^{58}Ni(^{14}N,2pnγ) 2009Ba30

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 115, 1 (2014)	31-Jul-2013

2009Ba30 (supersedes preprint 1997PoZT) reference in (HI,xnγ) dataset in 2000Bh05). E=37-52 MeV ^{14}N beam incident on enriched ^{58}Ni target at FN-tandem Van der Graff accelerator in Bucharest. Measured Eγ, Iγ, $\gamma\gamma$ coincidence, $\gamma(\theta)$. All measurements except for γ-linear polarization were performed in coincidence with neutrons to identify low intensity γ-rays and to eliminate other exit channels. Two HPGe detectors, FWHM=2 keV at 1.33 MeV for the γ's and a liquid scintillator NE213 for neutron detection were used.

1997PoZT: E=37=50 MeV; neutron $\gamma\gamma$ coincidence measurements with HPGe liquid scintillation detectors.

1984LeZS: magnetic moment of 1307 level.

1976IvZW: E=47.6 MeV; Eγ, $T_{1/2}$ by recoil-distance method.

1981Ki07: E=47.6 MeV; g-factor of 1307 level by $\gamma(\theta$,H,t).

E: From least-squares fit to Eγ's.

^{69}As Levels

E(level)	J$^{\pi}$[†]	$T_{1/2}$[‡]	Comments
0.0	5/2$^-$		
98.2	3/2$^-$		
864.5	7/2$^-$	5.5 ps *21*	
1307.6	9/2$^+$	1.3 ns *1*	
1409.9			
1678.9			
2003.8			
2163.0	13/2$^+$	4 ps *2*	
2213.7	11/2$^+$	<1.4 ps	
2310.9	9/2$^-$		J$^{\pi}$: 2009Ba30 suggests π=+.
2424.3			
2809.1	13/2$^+$		J$^{\pi}$: from 598.8 $\gamma(\theta)$, 643.6 $\gamma(\theta)$.
2930.4			
3044.4	13/2$^-$		J$^{\pi}$: Tentative spin assignment (13/2$^+$) by 2009Ba30 based on the suggested presence of a 9/2$^+$ rotational band at 2310.
3219.3			
3259.69	17/2$^+$	<4.2 ps	
3266	15/2$^+$	<1.4 ps	J$^{\pi}$: $\geq$ 9/2 from $\gamma(\theta)$. Unable to make π assignment due to large error from γ linear polarization (2009Ba30). (15/2) from systematics of neighboring nuclides.
3302.2			
3355.4			
3560.9			
3846.3	17/2$^-$		J$^{\pi}$: 2009Ba30 suggests π=+.
4206.4			
4466.3	21/2$^+$	6.6 ps *14*	$T_{1/2}$: From the data of 1976IvZW on 1205γ which is placed deexciting the 5198 level.
4655.5	21/2$^-$		J$^{\pi}$: (21/2$^+$) in ^{58}Ni(^{14}N,2pnγ) (2009Ba30).
4880.3			
5119.7			
5130.3			
5170.9			
5198.7	25/2$^+$	5.5 ps *14*	$T_{1/2}$: From the data of 1976IvZW on 733γ which is placed deexciting the 3991 level.
5482.4			
5679.9			
6375.2	29/2$^+$		

[†] From Adopted Levels.

[‡] From recoil distance method in 1976IvZW.

^{58}Ni(^{14}N,2pnγ) 2009Ba30 (continued)

$\gamma(^{69}As)$

A_2 and A_4 values are from $\gamma(\theta)$ data in 2009Ba30.

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[†]	α[@]	Comments
98.2 *3*	22.1 *7*	98.2	3/2$^-$	0.0	5/2$^-$	[M1+E2]	0.8 *3*	0.39 *15*	α(K)=0.34 *13*; α(L)=0.044 *17*; α(M)=0.007 *3* α(N)=0.00045 *17* A_2=−0.35 *7*, A_4=−0.01 *1*.
215.7 *5*	1.7 *3*	3259.69	17/2$^+$	3044.4	13/2$^-$				
224.8 *5*	2.8 *5*	4880.3		4655.5	21/2$^-$				
262.4 *5*	4.7 *7*	2424.3		2163.0	13/2$^+$				
307.0 *6*	2.0 *5*	2310.9	9/2$^-$	2003.8					
317.9 *6*	3.4 *6*	5198.7	25/2$^+$	4880.3					
372.9 *8*	1.3 *3*	1678.9		1307.6	9/2$^+$				
443.9 *2*	66.4 *2*	1307.6	9/2$^+$	864.5	7/2$^-$	[E1+M2]	0.04 *2*	1.04×10^{-3} *2*	α(K)=0.000930 *17*; α(L)=9.60×10^{-5} *18*; α(M)=1.46×10^{-5} *3* α(N)=1.109×10^{-6} *21* E_γ: Value of 433.9 given in authors' level scheme is a misprint. A_2=−0.167 *3*, A_4=+0.005 *4*. Linear γ polarization=+0.30 *10*.
509.0 *5*	5.3 *7*	5679.9		5170.9					
516.5 *5*	3.9 *9*	3560.9		3044.4	13/2$^-$				
545.4 *5*	5.4 *8*	1409.9		864.5	7/2$^-$				
598.8[‡] *4*	8.0 *6*	2809.1	13/2$^+$	2213.7	11/2$^+$	[M1+E2]	−0.06 *5*	1.04×10^{-3}	α(K)=0.000925 *14*; α(L)=9.59×10^{-5} *14*; α(M)=1.463×10^{-5} *22* α(N)=1.117×10^{-6} *17* A_2=−0.45 *6*, A_4=+0.05 *7*.
643.6 *5*	11.5 *8*	2809.1	13/2$^+$	2163.0	13/2$^+$	[M1+E2]	−0.64 *40*	0.00098 *8*	α(K)=0.00087 *7*; α(L)=9.1×10^{-5} *8*; α(M)=1.38×10^{-5} *12* α(N)=1.05×10^{-6} *9* A_2=+0.38 *7*, A_4=−0.09 *9*.
653.4 *5*	5.7 *6*	5119.7		4466.3	21/2$^+$				
664.0 *6*	4.2 *6*	5130.3		4466.3	21/2$^+$				A_2=+0.16 *7*, A_4=0.08 *9*.
696.2 *6*	4.9 *6*	2003.8		1307.6	9/2$^+$				
716.7 *5*	5.3 *7*	2930.4		2213.7	11/2$^+$				A_2=−0.01 *7*, A_4=+0.03 *4*.
732.9 *6*	11.6 *6*	5198.7	25/2$^+$	4466.3	21/2$^+$	E2		8.45×10^{-4}	α(K)=0.000753 *11*; α(L)=7.88×10^{-5} *12*; α(M)=1.201×10^{-5} *17* α(N)=9.09×10^{-7} *13* E_γ: Doublet: γ 733.5 and γ 732.9.$\gamma(\theta)$ shows a typical Q type transition and γ linear polarization indicates pure E2 character.
733.5 *6*	14.5 *4*	3044.4	13/2$^-$	2310.9	9/2$^-$				
766.3 *5*	6.4 *7*	864.5	7/2$^-$	98.2	3/2$^-$	[E2+M3]		0.00078 *4*	α(K)=0.00069 *3*; α(L)=7.3×10^{-5} *3*; α(M)=1.11×10^{-5} *5* α(N)=8.4×10^{-7} *4* A_2=+0.22 *6*, A_4=−0.01 *7*. E_γ: E=854.5 for initial level as given in Table 1 is a misprint.
800.8 *5*	12.1 *5*	3846.3	17/2$^-$	3044.4	13/2$^-$	[E2+M3]		0.00069 *3*	α(K)=0.000619 *24*; α(L)=6.5×10^{-5} *3*; α(M)=9.9×10^{-6} *4*

$^{69}_{33}As_{36}$-2

^{58}Ni(^{14}N,2pnγ) 2009Ba30 (continued)

γ(^{69}As) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[†]	α[@]	Comments
									α(N)=7.5×10^{-7} *3* A_2=+0.29 *7*, A_4=−0.02 *9*. Linear γ polarization=+0.27 *9*.
809.3 *5*	11.2 *5*	4655.5	21/2$^-$	3846.3	17/2$^-$	[E2+M3]	0.10 *6*	0.00068 *4*	α(K)=0.00060 *4*; α(L)=6.3×10^{-5} *4*; α(M)=9.6×10^{-6} *6* α(N)=7.3×10^{-7} *5* A_2=0.43 *7*, A_4=−0.01 *9*.
812.8 *6*	8.2 *7*	1678.9		864.5	7/2$^-$				
834.9 *5*	5.0 *6*	3259.69	17/2$^+$	2424.3					A_2=+0.05 *9*, A_4=+0.23 *10*.
855.4 *1*	77.8 *9*	2163.0	13/2$^+$	1307.6	9/2$^+$	[E2+M3]	0.02 *6*	5.66×10^{-4} *15*	α(K)=0.000505 *13*; α(L)=5.26×10^{-5} *14*; α(M)=8.01×10^{-6} *22* α(N)=6.08×10^{-7} *17* A_2=+0.275 *36*, A_4=−0.040 *44*. Linear γ polarization=−0.29 *11*.
864.5 *1*	100	864.5	7/2$^-$	0.0	5/2$^-$	[M1+E2]	−2.91 *25*	5.41×10^{-4}	α(K)=0.000483 *7*; α(L)=5.02×10^{-5} *8*; α(M)=7.65×10^{-6} *11* α(N)=5.81×10^{-7} *9* E_γ: 664.5 in level scheme of Fig.4 (2009Ba30) is a misprint. A_2=−0.325 *3*, A_4=+0.082 *37*. Linear γ polarization=+0.22 *5*.
906.1 *1*	31.6 *2*	2213.7	11/2$^+$	1307.6	9/2$^+$	[M1+E2]	−0.48 *7*	4.35×10^{-4} *7*	α(K)=0.000388 *6*; α(L)=4.00×10^{-5} *7*; α(M)=6.11×10^{-6} *10* α(N)=4.66×10^{-7} *8* A_2=−0.667 *30*, A_4=0.026 *31*. Linear γ polarization=+0.02 *2*.
964.5 *5*	<7	5170.9		4206.4					
1003.3 *5*	7.0 *8*	2310.9	9/2$^-$	1307.6	9/2$^+$	[E1+M2]	−0.9 *6*	0.00044 *23*	α(K)=0.00040 *21*; α(L)=4.1×10^{-5} *22*; α(M)=6.E−6 *4* α(N)=4.8×10^{-7} *25* A_2=−0.22 *7*, A_4=+0.05 *7*. Linear γ polarization=+0.21 *5*.
1016.1 *5*	6.2 *9*	5482.4		4466.3	21/2$^+$				A_2=+0.27 *8*, A_4=+0.11 *9*.
1037.7 *5*	10.0 *7*	3846.3	17/2$^-$	2809.1	13/2$^+$				
1056.2 *5*	9.8 *8*	3219.3		2163.0	13/2$^+$				
1088.5 *5*	8.2 *9*	3302.2		2213.7	11/2$^+$				
1097.4 *1*	44.9 *2*	3259.69	17/2$^+$	2163.0	13/2$^+$	[E2+M3]	0.06 *2*	3.15×10^{-4} *6*	α(K)=0.000281 *5*; α(L)=2.91×10^{-5} *5*; α(M)=4.43×10^{-6} *8* α(N)=3.37×10^{-7} *6* A_2=+0.251 *43*, A_4=−0.015 *37*. Linear γ polarization=0.25 *9*.
1103.0 *5*	13.0 *3*	3266	15/2$^+$	2163.0	13/2$^+$	[M1+E2]	0.06 *3*	2.82×10^{-4}	α(K)=0.000252 *4*; α(L)=2.58×10^{-5} *4*; α(M)=3.94×10^{-6} *6* α(N)=3.01×10^{-7} *5*; α(IPF)=6.00×10^{-7} *13* A_2=−0.19 *7*, A_4=0.01 *8*.
1115.6 *8*	2.7 *9*	2424.3		1307.6	9/2$^+$				
1141.7 *6*	9.3 *9*	3355.4		2213.7	11/2$^+$				
1177.1 *7*	7.4 *7*	6375.2	29/2$^+$	5198.7	25/2$^+$				A_2=+0.48 *8*, A_4=+0.12 *10*.
1206.4 *1*	28.0 *2*	4466.3	21/2$^+$	3259.69	17/2$^+$	[E2+M3]	0.04 *9*	2.63×10^{-4} *12*	α(K)=0.000226 *11*; α(L)=2.33×10^{-5} *11*; α(M)=3.55×10^{-6}

$^{69}_{33}As_{36}$-3

^{58}Ni(^{14}N,2pnγ) 2009Ba30 (continued)

$\gamma(^{69}As)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[†]	α[@]	Comments
									17 α(N)=2.71×10^{-7} *13*; α(IPF)=9.42×10^{-6} *20* A_2=+0.266 *37*, A_4=−0.022 *44*. Linear γ polarization=+0.27 *15*.
1306.8 *1*	48.8 *3*	1307.6	9/2$^+$	0.0	5/2$^-$	[M2+E3]	−0.05 *2*	4.23×10^{-4}	α(K)=0.000372 *6*; α(L)=3.85×10^{-5} *6*; α(M)=5.88×10^{-6} *9* α(N)=4.50×10^{-7} *7*; α(IPF)=5.99×10^{-6} *9* A_2=+0.253 *32*, A_4=+0.021 *6*. Linear γ polarization=−0.20 *7*.
1502.2 *5*	8.7 *8*	2809.1	13/2$^+$	1307.6	9/2$^+$				
2311.0 *10*	12.8 *10*	2310.9	9/2$^-$	0.0	5/2$^-$				

[†] From $\gamma(\theta)$ 2009Ba30; sign convention by Biedenharm-Rose.
[‡] Not used in the least-squares fit. This γ was excluded from the fitting procedure due to disagreement (by up to ≈ 3 keV) with corresponding level-energy difference.
[#] Multipolarity in square brackets is assumed from ΔJ^π in the present level scheme.
[@] Additional information 1.

$^{69}_{33}As_{36}$-4

^{58}Ni(^{14}N,2pnγ) 2009Ba30

Level Scheme

Intensities: Relative I_γ

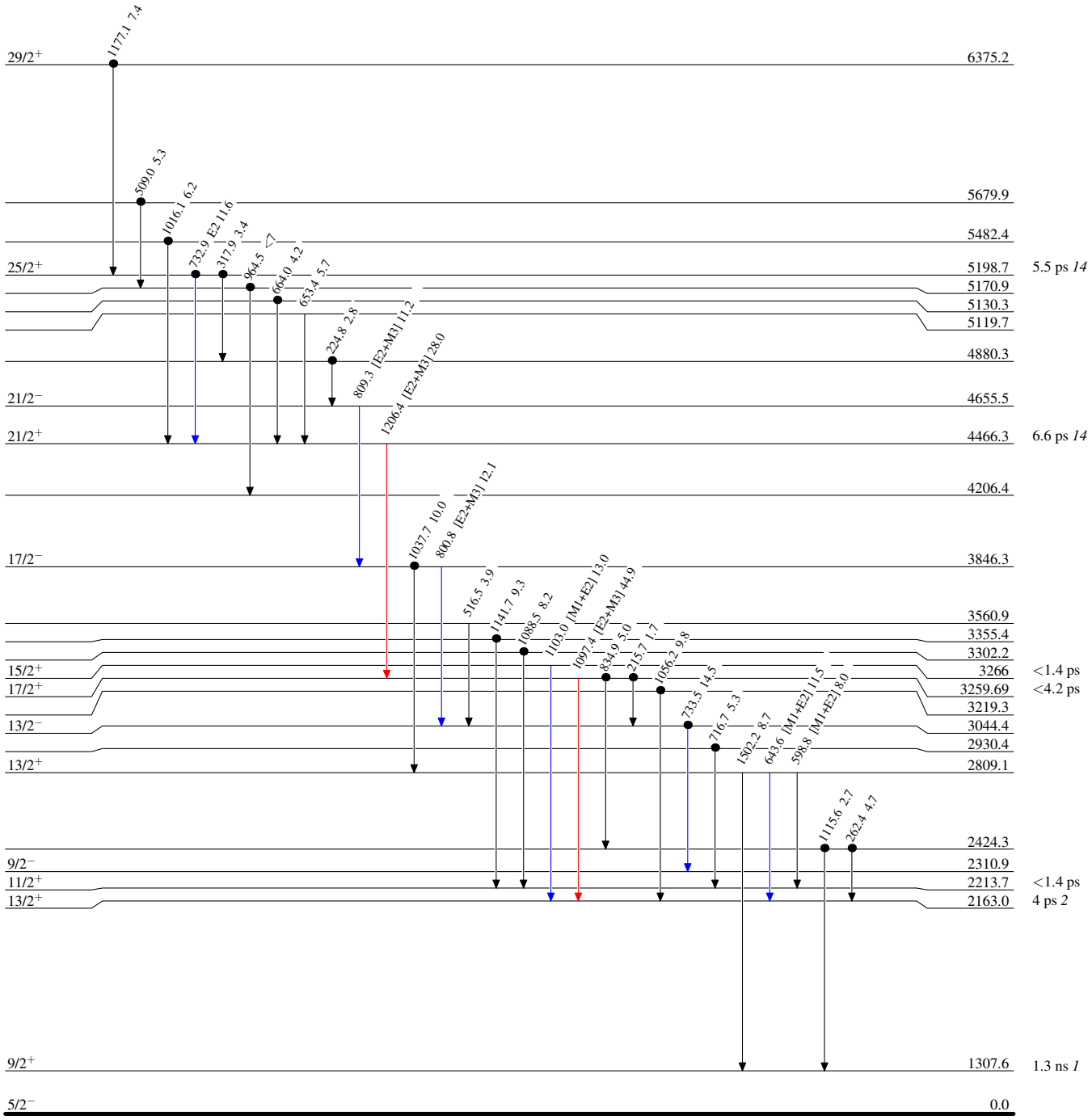
Legend

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

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

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

Coincidence



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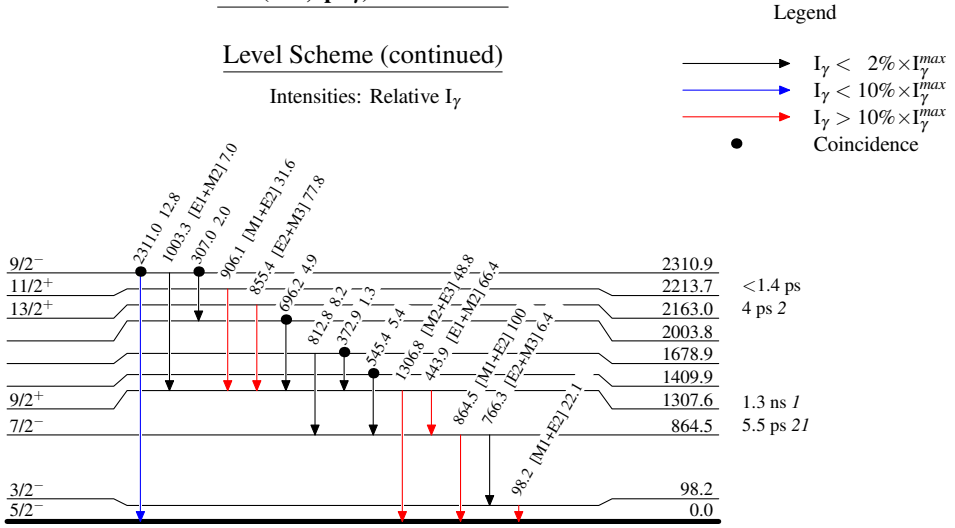
Level Scheme (continued)

Intensities: Relative I_γ



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