^{58}Ni(^{16}O,3pγ) 1999Fo02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 188,1 (2023)	17-Jan-2023

1999Fo02: E(^{16}O)=59.5 MeV. Measured Eγ, Iγ, γγ- and (recoil)γ-coin and γγ(θ)(DCO) using Gammasphere array coupled to the Fragment Mass Analyzer at ATLAS-ANL facility. Only the negative-parity states are reported in this study. The authors stated that positive-parity states were confirmed with those from the study of 1994Zi01.

^{71}As Levels

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
0.0	5/2−	1798.39 *23*	9/2−	3263.0[a] *5*	15/2−	4774.7[b] *6*	21/2−
147.7 *3*	3/2−	2062.2[b] *4*	9/2−	3290.8[@] *3*	17/2−	5074.2[&] *5*	(23/2−)
924.62 *16*	7/2−	2111.02[&] *23*	11/2−	3738.8[b] *5*	17/2−	5359.0[a] *7*	(23/2−)
1245.6[#] *3*	5/2−	2417.0[a] *5*	11/2−	3917.2[&] *3*	19/2−	5371.8[@] *4*	25/2−
1394.87 *17*	9/2−	2470.24[@] *21*	13/2−	4233.0[a] *5*	19/2−	6673.2[@] *5*	29/2−
1729.1[a] *4*	7/2−	2820.5[b] *5*	13/2−	4234.2[@] *4*	21/2−	8115.2[@] *6*	33/2−
1759.5 *4*	7/2−	2921.23[&] *24*	15/2−	4372.4 *4*	21/2−	9685.2[@] *7*	(37/2−)

[†] From a least-squares fit to Eγ data.
[‡] As proposed by 1999Fo02 based on earlier assignments for low-lying levels and DCO ratios and band associations for higher levels.
[#] Note that the most intense 1095γ ray from a closely spaced level at 1242.6 level is not reported or discussed by 1999Fo02.
[@] Band(A): 13/2− band,α=+1/2.
[&] Band(a): 11/2− band,α=−1/2.
[a] Band(B): Possible π7/2[703] band,α=−1/2. This configuration originates from the $f_{7/2}$ orbital.
[b] Band(b): Possible π7/2[703] band,α=+1/2.

γ(^{71}As)

DCO ratios correspond to ΔJ=2, quadrupole gated spectra, unless otherwise stated. Expected DCO=1.0 for ΔJ=2, quadrupole and 0.5 for ΔJ=1, dipole. When gate is on ΔJ=1, dipole transition, expected DCO=1.0 for ΔJ=1, dipole and 2.0 for ΔJ=2, quadrupole.

Eγ[†]	Iγ	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[‡]	Comments
147.7 *4*	2.8 *4*	147.7	3/2−	0.0	5/2−	D	DCO(D)=0.83 *7*
302.7 *4*	4.9 *10*	2062.2	9/2−	1759.5	7/2−	D	DCO(D)=1.06 *11*
312.7 *10*	1.2 *4*	2111.02	11/2−	1798.39	9/2−	D	DCO(Q)=0.52 *8*
333.2 *3*	7.9 *15*	2062.2	9/2−	1729.1	7/2−	D	DCO(D)=1.02 *6*
354.8 *2*	14.1 *20*	2417.0	11/2−	2062.2	9/2−	D	DCO(D)=1.18 *9*
369.6 *4*	3.0 *6*	3290.8	17/2−	2921.23	15/2−	D	DCO(Q)=0.40 *12*
403.5 *2*	14.5 *25*	2820.5	13/2−	2417.0	11/2−	D	DCO(D)=1.09 *6*
442.6 *2*	15.4 *25*	3263.0	15/2−	2820.5	13/2−	D	DCO(D)=0.90 *6*
451.0 *2*	10.9 *20*	2921.23	15/2−	2470.24	13/2−	D	DCO(Q)=0.59 *9*
455.2 *2*	13 *3*	4372.4	21/2−	3917.2	19/2−	D	DCO(Q)=0.43 *6*
470.2 *4*	3.0 *5*	1394.87	9/2−	924.62	7/2−		
475.9 *2*	10.2 *15*	3738.8	17/2−	3263.0	15/2−	D	DCO(D)=0.93 *9*
483.6 *10*	1.5 *3*	1729.1	7/2−	1245.6	5/2−	D	DCO(D)=0.70 *10*
494.2 *3*	8.1 *10*	4233.0	19/2−	3738.8	17/2−	D	DCO(D)=0.94 *9*
514.0 *4*	2.6 *7*	1759.5	7/2−	1245.6	5/2−		
541.6 *4*	3.1 *6*	4774.7	21/2−	4233.0	19/2−	D	DCO(D)=1.03 *24*
552.6 *4*	3.5 *8*	1798.39	9/2−	1245.6	5/2−	(Q)	DCO(Q)=0.75 *7*
584.6 *10*	0.6 *2*	5359.0	(23/2−)	4774.7	21/2−		
626.4 *3*	8.6 *10*	3917.2	19/2−	3290.8	17/2−	D	DCO(Q)=0.48 *4*

Continued on next page (footnotes at end of table)

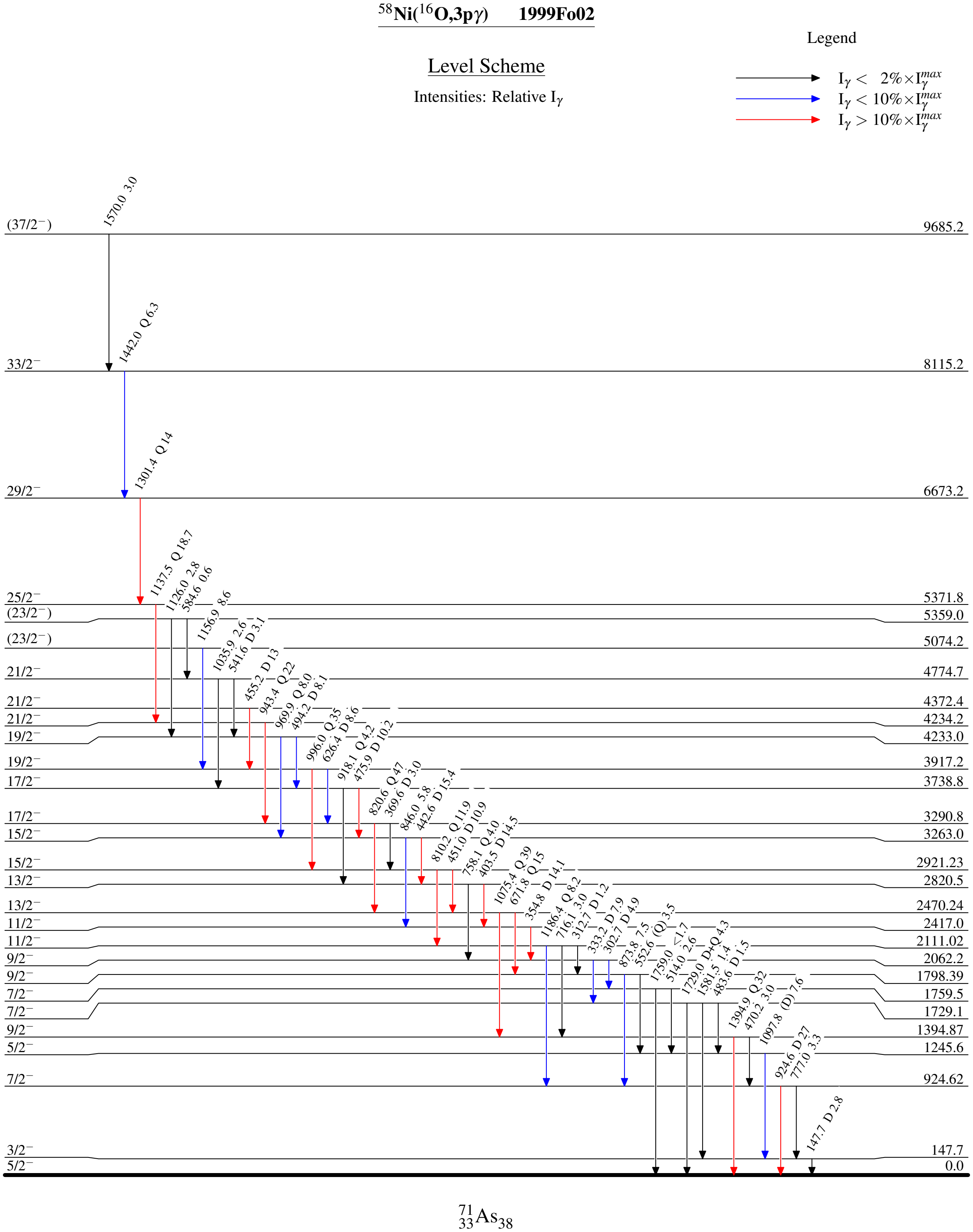
^{58}Ni(^{16}O,3pγ) 1999Fo02 (continued)

γ(^{71}As) (continued)

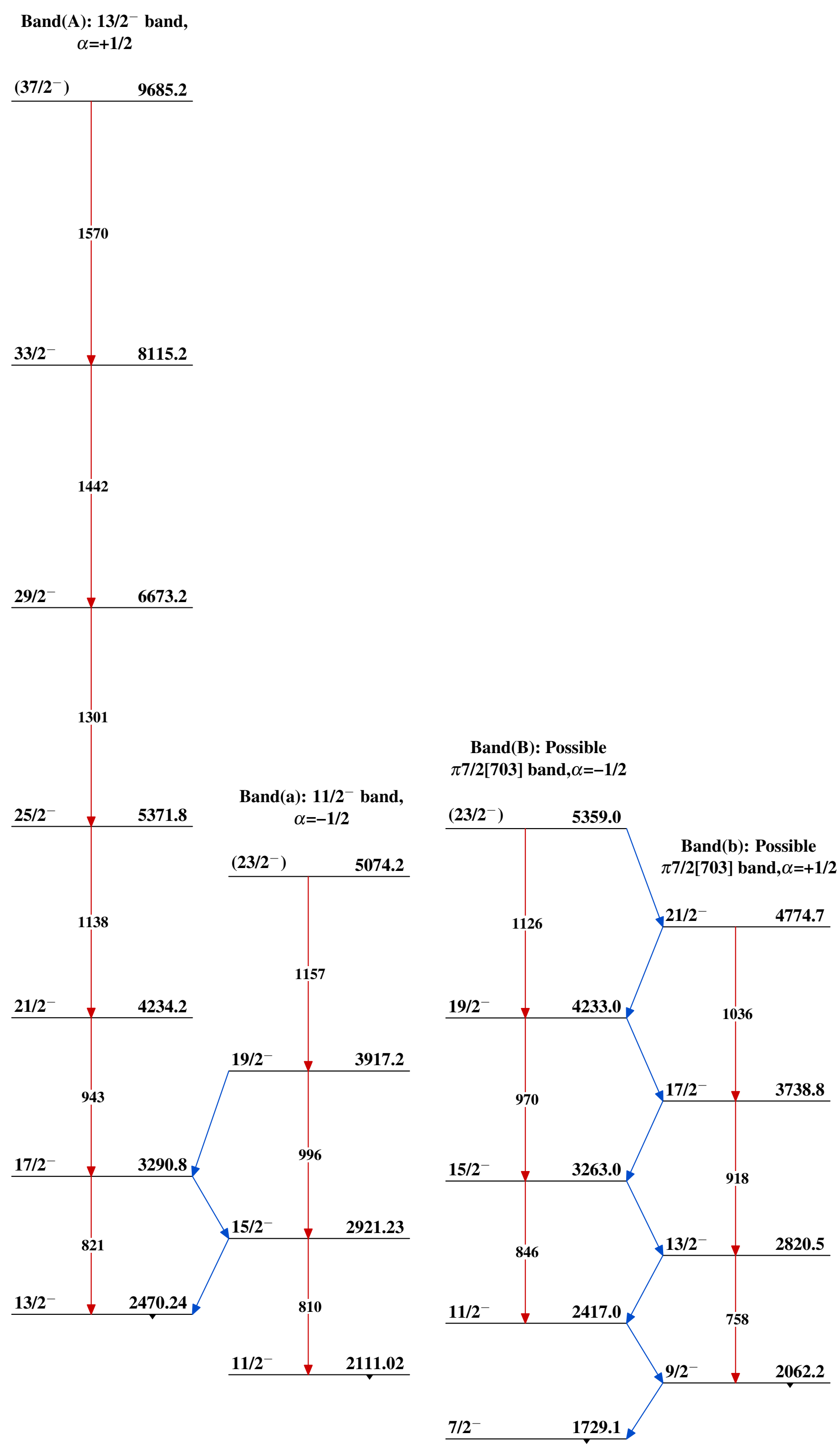
E_γ†	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
671.8 *2*	15 *3*	2470.24	13/2⁻	1798.39	9/2⁻	Q	DCO(Q)=0.99 *7*
716.1 *4*	3.0 *10*	2111.02	11/2⁻	1394.87	9/2⁻		
758.1 *4*	4.0 *8*	2820.5	13/2⁻	2062.2	9/2⁻	Q	DCO(D)=1.6 *3*
777.0 *4*	3.3 *9*	924.62	7/2⁻	147.7	3/2⁻		
810.2 *2*	11.9 *25*	2921.23	15/2⁻	2111.02	11/2⁻	Q	DCO(Q)=0.89 *10*
820.6 *2*	47 *6*	3290.8	17/2⁻	2470.24	13/2⁻	Q	DCO(Q)=1.02 *8*
846.0 *3*	5.8 *10*	3263.0	15/2⁻	2417.0	11/2⁻		
873.8 *3*	7.5 *10*	1798.39	9/2⁻	924.62	7/2⁻		
918.1 *4*	4.2 *5*	3738.8	17/2⁻	2820.5	13/2⁻	Q	DCO(D)=2.6 *5*
924.6 *2*	27 *5*	924.62	7/2⁻	0.0	5/2⁻	D	DCO(Q)=0.48 *5*
943.4 *2*	22 *4*	4234.2	21/2⁻	3290.8	17/2⁻	Q	DCO(Q)=1.10 *7*
969.9 *3*	8.0 *10*	4233.0	19/2⁻	3263.0	15/2⁻	Q	DCO(D)=1.8 *3*
996.0 *2*	35 *7*	3917.2	19/2⁻	2921.23	15/2⁻	Q	DCO(Q)=0.85 *10*
1035.9 *4*	2.6 *5*	4774.7	21/2⁻	3738.8	17/2⁻		
1075.4 *2*	39 *5*	2470.24	13/2⁻	1394.87	9/2⁻	Q	DCO(Q)=1.03 *6*
1097.8 *3*	7.6 *20*	1245.6	5/2⁻	147.7	3/2⁻	(D)	DCO(D)=1.45 *16*
1126.0 *4*	2.8 *6*	5359.0	(23/2⁻)	4233.0	19/2⁻		
1137.5 *2*	18.7 *20*	5371.8	25/2⁻	4234.2	21/2⁻	Q	DCO(Q)=1.01 *7*
1156.9 *3*	8.6 *15*	5074.2	(23/2⁻)	3917.2	19/2⁻		
1186.4 *3*	8.2 *20*	2111.02	11/2⁻	924.62	7/2⁻	Q	DCO(Q)=0.90 *13*
1301.4 *2*	14 *3*	6673.2	29/2⁻	5371.8	25/2⁻	Q	DCO(Q)=1.03 *13*
1394.9 *2*	32 *4*	1394.87	9/2⁻	0.0	5/2⁻	Q	DCO(Q)=1.03 *7*
1442.0 *3*	6.3 *15*	8115.2	33/2⁻	6673.2	29/2⁻	Q	DCO(Q)=1.37 *18*
1570.0 *4*	3.0 *7*	9685.2	(37/2⁻)	8115.2	33/2⁻		
1581.5 *10*	1.4 *4*	1729.1	7/2⁻	147.7	3/2⁻		
1729.0 *4*	4.3 *15*	1729.1	7/2⁻	0.0	5/2⁻	D+Q	DCO(D)=2.1 *4*
1759.0 *10*	<1.7	1759.5	7/2⁻	0.0	5/2⁻		

† Uncertainties assigned by the evaluators are: 0.2 keV for Iγ>10, 0.3 keV for Iγ=5 to 10, 0.4 keV for Iγ=2 to 5 and 1.0 keV for Iγ≤2, based on a general statement by 1999Fo02 that the uncertainties are 0.2 to 0.4 keV for strong transitions and 0.8 to 1.0 keV for the weakest transitions.

‡ Assigned by the evaluators based on DCO values. The mult=Q indicates ΔJ=2, quadrupole (most likely E2) and mult=D or D+Q indicates ΔJ=1 transition. The ΔJ=0 transitions are not ruled out by the DCO ratios but from band structures and population of states in heavy-ion reactions, such transitions are less common and none are evident in this study.


^{58}Ni(^{16}O,3pγ) 1999Fo02
Level Scheme
Intensities: Relative I_γ
Legend
$I_\gamma <$ 2%×I_γ^{max}
$I_\gamma <$ 10%×I_γ^{max}
$I_\gamma >$ 10%×I_γ^{max}
(37/2⁻) 9685.2
33/2⁻ 8115.2
29/2⁻ 6673.2
25/2⁻ 5371.8
(23/2⁻) 5359.0
(23/2⁻) 5074.2
21/2⁻ 4774.7
21/2⁻ 4372.4
21/2⁻ 4234.2
19/2⁻ 4233.0
19/2⁻ 3917.2
17/2⁻ 3738.8
17/2⁻ 3290.8
15/2⁻ 3263.0
15/2⁻ 2921.23
13/2⁻ 2820.5
13/2⁻ 2470.24
11/2⁻ 2417.0
11/2⁻ 2111.02
9/2⁻ 2062.2
9/2⁻ 1798.39
7/2⁻ 1759.5
7/2⁻ 1729.1
9/2⁻ 1394.87
5/2⁻ 1245.6
7/2⁻ 924.62
3/2⁻ 147.7
5/2⁻ 0.0
1570.0 3.0
1442.0 Q 6.3
1301.4 Q 14
1137.5 Q 18.7
1126.0 2.8
584.6 0.6
1156.9 8.6
1035.9 2.6
541.6 D 3.1
455.2 D 13
943.4 Q 22
969.9 Q 8.0
494.2 D 8.1
996.0 Q 35
626.4 D 8.6
918.1 Q 4.2
475.9 D 10.2
820.6 Q 47
369.6 D 3.0
846.0 5.8
442.6 D 15.4
810.2 Q 11.9
451.0 D 10.9
758.1 Q 4.0
403.5 D 14.5
1075.4 Q 39
671.8 Q 15
354.8 D 14.1
1186.4 Q 8.2
716.1 3.0
312.7 D 1.2
333.2 D 7.9
302.7 D 4.9
873.8 7.5
552.6 (Q) 3.5
1759.0 ≤1.7
514.0 2.6
1729.0 D+Q 4.3
1581.5 1.4
483.6 D 1.5
1394.9 Q 32
470.2 3.0
1097.8 (D) 7.6
924.6 D 27
777.0 3.3
147.7 D 2.8
$^{71}_{33}As_{38}$

$^{58}Ni(^{16}O,3p\gamma)$ 1999Fo02



$^{71}_{33}As_{38}$