$^{58}Ni(^{14}N,pn\gamma)$, $^{60}Ni(^{12}C,2n\gamma)$ 1981Ah03,1980Wa19

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal, E. A. Mccutchan	NDS 136, 1 (2016)	1-Jul-2016

1981Ah03: $^{58}Ni(^{14}N,pn\gamma)$ with $E(^{14}N)$=38 MeV. The beam provided by ORNL EN Tandem. 58 mg/cm^2 thick ^{58}Ni target. γ-rays were measured using two Ge(Li) and one Na(I) detectors. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma(\theta)$, $\gamma\gamma(\theta)$. Deduced DCO and mixing ratio.

1980Wa19: $^{60}Ni(^{12}C,2n\gamma)$ with $E(^{12}C)$=34 MeV. More than 99% enriched 3-5 mg/cm^2 thick ^{60}Ni target. Measured Eγ, $\gamma\gamma$ coin, $\gamma(\theta)$, and γn coincidences, linear polarization. Deduced multipolarity and mixing ratio.

1975GuYV: E=36 MeV, $^{58}Ni(^{14}N,pn\gamma)$, $T_{1/2}$ by plunger technique.

1974No08: $^{58}Ni(^{14}N,pn\gamma)$ with $E(^{14}N)$=36 MeV. 99.89% enriched 2.55 mg/cm^2 thick ^{58}Ni target. Measured Eγ, $\gamma\gamma$ coincidences.

^{70}Se Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0[@]	0$^+$		
945.4[@] *2*	2$^+$	1.1 ps *3*	J$^\pi$: 2$^+$ from 945.4γ E2 to 0$^+$.
1601.4[&] *2*	2$^+$		J$^\pi$: 2$^{(+)}$ from 1601.4γ Q to 0$^+$; 656.0γ D+Q to 2$^+$.
2011.2 *4*	(0$^+$)		J$^\pi$: from 1065.8γ Q to 2$^+$. $\gamma(\theta)$ in both 1980Wa19 and 1981Ah03 is isotropic.
2039.6[@] *4*	4$^+$	2.3 ps *6*	J$^\pi$: from 1094γ E2 to 2$^+$.
2384.4[&] *3*	4$^+$		J$^\pi$: from 782.9γ Q to 2$^{(+)}$;1439γ Q to 2$^+$.
2519.2 *4*	3$^-$		J$^\pi$: from 1573γ D to 2$^+$.
3004.1[@] *5*	6$^+$		J$^\pi$: from 964.6γ E2 to 4$^+$.
3140.4 *4*			E(level): based on deexciting 2195γ (1981Ah03). Transition not seen by 1980Wa19.
3388.7 *5*	5$^-$		J$^\pi$: from 1349.0γ D(+Q) to 4$^+$.
3525.2 *4*	(5$^-$)		J$^\pi$: as proposed in 1980Wa19. Other: (4) in 1980Wa19.
3789.8 *5*	(6$^-$)		J$^\pi$: from 1980Wa19. Other: (5) in 1981Ah03.
3916.1 *5*	7$^-$		J$^\pi$: from 912.1γ E1 to 6$^+$.
4038.9[@] *6*	8$^+$		J$^\pi$: from 1034.8γ Q to 6$^+$.

† From a least-squares fit to Eγ's, by evaluators.
‡ From 1981Ah03 based on $\gamma(\theta)$, R_{DCO} and γ-deexcitation pattern. Additional support for J^π assignments as determined in this dataset are indicated in the comments.
# From 1975GuYV.
@ Band(A): yrast band.
& Band(B): $K^\pi=2^+$ γ vibrational band.

$\gamma(^{70}Se)$

E$_\gamma$	I$_\gamma$[‡]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†]	δ[#]	Comments
264.6 *3*	8.8	3789.8	(6$^-$)	3525.2	(5$^-$)	D+Q[@]		Mult.,δ: from $\gamma(\theta)$ in 1980Wa19 which gives mult=D+Q, 0.0<δ<3.7 (1980Wa19). 1981Ah03 give E2 for the transition multipolarity, however, this does not agree with their measured A_2 and A_4 values and their assignment as J^π=(5) to (4) transition. Mult.: A_2=−0.14 *5*, A_4=0.0 *5* (1980Wa19); A_2=−0.28 *6*, A_4=0.09 *7* (1981Ah03).
527.3 *3*	2.2	3916.1	7$^-$	3388.7	5$^-$	Q		Mult.: A_2=+0.24 *10*, A_4=−0.12 *13* (1981Ah03). I$_\gamma$: other: Iγ(527γ):Iγ(912γ)= <10 :>90 (1980Wa19).
656.0 *3*	5.0	1601.4	2$^+$	945.4	2$^+$	D+Q	−1.0 +*1*−*2*	δ: Other: 1.4 +*2.3*−*0.6* (1980Wa19).

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^{58}Ni(^{14}N,pnγ), ^{60}Ni(^{12}C,2nγ) 1981Ah03,1980Wa19 (continued)

γ(^{70}Se) (continued)

E_γ	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	Comments
							Mult.: A_2=−0.25 *7*, A_4=0.04 *12* (1980Wa19); A_2=−0.23 *5*, A_4=0.02 *7* (1981Ah03). I_γ: other: Iγ(656γ):Iγ(1600γ)=52 *2*:48 *2* (1980Wa19).
782.9 *3*	7.7	2384.4	4+	1601.4	2+	Q	Mult.: A_2=0.20 *5*, A_4=−0.07 *6* (1980Wa19); A_2=0.30 *10*, A_4=−0.20 *9* (1981Ah03). I_γ: other: Iγ(783γ):Iγ(1439γ)=63 *4*:37 *4* (1980Wa19).
912.1 *3*	22.4	3916.1	7−	3004.1	6+	E1[@]	δ: −0.15 *5* (1981Ah03). Mult.: A_2=−0.28 *3*, A_4=−0.08 *5*, POL=+0.16 *4* (1980Wa19); A_2=−0.226 *31*, A_4=0.071 *34* (1981Ah03).
945.4 *3*	100	945.4	2+	0.0	0+	E2[@]	Mult.: A_2=0.154 *7*, A_4=−0.036 *8*, POL=+0.27 *7* (1980Wa19); A_2=0.172 *16*, A_4=−0.077 *20* (1981Ah03).
964.6 *3*	33.3	3004.1	6+	2039.6	4+	E2[@]	Mult.: A_2=0.15 *4*, A_4=−0.08 *5*, POL=+0.62 *30* (1980Wa19); A_2=0.181 *18*, A_4=0.040 *22* (1981Ah03).
1005.9 *3*	6.7	3525.2	(5−)	2519.2	3−	(Q)	Mult.,δ: Q in 1980Wa19; D(+Q), δ= −0.06 *+9−2* (1981Ah03); A_2=0.41 *15*, A_4=−0.03 *12* (1980Wa19); A_2=−0.164 *25*, A_4=0.069 *31* (1981Ah03). I_γ: other: Iγ(1006γ):Iγ(1485γ)=18 *3*:83 *3* (1980Wa19).
1034.8 *3*	11.1	4038.9	8+	3004.1	6+	Q	Mult.: from R(DCO) in 1981Ah03.
1065.8 *3*	4.2	2011.2	(0+)	945.4	2+	Q	Mult.: A_2=0.00 *4*, A_4=0.01 *5* (1980Wa19); A_2=−0.04 *10*, A_4=0.21 *11* (1981Ah03).
1094.2 *3*	59.7	2039.6	4+	945.4	2+	E2[@]	Mult.: A_2=0.21 *2*, A_4=−0.06 *2*, POL=+0.47 *13* (1980Wa19); A_2=0.218 *19*, A_4=0.083 *22* (1981Ah03).
1349.0 *3*	17.2	3388.7	5−	2039.6	4+	D(+Q)	δ: +0.12 with large error (1981Ah03); 0.0 (1980Wa19). Mult.: A_2=−0.052 *28*, A_4=−0.092 *34* (1981Ah03); A_2=−0.20 *7*, A_4=0.01 *8* (1980Wa19).
1439.0 *3*	7.7	2384.4	4+	945.4	2+	Q	Mult.: A_2=0.25 *8*, A_4=−0.06 *10* (1980Wa19); A_2=0.19 *6*, A_4=−0.17 *8* (1981Ah03).
1485.6 *3*	11.2	3525.2	(5−)	2039.6	4+	D	Mult.: From γ(θ) in 1980Wa19. A_2=−0.25 *7*, A_4=−0.10 *8* (1980Wa19).
1573.8 *3*	7.6	2519.2	3−	945.4	2+	D	δ: −0.26 *15* (1981Ah03); 0.0 (1980Wa19). Mult.: A_2=−0.295, A_4=0.03 *5* (1980Wa19); A_2=−0.36 *5*, A_4=−0.054 *54* (1981Ah03).
1601.4 *3*	7.0	1601.4	2+	0.0	0+	Q	Mult.: A_2=0.25 *8*, A_4=−0.05 *9* (1980Wa19); A_2=0.18 *6*, A_4=−0.11 *7* (1981Ah03).
2195.0 *3*	<1	3140.4		945.4	2+		E_γ: Not seen by 1980Wa19.

[†] From γ(θ) and R_{DCO} in 1981Ah03, unless otherwise noted.
[‡] From 1981Ah03. Authors make only a general statement that uncertainties range from 5% to 20% depending on the strength of the transitions. 1980Wa19 provide only relative branchings from levels, which are indicated in the comments.
[#] From γ(θ) in 1981Ah03.
[@] From γ(θ) and linear polarization measurements in 1980Wa19.

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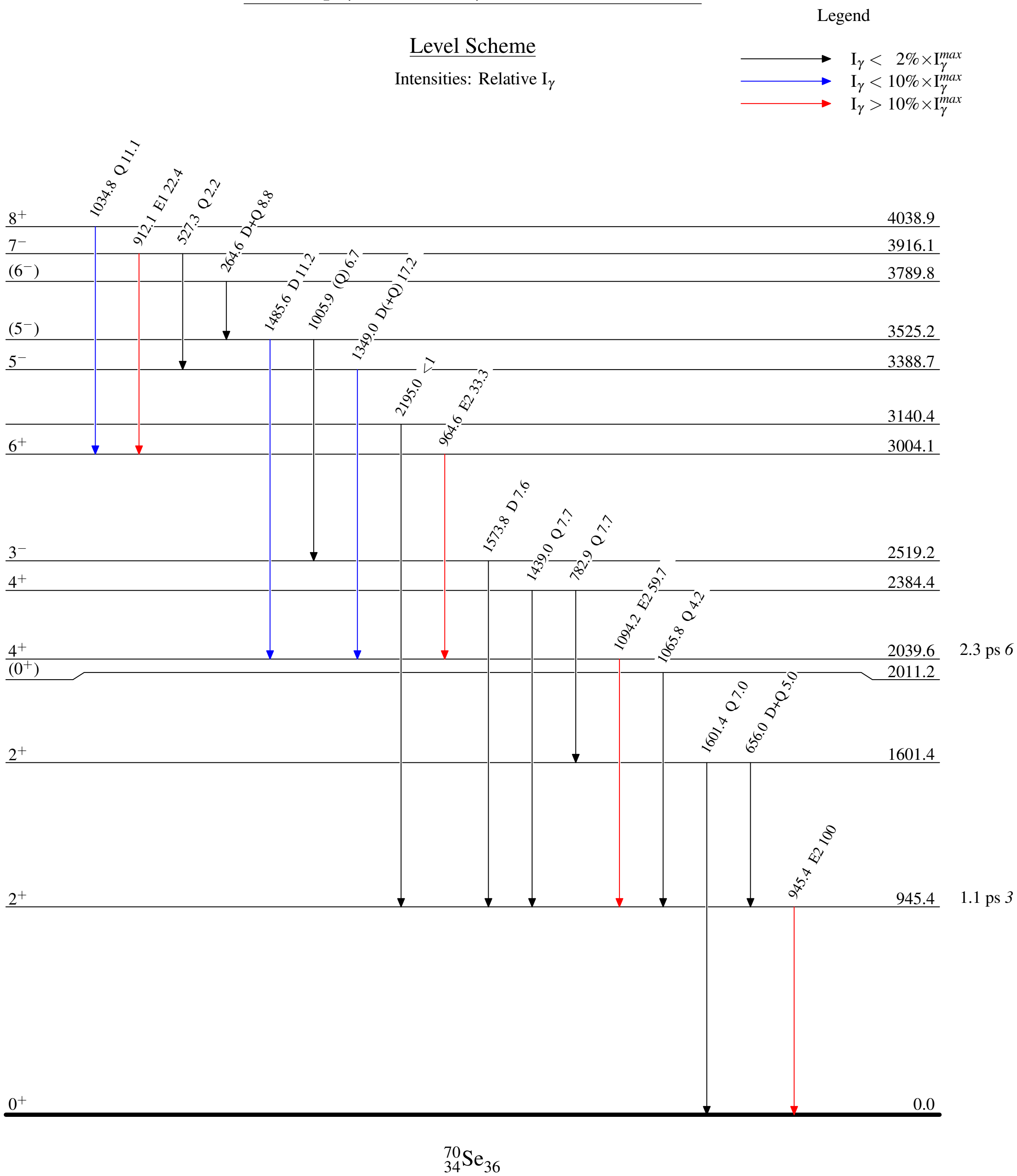
Level Scheme

Intensities: Relative I_γ



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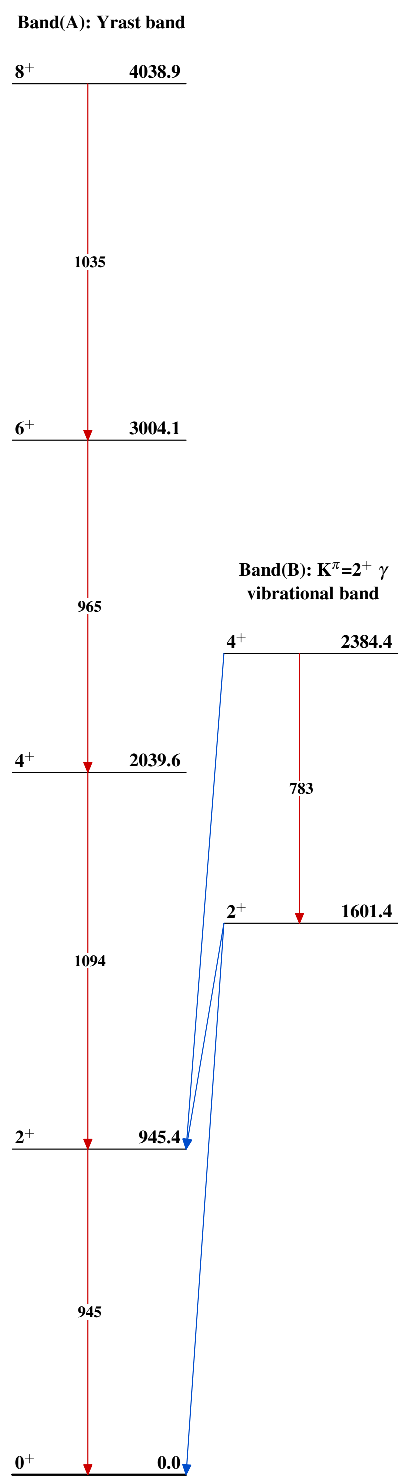

$^{70}_{34}Se_{36}$