^{52}Cr(^{16}O,2pnγ) 2001Mu24

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

Additional information 1.

Adapted from the XUNDL dataset for 2001Mu24, compiled by R. Zywina and B. Singh (McMaster) on July 4, 2001.

2001Mu24,2001Mu33: E=65 MeV ^{16}O beam was produced from the Nuclear Science Centre 15 UD pelletron. Target was 1 mg/cm^2 natural Cr on a gold backing. γ rays were detected with the Gamma Detector Array (GDA) consisting of 12 Compton-suppressed HPGe detectors; charged particles were detected with the 4π Charged Particle Detector Array (CPDA) consisting of 14 phoswich ΔE-E detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(DCO). Deduced levels, J, π, band structures. Comparisons with Total Routhian Surface calculations.

^{65}Zn Levels

E(level)†‡	J$^\pi$#	E(level)†‡	J$^\pi$#	E(level)†‡	J$^\pi$#	E(level)†‡	J$^\pi$#
0[c]	5/2$^-$	2923.01[&] *11*	13/2$^+$	4933.49[@] *16*	21/2$^+$	6841.97[@] *17*	29/2$^+$
53.65[c] *16*	1/2$^-$	3225.86[@] *15*	17/2$^+$	5063.94[a] *16*	21/2$^+$	6984.89 *19*	29/2$^+$
114.92 *8*	3/2$^-$	3471.64[b] *12*	15/2$^+$	5339.41[&] *24*	21/2$^+$	7061.70 *22*	(29/2$^+$)
206.65[c] *12*	3/2$^-$	3783.20[a] *16*	17/2$^+$	5410.68 *17*	23/2$^+$	7686.41[a] *19*	29/2$^+$
863.95[c] *7*	7/2$^-$	4077.60[&] *13*	17/2$^+$	5669.02 *19*	25/2$^+$	7996.69[@] *19*	33/2$^+$
1047.03 *22*	5/2$^-$	4237.00 *16*	(21/2$^+$)	5768.30[@] *16*	25/2$^+$	8326.0[&] *4*	(29/2$^+$)
1065.24[@] *8*	9/2$^+$	4546.47 *25*		5804.04 *25*		8592.71 *27*	
1262.70[c] *16*	9/2$^-$	4622.87 *16*	21/2$^+$	6279.05[a] *17*	25/2$^+$	9223.70[@] *22*	37/2$^+$
2053.03[@] *11*	13/2$^+$	4702.18 *25*		6523.00 *20*	(25/2$^+$)	10572.32[@] *24*	(41/2$^+$)
2137.42[b] *11*	11/2$^+$	4880.37[b] *22*	(19/2$^+$)	6752.23[&] *31*	(25/2$^+$)		

† Additional information 2.

‡ From a least-squares fit to γ-ray energies.

As given in 2001Mu24, based on measured $\gamma\gamma$(DCO) and proposed band structures. When considered in Adopted Levels, firm assignments here will be placed inside paretheses if there is no strong supporting argument from other studies.

@ Band(A): Band based on 1065, 9/2$^+$ level.

& Band(B): Band based on 2923, 13/2$^+$ level.

a Band(C): Band based on 3783, 17/2$^+$ level.

b Band(D): Band based on 2138, 11/2$^+$ level.

c Seq.(E): Sequence based on g.s.

γ(^{65}Zn)

DCO values under comments are obtained by gating on a stretched transition. Expected DCO values are 1.0 for a stretched quadrupole transition, 0.4 to 0.6 for a stretched dipole transition, and 0.6 to 0.8 for a mixed transition. A dipole transition with ΔJ=0 (non-stretched) could also have DCO close to 1.0.

E$_\gamma$#	I$_\gamma$#	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[@]	Comments
114.9 *1*	5.1 *6*	114.92	3/2$^-$	0	5/2$^-$	(D)	DCO=0.5 *3*.
153.0 *1*	3.0 *10*	206.65	3/2$^-$	53.65	1/2$^-$		
197.0 *2*	1.6 *8*	1262.70	9/2$^-$	1065.24	9/2$^+$		
201.3 *1*	100[&] *1*	1065.24	9/2$^+$	863.95	7/2$^-$	(D)	DCO=0.5 *1*.
244.0 *2*	1.1 *3*	6523.00	(25/2$^+$)	6279.05	25/2$^+$		
256.0[‡] *1*	4.7 *7*	5669.02	25/2$^+$	5410.68	23/2$^+$	(D)	E$_\gamma$: very poor fit and omitted in the fitting; level-energy

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^{52}Cr(^{16}O,2pnγ) 2001Mu24 (continued)

γ(^{65}Zn) (continued)

E_γ[#]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
							difference=258.35. DCO=0.5 *4*.
346.0[†] *1*	11.6 *4*	5410.68	23/2$^+$	5063.94	21/2$^+$	D+Q	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=346.74. DCO=0.6 *1*.
357.2[†] *1*	3.8 *8*	5768.30	25/2$^+$	5410.68	23/2$^+$	(D+Q)	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=357.62. DCO=0.6 *4*.
399.2 *2*	1.0 *6*	1262.70	9/2$^-$	863.95	7/2$^-$		
439.9[†] *2*	1.0 *5*	5063.94	21/2$^+$	4622.87	21/2$^+$		E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=441.07.
510.2[†] *1*	4.6 *4*	6279.05	25/2$^+$	5768.30	25/2$^+$	(D)	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=510.75. DCO=0.3 *2*.
548.9 *2*	1.3 *5*	3471.64	15/2$^+$	2923.01	13/2$^+$		
557.3 *1*	5.7 *9*	3783.20	17/2$^+$	3225.86	17/2$^+$		
563.0 *2*	2.1 *5*	6841.97	29/2$^+$	6279.05	25/2$^+$		
605.9 *1*	2.6 *8*	4077.60	17/2$^+$	3471.64	15/2$^+$		
657.3 *1*	3.4 *5*	863.95	7/2$^-$	206.65	3/2$^-$		
704.2 *1*	7.7 *5*	5768.30	25/2$^+$	5063.94	21/2$^+$	Q	DCO=0.9 *3*.
740.1 *2*	1.2 *5*	5804.04		5063.94	21/2$^+$		
749.0 *1*	9.6 *4*	863.95	7/2$^-$	114.92	3/2$^-$	Q	DCO=1.4 *2*.
785.7 *1*	5.4 *8*	2923.01	13/2$^+$	2137.42	11/2$^+$	D+Q	DCO=0.7 *3*.
787.8 *1*	3.1 *4*	5410.68	23/2$^+$	4622.87	21/2$^+$	(D)	DCO=0.4 *4*.
803.0 *2*	1.2 *4*	4880.37	(19/2$^+$)	4077.60	17/2$^+$		
826.8 *1*	2.6 *6*	5063.94	21/2$^+$	4237.00	(21/2$^+$)		
835.0 *1*	18.1 *4*	5768.30	25/2$^+$	4933.49	21/2$^+$	Q	DCO=0.9 *1*.
839.7 *2*	1.1 *5*	4622.87	21/2$^+$	3783.20	17/2$^+$		E_γ: Eγ=849.7 in 2001Mu24 is a misprint. According to e-mail reply (July 5/01) from one of the authors (R. Bhowmik), it should be 839.7.
845.2[†] *2*	1.6 *5*	7686.41	29/2$^+$	6841.97	29/2$^+$		E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=844.44.
858.7[‡] *1*	5.1 *8*	3783.20	17/2$^+$	2923.01	13/2$^+$	Q	E_γ: very poor fit and omitted in the fitting; level-energy difference=860.18. DCO=1.4 *4*.
864.1 *1*	88[&] *1*	863.95	7/2$^-$	0	5/2$^-$	D+Q	DCO=0.6 *1*.
932.1 *2*	1.1 *6*	1047.03	5/2$^-$	114.92	3/2$^-$		
934.8 *2*	0.5 *4*	7996.69	33/2$^+$	7061.70	(29/2$^+$)		
987.8 *1*	78[&] *1*	2053.03	13/2$^+$	1065.24	9/2$^+$	Q	DCO=1.0 *1*.
1011.0 *1*	3.0 *10*	4237.00	(21/2$^+$)	3225.86	17/2$^+$	(Q)	DCO=1.1 *5*.
1012.7[†] *2*	1.0 *3*	7996.69	33/2$^+$	6984.89	29/2$^+$		E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1011.80.
1065.1 *1*	5.3 *7*	1065.24	9/2$^+$	0	5/2$^-$		
1072.1 *1*	9.0 *14*	2137.42	11/2$^+$	1065.24	9/2$^+$	D	DCO=0.4 *3*.
1073.6 *1*	12.0 *19*	6841.97	29/2$^+$	5768.30	25/2$^+$	Q	DCO=1.1 *1*.
1150.3 *2*	1.7 *5*	4933.49	21/2$^+$	3783.20	17/2$^+$		
1154.7 *1*	5.0 *4*	4077.60	17/2$^+$	2923.01	13/2$^+$	(Q)	DCO=1.0 *5*.
1154.7 *1*	11.1 *12*	7996.69	33/2$^+$	6841.97	29/2$^+$	Q	DCO=1.2 *2*.
1163.4 *2*	1.2 *5*	7686.41	29/2$^+$	6523.00	(25/2$^+$)		
1172.7 *1*	45.0[&] *5*	3225.86	17/2$^+$	2053.03	13/2$^+$	Q	DCO=1.0 *1*.
1173.0 *1*	3.0 *5*	6841.97	29/2$^+$	5669.02	25/2$^+$		
1215.1 *1*	3.4 *12*	6279.05	25/2$^+$	5063.94	21/2$^+$	Q	DCO=0.9 *3*.
1216.7 *1*	3.5 *5*	6984.89	29/2$^+$	5768.30	25/2$^+$	(Q)	DCO=0.9 *4*.

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^{52}Cr(^{16}O,2pnγ) 2001Mu24 (continued)

$\gamma(^{65}Zn)$ (continued)

E_γ[#]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
1227.0 *1*	10.5 *8*	9223.70	37/2$^+$	7996.69	33/2$^+$	Q	DCO=1.2 *1*.
1261.8 *2*	1.6 *3*	5339.41	21/2$^+$	4077.60	17/2$^+$	Q	DCO=1.3 *5*.
1280.8 *1*	13.5 *11*	5063.94	21/2$^+$	3783.20	17/2$^+$	Q	DCO=1.2 *1*.
1293.2 *2*	1.5 *7*	7061.70	(29/2$^+$)	5768.30	25/2$^+$	Q	DCO=1.6 *5*.
1315.6 *2*	1.8 *9*	6984.89	29/2$^+$	5669.02	25/2$^+$		
1320.6 *2*	1.8 *2*	4546.47		3225.86	17/2$^+$		
1334.0 *1*	3.8 *9*	3471.64	15/2$^+$	2137.42	11/2$^+$		
1348.6 *1*	3.8 *3*	10572.32	(41/2$^+$)	9223.70	37/2$^+$	(Q)	DCO=0.9 *4*.
1397.0 *1*	4.5 *5*	4622.87	21/2$^+$	3225.86	17/2$^+$	Q	DCO=1.3 *3*.
1407.3 *1*	3.6 *9*	7686.41	29/2$^+$	6279.05	25/2$^+$	Q	DCO=1.3 *4*.
1407.8[†] *2*	1.5 *3*	4880.37	(19/2$^+$)	3471.64	15/2$^+$	(Q)	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1408.72. DCO=1.2 *6*.
1412.8 *2*	1.4 *5*	6752.23	(25/2$^+$)	5339.41	21/2$^+$	(Q)	DCO=1.2 *5*.
1418.6 *1*	3.3 *7*	3471.64	15/2$^+$	2053.03	13/2$^+$		
1431.3 *1*	2.4 *4*	6841.97	29/2$^+$	5410.68	23/2$^+$		
1459.0 *2*	1.2 *6*	6523.00	(25/2$^+$)	5063.94	21/2$^+$		
1476.3 *2*	1.4 *7*	4702.18		3225.86	17/2$^+$		
1573.7 *2*	1.4 *8*	8326.0	(29/2$^+$)	6752.23	(25/2$^+$)	(Q)	DCO=0.9 *6*.
1607.8 *2*	1.0 *3*	8592.71		6984.89	29/2$^+$		
1656.2 *1*	2.9 *4*	6279.05	25/2$^+$	4622.87	21/2$^+$		
1707.8 *1*	18.9 *10*	4933.49	21/2$^+$	3225.86	17/2$^+$	Q	DCO=0.9 *1*.
1730.6[†] *1*	9.3 *11*	3783.20	17/2$^+$	2053.03	13/2$^+$	Q	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1730.14. DCO=1.1 *3*.
1837.9 *1*	3.8 *6*	5063.94	21/2$^+$	3225.86	17/2$^+$	(Q)	DCO=1.0 *5*.
1857.8 *1*	7.0 *10*	2923.01	13/2$^+$	1065.24	9/2$^+$	Q	DCO=1.2 *3*.
1916.1[‡] *2*	2.0 *8*	7686.41	29/2$^+$	5768.30	25/2$^+$		E_γ: very poor fit and omitted in the fitting; level-energy difference=1918.09.

[†] Poor fit; uncertainty multiplied by a factor in the fitting.

[‡] Very poor fit and omitted in the fitting.

[#] From 2001Mu24. Uncertainty in energy of 0.1 keV assigned for Iγ>2 and 0.2 keV for Iγ<2 as suggested in an e-mail reply of July 5/01 from one of the authors (R. Bhowmik) to B. Singh, unless otherwise noted.

[@] Assignments made by the evaluator based on measured DCO values and expected values as stated by authors. No assignments are reported by the authors.

[&] Uncertainty increased to 1%, as suggested in an e-mail reply of July 5/01 from one of the authors (R. Bhowmik) to B. Singh.

^{52}Cr(^{16}O,2pnγ) 2001Mu24

Level Scheme

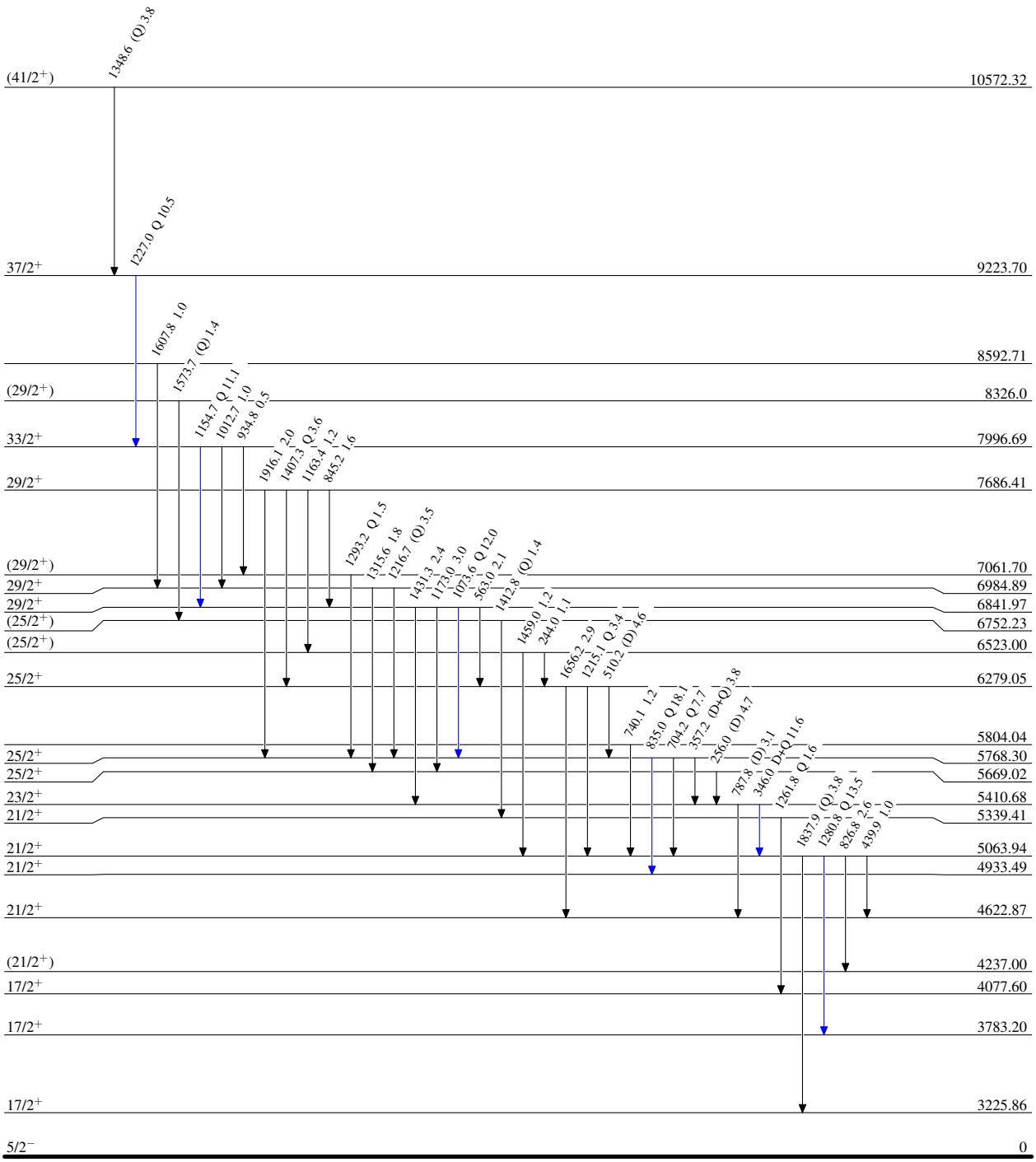
Intensities: Relative I_γ

Legend

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

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

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

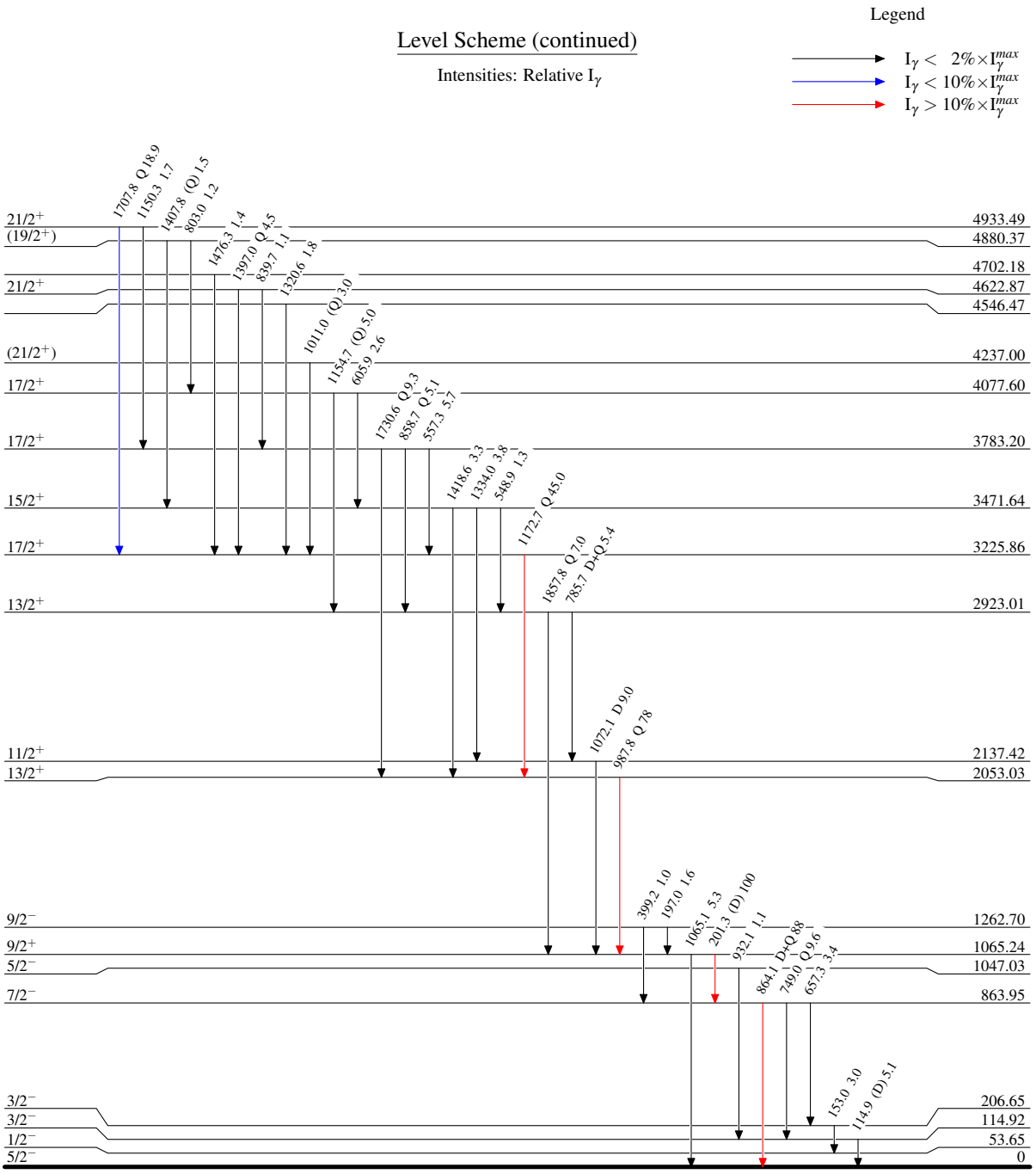


$^{65}_{30}Zn_{35}$

^{52}Cr(^{16}O,2pnγ) 2001Mu24

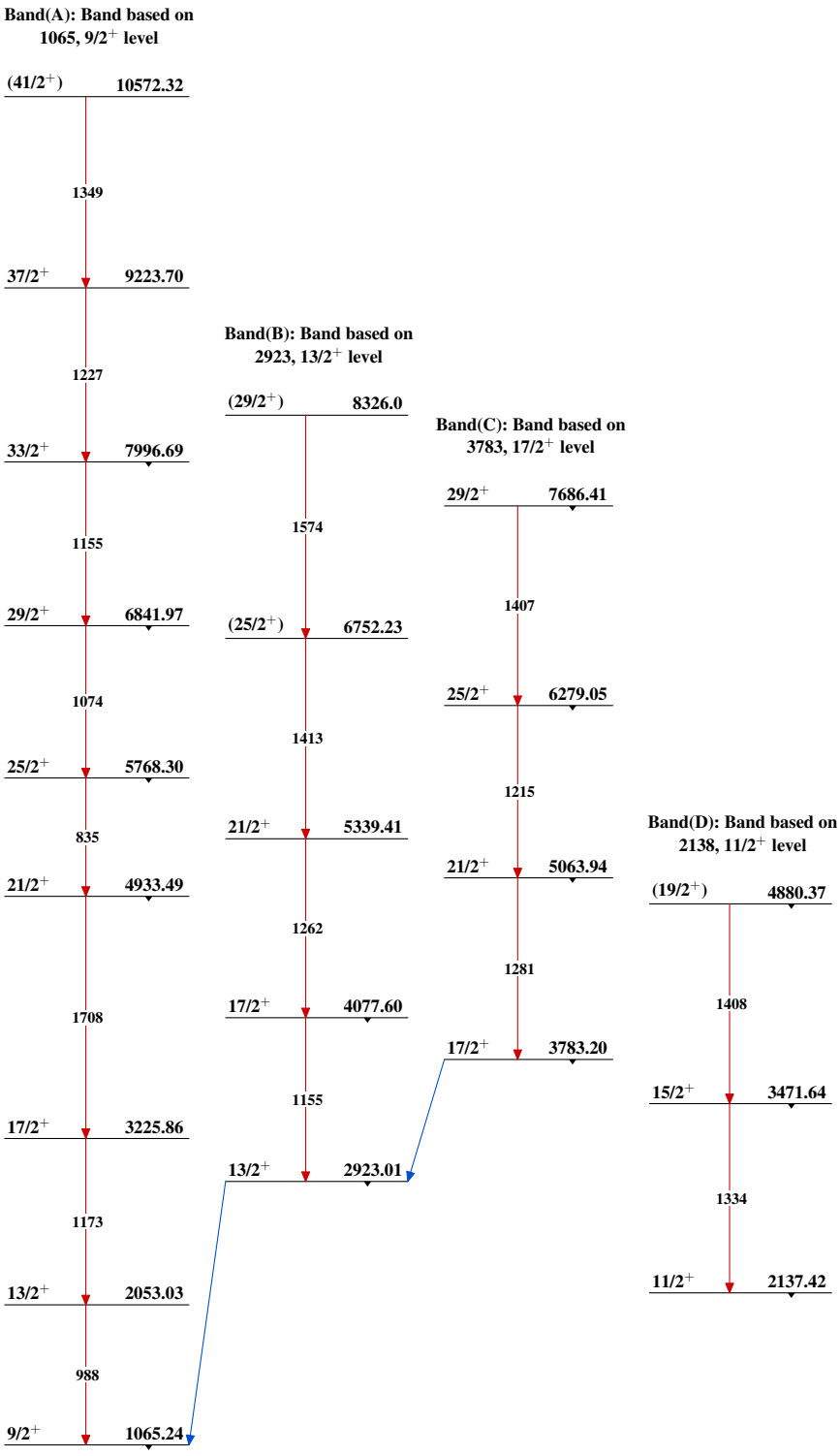
Level Scheme (continued)

Intensities: Relative I_γ



$^{65}_{30}Zn_{35}$

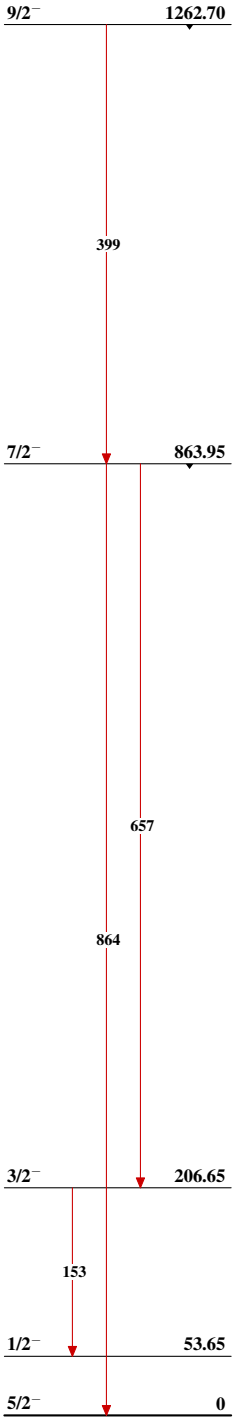
^{52}Cr(^{16}O,2pnγ) 2001Mu24



$^{65}_{30}Zn_{35}$

^{52}Cr(^{16}O,2pnγ) 2001Mu24 (continued)

Seq.(E): Sequence based on g.s



$^{65}_{30}Zn_{35}$