^{10}B(^{3}He,p3α),^{11}B(^{3}He,D3A) 2007Bo49,2009Ki13,2012Al22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, J. E. Purcell and C. G. Sheu	NP A968,71 (2017)	1-Jan-2017

1968Kr02: ^{10}B(^{3}He,Pα) E=2.43 MeV, measured p-α-coin.

1974Fo08: ^{10}B(^{3}He,Pα) E=1.8 MeV, measured α-p-coin.

2007Bo49: ^{10}B(^{3}He,p) E=2.45 MeV. measured E_α, I_α from the triple α breakup of ^{12}C from ground state up to 18 MeV.

2009Ki13: XUNDL dataset compiled by TUNL, 2009; updated, 2013.

^{10}B(^{3}He,p) E=4.9 MeV and ^{11}B(^{3}He,d3α) E=8.5 MeV, measured E_p, I_p, E_α I_α in complete kinematics. ^{12}C deduced γ-ray and α-decay branching ratios from high energy levels, B(M1). The ^{12}C excitation energies are deduced from the ejected proton or deuteron for the respective ^{10}B or ^{11}B target, while the final decaying ^{12}C state is deduced from the relative 3α energy. Single step γ-ray transitions are assumed to account for the energy difference between the populated ^{12}C state (deduced from p or d) and the 3α decay energy state. Authors deduced the overall decay branching ratios for ^{12}C*(12.71,15.11 MeV). The γ-ray transitions are deduced, not measured.

2012Al22: XUNDL dataset compiled by TUNL, 2013.

^{10}B(^{3}He,p) E=4.9 MeV and ^{11}B(^{3}He,d3α) E=8.5 MeV, measured E_p, I_p, E_α I_α in complete kinematics at the Centro de Microanalisis de Materiales in Madrid. The ejectiles were detected in an array of position sensitive ΔE-E detectors that surrounded the target (38% of 4π). The ^{12}C excitation energy is deduced from the proton or deuteron, for the respective ^{10}B or ^{11}B target, and in addition the relative 3α decay energy is used to exclude reaction channels such as ^{3}He+^{10}B→α+^{9}B or ^{8}Be+^{5}Li and ^{3}He+^{11}B→α+^{10}B* or ^{8}Be+^{6}Li* that may also populate the 4-body breakup channels. Further analysis also permitted separation of the ^{12}C* α_0 and α_1 decay channels.

^{12}C Levels

E(level)[†]	J$^\pi$[†]	$T_{1/2}$	Comments
0	0$^+$		
4.44×10^3	2$^+$		
7650[‡#@]	0$^+$		$\Gamma_{\alpha0}/\Gamma$=100.00% *1*; $\Gamma_{\alpha0}/\Gamma$ is corrected for the "ghost" threshold effect (2012Al22).
9641[‡#@]	3$^-$	43[&] keV *4*	$\Gamma_{\alpha0}/\Gamma$=100.0% *4*; $\Gamma_{\alpha0}/\Gamma$ is corrected for the "ghost" threshold effect (2012Al22). $\Gamma_{\alpha0}$=43 keV *4*.
10.3×10^3[#]	(0$^+$)		
10847[‡#@&] *4*	1$^-$	272[&] keV *5*	$\Gamma_{\alpha0}/\Gamma$=102.6% *9*; $\Gamma_{\alpha0}/\Gamma$ is corrected for the "ghost" threshold effect (2012Al22). $\Gamma_{\alpha0}$=272 keV *6*.
11837[‡#@&] *4*	2$^-$	229[&] keV *8*	
12.4×10^3[@]	4$^-$,5$^+$,6$^-$,7$^+$		Γ=Broad. J$^\pi$: Unnatural-parity state with J≥4 (2012Al22).
12710[‡#@]	1$^+$		$\Gamma\alpha/\Gamma$=0.974 *3*, Γ_γ/Γ=0.026 *4*. Γ_α/Γ: From (2009Ki13).
13305[‡@&] *9*	4$^-$	510[&] keV *40*	J$^\pi$: From (2007Fr17,2010Ki08), also see J$^\pi$=(4$^-$) in (2007Bo49).
14078[‡#@&] *5*	4$^+$	273[&] keV *5*	$\Gamma_{\alpha0}/\Gamma$=25% *3*; $\Gamma_{\alpha0}/\Gamma$ is corrected for the "ghost" threshold effect (2012Al22). $\Gamma_{\alpha0}$=68 keV *8*.
15.11×10^3[‡#]	1$^+$		$\Gamma\alpha/\Gamma$=0.028 *12* (2009Ki13). $\Gamma\alpha/\Gamma$: Compare with (1974Ba42) who give $\Gamma\alpha/\Gamma$, but who did not account for the 11.83 and 10.3 states. Γ_α/Γ: From (2009Ki13).
16110[‡#@]	2$^+$		$\Gamma_{\alpha0}/\Gamma$=7.2% *9*; $\Gamma_{\alpha0}/\Gamma$ is corrected for the "ghost" threshold effect (2012Al22). $\Gamma_{\alpha0}$=0.38 keV *5*.

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^{10}B(^{3}He,p3α),^{11}B(^{3}He,D3A) 2007Bo49,2009Ki13,2012Al22 (continued)

^{12}C Levels (continued)

E(level)†	J$^{\pi}$†	$T_{1/2}$	Comments
16.57×10^{3}‡	2^{-}		E(level): From (2007Bo49).
20553@& *5*	(3^{+})	245& keV *7*	

† From Adopted Levels unless otherwise stated.
‡ Reported in (2007Bo49).
# Reported in (2009Ki13).
@ Reported in (2012Al22).
& From (2012Al22).

γ(^{12}C)

E_i(level)	J^{π}_i	E_γ†	I_γ‡	E_f	J^{π}_f	Comments
12710	1^{+}	2.41×10^{3}	0.9 *6*	10.3×10^{3}	(0^{+})	I_γ: 0.9 *+6−5*.
		5.06×10^{3}	2.6 *16*	7650	0^{+}	I_γ: 2.6 *+16−12*.
		8.27×10^{3}	12.7 *24*	4.44×10^{3}	2^{+}	The authors give branching=96.6 *+17−13* for decay to ^{12}C*(0,4.4 MeV). The evaluator has divided 96.6 into the $^{12}C_{g.s.}$ and ^{12}C*(4.4 MeV) branches using the branching ratios given in Adopted data set.
		12.70×10^{3}	84 *12*	0	0^{+}	The authors give branching=96.6 *+17−13* for decay to ^{12}C*(0,4.4 MeV). The evaluator has divided 96.6 into the $^{12}C_{g.s.}$ and ^{12}C*(4.4 MeV) branches using the branching ratios given in Adopted data set.
15.11×10^{3}	1^{+}	2.40×10^{3}	1.2 *2*	12710	1^{+}	
		3.28×10^{3}	0.32 *12*	11837	2^{-}	
		4.27×10^{3}	<0.13	10847	1^{-}	
		4.81×10^{3}	1.4 *2*	10.3×10^{3}	(0^{+})	
		7.46×10^{3}	4.4 *8*	7650	0^{+}	
		10.67×10^{3}	2.3 *3*	4.44×10^{3}	2^{+}	The authors give branching=92.7 *10* for decay to ^{12}C*(0,4.4 MeV). The evaluator has divided 92.7 into the $^{12}C_{g.s.}$ and ^{12}C*(4.4 MeV) branches using the branching ratios given in Adopted data set.
		15.10×10^{3}	90.4 *10*	0	0^{+}	The authors give branching=92.7 *10* for decay to ^{12}C*(0,4.4 MeV). The evaluator has divided 92.7 into the $^{12}C_{g.s.}$ and ^{12}C*(4.4 MeV) branches using the branching ratios given in Adopted data set.

† From energy level difference.
‡ Deduced from indirect evidence observed in (2009Ki13).

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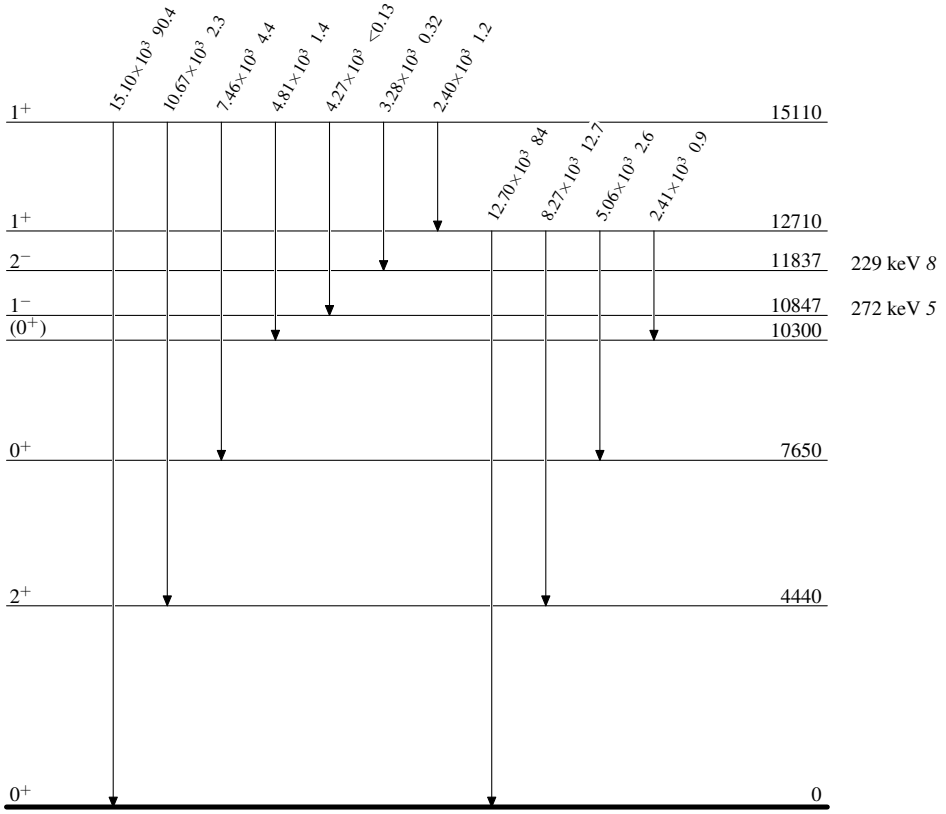
Level Scheme

Intensities: % photon branching from each level



$^{12}_{6}C_{6}$