^{58}Ni(^{3}He,$\alpha\gamma$), (pol P,dγ)   **1981Oh02,1969Go06**

	Type	Author	History Citation	Literature Cutoff Date
	Full Evaluation	M. R. Bhat	NDS 85, 415 (1998)	24-Sep-1998

All data from 1969Go06, except as noted. E(^{3}He)= 15 MeV. Measured $\alpha\gamma(\theta)$; $\theta(\alpha)$=0°; $\theta(\gamma)$=90°, 113°, 136°, 159°; magnetic spectrometer, NaI.

^{57}Ni Levels

E(level)[†]	J$^{\pi}$[‡]	Comments
0.0	3/2$^-$	
7.8×10^2 2	5/2$^-$	J$^{\pi}$: ≤5/2 from $\alpha\gamma(\theta)$. L(n)=3 from pickup rules out 1/2,3/2.
1.11×10^3 2	1/2$^-$	J$^{\pi}$: $\alpha\gamma(\theta)$ could not distinguish between 1/2$^-$,3/2$^-$ from L(n)=1 in pickup.
2.59×10^3 2	7/2$^-$	J$^{\pi}$: J=7/2 from $\alpha\gamma(\theta)$. L(n)=3 from pickup work.
		Clear evidence of the effect of the deuteron d-state on polarization of this state in d$\gamma(\theta)$ (1981Oh02; E= 30 MeV. Si, d; NaI, γ).
3.24×10^3 2	7/2$^-$	J$^{\pi}$: J=7/2 from $\alpha\gamma(\theta)$ of both branches. L(n)=3 from pickup.
3.37×10^3 2	7/2$^-$	
3.71×10^3 2	(5/2)$^-$	J$^{\pi}$: not 1/2 from anisotropy(1120γ,2590γ).
3.85×10^3 2	3/2$^-$	J$^{\pi}$: 3/2,5/2 from $\alpha\gamma(\theta)$(3850γ).
4.23×10^3 2	7/2$^-$	J$^{\pi}$: 3/2 to 7/2 since $\alpha\gamma(\theta)$(1640γ,3450γ) rules out 1/2, 9/2.
4.56×10^3 2	7/2$^-$	J$^{\pi}$: ≤7/2 from $\alpha\gamma(\theta)$.
5.22×10^3 2	7/2$^-$	J$^{\pi}$: (7/2) from $\alpha\gamma(\theta)$; assignment based partially on isobaric analog arguments. However, existence of branch to 780 level would violate the argument.
5.56×10^3 2	($^+$)	J$^{\pi}$: ≤1/2,3/2 from $\alpha\gamma(\theta)$(5560γ). J≠5/2 from $\alpha\gamma(\theta)$(4450γ). This level may correspond to either 5546 6 or 5561 6 levels, both with J$^{\pi}$=(+).
6.00×10^3 2	(3/2)$^+$	J$^{\pi}$: 3/2 from $\alpha\gamma(\theta)$(4890γ,6000γ). This level may correspond to either J$^{\pi}$(5980 8)=(3/2)$^+$ or J$^{\pi}$(6027 10)=3/2$^+$,5/2$^+$ in Adopted Levels.

† Measured separately by a surface-barrier detector at 45° to the beam.
‡ From Adopted Levels; supporting arguments from this data set are indicated.

$\gamma(^{57}$Ni)

Unplaced gammas observed in $\alpha\gamma$-spectrum for 6-MeV state, but could not be unambiguously placed.

E$_i$(level)	J$_i^{\pi}$	E$_\gamma$	I$_\gamma$[†]	E$_f$	J$_f^{\pi}$	Mult.[‡]	δ[‡]	Comments
7.8×10^2	5/2$^-$	780[#]	100	0.0	3/2$^-$	M1+E2	+0.23 2	
1.11×10^3	1/2$^-$	1110	100	0.0	3/2$^-$			
2.59×10^3	7/2$^-$	2590[#]	100	0.0	3/2$^-$	E2(+M3)	+0.02 3	
3.24×10^3	7/2$^-$	2460	60	7.8×10^2	5/2$^-$	M1+E2	+0.58 8	Mult.,δ: after subtraction of 3240γ and 780γ spectra.
		3240	40	0.0	3/2$^-$	E2(+M3)	−0.02 5	
3.37×10^3	7/2$^-$	780[#@]		2.59×10^3	7/2$^-$			
		2590[#@]		7.8×10^2	5/2$^-$			
3.71×10^3	(5/2)$^-$	1120	25	2.59×10^3	7/2$^-$			
		2590[#]	≤70	1.11×10^3	1/2$^-$			
		2930	≤70	7.8×10^2	5/2$^-$			
		3710	≤5	0.0	3/2$^-$			
3.85×10^3	3/2$^-$	1260	20	2.59×10^3	7/2$^-$			

Continued on next page (footnotes at end of table)

$^{58}\text{Ni}(^3\text{He},\alpha\gamma)$, (pol P,d$\gamma$)   **1981Oh02,1969Go06 (continued)**

$\underline{\gamma(^{57}\text{Ni}) \text{ (continued)}}$

E_i(level)	J^π_i	E_γ	I_γ[†]	E_f	J^π_f	Mult.[‡]	Comments
3.85×10^3	$3/2^-$	2740	10	1.11×10^3	$1/2^-$		
		3850	70	0.0	$3/2^-$	D+Q	δ: -0.58 *8* or -3.6 *9* if J=3/2. $+0.01$ *3* if J=5/2.
4.23×10^3	$7/2^-$	1640	35	2.59×10^3	$7/2^-$		
		3450	65	7.8×10^2	$5/2^-$		
		4230[@]	≤2	0.0	$3/2^-$		
4.56×10^3	$7/2^-$	3780	35	7.8×10^2	$5/2^-$		
		4560	65	0.0	$3/2^-$		
5.22×10^3	$7/2^-$	(1510)	15	3.71×10^3	$(5/2)^-$		Expected from existence of 1120γ and 1510γ in coincidence spectra.
		(1980)	25	3.24×10^3	$7/2^-$		Expected from existence of 3240γ in coincidence spectra.
		2630	50	2.59×10^3	$7/2^-$	D+Q	Mult.,δ: 2630γ and 2590γ not resolved in coincidence spectrum and, therefore, were analyzed together. δ=+0.95 *+26−20* or −0.02 *6* if J=7/2.
		4440	10	7.8×10^2	$5/2^-$		
5.56×10^3	$(^+)$	1710	15	3.85×10^3	$3/2^-$		
		4450	50	1.11×10^3	$1/2^-$	D+Q	Additional information 1. δ: + 0.27 *6* or - 3.7 *8*.
		5560	35	0.0	$3/2^-$	D+Q	δ: - 0.23 *3* or large (negative).
6.00×10^3	$(3/2)^+$	4890	≈50	1.11×10^3	$1/2^-$	D+Q	Additional information 2. δ: + 0.03 *9* or - 1.8 *4*.
		6000	≈50	0.0	$3/2^-$	D+Q	δ: + 0.02 *5* or + 3.6 *8*.

[†] Estimated photon branching ratio (in percent) from each level.
[‡] From $\alpha\gamma(\theta)$ and L-transfer from previous pickup measurements.
[#] Multiply placed.
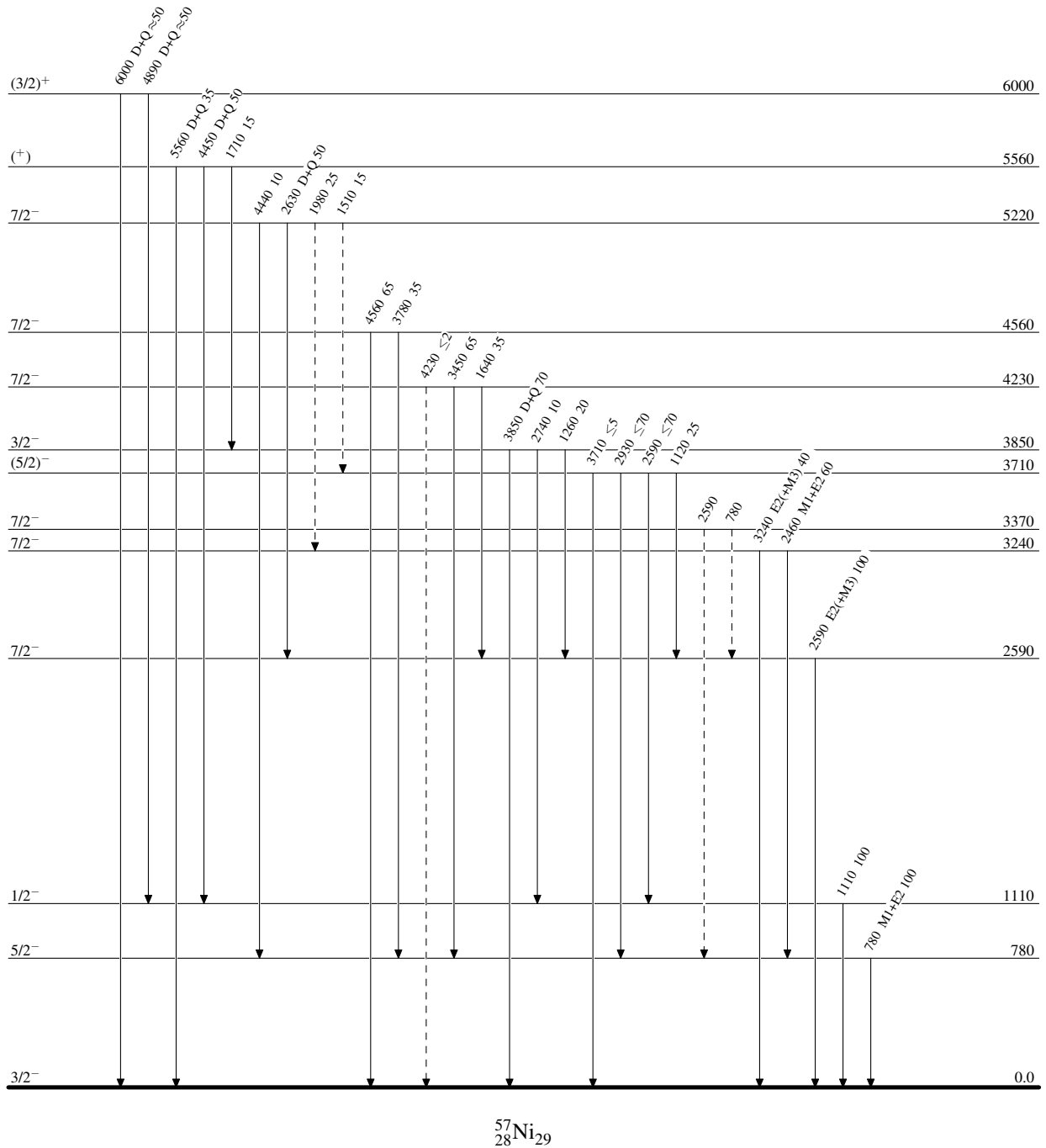[@] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{58}Ni(^{3}He,$\alpha\gamma$), (pol P,dγ)   1981Oh02,1969Go06   Legend

Level Scheme

Intensities: % photon branching from each level

- - - - - ▶ γ Decay (Uncertain)

$^{57}_{28}$Ni$_{29}$