^{50}Cr(^{58}Ni,4p$\alpha\gamma$),^{70}Zn(^{36}S,6nγ) 2001Pe05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

2001Pe05 report data from two different measurements.

2001Pe05: ^{50}Cr(^{58}Ni,4p$\alpha\gamma$). E=261 MeV ^{58}Ni beam was produced from the tandem accelerator of the Niels Bohr Institute. Target was 96.8% enriched gold-backed ^{50}Cr. γ rays were detected with the NORDBALL detector array consisting of 15 BGO-shielded Ge detectors, 21 ΔE-type Si detectors, 11 liquid scintillators, and an inner ball of 30 BaF2 crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$. Deduced levels, J, π, band structures, configurations, γ-ray multipolarities for levels up to 8303 level. Comparisons with shell-model calculations.

2001Pe05: ^{70}Zn(^{36}S,6nγ). E=130 MeV ^{36}S beam was produced from the Vivitron accelerator of IRes, Strasbourg. Target was two stacked 440 μg/cm^2 thick self-supporting ^{70}Zn foils (70% enriched). γ-rays were detected with the EUROGAMM-II spectrometer consisting of 30 tapered coaxial and 24 clover Ge detectors, all in BGO Compton-suppression shields. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(DCO), γ(lin pol). Deduced levels, J, π, band structures, configurations, γ-ray multipolarities for level above 8303 level.

^{100}Pd Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
0[#]	0$^+$	4053.95[@] *18*	9$^-$	5918.44[b] *21*	14$^+$	11211.0 *3*	22$^-$
665.40[#] *10*	2$^+$	4092.72[a] *18*	9$^-$	6133.73 *23*		11527.9 *3*	
1416.00[#] *15*	4$^+$	4145.81 *20*	10$^+$	6458.99[c] *21*	15$^+$	11652.6[d] *5*	22$^+$
2054.58[&] *18*	(4$^-$)	4634.92[&] *20*	(10$^-$)	6704.51[@] *21*	15$^-$	11685.8 *4*	
2189.24[#] *17*	6$^+$	4761.46[#] *20*	12$^+$	6938.40[#] *22*	16$^+$	11820.9[@] *3*	23$^-$
2469.71 *20*	6$^+$	4779.61 *23*		7085.43[b] *22*	(16$^+$)	12620.2? *4*	(24$^-$)
2505.27[a] *17*	5$^-$	4863.37[@] *18*	11$^-$	7340.3 *4*		12879.0 *3*	
2987.91[#] *18*	8$^+$	4926.04[b] *21*	12$^+$	7644.72[@] *23*	17$^-$	12945.7[e] *6*	(23$^+$)
3021.61[&] *17*	(6$^-$)	4946.4[a] *3*	11$^-$	7970.40 *24*		13204.9[@] *3*	25$^-$
3178.13 *18*	8$^+$	5078.03 *22*	12$^+$	8303.41[#] *24*	(18$^+$)	13438.5 *7*	
3231.19[a] *17*	7$^-$	5452.53[c] *21*	13$^+$	8715.92[@] *24*	19$^-$	13503.8[d] *6*	(24$^+$)
3439.70 *21*	8$^+$	5573.3 *4*		9871.5 *5*		15014.9[e] *6*	(25$^+$)
3869.05[#] *19*	10$^+$	5669.21[@] *20*	13$^-$	10103.9[@] *3*	21$^-$	16107.9 *6*	
3879.01[&] *18*	(8$^-$)	5706.60[#] *21*	14$^+$	10452.4[d] *5*	20$^+$		

[†] From least-squares fit to Eγ data.

[‡] As proposed by 2001Pe05 based on $\gamma(\theta)$ and γ(lin pol) data and band assignments. The assignments in the Adopted Levels are the same, except that many are given in parentheses there due to lack of strong supporting arguments.

[#] Band(A): g.s band. The 18$^+$ state probably corresponds to configuration=$\nu(d_{5/2}g_{7/2})^4\otimes\pi g_{9/2}^{-2}$. The terminating state at 22$^+$ will have a break-up of second pair of $g_{9/2}$ protons.

[@] Band(B): Band based on 9$^-$. The 25$^-$ state probably corresponds to terminating state with configuration=$[\nu(d_{5/2}g_{7/2})^3h_{11/2}]\otimes\pi g_{9/2}^{-4}$.

[&] Band(C): Band based on (4$^-$),α=0.

[a] Band(c): Band based on (5$^-$),α=1.

[b] Band(D): Band based on (12$^+$),α=0.

[c] Band(d): Band based on (13$^+$),α=1.

[d] Band(E): Band based on 20$^+$. The 24$^+$ (terminating) state probably corresponds to configuration= $\nu(g_{7/2}^3h_{11/2})\otimes\pi(g_{9/2}^{-3}p_{1/2}^{-1})$.

[e] Band(e): Band based on (23$^+$). The (25$^+$) (terminating) state probably corresponds to configuration= $\nu(g_{7/2}^2d_{5/2}h_{11/2})\otimes\pi(g_{9/2}^{-3}p_{1/2}^{-1})$.

^{50}Cr(^{58}Ni,4pαγ),^{70}Zn(^{36}S,6nγ) 2001Pe05 (continued)

γ(^{100}Pd)

All γ-ray data up to 8303, (18$^+$) level excluding γ(lin pol) are from the ^{50}Cr(^{58}Ni,4pαγ) reaction and all γ-ray data above that plus all γ(lin pol) data are from the ^{70}Zn(^{36}S,6nγ) reaction (2001Pe05), unless otherwise noted..

R_{ang}=Iγ(at 143°)/Iγ(79° or 101°) from ^{50}Cr(^{58}Ni,4pαγ). A value of 1.5 indicates ΔJ=2, Q or ΔJ=0, dipole; and 0.8 for ΔJ=1, dipole. Values for mixed M1+E2 transitions can range from 0.3 to 1.8.

R_{DCO}=Iγ(22°+158γ, 90° gate)/Iγ(90°, 22°+159° gate) are from ^{70}Zn(^{36}S,6nγ). A value of 1.00 is expected for ΔJ=2, quadrupole, 0.70 for ΔJ=1, dipole and 1.14 for ΔJ=0, dipole when gated by a stretched quadrupole transition.

Positive value of pol indicates electric nature and negative value indicates magnetic nature for a stretched transition (2001Pe05), unless otherwise noted.

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	Comments
190.3 *1*	16.1 *7*	3178.13	8$^+$	2987.91	8$^+$	M1[&]	Mult.: assigned by 2001Pe05 based on pol=+1.4 *10* for ΔJ=0. R_{ang}=1.44 *7*.
209.3 *2*	1.3 *1*	3231.19	7$^-$	3021.61	(6$^-$)	D	R_{ang}=0.89 *19*.
213.7 *1*	0.5 *1*	4092.72	9$^-$	3879.01	(8$^-$)		
254.1 *1*	0.3 *1*	5706.60	14$^+$	5452.53	13$^+$		
261.6 *2*	1.4 *1*	3439.70	8$^+$	3178.13	8$^+$		
276.6 *2*	3.2 *2*	4145.81	10$^+$	3869.05	10$^+$	D[&]	R_{ang}=1.47 *14*.
280.4 *2*	1.5 *2*	2469.71	6$^+$	2189.24	6$^+$	D[&]	R_{ang}=1.43 *20*.
311.4 *4*	0.3 *1*	4946.4	11$^-$	4634.92	(10$^-$)		
374.6 *2*	1.4 *1*	5452.53	13$^+$	5078.03	12$^+$	D	R_{ang}=0.78 *17*.
450.7 *2*	0.7 *1*	2505.27	5$^-$	2054.58	(4$^-$)	D	R_{ang}=0.77 *30*.
465.9 *1*	6.8 *4*	5918.44	14$^+$	5452.53	13$^+$	M1	R_{ang}=0.68 *6*. POL=−0.30 *34*.
479.4 *1*	5.8 *2*	6938.40	16$^+$	6458.99	15$^+$	M1	R_{ang}=0.63 *15*. POL=−0.64 *59*.
516.3 *1*	1.6 *2*	3021.61	(6$^-$)	2505.27	5$^-$		
526.5 *1*	1.3 *1*	5452.53	13$^+$	4926.04	12$^+$		
540.5 *1*	1.3 *3*	6458.99	15$^+$	5918.44	14$^+$	D	R_{ang}=0.85 *27*.
542.2 *2*	0.6 *1*	4634.92	(10$^-$)	4092.72	9$^-$	(D)	R_{ang}=0.9 *3*.
558.1[‡] *1*	2.6[‡] *4*	13503.8	(24$^+$)	12945.7	(23$^+$)		
584.7[‡#] *2*	1.6[‡] *4*	13204.9	25$^-$	12620.2?	(24$^-$)		
591.2 *2*	0.1 *1*	5669.21	13$^-$	5078.03	12$^+$		
609.9[‡] *1*	6.5[‡] *3*	11820.9	23$^-$	11211.0	22$^-$	D	R_{DCO}=0.52 *6*.
614.3 *2*	1.7 *2*	4053.95	9$^-$	3439.70	8$^+$	D	R_{DCO}=0.65 *12*.
615.8 *3*	0.4 *1*	4761.46	12$^+$	4145.81	10$^+$		
626.4[#] *2*	1.0 *3*	7085.43	(16$^+$)	6458.99	15$^+$		
626.9 *3*	0.4 *1*	5573.3		4946.4	11$^-$		
633.8 *1*	1.3 *3*	4779.61		4145.81	10$^+$		
638.5 *2*	0.9 *3*	2054.58	(4$^-$)	1416.00	4$^+$		
647.8 *1*	0.8 *1*	3879.01	(8$^-$)	3231.19	7$^-$	D	R_{ang}=0.78 *35*.
665.4 *1*	100 *7*	665.40	2$^+$	0	0$^+$	E2	R_{ang}=1.48 *8*. POL=+0.73 *20*.
681.2 *1*	3.3 *1*	6133.73		5452.53	13$^+$		
691.2 *2*	8.7 *5*	5452.53	13$^+$	4761.46	12$^+$	M1	R_{ang}=0.70 *6*. POL=−0.7 *4*.
706.4 *2*	2.6 *1*	7644.72	17$^-$	6938.40	16$^+$		
717.5 *1*	2.3 *1*	4863.37	11$^-$	4145.81	10$^+$		
726.0 *1*	8.7 *8*	3231.19	7$^-$	2505.27	5$^-$	Q	R_{ang}=1.55 *16*.
750.6 *1*	86 *6*	1416.00	4$^+$	665.40	2$^+$	E2	R_{ang}=1.44 *3*. POL=+0.61 *19*.
752.4 *1*	8.7 *7*	6458.99	15$^+$	5706.60	14$^+$		
755.9[#] *1*	0.2 *1*	4634.92	(10$^-$)	3879.01	(8$^-$)		
770.7 *1*	1.0 *1*	4863.37	11$^-$	4092.72	9$^-$	Q	R_{ang}=1.55 *28*.
773.2 *1*	66 *5*	2189.24	6$^+$	1416.00	4$^+$	E2	R_{ang}=1.47 *3*. POL=+0.56 *27*.
786.0 *2*	1.9 *1*	6704.51	15$^-$	5918.44	14$^+$		
798.6 *1*	53 *4*	2987.91	8$^+$	2189.24	6$^+$	E2	R_{ang}=1.45 *6*. POL=+0.6 *4*.

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^{50}Cr(^{58}Ni,4pαγ),^{70}Zn(^{36}S,6nγ) 2001Pe05 (continued)

γ(^{100}Pd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	Comments
799.3‡# 4	1.9‡ 7	12620.2?	(24⁻)	11820.9	23⁻		
805.8 1	35.5 16	5669.21	13⁻	4863.37	11⁻	E2	R_{ang}=1.41 5. POL=+1.0 4.
809.4 1	33.9 16	4863.37	11⁻	4053.95	9⁻	E2	R_{ang}=1.51 5. POL=+0.59 31.
822.8 2	5.0 3	4053.95	9⁻	3231.19	7⁻	Q	R_{ang}=1.64 15.
853.7 2	1.6 2	4946.4	11⁻	4092.72	9⁻	Q	R_{ang}=1.66 27.
857.4# 1	0.2 1	3879.01	(8⁻)	3021.61	(6⁻)		
861.8 2	4.6 4	4092.72	9⁻	3231.19	7⁻	Q	R_{ang}=1.44 10.
875.9 1	27.4 13	4053.95	9⁻	3178.13	8⁺	E1	R_{ang}=0.77 4. POL=+0.96 19.
881.1 1	38 3	3869.05	10⁺	2987.91	8⁺	E2	R_{ang}=1.43 9. POL=+0.6 3.
892.4 1	25.6 18	4761.46	12⁺	3869.05	10⁺	E2	R_{ang}=1.44 12. POL=+0.98 35.
907.9 2	1.4 2	5669.21	13⁻	4761.46	12⁺	D	R_{ang}=0.9 3.
940.2 1	36.8 15	7644.72	17⁻	6704.51	15⁻	E2	R_{ang}=1.42 7. POL=+1.0 3.
945.0 2	15.2 9	5706.60	14⁺	4761.46	12⁺	E2	R_{ang}=1.47 11. POL=+0.8 7.
967.0 1	0.1 1	3021.61	(6⁻)	2054.58	(4⁻)	(Q)	R_{ang}=1.6 4.
970.0 2	1.1 1	3439.70	8⁺	2469.71	6⁺	Q	R_{ang}=1.5 4.
988.9 1	14.2 6	3178.13	8⁺	2189.24	6⁺	E2	R_{ang}=1.48 12. POL=+1.1 7.
992.4 1	3.2 2	5918.44	14⁺	4926.04	12⁺		
994.3 1	1.9 2	4863.37	11⁻	3869.05	10⁺		
997.9 1	0.6 1	6704.51	15⁻	5706.60	14⁺		
1006.5 1	1.3 1	6458.99	15⁺	5452.53	13⁺		
1032.0 1	3.7 3	7970.40		6938.40	16⁺		
1035.3 1	35.5 15	6704.51	15⁻	5669.21	13⁻	E2	R_{ang}=1.46 19. POL=+0.81 35.
1042.0 1	1.4 2	3231.19	7⁻	2189.24	6⁺		
1053.8 2	2.0 3	2469.71	6⁺	1416.00	4⁺		
1057.0 2	3.9 3	4926.04	12⁺	3869.05	10⁺	Q	R_{ang}=1.42 16.
1065.5 2	1.8 5	4053.95	9⁻	2987.91	8⁺		
1071.2‡ 1	37.1‡ 21	8715.92	19⁻	7644.72	17⁻	E2	R_{ang}=1.28 7. R_{DCO}=1.01 5. POL=+0.8 4.
1089.3 1	10.9 9	2505.27	5⁻	1416.00	4⁺	E1	R_{ang}=0.77 9. POL=+1.3 10.
1093.0‡# 3	2.4‡ 6	16107.9		15014.9	(25⁺)		
1107.1‡ 1	9.7‡ 3	11211.0	22⁻	10103.9	21⁻	D	R_{DCO}=0.66 6.
1155.6‡ 4	4.5‡ 8	9871.5		8715.92	19⁻		
1156.7 3	2.0 3	5918.44	14⁺	4761.46	12⁺		
1167.0 1	2.6 3	7085.43	(16⁺)	5918.44	14⁺		
1200.3‡ 2	5.8‡ 8	11652.6	22⁺	10452.4	20⁺	Q	R_{DCO}=1.02 9.
1209.1 2	4.2 2	5078.03	12⁺	3869.05	10⁺	Q	R_{ang}=1.52 29.
1231.8 1	4.8 2	6938.40	16⁺	5706.60	14⁺	E2	R_{ang}=1.5 4. POL=+1.0 7.
1293.0‡ 1	3.2‡ 3	12945.7	(23⁺)	11652.6	22⁺		
1351.0‡# 1	2.3‡ 3	12879.0		11527.9			
1365.0 1	2.9 1	8303.41	(18⁺)	6938.40	16⁺		
1378.8 1	2.8 3	7085.43	(16⁺)	5706.60	14⁺	Q	R_{ang}=1.4 4.
1384.0‡ 1	4.8‡ 3	13204.9	25⁻	11820.9	23⁻	Q	R_{DCO}=1.06 19.
1388.0‡ 1	24.2‡ 14	10103.9	21⁻	8715.92	19⁻	E2	R_{DCO}=0.91 6. POL=+1.2 5.
1421.8 3	3.4 12	7340.3		5918.44	14⁺		
1424.0‡# 1	2.9‡ 3	11527.9		10103.9	21⁻		
1511.0‡ 1	5.5‡ 3	15014.9	(25⁺)	13503.8	(24⁺)	D	R_{DCO}=0.53 16.
1581.9‡ 3	3.9‡ 8	11685.8		10103.9	21⁻		
1716.9‡ 3	4.8‡ 8	11820.9	23⁻	10103.9	21⁻		
1736.5‡ 4	6.5‡ 7	10452.4	20⁺	8715.92	19⁻	E1	R_{ang}=0.65 12. POL=+1.2 11.
1752.6‡ 5	3.2‡ 6	13438.5		11685.8			
1852.0‡ 4	2.9‡ 4	13503.8	(24⁺)	11652.6	22⁺		

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^{50}Cr(^{58}Ni,4p$\alpha\gamma$),^{70}Zn(^{36}S,6nγ) 2001Pe05 (continued)

γ(^{100}Pd) (continued)

† From ^{50}Cr(^{58}Ni,4p$\alpha\gamma$) reaction in 2001Pe05, unless otherwise noted.

‡ From ^{70}Zn(^{36}S,6nγ) in 2001Pe05. Iγ values given in table 2 of 2001Pe05 are renormalized to Iγ(1071)=37.1 *21* in ^{50}Cr(^{58}Ni,4p$\alpha\gamma$).

γ not reported in other high-spin studies (2000ApZY,2001Zh26).

@ Deduced by evaluators based on $\gamma(\theta)$ and/or γ(lin pol) data of 2001Pe05. Explicit assignments are not given by 2001Pe05 for most of transitions. $\gamma(\theta)$ and/or γ(lin pol) data are consistent with ΔJ=2 for Mult=Q (E2 if polarization data are available) and with ΔJ=1 for Mult=D (E1 or M1 polarization data are available), unless otherwise noted.

& $\gamma(\theta)$ and/or γ(lin pol) data consistent with ΔJ=0, dipole or dipole+quadrupole.

^{50}Cr(^{58}Ni,4p$\alpha\gamma$),^{70}Zn(^{36}S,6nγ) 2001Pe05

Level Scheme

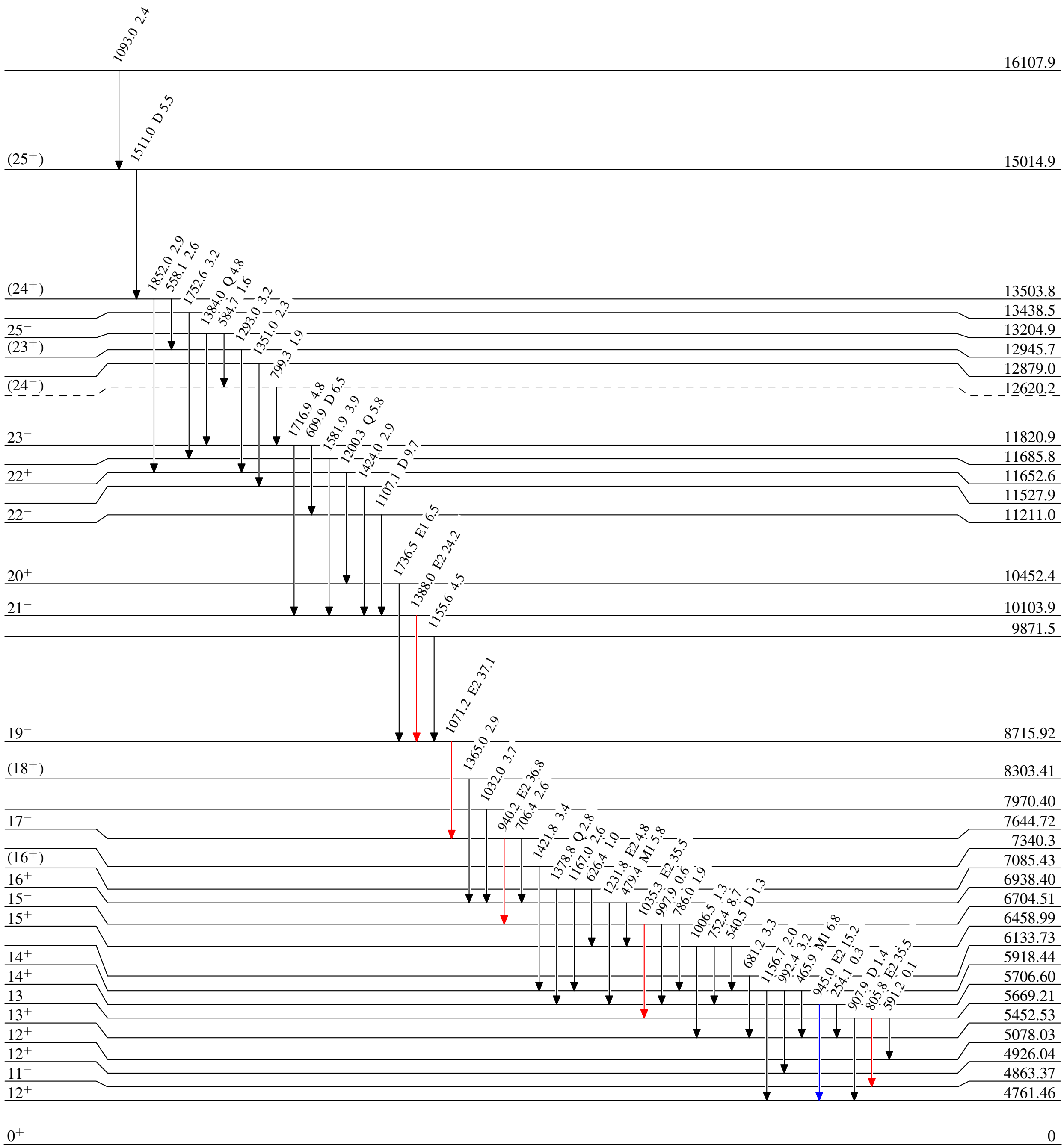
Intensities: Relative I_γ

Legend

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

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

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



$^{100}_{46}Pd_{54}$

$^{50}Cr(^{58}Ni,4p\alpha\gamma),^{70}Zn(^{36}S,6n\gamma)$ 2001Pe05

Level Scheme (continued)

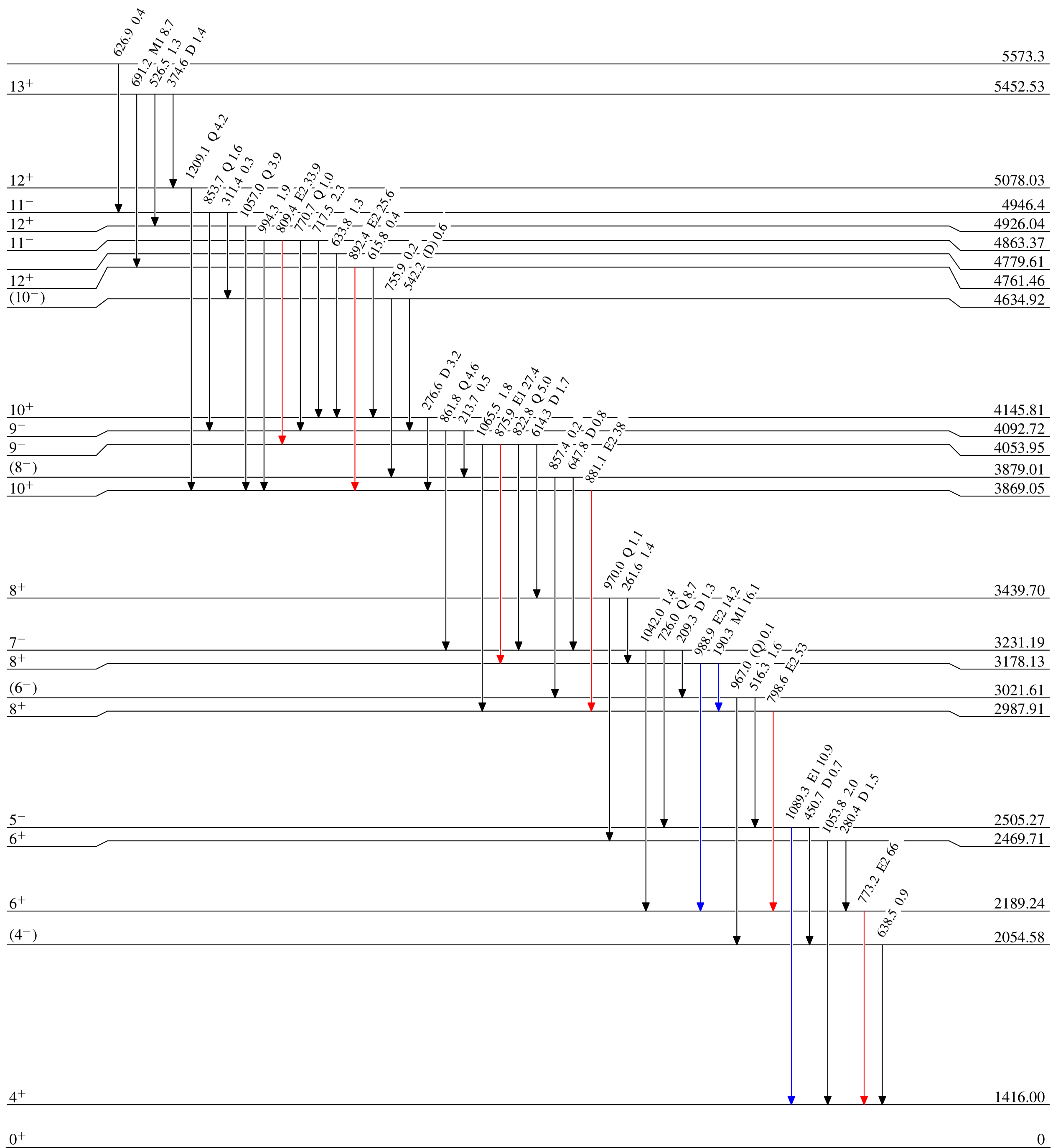
Intensities: Relative I_γ

Legend

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

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

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

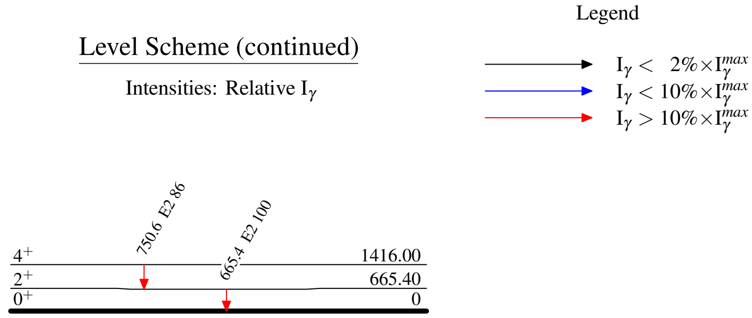


$^{100}_{46}Pd_{54}$

^{50}Cr(^{58}Ni,4p$\alpha\gamma$),^{70}Zn(^{36}S,6nγ) 2001Pe05

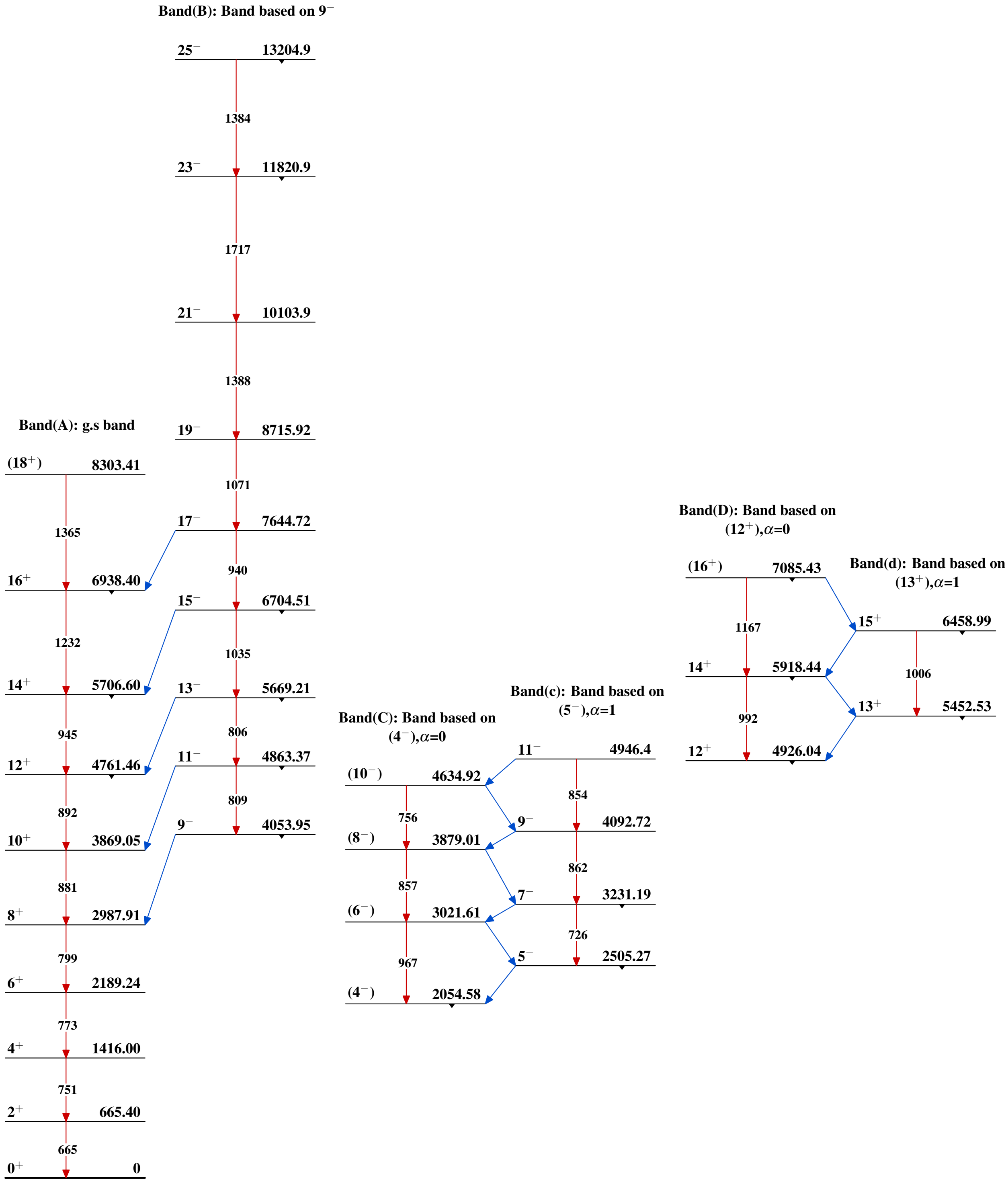
Level Scheme (continued)

Intensities: Relative I_γ



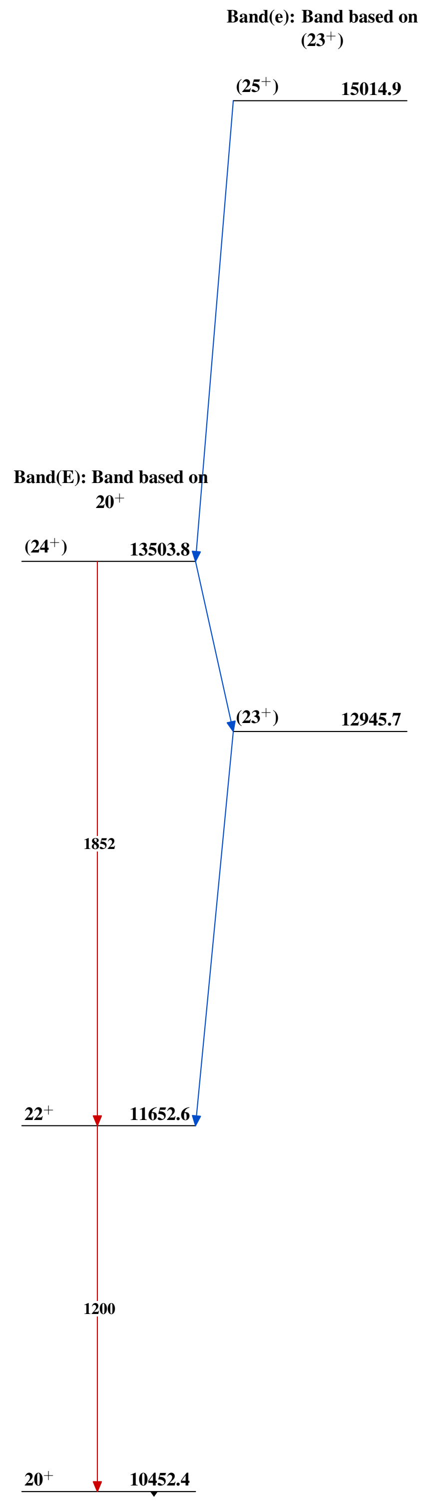
$^{100}_{46}Pd_{54}$

$^{50}Cr(^{58}Ni,4p\alpha\gamma),^{70}Zn(^{36}S,6n\gamma)$ 2001Pe05



$^{100}_{46}Pd_{54}$

$^{50}Cr(^{58}Ni,4p\alpha\gamma),^{70}Zn(^{36}S,6n\gamma)$ 2001Pe05 (continued)



$^{100}_{46}Pd_{54}$