/2^-$	C	J^π: L=3 in (d,t).
1685.4 *8*	$3/2^+,5/2^+$	B	J^π: L=2 in (d,p).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
1690.6 *5*	$5/2^+$	C HI	XREF: I(1694). J^π: L=2 in (d,t); (pol d,t).
1693.5[k] *6*	$5/2^-$	B	J^π: From L=(3) in (d,p), $J^\pi=(5/2^-,7/2^-)$. From band assignment, $5/2^-$ is chosen.
1702.5 *4*	$7/2^-$	BC	J^π: From L=3 in (d,p),(d,t), $J^\pi=5/2^-,7/2^-$. (pol d,t) indicates $7/2^-$; and 2004Gr26 list this in their Tabular Level Scheme (their Table iv). However, these authors (tentatively) assign it as the $5/2^-$ member of $\nu 3/2[512]$. This assignment has not been adopted by the evaluator.
1704.6 *10*	1/2,3/2	D	J^π: Population by primary γ in (n,γ) resonances.
1713.2 *15*	$(5/2^+)$	C	J^π: L=(2) in (d,t); (pol d,t).
1719.1 *12*	$(3/2^+)$	BC	J^π: L=2 in (d,p) indicates $J^\pi=3/2^+,5/2^+$. $(3/2^+)$ in (pol d,t).
1721.74 *19*	1/2,3/2	DE GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1729.4 *6*	$5/2^-$	BC	J^π: L=3 in (d,t); (pol d,t). Value is also that listed in the Tabular Level Scheme (their Table iv) of 2004Gr26. However, these authors assign this as the $7/2^-$ member of $\nu 1/2[510]$. The evaluator has not adopted this assignment.
1745.7 *5*	$(5/2^+)$	BC	J^π: L=(2) in (d,p) indicates $J^\pi=(3/2^+,5/2^+)$. $(5/2^+)$ in (pol d,t).
1746.0 *8*	$1/2^+,3/2^+$	D GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1751.0 *10*	$7/2^+,9/2^+$	B	J^π: L=4 in (d,p).
1753.6 *12*	$1/2^+$	C	J^π: L=0 in (d,t).
1758.69 *10*	$3/2^-$	BC GH	J^π: From L=1 in (d,p),(d,t), together with intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^-,3/2^-$. From (pol d,t), $3/2^-$ is chosen.
1772.57 *14*	1/2,3/2	D G	XREF: D(1770.3). J^π: Population by primary γ in resonance-averaged n-capture.
1773.8 *7*	$3/2^-$	C	J^π: L=1 in (d,t); (pol d,t).
1774.1 *6*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1782.53 *11*	$1/2^-,3/2^-$	B GHI	J^π: L=1 in (d,p) and intensity of populating primary γ in resonance-averaged n-capture. configuration: 2004Gr26 propose that this state contains a large component of the $K^\pi=2^-$ and 3^- octupole vibrations built on $\nu 5/2[642]$.
1783.8 *7*	$(7/2^-)$	C	J^π: L=(3) in (d,t); (pol d,t).
1792.0 *9*	$(1/2^+)$	C	J^π: L=(0) in (d,t).
1807.2 *10*	$7/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
1808.50 *29*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1809.2[l] *12*	$5/2^-,7/2^-$	B	J^π: L=3 in (d,p). Tentatively assigned by 2004Gr26 as the $7/2^-$ member of $\nu 3/2[512]$, in which case $J^\pi=7/2^-$.
1813.4 *6*	$3/2^+$	BC	J^π: L=2 in (d,p),(d,t); (pol d,t).
1825.27 *16*	$1/2^-$	CD G	XREF: C(1823.8). J^π: L=1 in (d,t); (pol d,t). Population by primary E1 γ in (n,γ) resonances supports this.
1826.2 *9*	$1/2^+$	B	J^π: L=0 in (d,p).
1830.99 *19*	$3/2^+$	C G	J^π: L=2 in (d,t); (pol d,t).
1840.0 *7*	$1/2^+$	C	J^π: L=0 in (d,t).
1840.9 *15*	$1/2^-,3/2^-$	DE	J^π: Population by primary E1 γ in (n,γ) resonances.
1841.0 *3*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1846.6 *8*	$5/2^-,7/2^-$	B	J^π: L=3 in (d,p).
1851.9 *5*	$1/2^+$	C GHI	XREF: C(1850.8)I(1848?). J^π: L=0 in (d,t). From L=(0) in (t,p), $(3/2^-)$ is suggested (assuming that it is the same level).
1859.4 *14*	$5/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
1869.02 *19*	$3/2^+$	BCD G I	XREF: B(1874.2)C(1868.2)I(1871). J^π: From L=2 in (d,t), $J^\pi=3/2^+,5/2^+$. From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^+$, $3/2^+$.
1872.7 *6*	$5/2^+$	C H	XREF: C(1874.2). J^π: L=2 in (d,t); (pol d,t).
1880.7 *10*	1/2,3/2	D	J^π: Population by primary γ in (n,γ) resonances.
1883.66 *9*	$1/2^-$	BCD GH	XREF: B(1885.4)D(1885.3). J^π: From L=1 in (d,p), $J^\pi=1/2^-,3/2^-$. (pol d,t) suggests $(1/2^-)$.
1889.5 *20*	$1/2^+,3/2^+$	D	J^π: Population by primary M1 γ in (n,γ) resonances.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
1891.26 *21*	$3/2^+,5/2^+$	C Hi	XREF: H(1890.5)i(1895). J^π: L=2 in (d,t).
1892.0 *8*	$1/2^-,3/2^-$	B	J^π: L=1 in (d,p).
1896.8 *30*	$1/2^{(+)},3/2^{(+)}$	DE i	XREF: i(1895). J^π: Population by primary (M1) γ in (n,γ) resonances.
1900.1 *4*	$3/2^+$	C GH	J^π: From L=2 in (d,t), $J^\pi=3/2^+,5/2^+$. From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^+,3/2^+$.
1908.5 *9*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
1910.4 *17*	$(1/2^-,3/2^-)$	B	J^π: L=(1) in (d,p).
1917.5 *7*	$3/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
1917.6 *5*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1918.4 *8*	$(1/2^-,3/2^-)$	B D i	XREF: i(1920). J^π: L=(1) in (d,p).
1925.9 *15*	$(1/2^-,3/2^-)$	C i	XREF: i(1920). J^π: L=(1) in (d,t).
1926.0 *9*	$1/2^{(+)},3/2^{(+)}$	D	J^π: Population by primary (M1) γ in (n,γ) resonances.
1927.9 *8*	$1/2^-,3/2^-$	B	J^π: L=1 in (d,p).
1930.6 *14*	$5/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
1933.3 *11*	$5/2^-,7/2^-$	B	J^π: L=3 in (d,p).
1938.4 *7*	$(7/2^+)$	C	J^π: L=(4) in (d,t); (pol d,t).
1945.88 *23*	$1/2^-$	CD GH	J^π: L=1 in (d,t); (pol d,t).
1954.50 *22*	$3/2^-$	CD GH	J^π: L=1 in (d,t); (pol d,t).
1958.1 *6*	$1/2^-,3/2^-$	B	J^π: L=1 in (d,p).
1964.6 *4*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
1971.47 *18*	$1/2^{(+)}$	B D GH	XREF: D(1972.1). J^π: L=(0) in (d,p). However, feeding by a primary (E1) γ in (n,γ) resonances suggests $\pi=-$.
1972.5 *8*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
1980.3 *10*	$1/2^+$	CdE	XREF: d(1981.6). J^π: L=0 in (d,t).
1983.3[j] *8*	$1/2^+$	B d G	XREF: d(1981.6). J^π: L=0 in (d,p).
1989.2 *19*	$3/2^-$	C	J^π: L=1 in (d,t); (pol d,t).
1996.4 *4*	5/2	E HI	XREF: E(1992)I(1996?). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
1997.3 *7*	$1/2^+$	C	J^π: L=0 in (d,t).
1997.3 *6*	$1/2^-,3/2^-$	B	J^π: From L=1 in (d,p). 2004Gr26 propose $3/2^-$ and assign it as the $3/2^-$ member of the $\nu 1/2[770]$ band, but the evaluator has not adopted this.
2003.2[j] *8*	$3/2^+$	B	J^π: From L=2 in (d,p), $J^\pi=3/2^+,5/2^+$. From band assignment, $3/2^+$ is chosen.
2006.5 *14*	$5/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
2007.5 *4*	$1/2^+,3/2^+$	D GH	XREF: D(2008.1). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2011.66 *13*	$3/2^-$	BC GH	J^π: L=1 in (d,t); (pol d,t).
2032.7 *4*	$5/2^+$	BCD	XREF: D(?). J^π: L=2 in (d,t); (pol d,t).
2033.00 *18*	$1/2^-,3/2^-$	D GH	XREF: D(2031.7). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2038.3 *17*	$1/2^-,3/2^-$	D	J^π: From population by primary E1 γ in (n,γ) resonances.
2039.63 *15*	$3/2^+$	C GH	J^π: L=2 in (d,t); (pol d,t).
2042.0 *6*	$(3/2^+,5/2^+)$	B I	XREF: I(2044). J^π: From L=(2) in (d,p).
2044.5 *15*	$5/2^-$	C	J^π: L=3 in (d,t); (pol d,t).
2048.7 *6*	$(1/2^-,3/2^-)$	B	J^π: From L=(1) in (d,p). 2004Gr26 suggest $1/2^-$ but give no basis for this choice.
2050.91 *19*	$1/2^+$	C GH	XREF: C(2051.9). J^π: L=0 in (d,t).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
2053.0 *13*	$1/2^-,3/2^-$	D	J^π: From population by primary E1 γ in (n,γ) resonances.
2058.0 *8*	$5/2^-,7/2^-$	B	J^π: From L=3 in (d,p), $J^\pi=5/2^-,7/2^-$. 2004Gr26 tentatively propose $7/2^-$ and assign it as a member of the $\nu 1/2[770]$ band, but the evaluator has not adopted this.
2074.1 *6*	$(5/2^-,7/2^-)$	B	J^π: L=(3) in (d,p).
2074.16 *12*	$1/2^-,3/2^-$	CD GH	XREF: D(2072.6). J^π: From L=1 in (d,t) and population by primary E1 γ in (n,γ) resonances.
2081.9 *8*	$1/2^+$	C	J^π: L=0 in (d,t).
2087.6 *9*	$1/2^{(-)},3/2^{(-)}$	D G	XREF: D(2086.2). J^π: From population by primary (E1) γ in (n,γ) resonances.
2088.1[j] *10*	$5/2^+$	B	J^π: From L=(2) in (d,p), $J^\pi=(3/2^+,5/2^+)$. From band assignment, $5/2^+$ is chosen.
2092.5 *7*	$5/2^+$	BC	J^π: From L=2 in (d,t); (pol d,t).
2100.8 *6*	$1/2^-,3/2^-$	B	J^π: L=1 in (d,p).
2103.0 *8*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2105.1 *6*	$3/2^+$	C	J^π: From L=2 in (d,t); (pol d,t).
2110.6 *5*	$1/2^{(-)},3/2^{(-)}$	D G	XREF: D(2111.4). J^π: From population by primary (E1) γ in (n,γ) resonances.
2115.1 *10*	$3/2^-$	C	J^π: From L=1 in (d,t); (pol d,t).
2116.7 *5*	$1/2^+,3/2^+$	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2121.7 *12*	$5/2^-,7/2^-$	B	J^π: L=3 in (d,p).
2121.7 *5*	$1/2^{(-)},3/2^{(-)}$	D G	XREF: D(2121.9). J^π: From population by primary (E1) γ in (n,γ) resonances.
2125.8 *14*	$3/2^-$	C	J^π: From L=1 in (d,t); (pol d,t).
2134.3 *12*	$1/2^{(-)},3/2^{(-)}$	D	J^π: From population by primary (E1) γ in (n,γ) resonances.
2136.8 *10*	$3/2^+,5/2^+$	C G	XREF: G(2137.6). J^π: L=2 in (d,t). From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^{(+)},3/2^{(+)}$.
2149.9 *10*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2150.9 *4*	1/2,3/2	D GH	XREF: D(2153.4)G(2151.2)H(2151.2). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2158.59 *16*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2162.0 *20*	$5/2^+$	C E i	XREF: E(2157)i(2163). J^π: L=2 in (d,t); (pol d,t).
2162.6 *8*	$1/2^-,3/2^-$	D	J^π: From population by primary E1 γ in (n,γ) resonances.
2165.39 *17*	1/2,3/2	GHi	XREF: i(2163).
2169.2 *20*	$3/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2176.2 *20*	$(5/2^+)$	C	J^π: L=(2) in (d,t); (pol d,t).
2178.7 *10*	$1/2^-,3/2^-$	D	J^π: From population by primary E1 γ in (n,γ) resonances.
2182.39 *12*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2186.0 *20*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2187.98 *23*	$1/2^-,3/2^-$	GH	J^π: From population by primary E1 γ in (n,γ) resonances.
2190.8 *14*	$1/2^{(-)},3/2^{(-)}$	D i	XREF: i(2191). J^π: From population by primary (E1) γ in (n,γ) resonances.
2193.8 *5*	$3/2^+$	C E G i	XREF: C(2194.3)i(2191). J^π: L=2 in (d,t); (pol d,t).
2200.8 *10*	$1/2^{(-)},3/2^{(-)}$	D	J^π: From population by primary (E1) γ in (n,γ) resonances.
2203.1 *11*	$3/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2203.8 *4*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2206.6 *10*	1/2,3/2	D G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2210.67 *27*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2212.8 *9*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2215.01 *27*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2222.0 *4*	$5/2^-$	CD GH	J^π: L=3 in (d,t); (pol d,t).
2234.32 *14*	$3/2^-$	CD GH	J^π: L=1 in (d,t); (pol d,t). From intensity of populating primary γ in resonance-averaged n-capture, $J^\pi=1/2^-,3/2^-$.
2242.3 *7*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
2252.4 *27*	$1/2^+,3/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2252.8 *16*	$5/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2257.02 *14*	$1/2^-,3/2^-$	D GH	XREF: D(2256.1). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2261.23 *22*	$3/2^+$	CD GH	XREF: D(2259.8). J^π: L=2 in (d,t); (pol d,t).
2271.9 *21*	$5/2^+$	C I	XREF: I(2274). J^π: L=2 in (d,t); (pol d,t).
2280.9 *7*	$1/2^-,3/2^-$	D GH	J^π: From population by primary E1 γ in (n,γ) resonances.
2283.71 *20*	$3/2^+$	C GH	J^π: L=2 in (d,t); (pol d,t).
2287.80 *18*	$1/2^-,3/2^-$	D GH	J^π: From population by primary E1 γ in (n,γ) resonances.
2297.3 *12*	$3/2^+$	C E	J^π: L=2 in (d,t); (pol d,t).
2300.8 *4*	$1/2^+,3/2^+$	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2303.6 *4*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2306.0 *20*	$3/2^+$	C	J^π: L=2 in (d,t); (pol d,t).
2315.22 *17*	$1/2^-,3/2^-$	CD GH	XREF: C(2316.6?)D(2314.3). J^π: From intensity of populating primary γ in resonance-averaged n-capture. From (d,t), $J^\pi=3/2^-,5/2^-$.
2318.4 *4*	$1/2^+,3/2^+$	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2321.7 *7*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2334.11 *16*	$1/2^-,3/2^-$	D GH	XREF: D(2335.4). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2346.85 *22*	$1/2^-,3/2^-$	D GH	XREF: D(2347.0). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2353.2 *3*	$1/2^-,3/2^-$	D GH	XREF: D(2352.0). J^π: From intensity of populating primary γ in resonance-averaged n-capture. Population by primary E1 γ in (n,γ) resonances.
2357.71 *13*	$1/2^-,3/2^-$	D GHI	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2378.40 *17*	$1/2^+,3/2^+,5/2^+$	D GH	XREF: D(2377.6). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2386.33 *24*	$1/2^-,3/2^-$	D GH	XREF: D(2388.6). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2391.37 *16*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2400.4 *3*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2411.18 *18*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2415.8 *3*	$1/2^+,3/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2421.79 *20*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2428.1 *5*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2438.97 *26*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2446.24 *22*	$1/2^-,3/2^-$	GHi	XREF: i(2448). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2452.98 *27*	$1/2^-,3/2^-$	GHi	XREF: i(2448). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2470.5 *3*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2486.7 *3*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2488.7 *6*	5/2	Hi	XREF: i(2492). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2495.5 *3*	$5/2^+$	GHi	XREF: i(2492). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2527.0 *7*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2539.4 *3*	$1/2^-,3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2546.1 *3*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2558.09 *24*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2561.3 *7*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2564.8 *4*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2587.87 *22*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
2598.6 *5*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2617.9 *3*	1/2,3/2	G I	XREF: I(2616). J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2625.7 *4*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2638.5 *6*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2642.5 *3*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2648		I	
2666.0 *5*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2668.5 *5*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2676.7 *5*	$1/2^+$,$3/2^+$,$5/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2687.79 *21*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2700.4 *4*	$1/2^+$,$3/2^+$,$5/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2705.3 *4*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2708	$(3/2^-)$	I	J^π: From L=(0) in (t,p).
2720.5 *3*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2728.0 *3*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2733		I	
2734.3 *4*	$1/2^+$,$3/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2748.7 *5*	$1/2^+$,$3/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2754.3 *4*	$1/2^+$,$3/2^+$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2762.6 *5*	1/2,3/2	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2767.2 *4*	$1/2^-$,$3/2^-$	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2791.4 *6*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2793.96 *21*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2797.4 *4*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2806.4 *8*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2815.4 *9*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2817.6 *8*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2826.4 *6*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2835.0 *12*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2849.0 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2858.5 *12*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2867.3 *7*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2874.1 *4*	$1/2^-$,$3/2^-$	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2883.1 *7*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2906.0 *6*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2918.4 *5*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2936.6 *3*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2941.8 *7*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2948.4 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2959.8 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2967.2 *6*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2983.3 *8*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2996.4 *3*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
2998.6 *6*	5/2	H	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
3010.2 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
3019.1 *4*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
3023.6 *9*	1/2,3/2	G	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
3029.5 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.
3041.8 *4*	$1/2^-$,$3/2^-$	GH	J^π: From intensity of populating primary γ in resonance-averaged n-capture.

[†] Values generally are those recommended by 2004Gr26, as listed in their tabular level scheme (their Table iv).
[‡] Band(A): $K^\pi=3/2^-$, $\nu 3/2[521]$ band. α=10.15 keV, β=−0.12 eV, A_3=−3.2 eV, from the $3/2^-$ through $9/2^-$ level energies.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{159}Gd Levels (continued)

Band(B): $K^\pi=5/2^+$ band. α=7.3 keV, from the $5/2^+$, $7/2^+$ level energies. Significant band staggering is observed. Dominant conf is $\nu 5/2[642]$, with significant amounts of $\nu 3/2[651]$ and $\nu 7/2[633]$ from the expected strong Coriolis mixing.

@ Band(C): $K^\pi=5/2^-$, $\nu 5/2[523]$ band. α=11.69 keV, β=−8.3 eV, from the $5/2^-$ through $9/2^-$ level energies. Calculations of 2004Gr26 suggest a contribution from $\nu 5/2[512]$, as well.

& Band(D): $K^\pi=1/2^-$, $\nu 1/2[521]$ band. α=11.50 keV, β=−7.4 eV, a=+0.47, from the $1/2^-$ through $7/2^-$ level energies. Calculations of 1973Ga29 indicate that the K-2 γ vibrations built on $\nu 5/2[523]$ and $\nu 3/2[521]$ are also components of this band.

a Band(E): $K^\pi=11/2^-$, $\nu 11/2[505]$ bandhead.

b Band(F): $K^\pi=3/2^+$, $\nu 3/2[402]$ band. α=11.45, β=−29 eV, from the $3/2^+$ through $7/2^+$ level energies. Calculations of 1973Ga29 suggest that the K-2 γ vibration built on $\nu 1/2[400]$ is a significant component in the makeup of this band.

c Band(G): $K^\pi=1/2^+$, $\nu 1/2[660]$ band. α=8.86 keV, a=+1.9, from the $1/2^+$ through $5/2^+$ level energies. This is the dominant conf, with admixtures of other $i_{13/2}$-based orbitals having K^π values close to $1/2^+$, due to the expected strong Coriolis coupling.

d Band(H): $K^\pi=5/2^-$, $\nu 5/2[512]$ band. α=11.02 keV, β=−17.3 eV from the $5/2^-$ through $9/2^-$ level energies. Calculations of 2004Gr26 suggest a contribution from $\nu 5/2[523]$, as well.

e Band(I): $K^\pi=3/2^+$, $\nu 3/2[651]$ band. α=8.93 keV, β=+8.3 eV. This is the dominant conf, with admixtures of other $i_{13/2}$-based orbitals having K^π values close to $3/2^+$, due to the expected strong Coriolis coupling.

f Band(J): $K^\pi=3/2^-$, $\nu 3/2[532]$ band. α=13.12 keV, β=−93.2 eV, A_3=+0.21 keV from the $3/2^-$ through $9/2^-$ level energies. Note that the large B and A_3 values indicate that the rotational-energy expression does not describe well the energy spacings within this band. This is the dominant conf, with significant contributions from the $K^\pi=0^-$ octupole vibration built on $\nu 3/2[402]$ and from $\nu 1/2[530]$, due to expected Coriolis mixing with $\nu 3/2[532]$ (from 2004Gr26).

g Band(K): $K^\pi=1/2^-$, $\nu 1/2[530]$ band. α=9.60 keV, β=+0.26 keV, a=−0.91, from the $1/2^-$ through $7/2^-$ level energies. (See also the comments on the $\nu 3/2[532]$ band). This is the dominant conf, with contributions from the $K^\pi=0^-$ octupole vibration built on $\nu 1/2[400]$ and from $\nu 3/2[532]$, due to the expected strong Coriolis mixing with $\nu 1/2[530]$ (from 2004Gr26).

h Band(L): $K^\pi=1/2^+$, $\nu 1/2[400]$ band. α=10.53 keV, β=−22 eV, a=−0.13, from the $1/2^+$ through $7/2^+$ level energies. This is the dominant conf, with an admixture of the K-2 γ vibration built on $\nu 3/2[402]$.

i Band(M): proposed $\nu 7/2[633]$ band. a≈14 keV, from the $7/2^+$ and $13/2^+$ level energies.

j Band(N): $K^\pi=1/2^+$, $\nu 1/2[651]$ band. α=11.81 keV, a=−0.44, from the $1/2^+$ through $5/2^+$ level energies.

k Band(O): $K^\pi=1/2^-$, $\nu 1/2[510]$ band. α=12.97 keV, a=−0.39, from the $1/2^-$ through $5/2^-$ level energies. Note that these parameters do not give an accurate value for the $7/2^-$ level energy, if the value for this energy is that proposed by 2004Gr26. This is the dominant conf, with significant contributions from the $K^\pi=2^-$ and 3^- octupole vibrations built on $\nu 5/2^+[642]$ and the K-2 γ vibration built on $\nu 5/2[512]$.

l Band(P): $K^\pi=3/2^-$, $\nu 3/2[512]$ band. α=14.3 keV, from the $3/2^-$ and $7/2^-$ level energies. A contribution from the K-2 γ vibration built on $\nu 7/2[514]$ is also expected (2004Gr26).

m Band(Q): $K^\pi=7/2^-$, $\nu 7/2[514]$ band. α=7.64 keV. A contribution from $\nu 7/2[503]$ is expected (2004Gr26).

$\gamma(^{159}Gd)$

E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Mult.	α ‡	Comments
50.627	$5/2^-$	50.7 *4*	100	0.0	$3/2^-$	[M1]	13.9	
67.829	$5/2^+$	17.1	13	50.627	$5/2^-$	[E1]	6.57	B(E1)(W.u.)≈5.8×10^{-5}
		67.8 *1*	100	0.0	$3/2^-$	E1	0.824 *18*	B(E1)(W.u.)≈1.14×10^{-5}
118.686	$7/2^+$	≈51	100	67.829	$5/2^+$			
121.899	$7/2^-$	71.4 *2*	100 *24*	50.627	$5/2^-$			
		121.9 *2*	36 *6*	0.0	$3/2^-$			
146.316	$5/2^-$	78.6 *1*	100 *18*	67.829	$5/2^+$			
		95.685 *5*	77 *9*	50.627	$5/2^-$			E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β-.
		146.324 *7*	43 *10*	0.0	$3/2^-$			E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Iγ(146γ)/Iγ(95γ) in Eu β- and Iγ(146γ). From Eu β-, Iγ=36.
185.0	$9/2^+$	118 *2*	100	67.829	$5/2^+$			
212.6	$9/2^-$	90.4 *2*	100	121.899	$7/2^-$			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{159}Gd) (continued)

E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Comments
227.412	7/2−	80.4 *4*	76 *20*	146.316	5/2−	
		105.5 *2*	44 *4*	121.899	7/2−	
		108.8 *3*	17 *3*	118.686	7/2+	
		159.547 *10*	84 *6*	67.829	5/2+	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
		176.9 *1*	80 *4*	50.627	5/2−	
		227.5 *3*	100 *30*	0.0	3/2−	
330.479	9/2−	184.163 *7*	100	146.316	5/2−	
507.724	1/2−	507.727 *20*	100	0.0	3/2−	
558.211	3/2−	507.639 *20*	100 *8*	50.627	5/2−	
		558.195 *10*	73 *8*	0.0	3/2−	
588.51	5/2−	466.618@ *11*	100@ *10*	121.899	7/2−	
		537.86 *4*	96 *10*	50.627	5/2−	
		588.54& *4*	10& *3*	0.0	3/2−	
601.977	3/2+	534.12 *6*	6.5 *9*	67.829	5/2+	
		551.385 *17*	48 *3*	50.627	5/2−	
		601.969 *7*	100 *3*	0.0	3/2−	
633.60	7/2+	582.85 *6*	64 *8*	50.627	5/2−	
		633.78# *6*	100 *11*	0.0	3/2−	
646.697	5/2+	524.77 *7*	71 *6*	121.899	7/2−	
		596.066 *24*	59 *2*	50.627	5/2−	
		646.75 *9*	100 *7*	0.0	3/2−	
710.38	7/2+	498.2 *7*	24 *7*	212.6	9/2−	
		588.54& *4*	29& *5*	121.899	7/2−	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
		659.26 *8*	100 *7*	50.627	5/2−	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
732.87		613.4 *2*	41 *3*	118.686	7/2+	
		665.04 *5*	100 *5*	67.829	5/2+	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
		681.9 *1*	75 *4*	50.627	5/2−	
		733.1a *4*	8 *2*	0.0	3/2−	
744.378	3/2+	676.512 *24*	100 *5*	67.829	5/2+	
		693.73 *6*	29 *4*	50.627	5/2−	
		744.375 *20*	35 *8*	0.0	3/2−	
781.556	1/2+	273.856 *21*	18 *8*	507.724	1/2−	
		713.649 *19*	100 *6*	67.829	5/2+	
		781.56 *5*	100 *6*	0.0	3/2−	
800.45	5/2+	678.53 *6*	34 *5*	121.899	7/2−	
		681.71 *6*	100 *7*	118.686	7/2+	
		732.68 *8*	21 *5*	67.829	5/2+	
		800.39 *14*	32 *5*	0.0	3/2−	
818.89	5/2+	172.368 *15*	27 *6*	646.697	5/2+	
		633.78# *6*	36 *4*	185.0	9/2+	
		700.163 *25*	100 *19*	118.686	7/2+	
		751.23 *5*	48 *4*	67.829	5/2+	
		768.15 *6*	28 *3*	50.627	5/2−	
858.51	3/2+	739.843 *17*	49 *8*	118.686	7/2+	
		790.90 *16*	100 *12*	67.829	5/2+	
		807.60 *11*	28 *3*	50.627	5/2−	
		858.39 *5*	49 *11*	0.0	3/2−	
872.64	5/2−	645.7 *3*	13.9 *13*	227.412	7/2−	
		726.47 *8*	25 *3*	146.316	5/2−	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β-.
		754.03 *9*	35 *3*	118.686	7/2+	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β-.
		804.739 *26*	100 *6*	67.829	5/2+	E_γ: From 2004Gr26, (n_{th},γ).

Adopted Levels, Gammas (continued)

$\gamma(^{159}Gd)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Comments
						I_γ: From Eu β-.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{159}Gd)$ (continued)

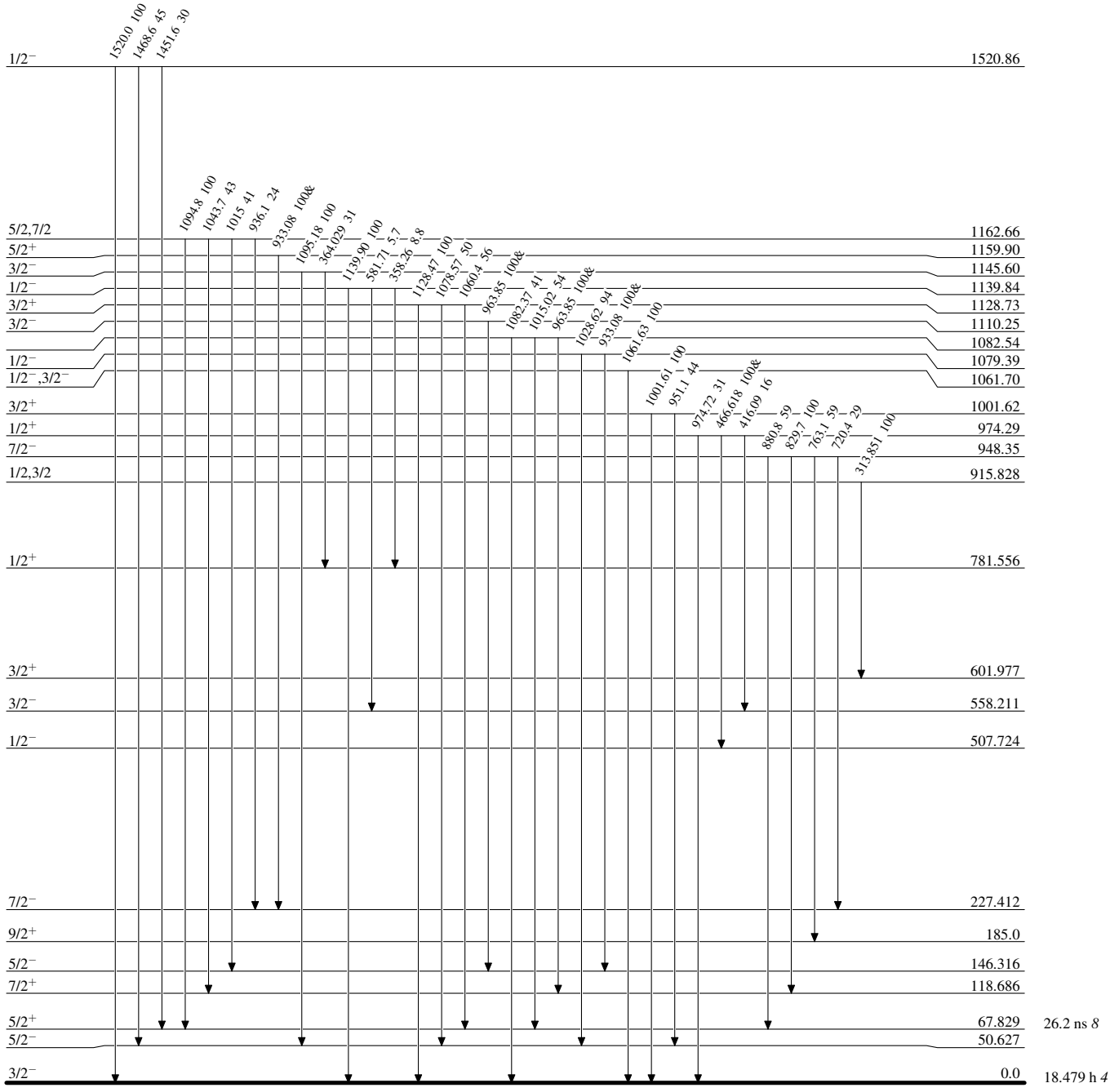
E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Comments
872.64	$5/2^-$	871.4 *5*	8.2 *13*	0.0	$3/2^-$	
880.63	$1/2^+,3/2^+,5/2^+$	813.12 *4*	100	67.829	$5/2^+$	
915.828	1/2,3/2	313.851 *8*	100	601.977	$3/2^+$	
948.35	$7/2^-$	720.4 *5*	29 *6*	227.412	$7/2^-$	
		763.1 *3*	59 *6*	185.0	$9/2^+$	
		829.7 *3*	100 *12*	118.686	$7/2^+$	
		880.8 *3*	59 *6*	67.829	$5/2^+$	
974.29	$1/2^+$	416.09 *5*	16 *3*	558.211	$3/2^-$	
		466.618@ *11*	100@ *10*	507.724	$1/2^-$	
		974.72 *6*	31 *20*	0.0	$3/2^-$	
1001.62	$3/2^+$	951.1 *3*	44 *14*	50.627	$5/2^-$	
		1001.61 *19*	100 *15*	0.0	$3/2^-$	
1061.70	$1/2^-,3/2^-$	1061.63 *11*	100	0.0	$3/2^-$	
1079.39	$1/2^-$	933.08@ *6*	100@ *25*	146.316	$5/2^-$	
		1028.62 *11*	94 *8*	50.627	$5/2^-$	
1082.54		963.85@ *10*	100@ *9*	118.686	$7/2^+$	
		1015.02 *14*	54 *7*	67.829	$5/2^+$	
		1082.37 *15*	41 *7*	0.0	$3/2^-$	
1110.25	$3/2^-$	963.85@ *10*	100@	146.316	$5/2^-$	
1128.73	$3/2^+$	1060.4 *4*	56 *6*	67.829	$5/2^+$	
		1078.57 *8*	50 *6*	50.627	$5/2^-$	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
		1128.47 *17*	100 *13*	0.0	$3/2^-$	E_γ: From 2004Gr26, (n_{th},γ). I_γ: From Eu β- decay.
1139.84	$1/2^-$	358.26 *3*	8.8 *10*	781.556	$1/2^+$	
		581.71 *9*	5.7 *15*	558.211	$3/2^-$	
		1139.90 *8*	100 *8*	0.0	$3/2^-$	
1145.60	$3/2^-$	364.029 *20*	31 *4*	781.556	$1/2^+$	
		1095.18 *8*	100 *17*	50.627	$5/2^-$	
1159.90	$5/2^+$	933.08@ *6*	100@	227.412	$7/2^-$	Note: In their summary of the γ branching of the ^{159}Gd levels from both β- decay and (n,γ), 2004Gr26 also place three γ's (1038.2, 1109 and 1159.4) seen in Eu β- decay but unplaced there from this level. These are not included here.
1162.66	5/2,7/2	936.1 *5*	24 *5*	227.412	$7/2^-$	
		1015 *1*	41 *14*	146.316	$5/2^-$	
		1043.7 *4*	43 *5*	118.686	$7/2^+$	
		1094.8 *2*	100 *8*	67.829	$5/2^+$	
1520.86	$1/2^-$	1451.6 *5*	30 *5*	67.829	$5/2^+$	
		1468.6 *4*	45 *5*	50.627	$5/2^-$	
		1520.0 *2*	100 *10*	0.0	$3/2^-$	

† Unplaced γ's are not included here. See the various source data sets for this information.
‡ 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.
# Multiply placed.
@ Multiply placed with undivided intensity.
& Multiply placed with intensity suitably divided.
a Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{159}_{64}Gd_{95}$

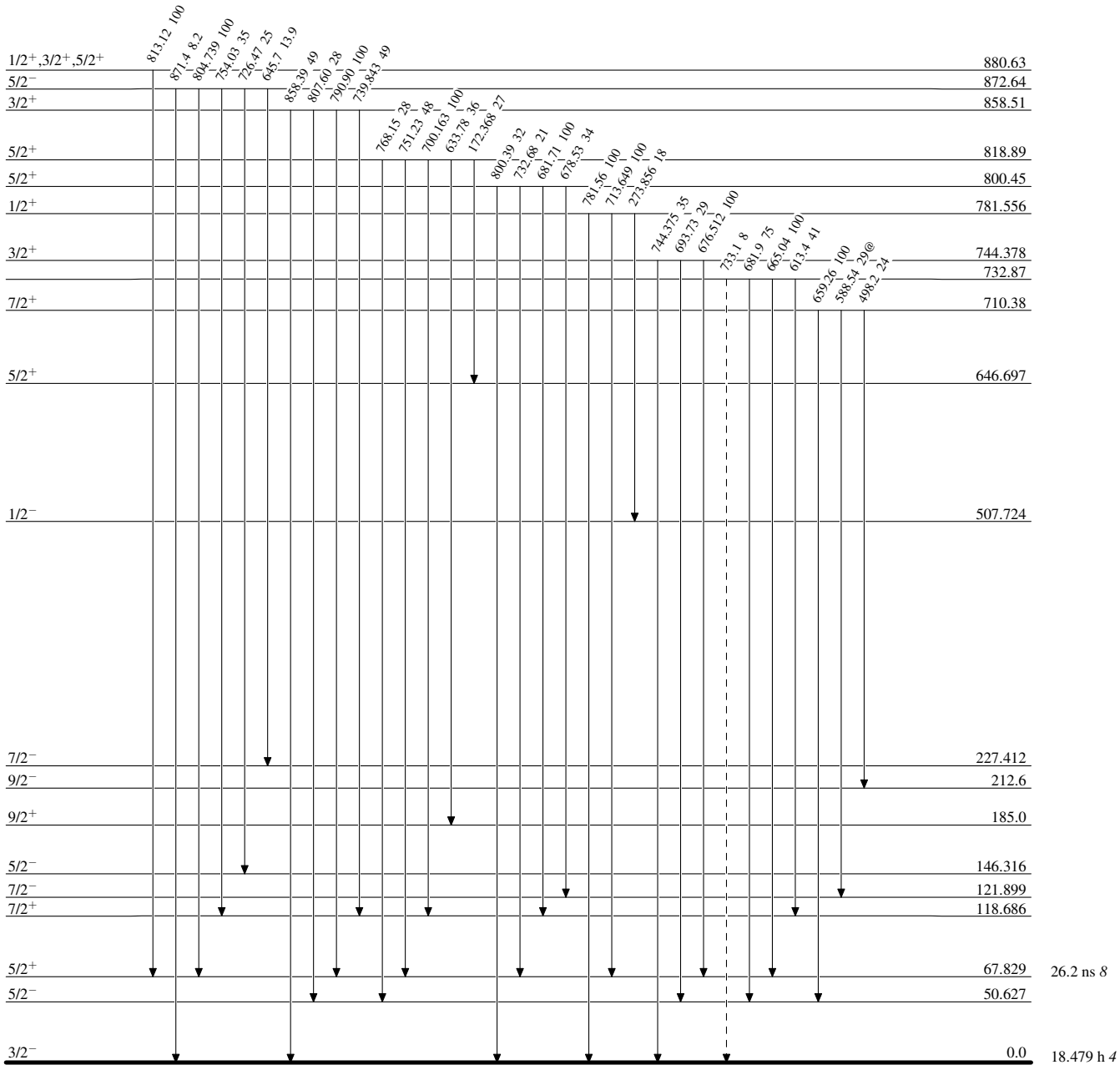
Adopted Levels, Gammas

Level Scheme (continued)

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

Legend

- - - - - - ► γ Decay (Uncertain)

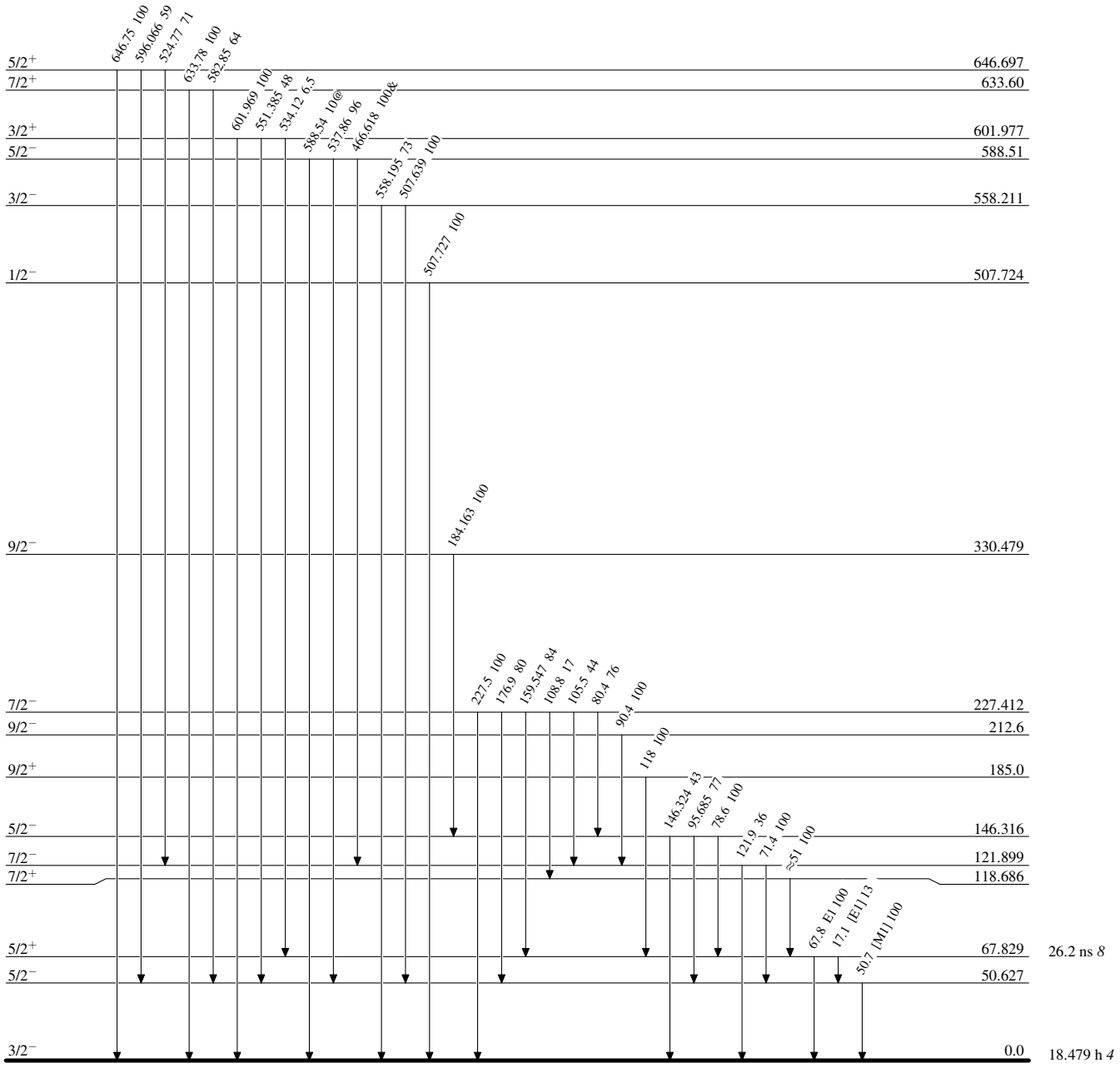


$^{159}_{64}Gd_{95}$

Adopted Levels, Gammas

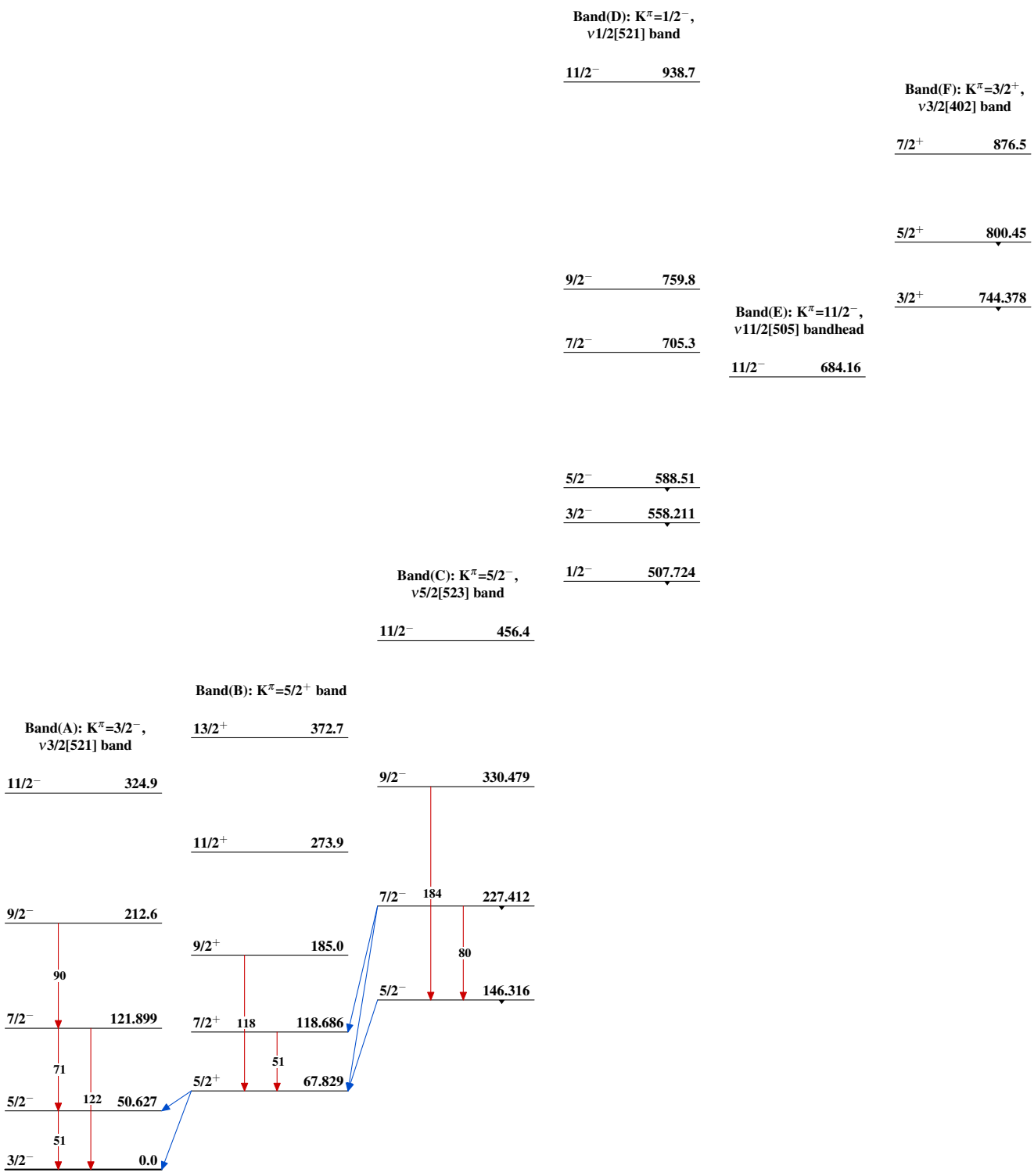
Level Scheme (continued)

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



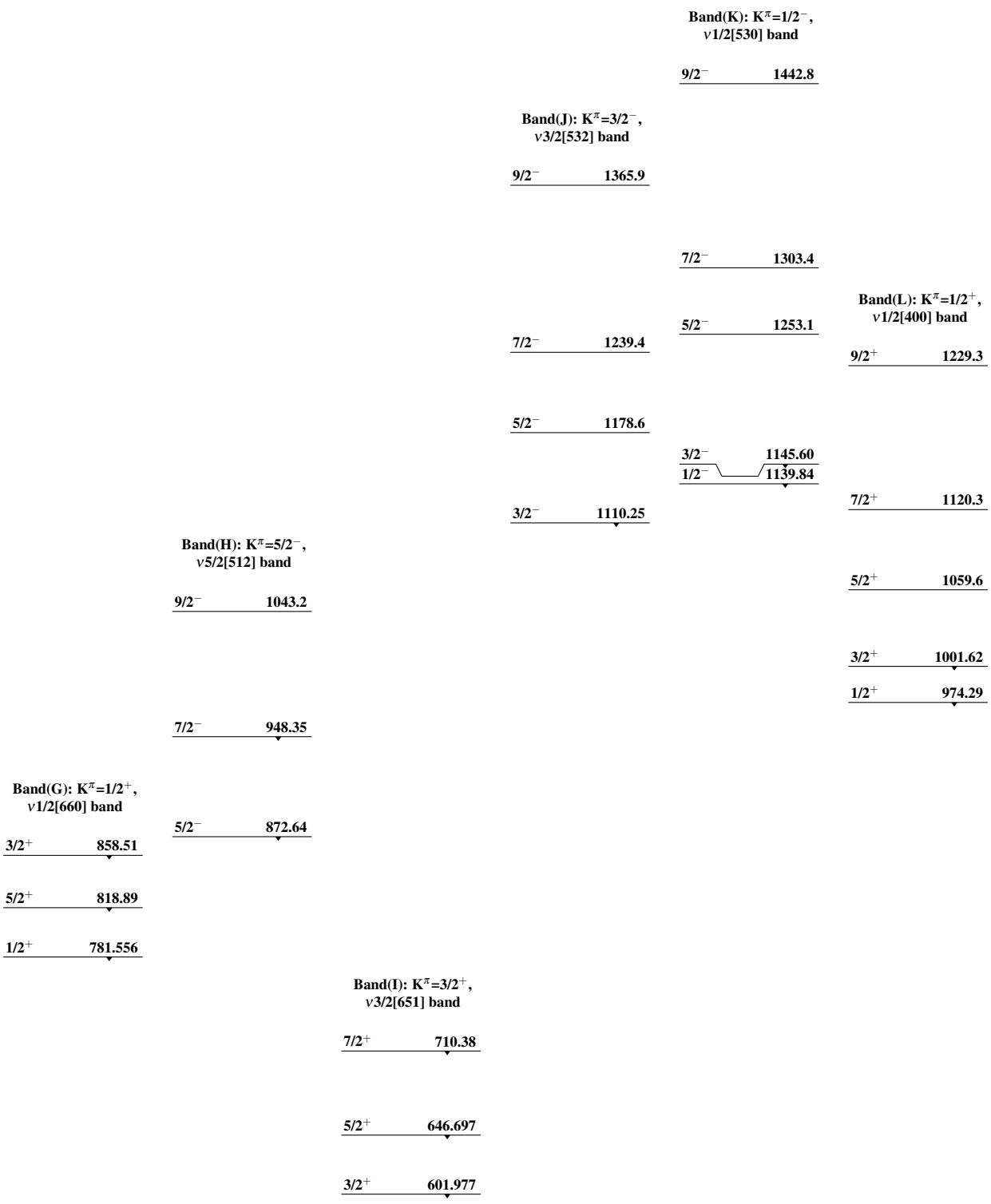
$^{159}_{64}Gd_{95}$

Adopted Levels, Gammas



$^{159}_{64}Gd_{95}$

Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)

Band(N): $K^{\pi}=1/2^{+}$, $\nu 1/2[651]$ band

$5/2^{+}$	2088.1
$3/2^{+}$	2003.2
$1/2^{+}$	1983.3

Band(P): $K^{\pi}=3/2^{-}$, $\nu 3/2[512]$ band

$5/2^{-},7/2^{-}$	1809.2
$(3/2^{-})$	1637.8

Band(O): $K^{\pi}=1/2^{-}$, $\nu 1/2[510]$ band

$5/2^{-}$	1693.5
$3/2^{-}$	1603.30
$1/2^{-}$	1579.6

Band(Q): $K^{\pi}=7/2^{-}$, $\nu 7/2[514]$ band

$9/2^{-}$	1203.5
$7/2^{-}$	1134.7

Band(M): Proposed $\nu 7/2[633]$ band

$13/2^{+}$	1093.0
$7/2^{+}$	633.60