Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 112,2497 (2011)	1-Jun-2011

Q(β^-)=1955.8 *15*; S(n)=5635.4 *10*; S(p)=9314 *10*; Q(α)=−1252 *5* 2012Wa38

Note: Current evaluation has used the following Q record $ 1955.5 *14* 5635.4 *10* 9433 syst −1204 *50* 2009AuZZ.

S(p): The uncertainty to be associated with this estimated value is 200 keV (2009AuZZ).

2003Au03 report the same values for Q(β^-) and S(n). For S(p) and Q(α), 2003Au03 report 9430, from systematics, and 1200 *50*, respectively.

Additional information 1.

Data are from only three measurements: ^{161}Eu β^- decay (1986Ma12), ^{160}Gd(d,p) (1967Tj01), and ^{160}Gd(n,γ) (1971Gr42).

^{161}Gd Levels

1971Ma41, 1973Ga29 (same results as 1971Ma41), and 1975Ma48 give calculated contributions of Nilsson states and vibrations to various bandheads. (All three papers have Soloviev as an author.) For levels which the authors associate with the experimental levels at 0, 314, 355, and 809 keV, the calculated contributions from the Nilsson states indicated here are from 84 to 98%. In contrast, for the 1/2$^-$ level at 1311 keV, the calculated contribution of the 1/2[510] Nilsson state varies from 0.7% to 27% with the other contributions from vibrational states.

Resonance parameters are given in the Atlas of Neutron Resonances (2006MuZX), which lists 57 neutron resonances, mostly having J^π=1/2$^+$. See, also, 1969Ka26 and 1974Ra23, as well as 1969Mu04 and 1973Mu14, previous publications by the author of 2006MuZX.

Additional information 2.

Cross Reference (XREF) Flags

A ^{160}Gd(d,p)
B ^{160}Gd(n,γ) E=th
C ^{161}Eu β^- decay

E(level)	J^π[†]	$T_{1/2}$	XREF	Comments
0[&]	5/2$^-$	3.66 min *5*	ABC	%β^-=100 J^π: log *ft*=4.86 for the β^- transition to the 417 level in ^{161}Tb indicates that it is an allowed-unhindered transition. In this mass region, the neutron and proton Nilsson orbitals involved are 5/2[523] and 7/2[523], respectively. This establishes the J^π assignments for both levels and also provides the conf assignments for them. $T_{1/2}$: weighted average of 3.64 min *8* (1949Bu01), 3.73 min *10* (1953Jo21), 3.7 min *3* (1960Wi10), 3.6 min *1* (1966Zy02), and 3.7 min *1* (1969Be54).
71.9[&] *2*	7/2$^-$		A C	
163.7[&] *2*	9/2$^-$		A C	
276[&] *3*	11/2$^-$		A	
314.3[a] *3*	3/2$^-$		ABC	
355[b] *1*	1/2$^-$		AB	
394.7[b] *1*	3/2$^-$		AB	
438[a] *3*	7/2$^-$		A	
438[‡b] *3*	5/2$^-$		A	
510[c] *3*	9/2$^+$		A	
529[b] *3*	7/2$^-$		A	
≈585[c]	11/2$^+$		A	
604[b] *3*	9/2$^-$		A	
645[a] *3*	11/2$^-$		A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{161}Gd Levels (continued)

E(level)	Jπ†	XREF	E(level)	Jπ†	XREF	E(level)	Jπ†	XREF
681[c] *3*	13/2+	A	1049 *5*		A	1501[f] *5*	3/2+	A
≈753[b]	11/2−	A	1097 *5*		A	1523 *1*		AB
804.3 *1*		B	1123[d] *5*	11/2−	A	1545 *1*		B
≈809[d]	5/2−	A	1128 *1*		B	1556[f] *5*	5/2+	A
824 *1*		B	1177 *5*		A	1591[f] *5*	7/2+	A
834 *3*	(1/2,3/2)−#	A	1273 *1*		B	1615 *5*		A
851 *1*		B	1311[e] *1*	1/2−	AB	1643 *5*		A
889[d] *3*	7/2−	A	1338[e] *1*	3/2−	AB	1664 *5*		A
898 *2*		B	1380 *1*		AB	1751 *1*		B
925 *3*		A	1403[e] *5*	5/2−	A	1803 *1*		B
972	@	A	1408 *1*		AB	1848 *1*		B
994[d] *3*	9/2−	A	1466[e] *5*	7/2−	A	1923 *1*		B
1036 *1*		B	1490[f] *1*	1/2+	AB			

† Band and J^π assignments are from the (d,p) study (1967Tj01), except for the 834 level. They are based on agreement of measured and calculated dσ/dΩ values, angular distributions, and energy separations within bands. See ^{160}Gd(d,p) for authors′ comments on the definitiveness of the assignments.

‡ Assigned as doublet in (d,p) (1967Tj01).

From L=1 in (p,p) for isobaric analog state (1973Me24).

@ Tentatively assigned as 13/2 member of 9/2[624] by 1967Tj01, but assignment not adopted.

& Band(A): 5/2[523] band. A=10.4 keV, B=−4 eV.

[a] Band(B): 3/2[521] band. A=10.3 keV, from the 3/2 and 11/2 levels (the 5/2 and 9/2 levels are not reported; and the 7/2 level is part of a doublet).

[b] Band(C): 1/2[521] band. A=10.9 keV, a=+0.21.

[c] Band(D): 7/2[633] band. A=7.1 keV, from the 9/2 and 13/2 levels (the 7/2 is not reported; and the 11/2 energy is approximate).

[d] Band(E): 5/2[512] band. A=11.7 keV, from the 7/2 and 9/2 levels (the 5/2 level energy is approximate).

[e] Band(F): 1/2[510] band. A=11.0 keV, a=−0.18.

[f] Band(G): 1/2[651] band. A=7.3 keV, a=−0.5.

γ(^{161}Gd)

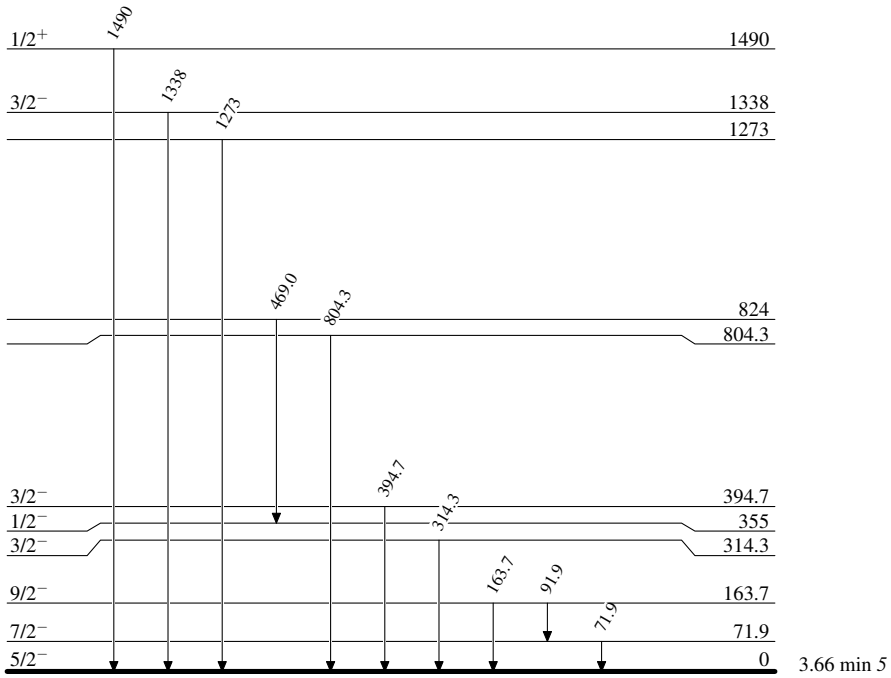
No γ intensities are given here; see the ^{160}Gd(n,γ) data for a few intensities given (in γ′s per 100 n captures).

E_i(level)	J^π_i	E_γ†	E_f	J^π_f
71.9	7/2−	71.9 *2*	0	5/2−
163.7	9/2−	91.9 *2*	71.9	7/2−
		163.7 *2*	0	5/2−
314.3	3/2−	314.3 *3*	0	5/2−
394.7	3/2−	394.7 *10*	0	5/2−
804.3		804.3 *10*	0	5/2−
824		469.0 *10*	355	1/2−
1273		1273 *1*	0	5/2−
1338	3/2−	1338 *1*	0	5/2−
1490	1/2+	1490 *1*	0	5/2−

† See the ^{160}Gd(n,γ) data for the primary γ′s from the thermal-neutron capture state at 5635.4 keV.

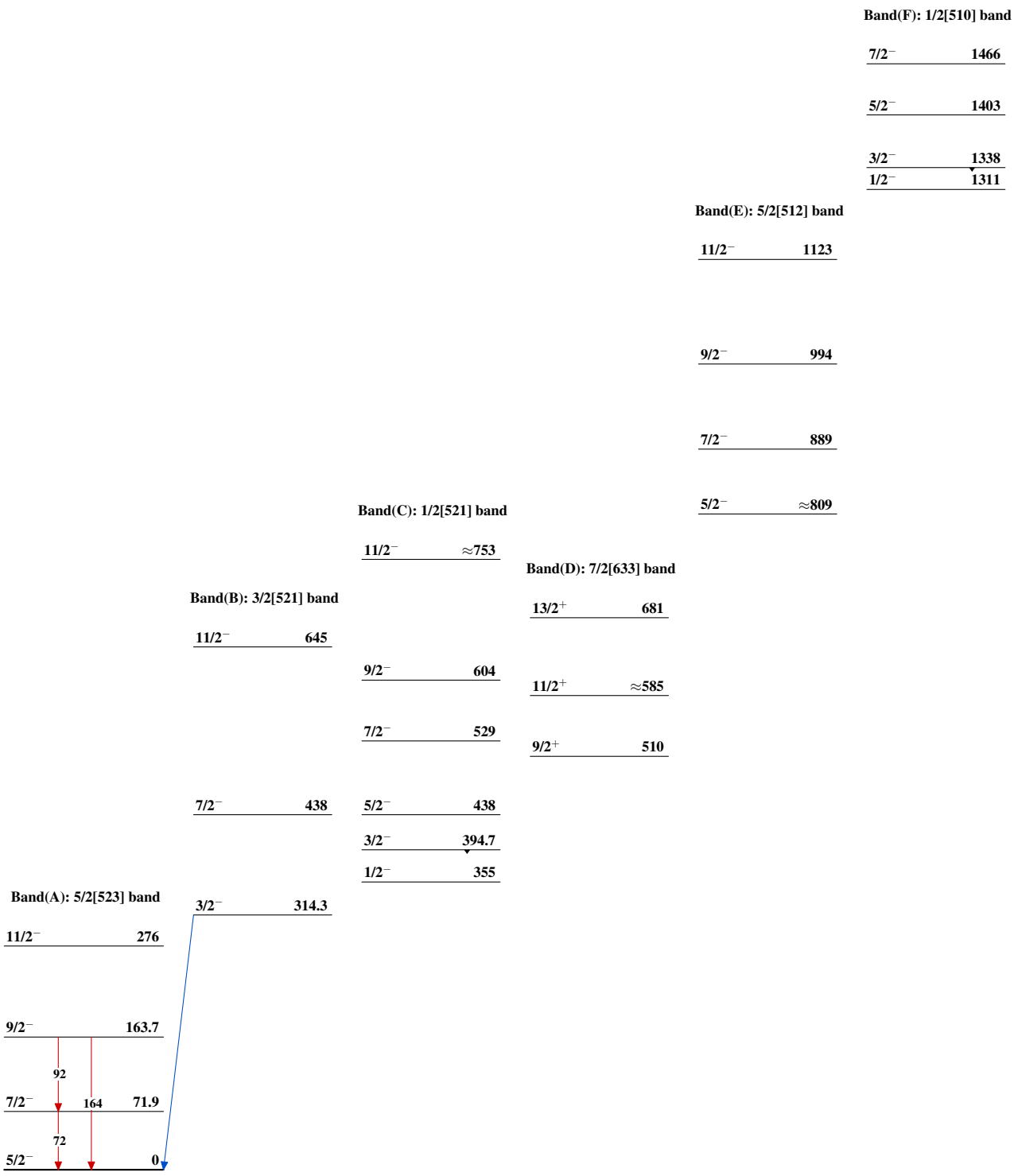
Adopted Levels, Gammas

Level Scheme



$^{161}_{64}Gd_{97}$

Adopted Levels, Gammas



$^{161}_{64}Gd_{97}$

Adopted Levels, Gammas (continued)

Band(G): 1/2[651] band

$7/2^+$ 1591

$5/2^+$ 1556

$3/2^+$ 1501

$1/2^+$ 1490

$^{161}_{64}Gd_{97}$