^{106}Cd(^{58}Ni,p2nγ) 2006La16

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 112,2497 (2011)	1-Jun-2011

Additional information 1.

E(^{58}Ni)=270 MeV. Self-supporting target foil, 96% enriched, thickness=0.9 mg/cm^2. Fusion-evaporation reaction products were separated using the gas-filled recoil separator RITU and implanted into double-sided Si-strip detectors In the GREAT spectrometer. γ rays studied using the JUROGAM detector array, consisting of 43 escape-suppressed coaxial Ge detectors. Assignment of γ rays to the respective reaction products was done using recoil-decay tagging involving the α and proton decay of the implanted recoil products. Measured Eγ, Iγ, $\gamma\gamma$ and isomer lifetimes.

^{161}Re Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[#]	1/2$^+$	0.44 ms *1*	%p=100; %$\alpha\leq$1.4 $T_{1/2}$: value reported As 440 μs *1* In the text of 2006La16, but this uncertainty seems too small. The evaluator has adopted the listed uncertainty As more reasonable. IT is also the value shown on the skeleton scheme (fig. 1) In 2006La16.
123.8[@] *13*	11/2$^-$	14.7 ms *3*	%p=7.0 *3*; %α=93.0 *3* E(level): From the Adopted Levels.
681.8?[#] *2*	(5/2$^+$)		
761.20[@] *10*	15/2$^-$		
1363.6?[#] *3*	(9/2$^+$)		
1447.30[@] *14*	19/2$^-$		
1478.40? *14*			
1865.60[&] *15*			
1975.7?[#] *5*	(13/2$^+$)		
2022.30[@] *17*	23/2$^-$		
2177.0[@] *3*	27/2$^-$		
2453.4?[#] *5*	(17/2$^+$)		
2589.91?[&] *18*			
2647.4[@] *3*	(31/2$^-$)		
2903.11[&] *20*			
2942.9[a] *3*	(31/2$^-$)		
3117.9[@] *3*			
3308.6[a] *3*	(33/2$^-$)		
3331.1[@] *3*			
3630.0[a] *3*	(35/2$^-$)		
3668.91?[&] *23*			
3798.2[a] *4*	(37/2$^-$)		
3929.0[@] *4*			
4075.91?[&] *25*			
4183.7 *4*			
4400.8?[a] *5*			

[†] Computed from a least-squares fit to the listed Eγ values. The uncertainties In the energies of the levels whose deexcitation leads to the 11/2$^-$ isomeric state do not include that of the isomer itself.

[‡] Values proposed by 2006La16 based on the usual considerations of band structure As populated In heavy-ion-induced reactions. The proposed level structure is interpreted In terms of the total Routhian surface formalism, including alignment of neutron orbitals and excitations based on the $\pi h_{11/2}$ subshell.

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^{106}Cd(^{58}Ni,p2nγ) 2006La16 (continued)

^{161}Re Levels (continued)

Band(A): proposed g.s. band.
@ Band(B): band based on $\pi h_{11/2}$.
& Band(C): possible $\pi h_{11/2} \otimes (\nu h_{9/2})^2$ band.
a Band(D): level sequence based on $(31/2^-)$.

$\gamma(^{161}Re)$

The angular distribution ratio is defined by 2006La16 As R=Iγ(158°)/(Iγ(94°)+Iγ(86°)). For the known E1 transition In ^{160}W, R=0.44 *6* and, for the strongest E2 transitions In this nuclide, the average R value is 0.62 *2*. Other than this, these authors do not specify which range of R values correspond to D and Q mults. IT is assumed that mult=Q corresponds to E2, rather than M2.

E_γ	I_γ ‡#	E_i(level)	J_i^π	E_f	J_f^π	Mult.&	Comments
154.7 *2*	13.3 *4*	2177.0	$27/2^-$	2022.30	$23/2^-$	E2	R=0.64 *7*.
168.2 *1*	1.98 *15*	3798.2	$(37/2^-)$	3630.0	$(35/2^-)$	(M1)	R=0.41 *15*.
213.2 *1*	4.8 *2*	3331.1		3117.9		(E2)	R=0.60 *10*.
254.5 *2*	1.20 *16*	4183.7		3929.0		(M1)	
295.6 *1*	4.1 *2*	2942.9	$(31/2^-)$	2647.4	$(31/2^-)$	(M1)	R=0.56 *12*.
313.2† *1*	9.3 *4*	2903.11		2589.91?		E2	R=0.70 *9*.
321.4 *1*	4.4 *3*	3630.0	$(35/2^-)$	3308.6	$(33/2^-)$	M1	R=0.43 *10*.
365.6 *1*	6.5 *3*	3308.6	$(33/2^-)$	2942.9	$(31/2^-)$	M1	R=0.47 *8*.
387.4 *1*	7.7 *4*	1865.60		1478.40?		(E2)	R=0.59 *10*.
406.8†b *1*	6.4 *3*	4075.91?		3668.91?		(M1)	R=0.47 *8*.
418.3 *1*	6.5 *3*	1865.60		1447.30	$19/2^-$		R=0.54 *10*.
470.5a *1*	37.1a *9*	2647.4	$(31/2^-)$	2177.0	$27/2^-$		R=0.49 *3*.
470.5a *1*	37.1a *9*	3117.9		2647.4	$(31/2^-)$		R=0.49 *3*.
477.7b *2*	41@ *5*	2453.4?	$(17/2^+)$	1975.7?	$(13/2^+)$	(E2)	
x518.5 *4*	12@ *5*						
x573.7 *9*	17@ *6*						
575.0 *1*	56.0 *10*	2022.30	$23/2^-$	1447.30	$19/2^-$	E2	R=0.59 *4*.
597.8 *1*	7.3 *4*	3929.0		3331.1		(M1)	R=0.38 *8*.
602.4b *3*	2.7 *4*	4400.8?		3798.2	$(37/2^-)$		
612.1b *3*	43@ *5*	1975.7?	$(13/2^+)$	1363.6?	$(9/2^+)$	(E2)	
x619.3 *6*	16@ *6*						
637.4 *1*	100.0 *14*	761.20	$15/2^-$	123.8	$11/2^-$	E2	R=0.63 *3*.
662.1 *5*	2.4 *6*	3308.6	$(33/2^-)$	2647.4	$(31/2^-)$	(M1)	R=0.72 *25*.
681.8ab *2*	100a@ *8*	681.8?	$(5/2^+)$	0.0	$1/2^+$	(E2)	
681.8ab *2*	100a@ *8*	1363.6?	$(9/2^+)$	681.8?	$(5/2^+)$	(E2)	
686.1 *1*	82.0 *13*	1447.30	$19/2^-$	761.20	$15/2^-$	E2	R=0.67 *4*.
717.0 *1*	12.7 *6*	1478.40?		761.20	$15/2^-$	E2	R=0.80 *13*.
724.3† *1*	8.6 *5*	2589.91?		1865.60		E2	R=0.85 *18*.
765.8a *1*	19.8a *8*	2942.9	$(31/2^-)$	2177.0	$27/2^-$	E2	R=0.80 *11*.
765.8a† *1*	19.8a *8*	3668.91?		2903.11		E2	R=0.80 *11*. The order of the four transitions In this cascade is not unambiguously determined.
852.9 *2*	5.1 *5*	4183.7		3331.1		(E2)	R=0.66 *17*.
985 *2*	1.6 *9*	3630.0	$(35/2^-)$	2647.4	$(31/2^-)$		

† The order of the four transitions In this cascade is not unambiguously determined.
‡ Intensities measured using detectors At angles of 158° and 86° (or 94°) with respect to the beam direction.
# Unless noted otherwise, values are for those γ's involved In the population of the $11/2^-$ isomer and are normalized to Iγ=100 for

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^{106}Cd(^{58}Ni,p2nγ) 2006La16 (continued)

$\gamma(^{161}Re)$ (continued)

the prominent 637.4γ. These transitions dominate the intensity flow In the level scheme (approximately 20 times that of the alternate path, which is presumed to proceed to the g.s.).

[@] Values for those γ's presumed to bypass the population of the $11/2^-$ isomer and normalized to Iγ=100 for the 681.8γ. This decay path is estimated to be≈5% of the decays In this reaction.

[&] Values assigned by 2006La16 based on the measured R values (and, presumably, on considerations of the location of the levels within the proposed band structure).

[a] Multiply placed with undivided intensity.

[b] Placement of transition in the level scheme is uncertain.

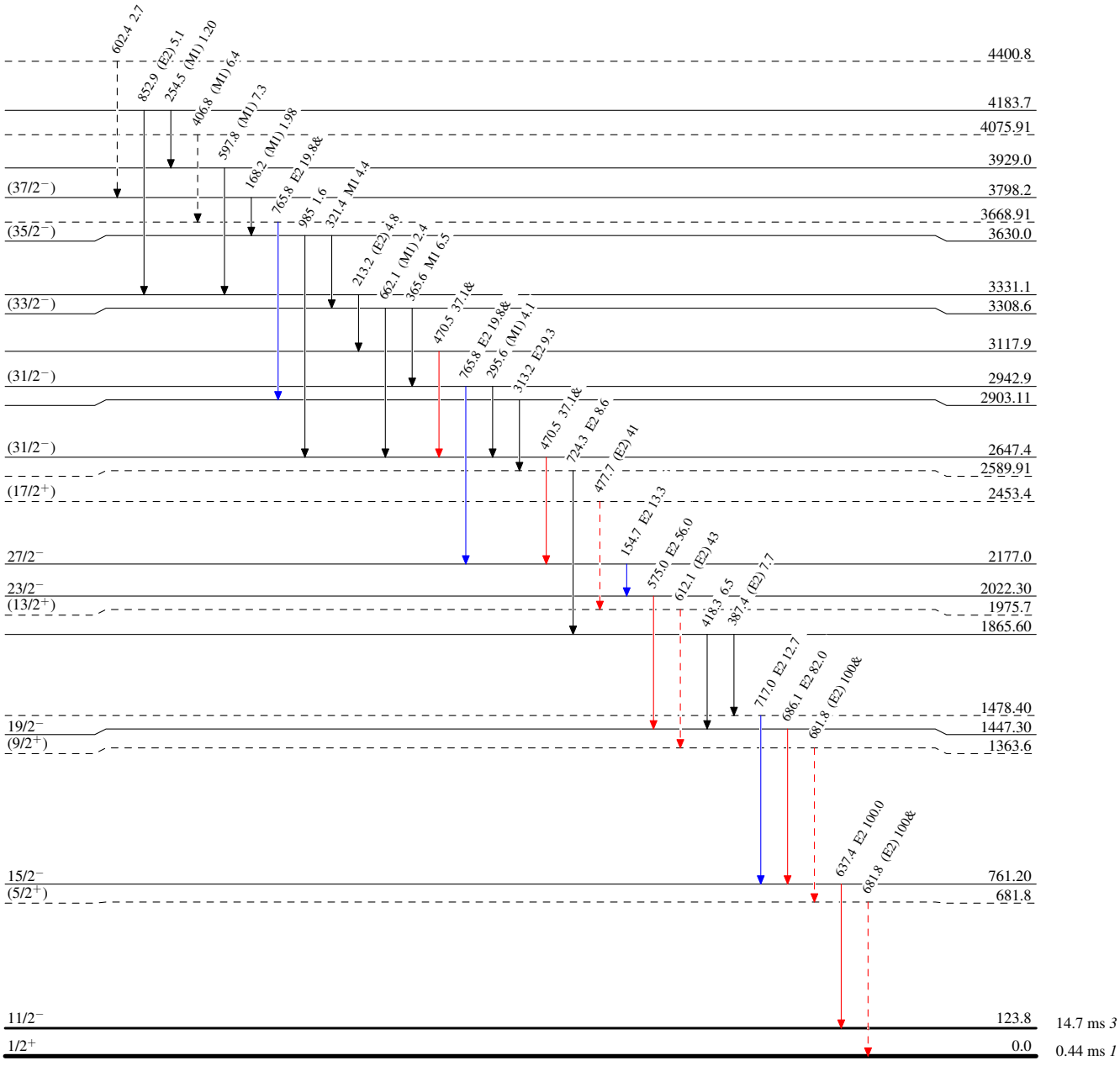
[x] γ ray not placed in level scheme.

^{106}Cd(^{58}Ni,p2nγ) 2006La16

Level Scheme

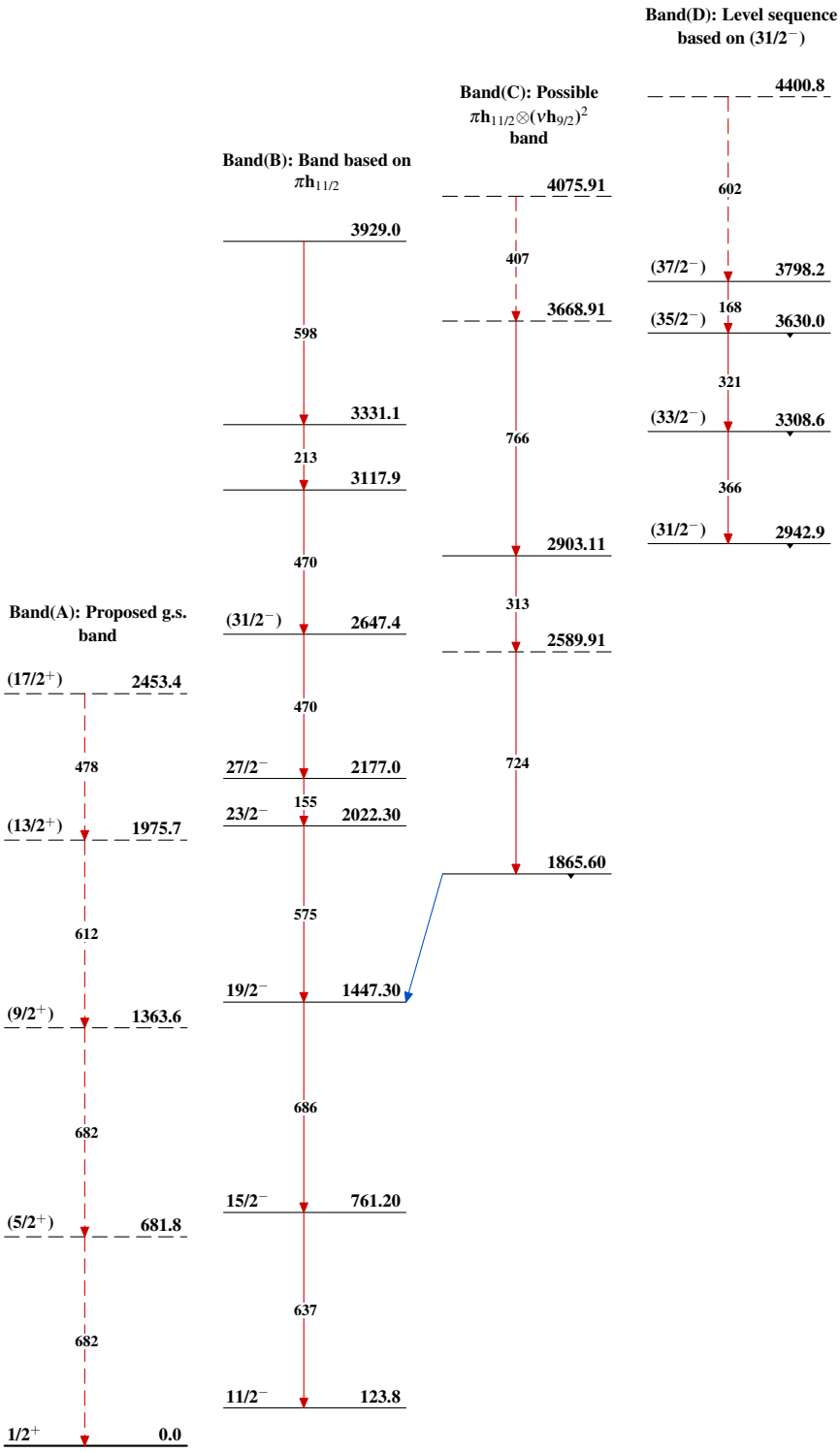
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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)



$^{161}_{75}Re_{86}$

$^{106}Cd(^{58}Ni,p2n\gamma)$ 2006La16



$^{161}_{75}Re_{86}$