^{59}Co(p,nγ)   **1983Mi01**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 151, 1 (2018)	1-Apr-2018

Others: 1961Lo03 (scin), 1961Va46 (scin), 1967St19, 1968Bi03, 1970Te02, 1971Kr12, 1972Ab16, 1976BaXD, 1976Wh01.

1983Mi01: E(p)=4.2 MeV; measured $\gamma(\theta)$, DSA; deduced alignment from Hauser-Feshbach calculations; θ(lab)=0°−90° in 15° steps.

1976BaXD: E(p)=4.5,5.0 MeV.

1976Wh01: E(p)=4.4 MeV. Pulsed pγ(t), centroid shift.

1971Kr12: E(p)=6 MeV; measured Eγ, Iγ.

1970Te02: E(p)=2.4-3.3 MeV; measured neutron time of flight, $\sigma(\theta)$, $\gamma(\theta)$, Iγ; Hauser-Feshbach calculations.

1967St19: E(p)=4.3, 5.3 MeV; measured Eγ, Iγ.

^{59}Ni Levels

E(level)[†]	J$^\pi$	T$_{1/2}$[‡]	Comments
0.0			
340	3/2,5/2[a]	64 ps 7	T$_{1/2}$: from γ(t) (1976Wh01).
465		24 ps 13	T$_{1/2}$: from γ(t) (1976Wh01).
878.0[@] 3		0.49 ps 17	
1189.0[@] 3		0.26 ps 6	
1302.0 2		0.097 ps 24	
1339.5[@] 10	7/2[b]	0.83 ps 32	
1680.5 5		0.19 ps 5	
1734.5 2		0.090 ps 28	
1746.1 7		76 fs 44	
1768.0[@] 9	9/2	0.83 ps 32	J$^\pi$: from 429$\gamma(\theta)$ and 1428$\gamma(\theta)$ (1983Mi01).
1948.1 5		0.10 ps 3	
2412.1 21			
2533.0 21			
2629.0 14			
2681.6 14			
2706.1?[&] 12			
2713.1 21			
3038.0 21			
3126.8 12			
3297.1 15			
3308.1 20			
3320[#] 4			
3340.0 14			
3354.0 21			
3380.7[#] 19			
3528[#] 3			

[†] For E<2000, Asgiven by 1983Mi01; for E≥2000, from 1967St19.

[‡] From the DSA measurements of 1983Mi01, except as noted. Quoted ΔT$_{1/2}$ includes 20% uncertainty from stopping power theory, added in quadrature by the evaluator (see 1983Mi01).

[#] From 1971Kr12.

[@] Possible K=3/2$^-$ rotational band member (1983Mi01).

[&] From 1976BaXD only.

[a] J=3/2,5/2, J ≠ 7/2 from 340$\gamma(\theta)$ (1972Ab16).

[b] From integrated Iγ compared with Hauser-Feshbach calculation (1970Te02).

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γ(^{59}Ni)

The 1779γ observed by 1967St19, 1976BaXD and 1983Mi01 is ascribed by 1983Mi01 to the ^{27}Al(n,γ) reaction in the detector casing.

E_i(level)	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.	δ	Comments
340	3/2,5/2	340 *1*	100	0.0		D		δ: A$_2$=+0.03 *3*, A$_4$=+0.03 *4* (1968Bi03) as expected for 5/2 to 3/2 transition. A$_2$=−0.08 *4* from 1972Ab16.
465		465 *1*	100	0.0				
878.0		538 *1*	4.2 *4*	340	3/2,5/2			
		878.0 *10*	100 *10*	0.0				
1189.0		311 *1*	5.3 *5*	878.0				
		1189.0 *10*	100 *10*	0.0				
1302.0		424 *1*	24.3 *24*	878.0				
		837 *1*	18.6 *19*	465				
		1302.0 *10*	100 *10*	0.0				
1339.5	7/2	999.2 *10*	100$^@$ *5*	340	3/2,5/2			
		1339 *1*	40.3$^@$ *20*	0.0				
1680.5		1340 *1*	100$^\&$	340	3/2,5/2			
		1680.5 *10*	18$^\&$	0.0				
1734.5		546 *1*	32 *3*	1189.0				
		1270 *1*	28 *3*	465				
		1395 *1*	40 *4*	340	3/2,5/2			
		1734.5 *10*	100 *10*	0.0				
1746.1		1746.1 *10*	100	0.0				
1768.0	9/2	429 *1*	11.1 *11*	1339.5	7/2	D+Q	−1.28 *15*	δ: from 1983Mi01. A$_2$=−0.026 *4*, A$_4$=+0.009 *4* (1983Mi01). Placement from 1735 level in 1971Kr12.
		1428.2^b *10*	100 *10*	340	3/2,5/2	Q(+O)		A$_2$=+0.201 *13*, A$_4$=+0.007 *16* imply δ(Q,O)=+0.4 *5* (1983Mi01).
1948.1		610 *1*		1339.5	7/2			E$_\gamma$: from 1967St19 and 1976BaXD.
		759 *1*	35 *4*	1189.0				
		1608 *1*	83 *8*	340	3/2,5/2			
		1948.1 *10*	100 *10*	0.0				
2412.1		1534 *2*	100	878.0				
2533.0		2193 *2*	100	340	3/2,5/2			
2629.0		2289 *2*	100	340	3/2,5/2			
		2629 *2*	64	0.0				
2681.6		1803 *2*	100	878.0				
		2682 *2*	50	0.0				
2706.1?		1367^{ad}	100	1339.5	7/2			From 1971Kr12. Similar E$_\gamma$ attributed to Al(p,d) by 1967St19; therefore, placement is shown as tentative.
2713.1		1835 *2*	100	878.0				
3038.0		2698 *2*	100	340	3/2,5/2			
3126.8		2787 *2*	100	340	3/2,5/2			
		3128 *2*	16	0.0				
3297.1		2106 *2*	92	1189.0				
		2959 *2*	100	340	3/2,5/2			
3308.1		3308 *2*	100	0.0				
3320		2440$^\#$ *5*	32$^\#$ *16*	878.0				
		2982$^\#$ *5*	100$^\#$ *32*	340	3/2,5/2			
3340.0		1659 *2*		1680.5				
		2002$^\#$ *3*	$\#$	1339.5	7/2			E$_\gamma$: From 1971Kr12; absent in 1967St19.

Continued on next page (footnotes at end of table)

^{59}Co(p,nγ)   1983Mi01 (continued)

γ(^{59}Ni) (continued)

E$_i$(level)	E$_\gamma$†	I$_\gamma$‡	E$_f$	J$^\pi_f$	Comments
					A comparable 2001.93 keV *10* γ-ray is unplaced in 2004Ra23 (n,γ). γ ray not adopted by the evaluator.
3340.0	2151 *2*		1189.0		
3354.0	3014 *2*	100	340	3/2,5/2	
3380.7	1432^d *2*		1948.1		E$_\gamma$: from 1971Kr12; arises primarily from 1768-340 transition.
	3384 *5*		0.0		E$_\gamma$: from 1971Kr12.
3528	3188$^\#$ *5*	35$^\#$ *14*	340	3/2,5/2	
	3528$^\#$ *3*	100$^\#$	0.0		

† From 1967St19 if ΔE=2 keV; from 1983Mi01 otherwise (authors estimate ΔE<1 keV). Exceptions are noted.

‡ Relative photon branching such that Iγ=100 for strongest transition deexciting level. From 1983Mi01 if uncertainty stated; from 1967St19 otherwise (except as noted). For relative Iγ, see 1967St19, 1971Kr12, 1970Te02.

$^\#$ From 1971Kr12.

$^@$ From 1970Te02, whose E(p)=3275 is below threshold for excitation of 1680 level (which also de-excites via a 1340γ). Average of E(p)=4.3, 5.3 MeV data.

$^\&$ Deduced by evaluator from I(1340γ doublet), I(999γ) and I(1680γ) of 1967St19 assuming branching from 1340 level given in 1970Te02 (where 1340γ is a single transition).

^{a} From 1976BaXD only. Ascribed to ^{59}Co(p,p'γ) in 1967St19; consequently, placement is shown as tentative.

^{b} Evaluator assumes that Eγ=1432 *2* line placed by 1971Kr12 from 3381 level arises primarily, if not entirely, from the 1768 level to 340 level transition.

^{c} Assigned by several authors as 1948 level to 465 level transition; however, γ absent in other reactions which excite the 1948 level, and that placement, if correct, would imply mult=M3 which exceeds RUL. A 1482γ is known in ^{59}Co and probably arises here from the (p,p'γ) reaction.

^{d} Placement of transition in the level scheme is uncertain.
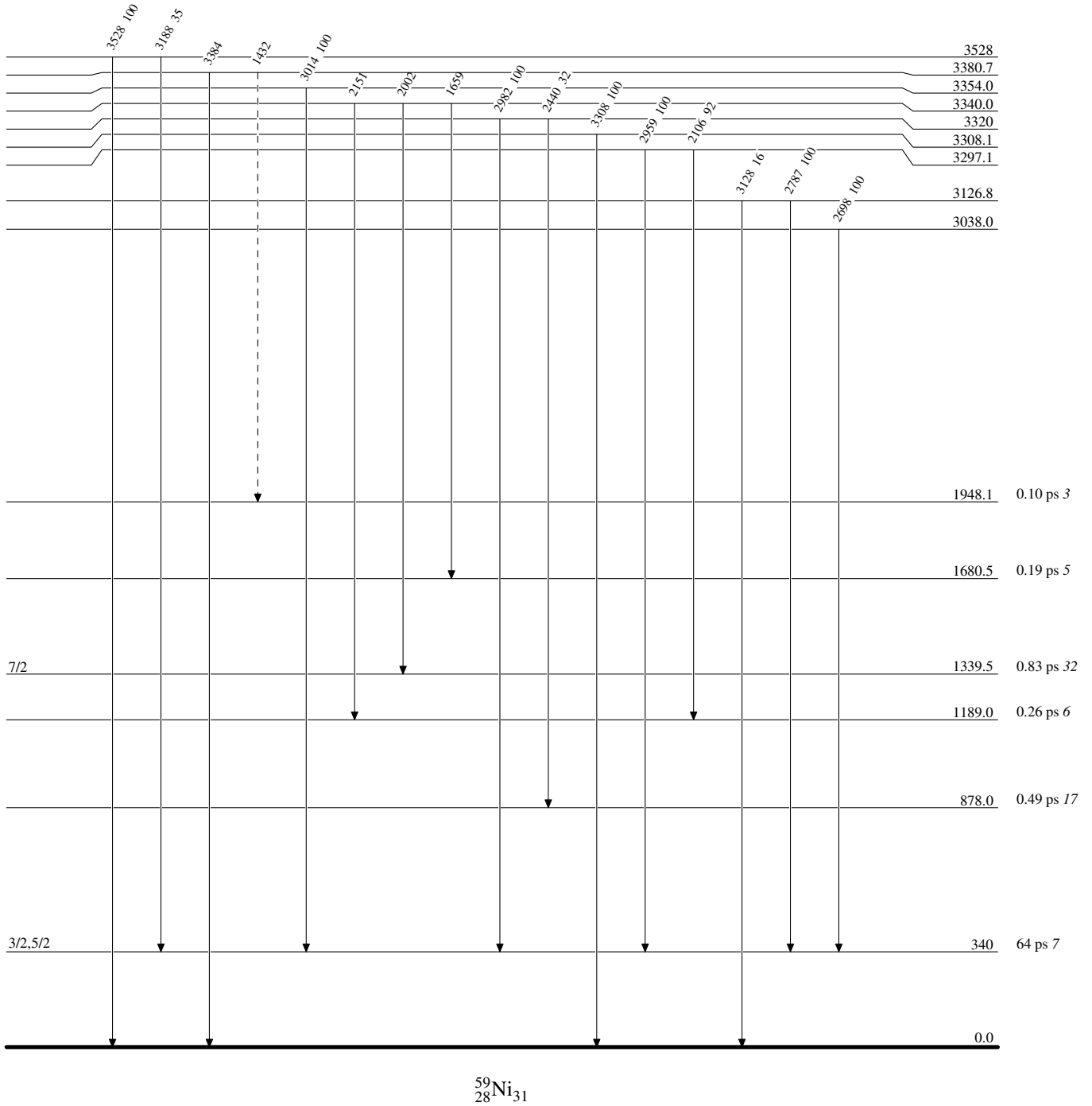
^{x} γ ray not placed in level scheme.

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Legend

<u>Level Scheme</u>

Intensities: Relative photon branching from each level
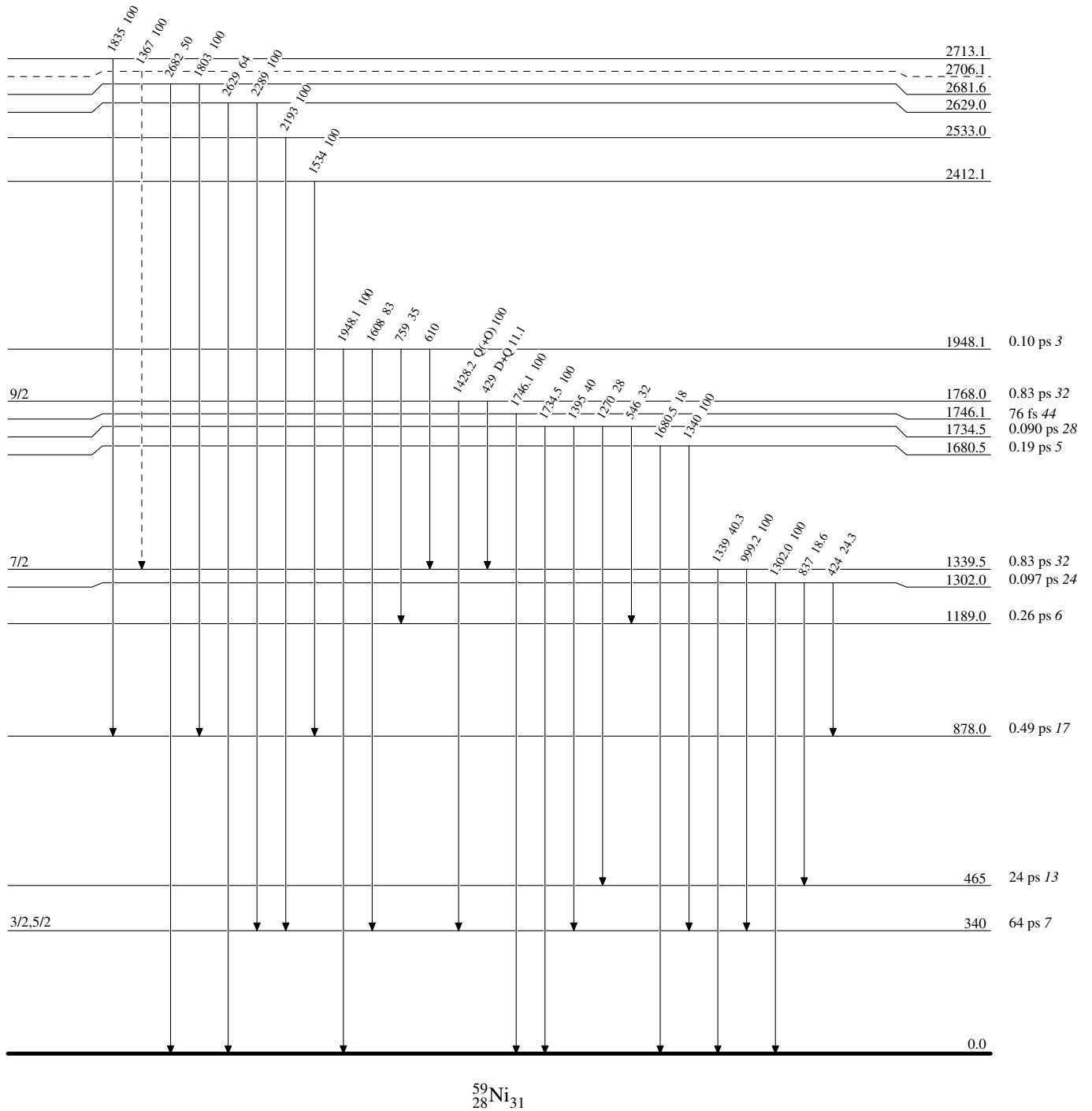
– – – – – ► γ Decay (Uncertain)

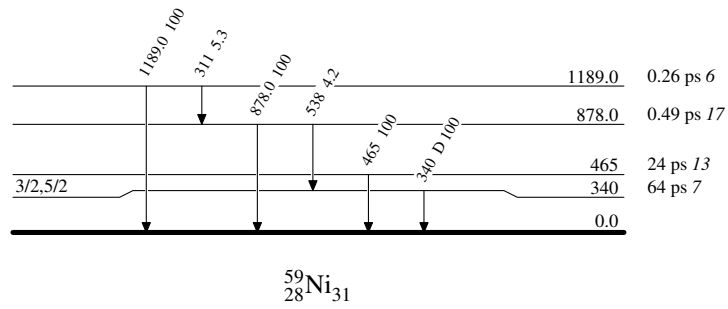## $^{59}\text{Co}(p,n\gamma)$ **1983Mi01**

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - ▶ γ Decay (Uncertain)

1835 100
1367 100
2682 50
1803 100
2629 64
2289 100
2193 100
1534 100

2713.1
2706.1
2681.6
2629.0
2533.0
2412.1

1948.1 100
1608 83
759 35
610
1428.2 Q(+Q) 100
429 D+Q 11.1
1746.1 100
1734.5 100
1395 40
1270 28
546 32
1680.5 18
1340 100

1948.1   0.10 ps *3*

9/2   1768.0   0.83 ps *32*
1746.1   76 fs *44*
1734.5   0.090 ps *28*
1680.5   0.19 ps *5*

1339 40.3
999.2 100
1302.0 100
837 18.6
424 24.3

7/2   1339.5   0.83 ps *32*
1302.0   0.097 ps *24*

1189.0   0.26 ps *6*

878.0   0.49 ps *17*

465   24 ps *13*

3/2,5/2   340   64 ps *7*

0.0

$^{59}_{28}\text{Ni}_{31}$

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Level Scheme (continued)

Intensities: Relative photon branching from each level

$${}^{59}_{28}\text{Ni}_{31}$$