^{160}Ho IT decay (3.2 s) 1988Bh05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Parent: ^{160}Ho: E=169.56+x; J^π=(9^+); $T_{1/2}$=3.2 s *2*; %IT decay=100.0

1988Bh05: ^{160}Ho is obtained from ^{159}Tb(α,3n). E(α) from 29 to 45 MeV; reaction products transported using gas-jet recoil transport system. LEPS detector (0.2 cm^3, having 620-eV resolution (FWHM) at 50 keV) and 30% GMX detector. Measured $T_{1/2}$, γ, I(K x ray). Deduced transition multipolarities.

Others: 2005KaZX (measured $T_{1/2}$), 2010VaZZ (Iγ).

^{160}Ho Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	5^+	25.6 min *3*	$T_{1/2}$,J^π: from the adopted values.
107.28 *5*	6^+		
118.41 *5*	6^-		
169.56 *7*	7^-		
169.56+x	(9^+)	3.2 s *2*	E(level): x<55, from absence of K x ray associated with deexciting γ. $T_{1/2}$: measured by 2005KaZX by the decrease of the 118γ. J^π: adopted value. 1988Bh05 give J>7, based on the absence of a direct γ to the 118 level. However, this lower limit seems overly conservative in view of the quite small transition probabilities that would be implied for the isomeric transition if its mult were E2 or less. Based on this observation, J^π would be expected to be 9^+ (but not 9^-) or larger.

† From a least-squares fit to the γ-ray energies.

‡ From Adopted Levels.

γ(^{160}Ho)

Iγ normalization: Transitions to g.s. I(γ+ce)(107γ)+I(γ+ce)(118γ) will sum to 100%.

%I(Ho K x rays)=28.8 *40*, from I(Ho K x rays)=51 *7*, weighted average of measured values 50 *10* (1988Bh05) and 52 *10* (2010VaZZ).

E_γ	I_γ&	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α#	$I_{(\gamma+ce)}$a	Comments
x		169.56+x	(9^+)	169.56	7^-				
(11.13 *7*)	2.39 *12*	118.41	6^-	107.28	6^+	[E1]	22.9 *5*	32.2 *16*	%Iγ=1.35 *5* ce(L)/(γ+ce)=0.742 *11*; ce(M)/(γ+ce)=0.175 *5* ce(N)/(γ+ce)=0.0372 *12*; ce(O)/(γ+ce)=0.00349 *11*; ce(P)/(γ+ce)=6.88×10^{-5} *20* α(L)=17.8 *4*; α(M)=4.20 *10* α(N)=0.890 *20*; α(O)=0.0836 *17*; α(P)=0.00165 *3* E_γ: from level-energy difference. I_γ: from I(γ+ce) and α. Mult.: from level scheme, $\Delta\pi$=yes. From RUL (applied to the (HI,xnγ) data), %M2 must be less than 0.0001. α: value for a pure E1 transition. $I_{(\gamma+ce)}$: from intensity balance at 107 level.

Continued on next page (footnotes at end of table)

^{160}Ho IT decay (3.2 s) 1988Bh05 (continued)

$\gamma(^{160}Ho)$ (continued)

E_γ	I_γ[&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†‡@]	α[#]	$I_{(\gamma+ce)}$[a]	Comments
51.15 *5*	41.1 *39*	169.56	7^-	118.41	6^-	M1+E2	0.10 *+4−6*	3.3 *4*	100	%Iγ=23.2 *20* ce(L)/(γ+ce)=0.60 *5*; ce(M)/(γ+ce)=0.134 *18* ce(N)/(γ+ce)=0.031 *5*; ce(O)/(γ+ce)=0.0044 *6*; ce(P)/(γ+ce)=0.000219 *19* α(L)=2.6 *3*; α(M)=0.58 *7* α(N)=0.134 *16*; α(O)=0.0189 *18*; α(P)=0.000948 *16* $I_{(\gamma+ce)}$: from decay scheme. I_γ: weighted average of 38 *4* (1988Bh05) and 46 *5* (2010VaZZ). α(exp): 3.8 *4* (1988Bh05); 3.3 *4* is deduced by evaluator from $I_{\gamma+ce}$=100%, calculated normalization and I_γ=41.1 *39*. Mult.,δ: from M1 from 1988Bh05 and δ calculated by evaluator from α=3.3 *4*.
107.28 *5*	18.2 *8*	107.28	6^+	0.0	5^+	M1+E2	0.25 *4*	2.14		%Iγ=10.3 *4* α(K)=1.74 *3*; α(L)=0.307 *14*; α(M)=0.069 *4* α(N)=0.0159 *8*; α(O)=0.00223 *9*; α(P)=0.0001069 *21* I_γ: weighted average of 18 *1* (1988Bh05) and 18.5 *15* (2010VaZZ). α(K)exp: α(K)exp=2.0 *6*, from measured I(K x ray) and Iγ values, after removal of the contribution to the K x-ray peak from the 118 γ (assumed to be pure E1); α(K)exp=1.8 *3* (1988Bh05).
118.41 *5*	100	118.41	6^-	0.0	5^+	E1		0.202		%Iγ=56.4 *9* α(K)=0.1688 *24*; α(L)=0.0260 *4*; α(M)=0.00572 *8* α(N)=0.001307 *19*; α(O)=0.000178 *3*; α(P)=7.88×10^{-6} *11* α: α(K)exp<0.53, from measured I(K x ray) and Iγ(118γ), assuming no contribution to K x-ray peak from the 107 γ. This conservative upper limit for α(K) indicates that this γ is E1 (although a small M2 admixture is not ruled out).

[†] From Adopted Gammas (some values are deduced in this dataset as commented).
[‡] Additional information 1.
[#] Additional information 2.
[@] Additional information 3.

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^{160}Ho IT decay (3.2 s) 1988Bh05 (continued)

$\gamma(^{160}Ho)$ (continued)

[&] For absolute intensity per 100 decays, multiply by 0.564 *9*.
[a] Absolute intensity per 100 decays.