^{168}Er(d,p), ^{170}Er(d,t) 1970Mu15,1969Tj01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 109, 2033 (2008)	15-Jun-2008

Others: 1963Is01 (E(d)=15 MeV, FWHM=80 keV, θ(lab)=9° to 90° (12 angles)); 1968Ha10 (E(d)≈12.0 MeV, θ(lab)=45°, 65°, 133°, energy resolution 0.08%); 1984Pe03 (reanalysis of selected data from 1969Tj01).

1970Mu15: E(d)=12 MeV; single-gap, broad-range magnetic spectrograph with array of 3 nuclear emulsion plates; >99.9% ^{168}Er target;

1969Tj01: E(d)=12.1 MeV; θ=60°, 90°, 125°; isotope separated targets; measured E(level) (mag spect, FWHM≈6 keV for (d,t),≈12 keV for (d,p)), angular distributions, differential cross sections.

^{169}Er Levels

E(level)[†]	J$^{\pi}$[‡]	dσ/dΩ(d,t) 75°[#]	Comments
0.0[d]	1/2$^-$	100	
65[bd] *2*	3/2$^-$		
74[bd] *3*	5/2$^-$	16 *1*	
93[be] *4*	5/2$^-$	3 *1*	
177[be] *2*	7/2$^-$	47 *2*	
225[cd] *2*	7/2$^-$	32 *2*	
244[&d] *2*	9/2$^-$	4 *1*	May include component from 7/2$^+$ 7/2[633] state (E(level)=244 in ^{169}Er Adopted Levels).
285[ce] *3*	9/2$^-$	2 *1*	
320[cf] *2*	9/2$^+$	10 *8*	
416[ce] *3*	11/2$^-$	1 *1*	May include component from 11/2$^+$ 7/2[633] state (E(level)=413 in ^{169}Er Adopted Levels).
475[cd] *4*	11/2$^-$	1 *1*	
528[bf] *2*	13/2$^+$	11 *8*	
557[b] *4*			E(level): reported by 1970Mu15 and possibly 1968Ha10.
565[g] *3*	1/2$^-$		E(level): not observed by 1970Mu15; May Be the 557 level from 1970Mu15. Seen only In (d,p).
602[g] *2*	3/2$^-$	9 *1*	E(level): mean value from (d,p) and (d,t) In 1970Mu15. 599 from 1969Tj01; 600 *10* from (1968Ha10).
654[bg] *2*	5/2$^-$	6 *1*	other E: 659 *2* In (d,t) (1970Mu15); 654 (1969Tj01); 655 *10* (1968Ha10).
717[h] *3*	3/2$^-$	41 *9*	E(level): unweighted average of 714 *3* In (d,p) and 720 *2* In (d,t) (1970Mu15). others: 713 (1969Tj01); 715 *10* (1968Ha10).
741[cg] *2*	7/2$^-$	3 *1*	
768[h] *3*	(5/2$^-$)		
822[@ci] *2*	7/2$^-$	1 *1*	
852[h] *3*	7/2$^-$	26 *1*	E(level): 849 *3* In (d,p) and 856 *3* In (d,t) (1970Mu15); possibly different states are favored In these two reactions. May include component from 5/2$^-$ 5/2[523] state (E(level)=853.0 in ^{169}Er Adopted Levels); this state is expected to have similar energy to the 7/2$^-$ 3/2[521] state, but its (d,t) cross section is expected to Be relatively small.
927[ci] *3*	9/2$^-$	3 *1*	other E: 931 *4* In (d,p) (1970Mu15), 927 (1969Tj01 and 1968Ha10).
940[&cj] *2*	7/2$^-$	10 *1*	
≈947[h]	9/2$^-$		
990[&c] *3*		1 *1*	
1051[@i] *5*	11/2$^-$		
1052[&cj] *2*	9/2$^-$	7 *1*	
1077[&ch] *2*	11/2$^-$	5 *1*	
1083[@bk] *3*	3/2$^-$		

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^{168}Er(d,p), ^{170}Er(d,t) 1970Mu15,1969Tj01 (continued)

^{169}Er Levels (continued)

E(level)[†]	Jπ[‡]	dσ/dΩ(d,t) 75°[#]	Comments
1095[&c] 3		2 1	
1112[&c] 4		1 1	other E: 1116 from (1969Tj01). May Be the same level As that reported At 1118 3 In (d,t) In 1970Mu15.
1118[@b] 3			
1136[c] 3		2 1	
1145[bk] 3	5/2−		E=1141 reported by 1969Tj01 May Be for a doublet.
1168[b] 2			
1186[cj] 4	11/2−	1 1	
1218[&c] 4		3 1	
1232[bk] 3	7/2−		
1234[&c] 3		8 1	other E: 1239 (1969Tj01).
1273[&c] 3		2 1	
1341[@k] 5	9/2−		
1359[&c] 3		9 1	
1364[@] 5			Level might be same as 1359 level seen in (d,t).
1388[@b] 2			
1394[&cl] 2	11/2−	7 1	
1415[@] 5			
1415[&b] 2		2 1	Level might be same as 1415 level seen in (d,p).
1459[@b] 2			
1462[&c] 2		11 1	Level might be same as 1457 level seen in (d,p).
1471[&] 5			
1484[&c] 2		26 1	
1489[@b] 2			E(level): from (d,p) (1970Mu15).
1529[&cm] 2	3/2+	39 2	Groups of levels between 1526 and 1564 in (d,t) not resolved by 1969Tj01.
1535[@] 5			
1554[@] 5			
1564[&] 5			
1570[@] 5			
1601[&] 5			
1608[@] 5			
1622[@] 5			
1623[&] 5			Level might be same as 1622 level seen in (d,p).
1644[&n] 5	1/2+		
1650[@] 5			
1677[&] 5			
1681[@] 5			
1699[@] 5			
1702[&] 5			Level might be same as 1699 level seen in (d,p).
1715[@] 5			
1718[&] 5			Level might be same as 1715 level seen in (d,p).
1727[@] 5			
1755[@] 5			
1776[@] 5			
1790[&] 5			
1823[@] 5			

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^{168}Er(d,p), ^{170}Er(d,t) 1970Mu15,1969Tj01 (continued)

^{169}Er Levels (continued)

E(level)[†]	Comments
1825[&] *5*	Level might be same as 1823 level seen in (d,p).
1844[@] *5*	
1857[&] *5*	
1867[@] *5*	
1886[&] *5*	
1899[@] *5*	
1904[&] *5*	Level might be same as 1899 level seen in (d,p).
1913[@] *5*	
1924[&] *5*	
1929[@] *5*	Groups of levels between 1929 and 2053 in (d,p) not resolved (1969Tj01).
1958[&] *5*	
1974[&] *5*	
1994[&] *5*	
2018[&] *5*	
2031[&] *5*	
2053[@] *5*	
2057[&] *5*	Level might be same as 2053 level seen in (d,p).
2092[@] *5*	
2123[@] *5*	Groups of levels between 2123 and 2184 in (d,p) not resolved (1969Tj01).
2184[@] *5*	
2204[@] *5*	
2228[@] *5*	
2255[@] *5*	
2272[@] *5*	
2295[@] *5*	
2336[@] *5*	
2382[@] *5*	
2420[@] *5*	
2440[@] *5*	
2484[@a] *15*	
2522[@a] *15*	
2583[@a] *15*	

[†] Value from 1969Tj01 for the reaction with the larger cross section, except As noted. ΔE is not explicitly stated, but assumed to be 3 keV below 1 MeV (5 keV above 1 MeV), as in similar work by the same authors (1967Tj01).
[‡] From 1969Tj01 based on combined analysis of the relative populations of band members, of absolute cross sections, and of angular distributions in the two reactions. These values are consistent with those In Adopted Levels, but some adopted values are given In parentheses.
[#] Relative dσ/dΩ At θ(lab)=75° from (d,t) reaction At 12 MeV (1970Mu15). see 1970Mu15 for additional dσ/dΩ data from (d,t) At 60° and from (d,p) At 25°, 45° and 60°.
[@] Seen only in (d,p).
[&] Seen only in (d,t).
[a] From (d,p) (1968Ha10).
[b] From (d,p) (1970Mu15).

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^{168}Er(d,p), ^{170}Er(d,t) 1970Mu15,1969Tj01 (continued)

^{169}Er Levels (continued)

[c] From (d,t) (1970Mu15).
[d] Band(A): 1/2[521] band. Observed (d,p) cross sections for J=1/2 through 7/2 band members match calculated fingerprint for 1/2[521] band (1968Ha10).
[e] Band(B): 5/2[512] band.
[f] Band(C): 7/2[633] band.
[g] Band(D): 1/2[510] band. Includes contribution from K-2 γ vibration built on 5/2[512] (1968Ha10).
[h] Band(E): 3/2[521] band.
[i] Band(F): 7/2[514] band.
[j] Band(G): 5/2[523] band. Includes contribution from K+2 γ vibration built on 1/2[521] (1968Ha10).
[k] Band(H): 3/2[512] band.
[l] Band(I): 11/2[505] band.
[m] Band(J): 3/2[402] band.
[n] Band(K): 1/2[400] band.

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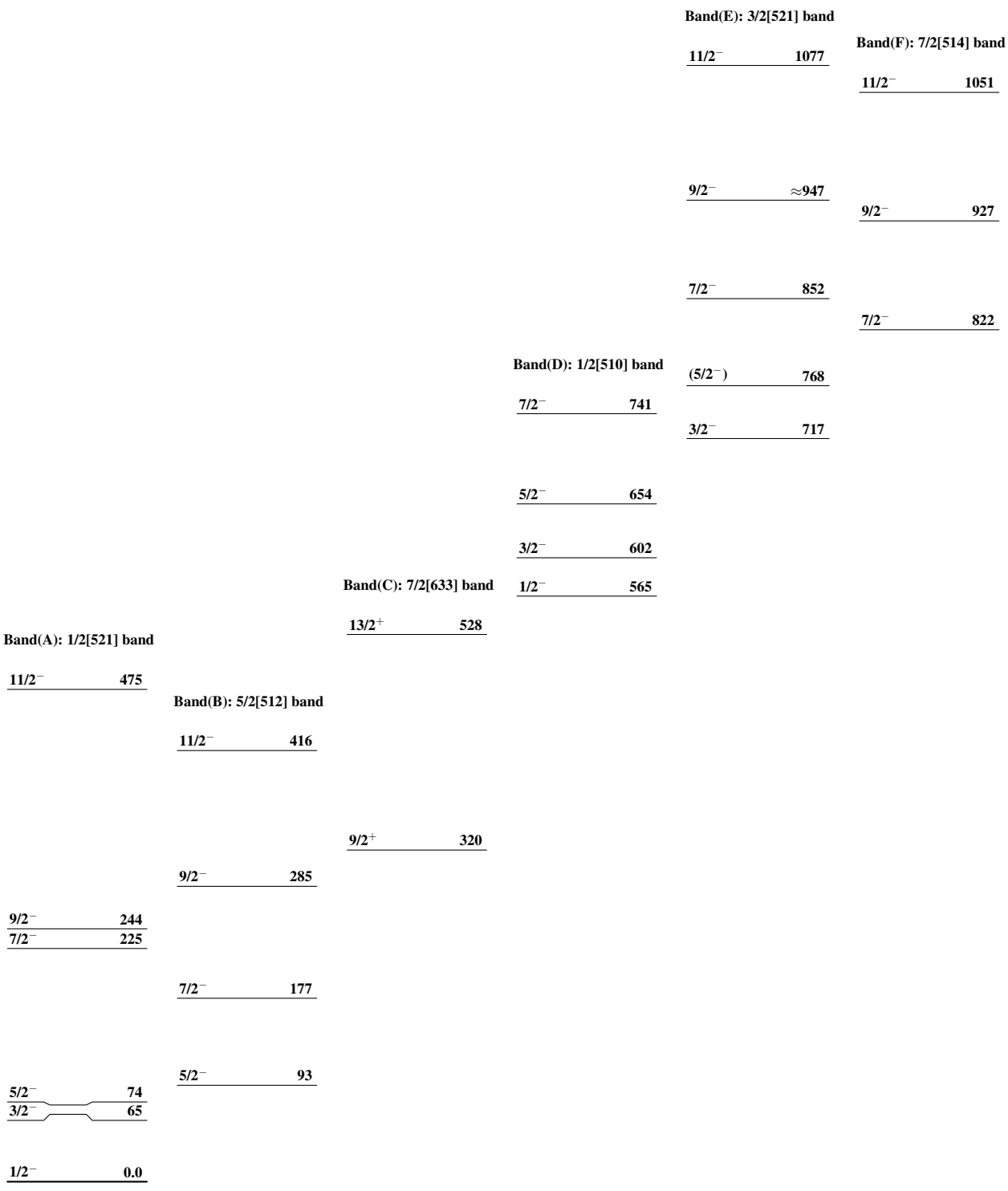

$^{169}_{68}Er_{101}$

^{168}Er(d,p), ^{170}Er(d,t) 1970Mu15,1969Tj01 (continued)

Band(K): 1/2[400] band

$1/2^+$ 1644

Band(J): 3/2[402] band

$3/2^+$ 1529

Band(I): 11/2[505] band

$11/2^-$ 1394

Band(H): 3/2[512] band

$9/2^-$ 1341

$7/2^-$ 1232

Band(G): 5/2[523] band

$11/2^-$ 1186

$5/2^-$ 1145

$3/2^-$ 1083

$9/2^-$ 1052

$7/2^-$ 940

$^{169}_{68}Er_{101}$