^{106}Cd(^{60}Ni,3pnγ) 2011Gh08

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

2011Gh08 compiled for XUNDL database by M. Birch and B. Singh (McMaster).

2011Gh08: E(^{60}Ni)=270 MeV. Enriched ^{106}Cd target, thickness=500 μg/cm^2. K130 cyclotron facility, University of Jyvaskyla. Gamma rays detected by the JUROGAM gamma-ray spectrometer, consisting of forty-three Compton-suppressed HPGe detectors. Scattered beam particles and reaction products separated by the gas-filled recoil separator Recoil Ion Transport Unit (RITU), then reaction products were implanted into the double-sided silicon strip detector (DSSD) of the spectrometer Gamma Recoil Electron Alpha Tagging (GREAT). Measured Eγ, Iγ, $\gamma\gamma$-coin, DCO ratios. Deduced levels, J, π. Interpretation based on total Routhian surface calculations.

^{162}Ta Levels

E(level)†	J$^\pi$‡	E(level)†	J$^\pi$‡	E(level)†	J$^\pi$‡	E(level)†	J$^\pi$‡
0+x	7$^-$	1173.6+x# *11*	14$^-$	3036.9+x# *11*	20$^-$	5445.7+x# *11*	26$^-$
275.4+x@ *1*	9$^-$	1419.1+x@ *11*	15$^-$	3347.1+x@ *11*	21$^-$	5750.7+x@ *11*	27$^-$
359.4+x# *10*	10$^-$	1731.1+x# *11*	16$^-$	3759.2+x# *11*	22$^-$	6402.7+x# *11*	28$^-$
450.0+x@ *10*	11$^-$	2020.5+x@ *11*	17$^-$	4082.0+x@ *11*	23$^-$	6668.7+x@ *11*	29$^-$
692.7+x# *11*	12$^-$	2359.9+x# *11*	18$^-$	4560.8+x# *11*	24$^-$	7631.7+x# *15*	30$^-$
877.2+x@ *11*	13$^-$	2667.1+x@ *11*	19$^-$	4886.5+x@ *11*	25$^-$		

† From least-squares fit to Eγ data. Uncertainties for some of the gamma rays as indicated were doubled by the evaluator to get an acceptable fit.

‡ Based on tentative assignment of 9$^-$ for the bandhead, and comparison with high-spin structure of ^{164}Ta (2011Gh08). Thus all J^π assignments are considered as tentative.

Band(A): π9/2[514]$\otimes\nu$1/2[660],α=0. 9/2[514] from h$_{11/2}$ orbital and 1/2[660] from i$_{13/2}$ orbital.

@ Band(a): π9/2[514]$\otimes\nu$1/2[660],α=1.

γ(^{162}Ta)

DCO ratio are for 94° and 158° geometry with gates on ΔJ=2, quadrupole transitions. Expected ratios are ≈0.8 for ΔJ=1, dipole and ≈1 for ΔJ=2, quadrupole.

E$_\gamma$†	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.@	Comments
84.0 *10*	6.6 *16*	359.4+x	10$^-$	275.4+x	9$^-$		
90.6‡ *1*	13.9 *19*	450.0+x	11$^-$	359.4+x	10$^-$		DCO=0.67 *23*
184.5‡ *1*	81 *3*	877.2+x	13$^-$	692.7+x	12$^-$	D	DCO=0.77 *8*
242.7‡ *1*	100 *5*	692.7+x	12$^-$	450.0+x	11$^-$	D	DCO=0.83 *6*
245.6‡ *1*	75 *3*	1419.1+x	15$^-$	1173.6+x	14$^-$		DCO=1.00 *13* DCO=1.0 *1.3* in Table I of 2011Gh08 seems a misprint.
266.0 *2*	6.1 *7*	6668.7+x	29$^-$	6402.7+x	28$^-$		
275.4‡ *1*	124 *5*	275.4+x	9$^-$	0+x	7$^-$	(E2)	DCO=1.24 *12*
289.4‡ *1*	73 *3*	2020.5+x	17$^-$	1731.1+x	16$^-$		DCO=0.97 *10*
296.4‡ *1*	95 *4*	1173.6+x	14$^-$	877.2+x	13$^-$	D	DCO=0.78 *9*
305.0 *1*	14.4 *12*	5750.7+x	27$^-$	5445.7+x	26$^-$		
307.3‡ *1*	45.7 *21*	2667.1+x	19$^-$	2359.9+x	18$^-$		DCO=0.89 *14*
310.3 *1*	33.4 *17*	3347.1+x	21$^-$	3036.9+x	20$^-$		
312.4‡# *1*	77 *3*	1731.1+x	16$^-$	1419.1+x	15$^-$		DCO=0.89 *11*

Continued on next page (footnotes at end of table)

^{106}Cd(^{60}Ni,3pnγ) 2011Gh08 (continued)

$\gamma(^{162}Ta)$ (continued)

E_γ [†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	Comments
322.8 *1*	12.8 *14*	4082.0+x	23^-	3759.2+x	22^-		
325.7 *1*	10.6 *12*	4886.5+x	25^-	4560.8+x	24^-		
332.6 *10*	4.9 *17*	692.7+x	12^-	359.4+x	10^-	(E2)	DCO=1.28 *13*
339.4 *1*	39.1 *20*	2359.9+x	18^-	2020.5+x	17^-		DCO=0.89 *33*
369.8 *1*	21.5 *16*	3036.9+x	20^-	2667.1+x	19^-		DCO=0.79 *34*
412.0 *1*	9.6 *13*	3759.2+x	22^-	3347.1+x	21^-		DCO=0.84 *36*
427.2 *2*	19.0 *19*	877.2+x	13^-	450.0+x	11^-		DCO=0.90 *34*
478.8 *1*	5.3 *12*	4560.8+x	24^-	4082.0+x	23^-		
481.2 *2*	16.3 *17*	1173.6+x	14^-	692.7+x	12^-		DCO=1.06 *35*
541.8 *1*	45 *3*	1419.1+x	15^-	877.2+x	13^-		DCO=1.00 *30* DCO=1.0 *30* in Table I of 2011Gh08 seems a misprint.
556.7[#] *2*	26 *3*	1731.1+x	16^-	1173.6+x	14^-		DCO=1.07 *35*
559.3 *1*	17.7 *17*	5445.7+x	26^-	4886.5+x	25^-		
601.3 *1*	33 *3*	2020.5+x	17^-	1419.1+x	15^-		DCO=1.41 *61*
628.8 *2*	20.3 *22*	2359.9+x	18^-	1731.1+x	16^-		DCO=1.07 *28*
646.7 *1*	26.3 *25*	2667.1+x	19^-	2020.5+x	17^-		DCO=1.10 *23*
652.0 *2*	3.8 *18*	6402.7+x	28^-	5750.7+x	27^-		
676.8 *2*	11.6 *15*	3036.9+x	20^-	2359.9+x	18^-		
679.9 *3*	9.6 *17*	3347.1+x	21^-	2667.1+x	19^-		
721.3[#] *3*	5.4 *14*	3759.2+x	22^-	3036.9+x	20^-		
735.5 *3*	7.7 *14*	4082.0+x	23^-	3347.1+x	21^-		
800.4[#] *4*	2.1 *9*	4560.8+x	24^-	3759.2+x	22^-		
804.3 *4*	2.8 *10*	4886.5+x	25^-	4082.0+x	23^-		
862.7 *10*	1.3 *10*	5750.7+x	27^-	4886.5+x	25^-		
883.5 *6*	2.3 *10*	5445.7+x	26^-	4560.8+x	24^-		
918.0 *11*	2.0 *9*	6668.7+x	29^-	5750.7+x	27^-		
956.1 *16*	0.4 *7*	6402.7+x	28^-	5445.7+x	26^-		
963.0[&] *10*	0.3 *9*	7631.7+x	30^-	6668.7+x	29^-		

[†] Uncertainties are statistical.
[‡] Authors quote an uncertainty of 0.0 keV, the evaluator has increased this to 0.1 keV.
[#] Uncertainty doubled by the evaluator in the least-squares fit procedure.
[@] Assignment by the evaluator from DCO values; in addition, (E2) assigned for two low-energy ΔJ=2, quadrupole transitions from RUL, assuming level half-life less than 20 ns or so from coincidence resolving time. In other cases, where DCO values are given by 2011Gh08, it was not possible to make secure assignments since the values overlap for ΔJ=2, quadrupole and ΔJ=1, dipole transitions.
[&] Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

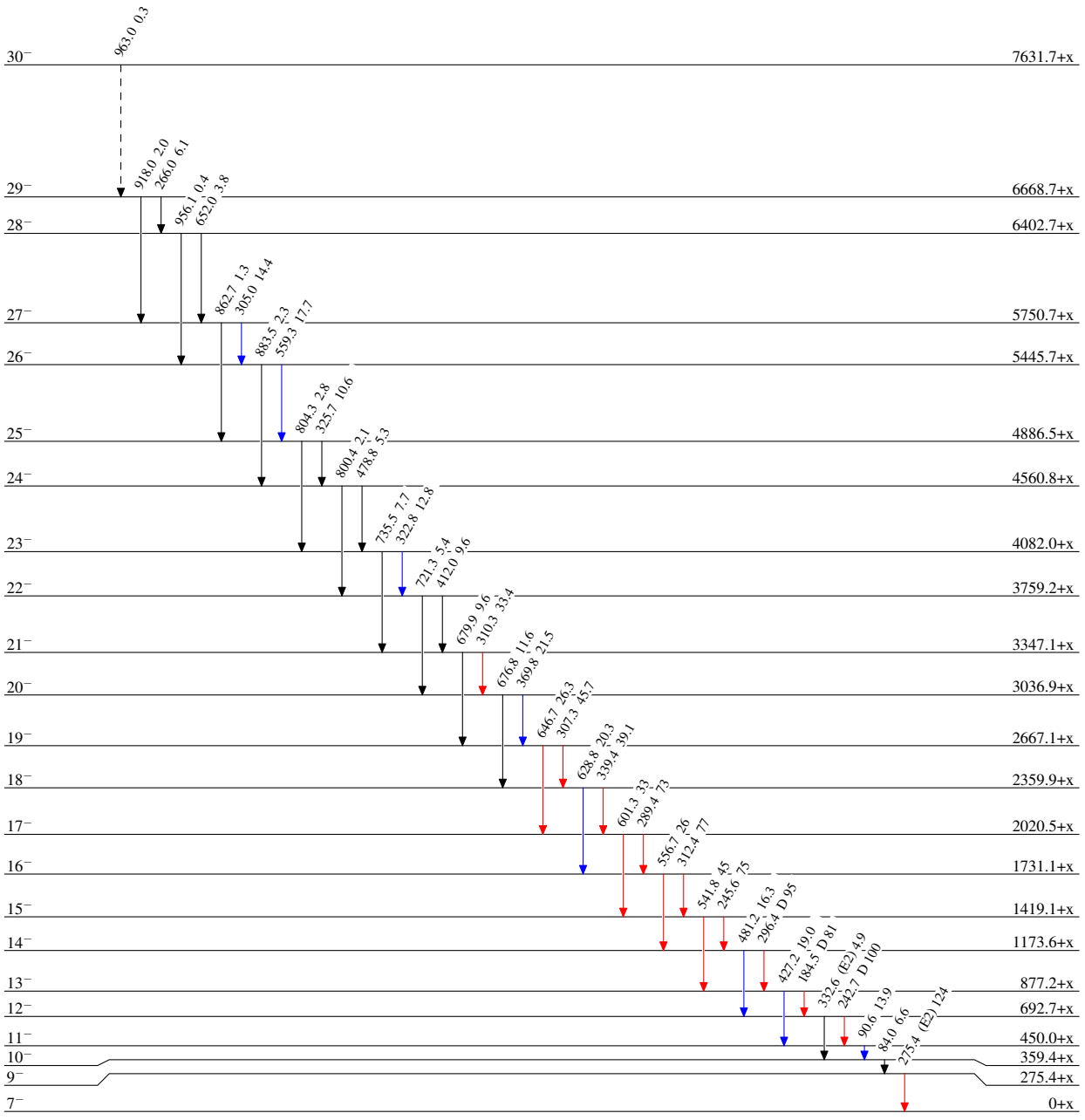
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{162}_{73}Ta_{89}$

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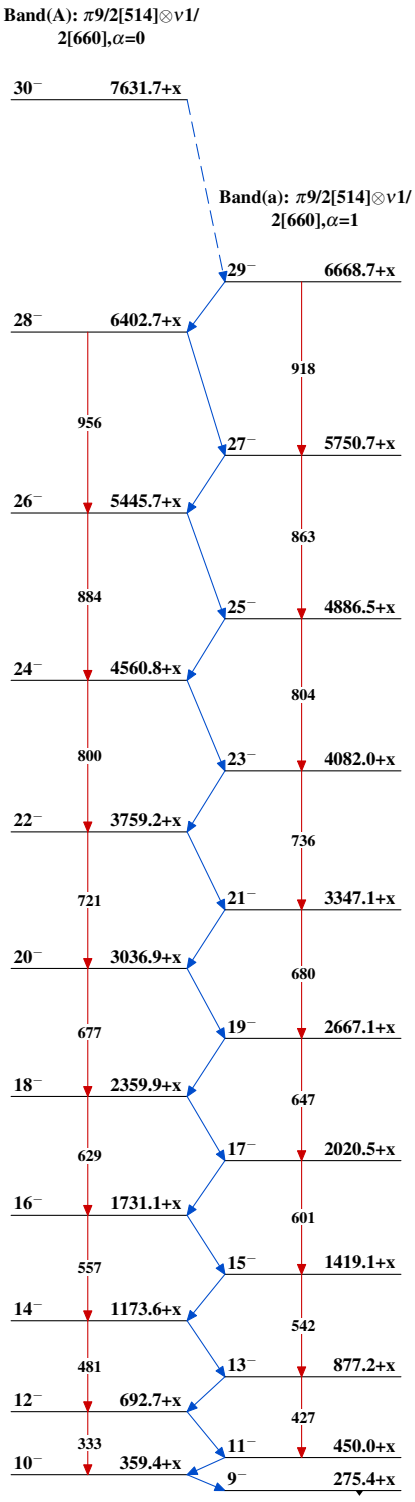

$^{162}_{73}Ta_{89}$