Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Apr-2022

Q(β^-)=−1.370×10^4 *16*; S(n)=14129 *5*; S(p)=4614.9 *7*; Q(α)=−7571.7 *16* 2021Wa16
Q(ε)=8694.0 *6*, Q(εp)=3629.7 *6*, S(2n)=31848 *25*, S(2p)=8966.4 *18* (2021Wa16).
1973Di11: search for ^{55}Ni in ^{59}Co(p,5nγ),^{58}Ni(p,p3nγ),E=65 MeV reactions, but no activity could be assigned to ^{55}Ni from γ-ray measurements.
1977Ho25: ^{55}Ni produced in ^{54}Fe(^{3}He,2n),E=12.79-15.34 MeV from the EN Tandem Van de Graaff generator of Aarhus University. Measured positron spectrum from the decay of ^{55}Ni using a scintillation spectrometer. Measured half-life of the decay of ^{55}Ni from positron decay curve. No γ transitions from the decay of ^{55}Ni to ^{55}Co were observed using a Ge(Li) detector.
Production: 1994Bl10 (1994BlZW).
Mass measurements: 2011Tu09, 2010Ka26, 2005Gu36 (analysis).
Theoretical calculations: 33 primary references (32 for structure and one for ^{55}Ni decay) retrieved from the NSR database at www.nndc.bnl.gov/nsr/. These are listed in this dataset under ‘document’ records.
Additional information 1.

^{55}Ni Levels

Cross Reference (XREF) Flags

A	^{55}Cu ε decay (55.9 ms)	E	^{9}Be(^{56}Ni,^{55}Niγ)
B	^{56}Zn εp decay (32.9 ms)	F	^{28}Si(^{36}Ar,2αnγ)
C	^{1}H(^{55}Co,N)	G	^{58}Ni(^{3}He,^{6}He)
D	^{1}H(^{56}Ni,D)	H	Coulomb excitation

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0‡	7/2$^-$	203.7 ms *20*	ABCDEFGH	%ε+%β^+=100 μ=(−)0.976 *26* (2009Be22,2019StZV) T$_{1/2}$: weighted average by Rajeval technique (RT) of 203 ms *2* (2017Ku12, from (^{55}Ni implants)β correlated decay curve, with total implants of 2.70×10^6 using LISE3 at GANIL); 196 ms *5* (2002Lo13,2002Bl17, implants)β correlated decay curve at GANIL); 204 ms *3* (1999Re06,1997Wo06, β decay curve using LISOL facility at Louvain-la-Neuve); 212.1 ms *38* (1988HaZD,1988HaZB)); 208 ms *5* (1984Ay01, IGISOL at the University of Jyvaskyla cyclotron facility); 189 ms *5* (1977Ho25, β^+ decay curve, at Aarhus University); 219 ms *6* (1976EdZX). In this method, uncertainties for the following values were adjusted upwards: 5.6 ms in 1988HaZD, 9.4 ms in 1977Ho25, and 9.7 ms in 1976EdZX. Weighted average (and LWM weighted average) is 203.9 ms *26*, but reduced χ^2 is 3.9 as compared to critical χ^2 of 2.1 at 95% confidence level. Weighted average by NRM is 204.3 ms *24* with reduced χ^2=3.1. Unweighted average is 204.4 ms *38*. Others: 155 ms *10* (1994Ve09, at Louvain-la-Neuve, value is discrepant); <5 s (1973Di11). Additional information 2. J$^\pi$: log *ft*=3.625 *5* for decay of ^{55}Ni g.s. to 7/2$^-$ g.s. in ^{55}Co, deduced in the present evaluation; L(n)=3 in ^{1H}(^{56}Ni,d); measured magnetic moment is in agreement with shell-model calculations for configuration=$\nu f_{7/2^{-1}};mirror$ analogy to 7/2$^-$, g.s. of ^{55}Co. μ: β-NMR method, negative sign is from theoretical considerations for g.s. configuration=$\nu f_{7/2^{-1}}$(2009Be22).
2085.4 *4*	3/2$^-$		A DE G	J$^\pi$: L(n)=1 in ^{1H}(^{56}Ni,d); γ to 7/2$^-$.
2465.5 *4*	(3/2$^-$)		A E G	
2587 *1*	(5/2$^-$)		A E	
2802.0 *4*	(1/2$^-$)		A	

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Adopted Levels, Gammas (continued)

^{55}Ni Levels (continued)

E(level)†	J$^{\pi}$	XREF	Comments
2842 *8*		E G	E(level): 2839 *5* in ^{58}Ni(^{3}H,^{6}He).
2882.1‡ *20*	(11/2)$^{-}$	EFGH	J$^{\pi}$: level is Coulomb excited from 7/2^{-} g.s. B(E2)↑=0.0251 *69* for J$^{\pi}$(2879)=11/2^{-} from Coulomb excitation.
3182.7 *4*	(5/2^{-})	A	E(level): 3186 and 3183 seem to be different levels from two different J$^{\pi}$ values.
3186 *4*	1/2^{+}	DE G	E(level): 3186 and 3183 seem to be different levels from two different J$^{\pi}$ values. J$^{\pi}$: L(n)=0 in ^{1H}(^{56}Ni,d).
3214.1 *7*	(1/2^{-})	A E	
3502 *15*		G	
3583.1‡ *23*	(13/2^{-})	BC F	XREF: C(?)F(?).
3593.7 *6*	(5/2^{-})	A G	
3617.1‡ *23*	(15/2^{-})	F	
3759 *4*	(3/2)$^{+}$	DE G	XREF: D(?). J$^{\pi}$: L(n)=2 in ^{9}Be(^{56}Ni,^{55}Ni); σ(θ) in (^{3}He,^{6}He).
3784 *15*		G	
3808.3 *8*	(1/2^{-},3/2^{-})	A	
4026.8 *6*	(1/2,3/2^{-})	A	
4046 *9*		G	
4444 *10*		G	E(level): possible doublet.
4483.1?‡ *25*	(17/2^{-})	F	
4579.4 *5*	(3/2^{-})	A	J$^{\pi}$: interpreted by 2013Tr09 as split IAS of (3/2^{-}) g.s. of ^{55}Cu, the other at 4599 keV, and also interpreted as mirror state of 4721, 3/2^{-} state in ^{55}Co.
4599.3 *4*	(3/2^{-})	A	J$^{\pi}$: interpreted by 2013Tr09 as split IAS of (3/2^{-}) g.s. of ^{55}Cu, the other at 4579 keV, and also interpreted as mirror state of 4748, 3/2^{-} state in ^{55}Co.
4616 *11*		G	
4743 *12*		G	
4983 *11*		G	
5075.5 *9*	(1/2,3/2,5/2)	A	J$^{\pi}$: possible β^{+} feeding from (3/2^{-}) parent; γ to (3/2^{-}).
5178 *11*		G	
5389 *12*		G	
5876 *13*		G	
5937 *13*		G	
6600 *50*		G	
6870 *50*		G	

† From least-squares fit to Eγ data for levels populated in γ-ray studies, assuming 1 keV uncertainty when not given. For levels populated in reaction studies with no γ rays, values are from ^{58}Ni(^{3}H,^{6}He).
‡ Seq.(A): Yrast sequence.

γ(^{55}Ni)

E$_{i}$(level)	J$^{\pi}_{i}$	E$_{\gamma}$†	I$_{\gamma}$	E$_{f}$	J$^{\pi}_{f}$
2085.4	3/2^{-}	2085.6 *5*	100	0.0	7/2^{-}
2465.5	(3/2^{-})	379.6 *1*	0 3.7 *4*	2085.4	3/2^{-}
		2465.3 *5*	100.0 *12*	0.0	7/2^{-}
2587	(5/2^{-})	2586.9 *5*	100	0.0	7/2^{-}
2802.0	(1/2^{-})	336.7 *5*	97 *4*	2465.5	(3/2^{-})
		716.5 *5*	100 *4*	2085.4	3/2^{-}
2842		2842‡ *8*		0.0	7/2^{-}
2882.1	(11/2)$^{-}$	2882# *2*		0.0	7/2^{-}
3182.7	(5/2^{-})	716.5 *5*	62 *5*	2465.5	(3/2^{-})

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Adopted Levels, Gammas (continued)

$\gamma(^{55}Ni)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ	E_f	J^π_f
3182.7	(5/2⁻)	3182.5 *5*	100 *6*	0.0	7/2⁻
3186	1/2⁺	720‡ *4*		2465.5	(3/2⁻)
		1099‡ *4*		2085.4	3/2⁻
3214.1	(1/2⁻)	748.5 *10*	100 *9*	2465.5	(3/2⁻)
		1128.6 *10*	82 *14*	2085.4	3/2⁻
3583.1	(13/2⁻)	701# *1*		2882.1	(11/2)⁻
3593.7	(5/2⁻)	1128.6 *1*	0 47 *10*	2465.5	(3/2⁻)
		3593.5 *1*	0 100 *10*	0.0	7/2⁻
3617.1	(15/2⁻)	735# *1*		2882.1	(11/2)⁻
3759	(3/2)⁺	1293‡ *4*		2465.5	(3/2⁻)
3808.3	(1/2⁻,3/2⁻)	1342.6 *10*	100	2465.5	(3/2⁻)
4026.8	(1/2,3/2⁻)	1561.3 *5*	100	2465.5	(3/2⁻)
4483.1?	(17/2⁻)	866#@ *1*		3617.1	(15/2⁻)
4579.4	(3/2⁻)	771.0 *1*	0 29 *3*	3808.3	(1/2⁻,3/2⁻)
		985.7 *1*	0 32 *3*	3593.7	(5/2⁻)
		1396.3 *5*	57 *5*	3182.7	(5/2⁻)
		1777.8 *5*	100 *6*	2802.0	(1/2⁻)
		1992.5 *1*	0 57 *5*	2587	(5/2⁻)
4599.3	(3/2⁻)	1005.8 *1*	0 5.8 *4*	3593.7	(5/2⁻)
		1385.1 *1*	0 5.8 *7*	3214.1	(1/2⁻)
		1416.3 *5*	20.7 *10*	3182.7	(5/2⁻)
		1797.0 *5*	14.6 *10*	2802.0	(1/2⁻)
		2133.9 *5*	100.0 *17*	2465.5	(3/2⁻)
		2514.3 *5*	13.9 *8*	2085.4	3/2⁻
5075.5	(1/2,3/2,5/2)	1267@ *2*	19 *3*	3808.3	(1/2⁻,3/2⁻)
		2610 *1*	100 *10*	2465.5	(3/2⁻)
		2990@ *2*	29 *7*	2085.4	3/2⁻

† From ^{55}Cu ε decay, unless specified otherwise.
‡ From $^{9}Be(^{56}Ni,X\gamma)$.
# From $^{28}Si(^{36}Ar,2\alpha n\gamma)$.
@ Placement of transition in the level scheme is uncertain.

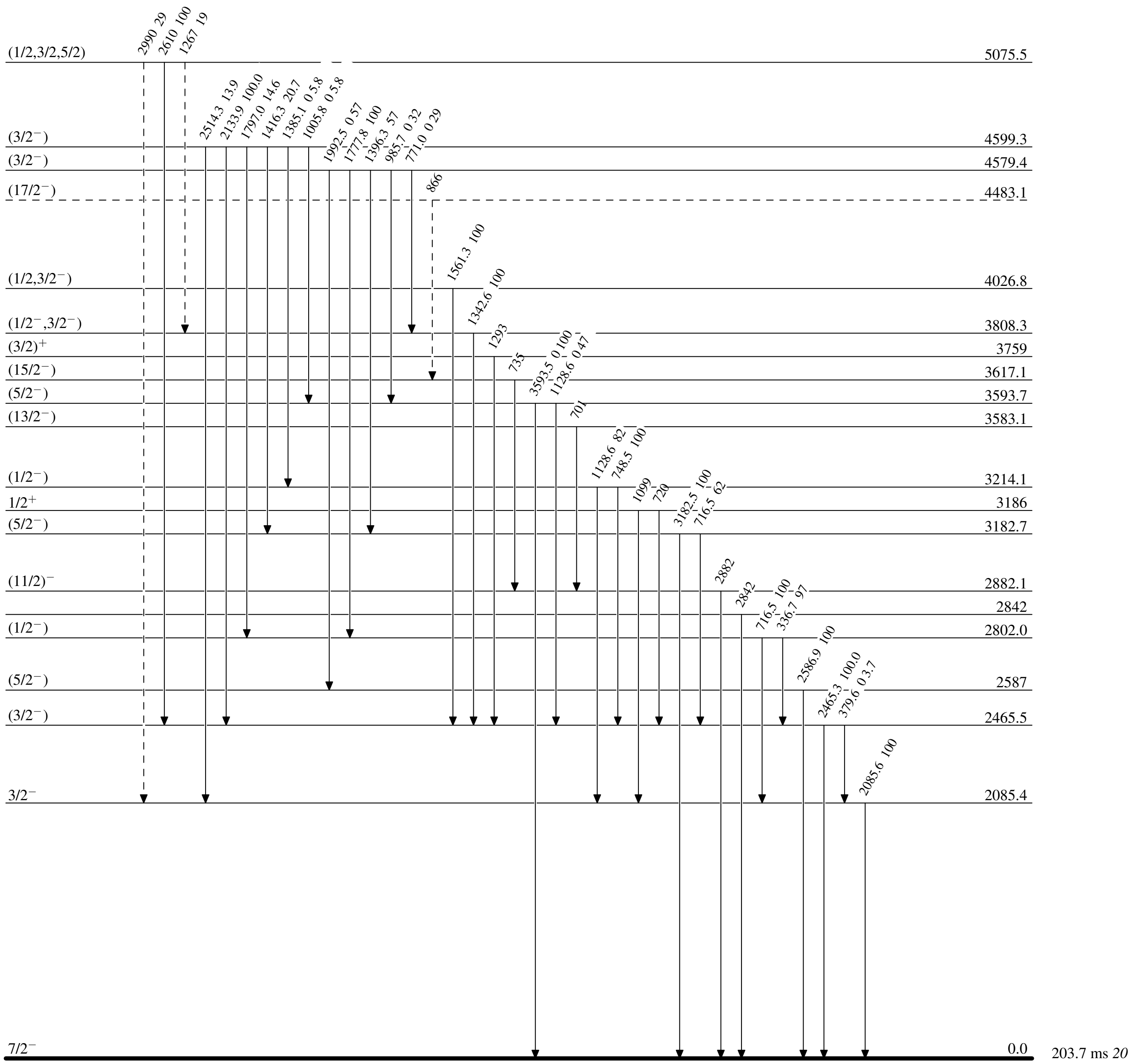
Adopted Levels, Gammas

Legend

Level Scheme

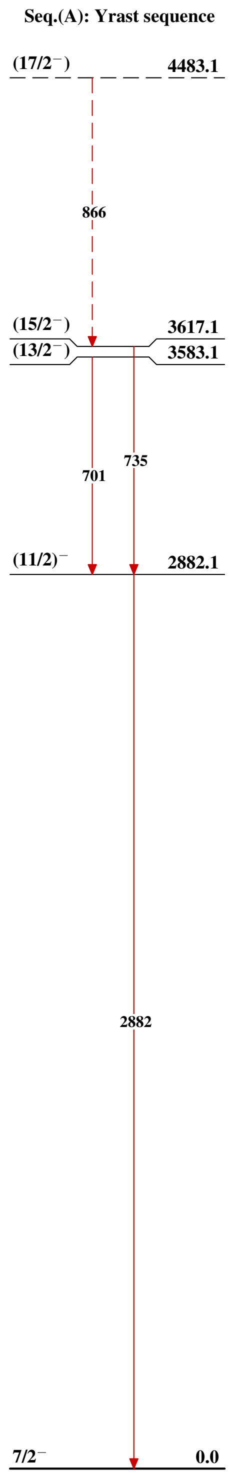
Intensities: Relative photon branching from each level

- - - - - ► γ Decay (Uncertain)



$^{55}_{28}Ni_{27}$

Adopted Levels, Gammas



$^{55}_{28}Ni_{27}$