^{54}Fe(^{32}S,2pnγ) 1988Hu01,1989Fi06

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 125, 201 (2015)	31-Dec-2014

1988Hu01: E(^{32}S)=105-120 MeV. Measured Eγ, Iγ, $\gamma\gamma$, recoil-γ, nγ, $\gamma\gamma$(t), $\gamma(\theta)$ for θ=0°, 30°, 45°, 60°, and 90°. In recoil-γ experiment, reaction products were separated with the Rochester recoil mass separator and implanted in a planar, position sensitive Si detector. γ rays in coincidence with A=83 nuclei were detected with five Ge detectors. In neutron-γ experiment, γ rays were detected with a Compton-suppressed Ge detector and neutrons with an NE213 liquid scintillator. Prompt $\gamma\gamma$ coincidences measured with a Compton-suppressed intrinsic Ge detector and a Ge(Li) detector. Delayed $\gamma\gamma$ coincidences measured with a Compton-suppressed Ge detector and a LEPS.

1989Fi06: E(^{32}S)=103, 107 MeV. Measured $T_{1/2}$ using Recoil Distance Doppler Shift (RDDS) method (at E=107 MeV) using four Ge(Li) detectors and with Doppler Shift Attenuation Method (DSAM) (at 103 MeV) using neutron-gated spectra collected at 0° with a Compton-suppressed Ge detector.

^{83}Zr Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0[&]	(1/2$^-$)		
52.7[c]	(5/2$^-$)	0.53 μs *12*	$T_{1/2}$: from $\gamma\gamma$(t) in 1988Hu01.
77.1[b]	(7/2$^+$)	132 ns *55*	$T_{1/2}$: from $\gamma\gamma$(t) in 1988Hu01.
129.0	(3/2$^-$)		
138.8[a]	(9/2$^+$)		
338.5[d]	(7/2$^-$)	50 ps *4*	
373.0	(5/2$^-$)		
582.0	(7/2$^-$)	21.5 ps *55*	
680.2[c]	(9/2$^-$)	4.2 ps *8*	
769.0[b]	(11/2$^+$)	<2.3 ps	$T_{1/2}$: effective lifetime of 2.0 ps *3* from RDDS.
880.2[a]	(13/2$^+$)	2.3 ps *3*	
984.0	(9/2$^-$)		
1013.2[d]	(11/2$^-$)	1.9 ps *3*	
1262.0	(11/2$^-$)	<2.1 ps	$T_{1/2}$: effective lifetime of 1.7 ps *4* from RDDS.
1474.8[c]	(13/2$^-$)	0.76 ps *21*	
1662.5[b]	(15/2$^+$)		
1772.0	(13/2$^-$)		
1817.3[a]	(17/2$^+$)	0.42 ps *14*	
1830.1[d]	(15/2$^-$)	0.62 ps *21*	
2126.0	(15/2$^-$)		
2397.5[c]	(17/2$^-$)	<1.04 ps	$T_{1/2}$: effective lifetime of 0.83 ps *21* from RDDS.
2707.8[b]	(19/2$^+$)		
2742.9[d]	(19/2$^-$)	<1.04 ps	$T_{1/2}$: effective lifetime of 0.83 ps *21* from RDDS.
2913.8[a]	(21/2$^+$)	0.37 ps *6*	$T_{1/2}$: weighted average of 0.38 ps *6* from RDDS and 0.35 ps *14* from DSAM (1989Fi06).
3373.5[c]	(21/2$^-$)		
3731.0[d]	(23/2$^-$)		
3956.0[a]	(25/2$^+$)	0.40[@] ps *6*	
4431.5[c]	(25/2$^-$)		
4837.3[d]	(27/2$^-$)		
4905.1[a]	(29/2$^+$)	<0.42[@] ps	$T_{1/2}$: effective lifetime of 0.35 ps *7* from DSAM.
5655.6[c]	(29/2$^-$)		
6029[a]	(33/2$^+$)		
6076[d]	(31/2$^-$)		

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^{54}Fe(^{32}S,2pnγ) 1988Hu01,1989Fi06 (continued)

^{83}Zr Levels (continued)

E(level)[†]	Jπ[‡]
7325[a]	(37/2$^+$)
7382[d]	(35/2$^-$)

† From a least-squares fit to Eγ, by evaluator.
‡ From the Adopted Levels.
# From Recoil Distance Doppler shift measurement (1989Fi06), except where noted.
@ From Doppler Shift Attenuation measurement (1989Fi06).
& Band(A): 1/2[301].
a Band(B): 5/2[422], α=+1/2.
b Band(C): 5/2[422], α=−1/2.
c Band(D): 5/2[303], α=+1/2.
d Band(E): 5/2[303], α=−1/2.

γ(^{83}Zr)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	δ[#]	Comments
24.3	265 *75*	77.1	(7/2$^+$)	52.7	(5/2$^-$)	(E1)		α(exp)= 8 *4* from intensity balance (1988Hu01). Mult.: α(exp) gives E1 or M1, the latter is excluded by comparison to RUL.
52.7	385 *45*	52.7	(5/2$^-$)	0.0	(1/2$^-$)	E2		α(exp)=18 *10* from intensity balance (1988Hu01). Mult.: α(exp) gives E2 or M2, the latter is excluded by comparison to RUL.
61.7	225 *32*	138.8	(9/2$^+$)	77.1	(7/2$^+$)	D+Q	0.05	Mult.,δ: A$_2$=−0.41 *2*, A$_4$=0.00 *2*.
111.2	2 *1*	880.2	(13/2$^+$)	769.0	(11/2$^+$)	D+Q	0.04	Mult.,δ: A$_2$=−0.35 *9*, A$_4$=+0.04 *9*.
129[@]		129.0	(3/2$^-$)	0.0	(1/2$^-$)			
261.3	7 *2*	338.5	(7/2$^-$)	77.1	(7/2$^+$)	D		Mult.: A$_2$=+0.30 *5*, A$_4$=−0.01 *5*.
285.8	42 *2*	338.5	(7/2$^-$)	52.7	(5/2$^-$)	D+Q	−0.51	Mult.,δ: A$_2$=+0.55 *2*, A$_4$=+0.11 *2*.
333.0	<1	1013.2	(11/2$^-$)	680.2	(9/2$^-$)			
341.7	5 *2*	680.2	(9/2$^-$)	338.5	(7/2$^-$)	D+Q	−0.47	Mult.,δ: A$_2$=+0.51 *6*, A$_4$=+0.04 *8*.
373[@]		373.0	(5/2$^-$)	0.0	(1/2$^-$)			
453[@]		582.0	(7/2$^-$)	129.0	(3/2$^-$)			
461.6	<1	1474.8	(13/2$^-$)	1013.2	(11/2$^-$)			
611[@]		984.0	(9/2$^-$)	373.0	(5/2$^-$)			
627.5	29 *3*	680.2	(9/2$^-$)	52.7	(5/2$^-$)	Q		Mult.: A$_2$=+0.33 *5*, A$_4$=−0.16 *6*.
630.2	20 *2*	769.0	(11/2$^+$)	138.8	(9/2$^+$)	D+Q	0.11	Mult.,δ: A$_2$=−0.55 *6*, A$_4$=+0.09 *7*.
674.7	45 *3*	1013.2	(11/2$^-$)	338.5	(7/2$^-$)	Q		Mult.: A$_2$=+0.37 *3*, A$_4$=−0.18 *3*.
680[@]		1262.0	(11/2$^-$)	582.0	(7/2$^-$)			
691.9	<2	769.0	(11/2$^+$)	77.1	(7/2$^+$)			
741.5	100 *2*	880.2	(13/2$^+$)	138.8	(9/2$^+$)	Q		Mult.: A$_2$=+0.24 *4*, A$_4$=−0.19 *5*.
[x]767.7								
782.2	3 *1*	1662.5	(15/2$^+$)	880.2	(13/2$^+$)			
788[@]		1772.0	(13/2$^-$)	984.0	(9/2$^-$)			
794.6	37 *5*	1474.8	(13/2$^-$)	680.2	(9/2$^-$)			E$_\gamma$: doublet.
816.9	40 *5*	1830.1	(15/2$^-$)	1013.2	(11/2$^-$)	Q		Mult.: A$_2$=+0.47 *5*, A$_4$=−0.25 *5*.
864[@]		2126.0	(15/2$^-$)	1262.0	(11/2$^-$)			
890.5	<2	2707.8	(19/2$^+$)	1817.3	(17/2$^+$)			
893.5	3 *1*	1662.5	(15/2$^+$)	769.0	(11/2$^+$)			
912.8	35 *4*	2742.9	(19/2$^-$)	1830.1	(15/2$^-$)	Q		Mult.: A$_2$=+0.41 *5*, A$_4$=−0.25 *6*.

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^{54}Fe(^{32}S,2pnγ) 1988Hu01,1989Fi06 (continued)

$\gamma(^{83}Zr)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
922.7	28 *4*	2397.5	(17/2$^-$)	1474.8	(13/2$^-$)	Q	Mult.: A_2=+0.35 *3*, A_4=−0.17 *4*.
937.0	72 *7*	1817.3	(17/2$^+$)	880.2	(13/2$^+$)		E_γ: doublet.
949.1	21 *4*	4905.1	(29/2$^+$)	3956.0	(25/2$^+$)	Q	Mult.: A_2=+0.44 *6*, A_4=−0.15 *7*.
976.0	14 *4*	3373.5	(21/2$^-$)	2397.5	(17/2$^-$)	Q	Mult.: A_2=+0.32 *7*, A_4=−0.08 *7*.
988.1	9 *2*	3731.0	(23/2$^-$)	2742.9	(19/2$^-$)	Q	Mult.: A_2=+0.33 *6*, A_4=−0.05 *7*.
1042.2	27 *3*	3956.0	(25/2$^+$)	2913.8	(21/2$^+$)	Q	Mult.: A_2=+0.32 *4*, A_4=−0.17 *4*.
1045.4	3 *1*	2707.8	(19/2$^+$)	1662.5	(15/2$^+$)		
1058.0	5 *2*	4431.5	(25/2$^-$)	3373.5	(21/2$^-$)		E_γ: doublet.
1096.5	47 *5*	2913.8	(21/2$^+$)	1817.3	(17/2$^+$)	Q	Mult.: A_2=+0.26 *5*, A_4=−0.05 *6*.
1106.3	8 *2*	4837.3	(27/2$^-$)	3731.0	(23/2$^-$)	Q	Mult.: A_2=+0.30 *8*, A_4=−0.04 *9*.
1123.6	5 *1*	6029	(33/2$^+$)	4905.1	(29/2$^+$)	Q	Mult.: A_2=+0.27 *7*, A_4=−0.07 *8*.
1224.1	<1	5655.6	(29/2$^-$)	4431.5	(25/2$^-$)	Q	
1239.1	<2	6076	(31/2$^-$)	4837.3	(27/2$^-$)		
1296.2	3 *1*	7325	(37/2$^+$)	6029	(33/2$^+$)		
1306.0	<1	7382	(35/2$^-$)	6076	(31/2$^-$)		

† From 1988Hu01, except where noted.
‡ From 1988Hu01, normalized to Iγ(742γ)=100.
# From $\gamma(\theta)$ in 1988Hu01, except where noted. A_2 and A_4 coefficients from 1988Hu01 are included in the comments.
@ From 1989Fi06.
x γ ray not placed in level scheme.

^{54}Fe(^{32}S,2pnγ) 1988Hu01,1989Fi06

Level Scheme

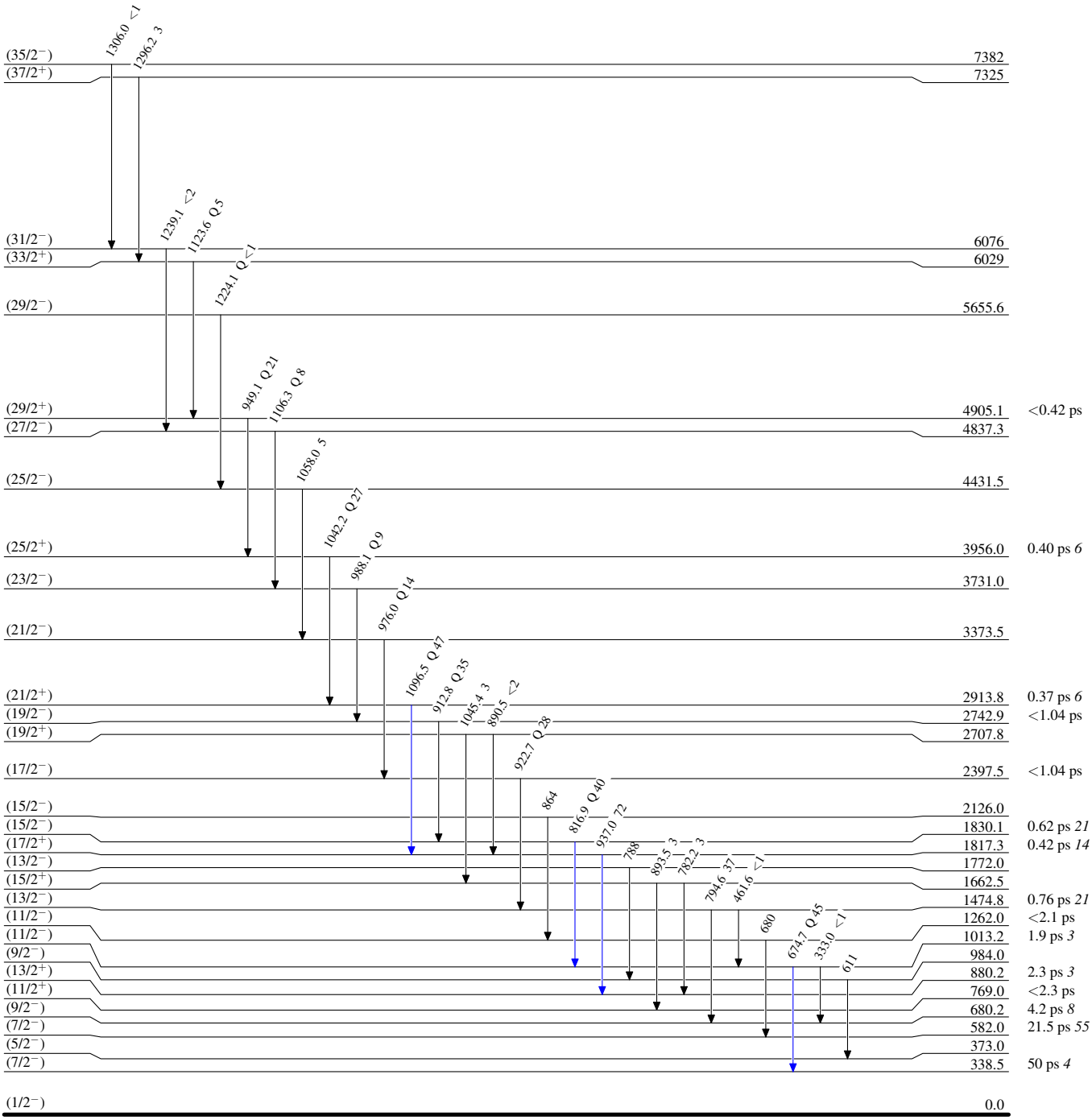
Intensities: Relative I_γ

Legend

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

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

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

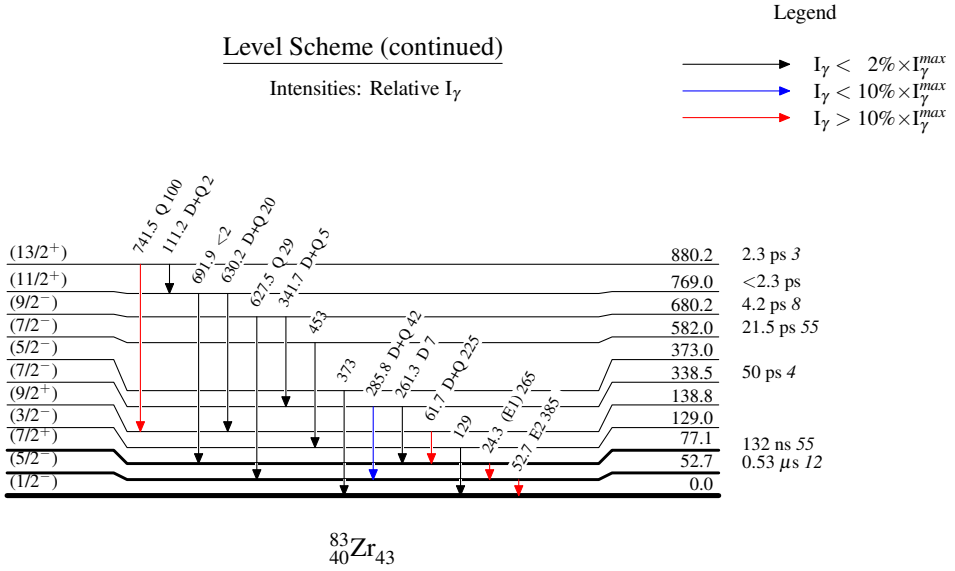


$^{83}_{40}Zr_{43}$

$^{54}Fe(^{32}S,2pn\gamma)$ 1988Hu01,1989Fi06

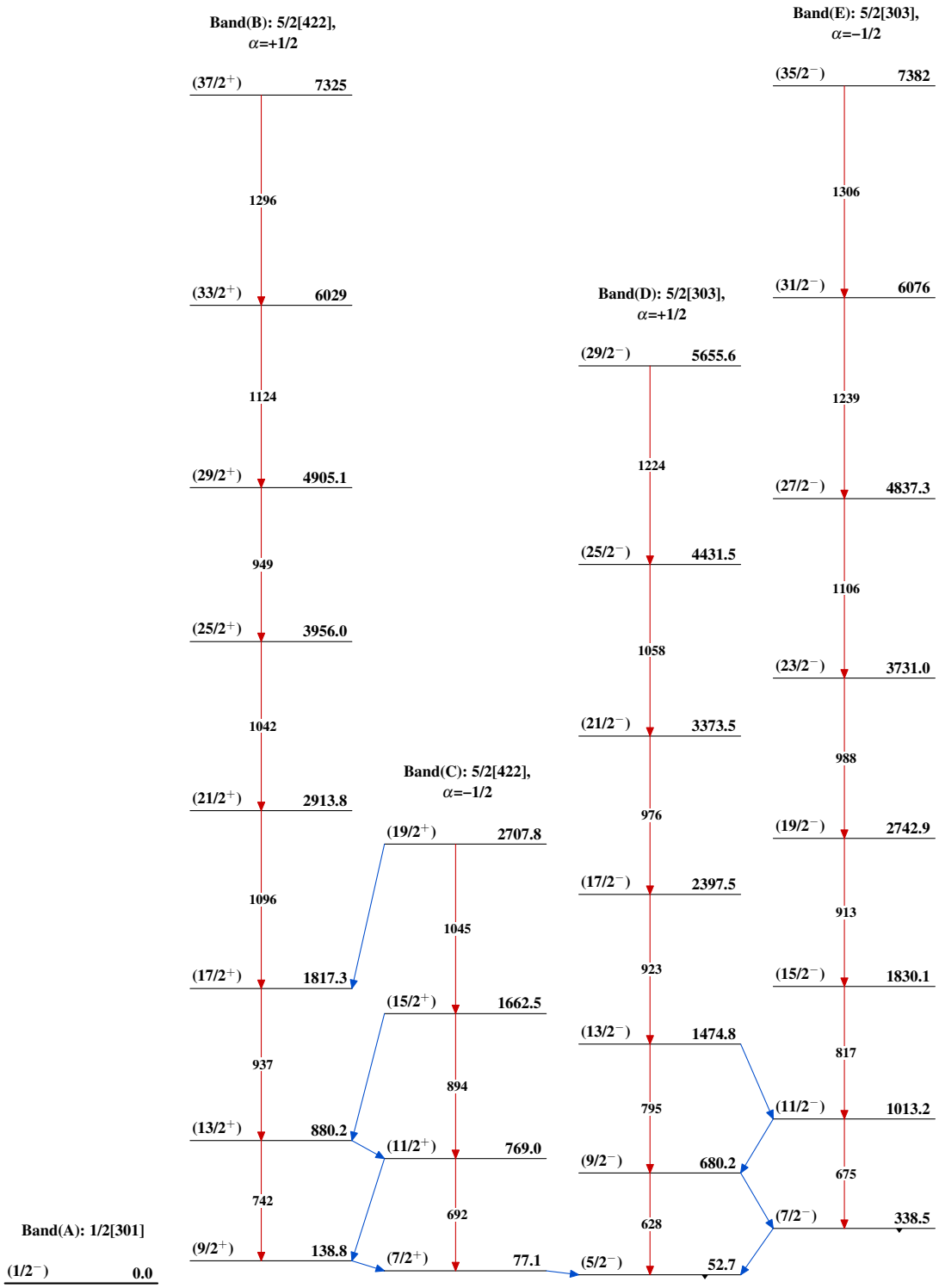
Level Scheme (continued)

Intensities: Relative I_γ



$^{83}_{40}Zr_{43}$

^{54}Fe(^{32}S,2pnγ) 1988Hu01,1989Fi06



$^{83}_{40}Zr_{43}$