

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 141, 1 (2017)	1-Feb-2017

Q(β⁻)=-10936 (syst) 197; S(n)=11271 (syst) 196; S(p)=2951 21; Q(α)=5405 3 2017Wa10
 Q(ε)=5110 15; S(2n)=2.043×10⁴(syst) 196; S(2p)=3415 21; Q(εp)=4031 21 2017Wa10

Additional information 1.

All of the data for the excited levels and γ's are from the Pd(⁵⁸Ni,xnpy) reaction.

¹⁵⁸Hf Levels

Cross Reference (XREF) Flags

- A ¹⁶²W α decay
- B Pd(⁵⁸Ni,xnpy)

E(level) [†]	J ^{π‡}	T _{1/2}	XREF	Comments
0 ^b	0 ⁺	2.85 s 7	AB	^α α=44.3 19; ^ε ε+ ^β β ⁺ =55.7 19 T _{1/2} : Weighted average of 3.0 s 5 (1965Ma14), 2.8 s 2 (1973To02), 3.2 s 6 (1979Ho10), and 2.85 s 7. ^α α: Weighted average of 46 3 (1979Ho10), 40 4 (1989W002), and 45 3 (1996Pa01).
476.36 ^b 11	2 ⁺		B	
1033.33 ^b 15	4 ⁺		B	
1642.61 ^b 19	6 ⁺		B	
2259.24 ^b 22	8 ⁺		B	
2940.05 ^b 24	10 ⁺		B	
2981.72 ^d 24	10 ⁺		B	
3093.20 ^c 25	(11 ⁻)		B	
3519.79 ^d 25	12 ⁺		B	
3904.4 ^c 3	(13 ⁻)		B	
4159.6 ^d 3	14 ⁺		B	
4591.5 ^c 3	(15 ⁻)		B	
4807.9 ^d 3	16 ⁺		B	
4917.8 ^e 4	16 ⁺		B	
5065.4 ^c 4	(17 ⁻)		B	
5249.5 ^e 4	(18 ⁺)		B	
5439.5 ^d 4	(18 ⁺)		B	
5667.0 4			B	
5779.4 4	(19 ⁻)		B	
5850.6 ^c 4	(19 ⁻)		B	
6010.7 ^e 9	(20 ⁺)		B	
6154.9 ^d 5	(20 ⁺)		B	
6462.3 ^c 6	(21 ⁻)		B	
6523.7 6	(22 ⁺) [#]		B	
6884.7 ^c 6	(23 ⁻)		B	
7210.3 6	(24 ⁺) [@]		B	
7268.1 6	(24 ⁺) ^a		B	
7557.2 6	(26 ⁺) ^{&}		B	
7597.1 ^c 7	(25 ⁻)		B	
7985.9 ^c 7			B	

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Adopted Levels, Gammas (continued) ^{158}Hf Levels (continued)

<u>E(level)[†]</u>	<u>XREF</u>
8046.4 7	B
8901.3 ^c 7	B
9106.6 ^c 7	B

[†] From least-squares fit to E_γ 's.

[‡] Based on adopted multiplicities and band assignments, assuming stretched transitions and increasing values of spins with increasing excitation energy.

(E1) γ from (23⁻).

@ (E1) γ to (23⁻).

& (E2) γ to (24⁺).

^a (E2) γ from (26⁺).

^b Band(A): ground-state band.

^c Band(B): band based on 11⁻ level.

^d Band(C): band based on 10⁺ level.

^e Band(D): band based on 16⁺ level.

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>I_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[†]</u>	<u>α^\ddagger</u>	<u>$\gamma(^{158}\text{Hf})$</u>	<u>Comments</u>
476.36	2 ⁺	476.36 11	100	0	0 ⁺	E2	0.0219		$\alpha(\text{K})=0.01685$ 24; $\alpha(\text{L})=0.00388$ 6; $\alpha(\text{M})=0.000910$ 13 $\alpha(\text{N})=0.000214$ 3; $\alpha(\text{O})=3.04\times 10^{-5}$ 5; $\alpha(\text{P})=1.283\times 10^{-6}$ 18
1033.33	4 ⁺	556.97 10	100	476.36	2 ⁺	E2	0.01483		$\alpha(\text{K})=0.01167$ 17; $\alpha(\text{L})=0.00243$ 4; $\alpha(\text{M})=0.000566$ 8 $\alpha(\text{N})=0.0001334$ 19; $\alpha(\text{O})=1.92\times 10^{-5}$ 3; $\alpha(\text{P})=9.00\times 10^{-7}$ 13
1642.61	6 ⁺	609.28 11	100	1033.33	4 ⁺	E2	0.01197		$\alpha(\text{K})=0.00953$ 14; $\alpha(\text{L})=0.00189$ 3; $\alpha(\text{M})=0.000438$ 7 $\alpha(\text{N})=0.0001032$ 15; $\alpha(\text{O})=1.499\times 10^{-5}$ 21; $\alpha(\text{P})=7.38\times 10^{-7}$ 11
2259.24	8 ⁺	616.63 11	100	1642.61	6 ⁺	E2	0.01164		$\alpha(\text{K})=0.00928$ 13; $\alpha(\text{L})=0.00183$ 3; $\alpha(\text{M})=0.000423$ 6 $\alpha(\text{N})=9.98\times 10^{-5}$ 14; $\alpha(\text{O})=1.451\times 10^{-5}$ 21; $\alpha(\text{P})=7.19\times 10^{-7}$ 10
2940.05	10 ⁺	680.89 10	100	2259.24	8 ⁺	E2	0.00927		$\alpha(\text{K})=0.00746$ 11; $\alpha(\text{L})=0.001400$ 20; $\alpha(\text{M})=0.000323$ 5 $\alpha(\text{N})=7.61\times 10^{-5}$ 11; $\alpha(\text{O})=1.116\times 10^{-5}$ 16; $\alpha(\text{P})=5.81\times 10^{-7}$ 9
2981.72	10 ⁺	722.31 14	100	2259.24	8 ⁺	E2	0.00813		$\alpha(\text{K})=0.00658$ 10; $\alpha(\text{L})=0.001201$ 17; $\alpha(\text{M})=0.000276$ 4 $\alpha(\text{N})=6.52\times 10^{-5}$ 10; $\alpha(\text{O})=9.59\times 10^{-6}$ 14; $\alpha(\text{P})=5.12\times 10^{-7}$ 8
3093.20	(11 ⁻)	111.49 12	19 3	2981.72	10 ⁺	(E1)	0.270		$\alpha(\text{K})=0.222$ 4; $\alpha(\text{L})=0.0370$ 6; $\alpha(\text{M})=0.00836$ 12 $\alpha(\text{N})=0.00195$ 3; $\alpha(\text{O})=0.000278$ 4; $\alpha(\text{P})=1.369\times 10^{-5}$ 20
		153.14 10	100 9	2940.05	10 ⁺	(E1)	0.1177		$\alpha(\text{K})=0.0976$ 14; $\alpha(\text{L})=0.01559$ 22; $\alpha(\text{M})=0.00352$ 5 $\alpha(\text{N})=0.000823$ 12; $\alpha(\text{O})=0.0001194$ 17; $\alpha(\text{P})=6.29\times 10^{-6}$ 9

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Adopted Levels, Gammas (continued)

$\gamma(^{158}\text{Hf})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. [†]	α^\ddagger	Comments
3519.79	12 ⁺	537.95 12	100 8	2981.72	10 ⁺	E2	0.01613	$\alpha(\text{K})=0.01265$ 18; $\alpha(\text{L})=0.00269$ 4; $\alpha(\text{M})=0.000628$ 9 $\alpha(\text{N})=0.0001477$ 21; $\alpha(\text{O})=2.12\times 10^{-5}$ 3; $\alpha(\text{P})=9.73\times 10^{-7}$ 14
		579.89 13	98 8	2940.05	10 ⁺	E2	0.01346	$\alpha(\text{K})=0.01065$ 15; $\alpha(\text{L})=0.00217$ 3; $\alpha(\text{M})=0.000504$ 7 $\alpha(\text{N})=0.0001187$ 17; $\alpha(\text{O})=1.718\times 10^{-5}$ 24; $\alpha(\text{P})=8.23\times 10^{-7}$ 12
3904.4	(13 ⁻)	811.18 13	100	3093.20	(11 ⁻)	E2	0.00632	$\alpha(\text{K})=0.00516$ 8; $\alpha(\text{L})=0.000898$ 13; $\alpha(\text{M})=0.000206$ 3 $\alpha(\text{N})=4.86\times 10^{-5}$ 7; $\alpha(\text{O})=7.20\times 10^{-6}$ 10; $\alpha(\text{P})=4.03\times 10^{-7}$ 6
4159.6	14 ⁺	639.79 12	100	3519.79	12 ⁺	E2	0.01069	$\alpha(\text{K})=0.00855$ 12; $\alpha(\text{L})=0.001652$ 24; $\alpha(\text{M})=0.000382$ 6 $\alpha(\text{N})=9.01\times 10^{-5}$ 13; $\alpha(\text{O})=1.315\times 10^{-5}$ 19; $\alpha(\text{P})=6.64\times 10^{-7}$ 10
4591.5	(15 ⁻)	687.09 11	100	3904.4	(13 ⁻)	E2	0.00909	$\alpha(\text{K})=0.00732$ 11; $\alpha(\text{L})=0.001367$ 20; $\alpha(\text{M})=0.000315$ 5 $\alpha(\text{N})=7.43\times 10^{-5}$ 11; $\alpha(\text{O})=1.090\times 10^{-5}$ 16; $\alpha(\text{P})=5.69\times 10^{-7}$ 8
4807.9	16 ⁺	648.36 14	100	4159.6	14 ⁺	E2	0.01037	$\alpha(\text{K})=0.00830$ 12; $\alpha(\text{L})=0.001594$ 23; $\alpha(\text{M})=0.000368$ 6 $\alpha(\text{N})=8.69\times 10^{-5}$ 13; $\alpha(\text{O})=1.269\times 10^{-5}$ 18; $\alpha(\text{P})=6.45\times 10^{-7}$ 9
4917.8	16 ⁺	758.2 3	100	4159.6	14 ⁺	E2	0.00731	$\alpha(\text{K})=0.00593$ 9; $\alpha(\text{L})=0.001062$ 15; $\alpha(\text{M})=0.000244$ 4 $\alpha(\text{N})=5.75\times 10^{-5}$ 8; $\alpha(\text{O})=8.50\times 10^{-6}$ 12; $\alpha(\text{P})=4.63\times 10^{-7}$ 7
5065.4	(17 ⁻)	473.95 11	100	4591.5	(15 ⁻)	E2	0.0222	$\alpha(\text{K})=0.01705$ 24; $\alpha(\text{L})=0.00394$ 6; $\alpha(\text{M})=0.000925$ 13 $\alpha(\text{N})=0.000217$ 3; $\alpha(\text{O})=3.09\times 10^{-5}$ 5; $\alpha(\text{P})=1.298\times 10^{-6}$ 19
5249.5	(18 ⁺)	331.70 14	100 14	4917.8	16 ⁺			
		441.3 4	38 14	4807.9	16 ⁺			
5439.5	(18 ⁺)	189.9 2	20 5	5249.5	(18 ⁺)			
		631.7 2	100 10	4807.9	16 ⁺			
5667.0		601.6 2	100	5065.4	(17 ⁻)			
5779.4	(19 ⁻)	339.9 2	100	5439.5	(18 ⁺)	(E1)	0.01583	$\alpha(\text{K})=0.01328$ 19; $\alpha(\text{L})=0.00198$ 3; $\alpha(\text{M})=0.000445$ 7 $\alpha(\text{N})=0.0001049$ 15; $\alpha(\text{O})=1.567\times 10^{-5}$ 22; $\alpha(\text{P})=9.38\times 10^{-7}$ 14
5850.6	(19 ⁻)	183.6 2	9 2	5667.0				
		785.17 12	100 7	5065.4	(17 ⁻)	E2	0.00677	$\alpha(\text{K})=0.00552$ 8; $\alpha(\text{L})=0.000973$ 14; $\alpha(\text{M})=0.000223$ 4 $\alpha(\text{N})=5.27\times 10^{-5}$ 8; $\alpha(\text{O})=7.80\times 10^{-6}$ 11; $\alpha(\text{P})=4.31\times 10^{-7}$ 6
6010.7	(20 ⁺)	761.2 8	100	5249.5	(18 ⁺)			
6154.9	(20 ⁺)	715.4 3	100	5439.5	(18 ⁺)			
6462.3	(21 ⁻)	611.7 4	100	5850.6	(19 ⁻)			
6523.7	(22 ⁺)	61.3 3	100	6462.3	(21 ⁻)			
6884.7	(23 ⁻)	360.94 12	70 8	6523.7	(22 ⁺)	(E1)	0.01373	$\alpha(\text{K})=0.01153$ 17; $\alpha(\text{L})=0.001714$ 24; $\alpha(\text{M})=0.000384$ 6 $\alpha(\text{N})=9.07\times 10^{-5}$ 13; $\alpha(\text{O})=1.357\times 10^{-5}$ 19; $\alpha(\text{P})=8.18\times 10^{-7}$ 12
		422.37 12	100 9	6462.3	(21 ⁻)	E2	0.0300	$\alpha(\text{K})=0.0226$ 4; $\alpha(\text{L})=0.00567$ 8; $\alpha(\text{M})=0.001341$ 19

Adopted Levels, Gammas (continued)

 $\gamma(^{158}\text{Hf})$ (continued)

<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>I_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[†]</u>	<u>α^\ddagger</u>	<u>Comments</u>
								$\alpha(\text{N})=0.000315\ 5$; $\alpha(\text{O})=4.43\times 10^{-5}\ 7$; $\alpha(\text{P})=1.701\times 10^{-6}\ 24$

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Adopted Levels, Gammas (continued)

$\gamma(^{158}\text{Hf})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. [†]	α^\ddagger	Comments
7210.3	(24 ⁺)	325.64 12	100	6884.7	(23 ⁻)	(E1)	0.01753	$\alpha(\text{K})=0.01470$ 21; $\alpha(\text{L})=0.00220$ 3; $\alpha(\text{M})=0.000494$ 7 $\alpha(\text{N})=0.0001165$ 17; $\alpha(\text{O})=1.738\times 10^{-5}$ 25; $\alpha(\text{P})=1.034\times 10^{-6}$ 15
7268.1	(24 ⁺)	383.3 2	100	6884.7	(23 ⁻)			
7557.2	(26 ⁺)	289.07 15	77 12	7268.1	(24 ⁺)	E2	0.0886	$\alpha(\text{K})=0.0607$ 9; $\alpha(\text{L})=0.0214$ 3; $\alpha(\text{M})=0.00516$ 8 $\alpha(\text{N})=0.001206$ 17; $\alpha(\text{O})=0.0001635$ 24; $\alpha(\text{P})=4.30\times 10^{-6}$ 6
7597.1	(25 ⁻)	346.97 14	100 14	7210.3	(24 ⁺)			
		386.8 5	<32	7210.3	(24 ⁺)			
		712.5 5	100 23	6884.7	(23 ⁻)			
7985.9		388.72 12	100	7597.1	(25 ⁻)			
8046.4		1161.7 3	100	6884.7	(23 ⁻)			
8901.3		915.4 2	100	7985.9		E2	0.00490	$\alpha(\text{K})=0.00403$ 6; $\alpha(\text{L})=0.000673$ 10; $\alpha(\text{M})=0.0001534$ 22 $\alpha(\text{N})=3.63\times 10^{-5}$ 5; $\alpha(\text{O})=5.42\times 10^{-6}$ 8; $\alpha(\text{P})=3.15\times 10^{-7}$ 5
9106.6		205.31 14	100	8901.3				

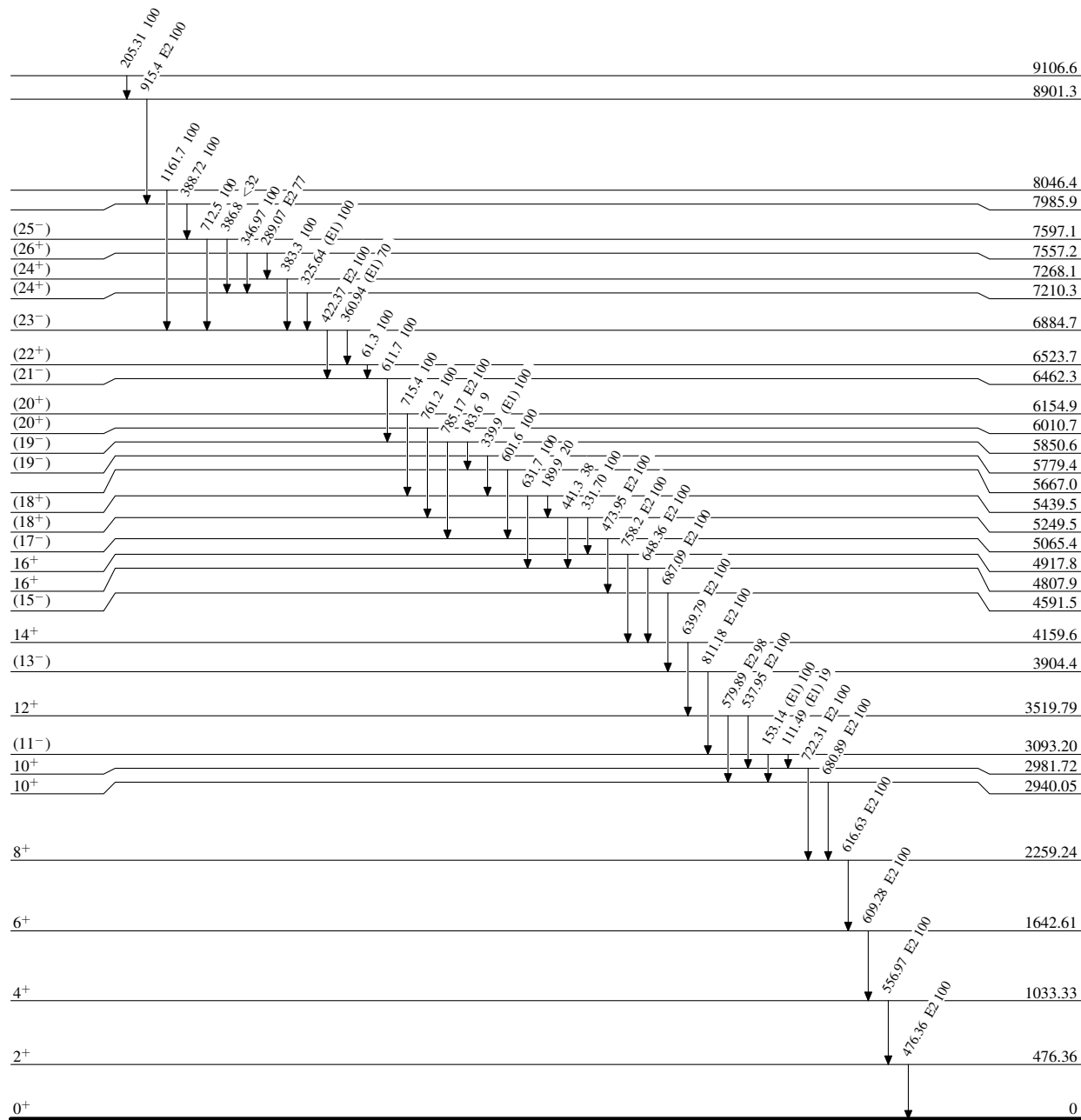
[†] Authors' assignments from A_2 values (2000Di18, Pd($^{58}\text{Ni}, x\text{npy}\gamma$)). Since the A_2 values only determine dipole or quadrupole character, all the assignments are strictly either Q, or D. However based on the heavy ion reaction type, the Q can be assigned E2, while the D transitions assignment as electric or magnetic is tentative and based on weaker arguments following from theory, systematics, etc. In this case for all occurrences D transitions were assigned electric character by authors, which were adopted as (E1) (tentatively, by evaluator). The assignments shown without measured A_2 were dropped by evaluator.

[‡] Additional information 2.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



2.85 s 7

Adopted Levels, Gammas