^{163}Dy(t,α) 2007Bu29

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 195,1 (2024)	19-Sep-2023

E=17 MeV beam provided by McMaster FN Tandem accelerator. Enriched target. The α particles were analyzed by a Enge split-pole magnetic spectrograph and spectra were recorded on photographic emulsion plates. Resolution (FHWM)=15-19 keV. Measured cross sections and angular distributions from 5° to 50°. DWBA analysis of angular distribution data.

Additional information 1.

J^π(^{163}Dy g.s.)=5/2$^-$.

Measured Q(t,α)=11741 *3* (2007Bu29) implies S(p)(^{163}Dy)=8073 *3* (2007Bu29) which is 83 keV higher than 7990 *40* in 2012Wa38. This suggests that mass excess=−65670 *40* for ^{162}Tb in 2012Wa38 is too low by ≈75 keV. 2007Bu29 provide arguments that the lowest level populated in ^{162}Tb from (t,α) is the g.s. and not an excited state near 80 keV.

^{162}Tb Levels

E(level)[†]	J^π[@]	L[#]	dσ/dΩ (μb/sr)[‡]	Comments
0[e]	1$^-$	2	27 *1*	dσ/dΩ distribution consistent with J=1, K^π=1$^-$.
39[e] *1*	2$^-$	2	51 *2*	dσ/dΩ distribution consistent with J=2, K^π=1$^-$.
97[e] *1*	3$^-$	2	50 *2*	dσ/dΩ distribution consistent with J=3, K^π=1$^-$.
176[e] *1*	4$^-$	2	28 *1*	dσ/dΩ distribution consistent with J=4, K^π=1$^-$.
216[d] *1*	4$^-$	2	100 *3*	dσ/dΩ distribution consistent with J=4, K^π=4$^-$.
268[e] *1*	5$^-$	2	7 *1*	
310[d] *1*	5$^-$	2	79 *2*	dσ/dΩ distribution consistent with J=5, K^π=4$^-$.
≈338			6 *2*	
389 *1*			5 *1*	
434[f] *1*	(5$^-$&1$^+$)	(4+5)	85 *3*	dσ/dΩ distribution consistent with J=5, K^π=5$^-$ and J=1, K^π=1$^+$. E(level): probable doublet or multiplet since the measured cross section is larger than predicted for band members. Also configuration=K^π=1$^+$,ν5/2[523]-π7/2[523].
475 *1*			18 *1*	
521 *1*			20 *3*	dσ/dΩ distribution shown in figure 4 of 2007Bu29.
550[cf] *1*	(6$^-$)[c]	4+5[b]	57 *8*	
570[cg] *2*	(6$^+$)[c]	4+5[b]	33 *7*	
616 *1*			10 *2*	
657[g] *1*	(7$^+$)	5	50 *2*	
727 *1*		5	36 *2*	
777[g] *1*	(8$^+$)	5	45 *5*	
829[&] *2*		5	42 *5*	
894 *1*		5[a]	55 *4*	
925 *1*		5[a]	17 *4*	
967 *2*		5	26 *3*	
995 *2*		5	21 *3*	
1033 *2*		5	13 *2*	
1069 *2*			5 *1*	
1108 *2*		5	34 *4*	
1128 *2*			18 *4*	
1167 *2*			10 *3*	
1186 *2*			13 *4*	
1222 *2*			27 *2*	
1264[&] *2*			16 *3*	
1292 *2*			13 *2*	
1337 *2*			29 *4*	
1358 *2*			15 *4*	
1387 *2*			35 *4*	
1424 *2*			14 *3*	

Continued on next page (footnotes at end of table)

^{163}Dy(t,α) 2007Bu29 (continued)

^{162}Tb Levels (continued)

E(level)[†]	dσ/dΩ (μb/sr)[‡]
1444 *2*	17 *4*
1479 *2*	37 *2*
1515 *2*	12 *2*

† Energies measured relative to 64.1-keV level. Average of values from two independent spectra recorded on photographic plates. There may be an additional uncertainty of ≤1 keV at low energies and up to 2 keV near 1.5 MeV excitation energy from calibration procedures.

‡ At 40°. In addition to the statistical uncertainties given here, there is additional 15% normalization uncertainty in absolute cross sections.

From comparison of measured angular distributions with DWBA calculations. Transfer of 3/2[411] proton from $d_{5/2}$ orbital is responsible for L=2, 5/2[413] proton transfer from $g_{7/2}$ orbital for L=4, and 5/2[532] proton transfer from $h_{11/2}$ orbital for L=5. In this mass region $2d_{5/2}$, $1g_{7/2}$ and $1h_{11/2}$ are the only active proton hole states.

@ From angular distributions, DWBA and Nilsson-model calculations which give predicted cross sections for members in a band: "fingerprint" method.

& Multiplet structure.

a Combined L=5 for 894 and 925 levels.

b Combined angular distribution for 550+570 group.

c The shape of the angular distribution for 550+570 group is consistent with J=6, $K^\pi=5^+$, but the total measured cross section is larger than the predicted value. Probably there are additional levels in this energy region.

d Band(A): $K^\pi=4^-$,ν5/2[523]+π3/2[411].

e Band(a): $K^\pi=1^-$,ν5/2[523]-π3/2[411].

f Band(B): $K^\pi=5^-$. Tentative configurations=ν5/2[523]+π5/2[413] + others.

g Band(C): $K^\pi=(6^+)$. Strongly Coriolis-mixed band of configurations=ν5/2[523]+π7/2[523] and ν5/2[523]+π5/2[532].

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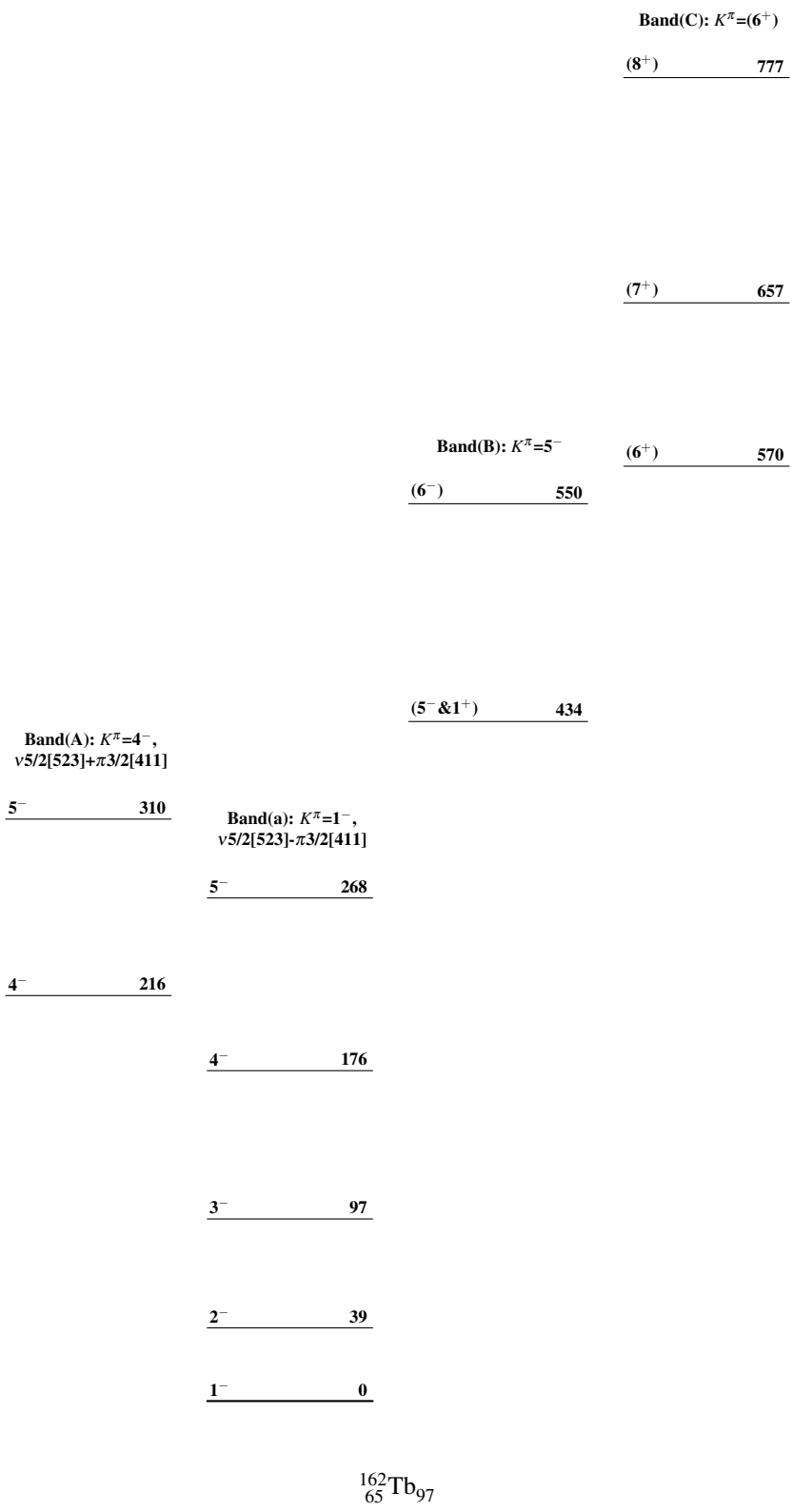

$^{162}_{65}Tb_{97}$