^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 199,271 (2025)	1-Sep-2024

1993LiZR: E=97 MeV; TESSA3 array (16 BGO suppressed Ge detectors with 50-element inner BGO ball for γ sum energy and multiplicity measurements); measured Eγ, $\gamma\gamma$ coin, $\gamma\gamma\gamma$ coin, DCO ratios. See also 1993LiZX.

^{81}Rb Levels

The level scheme is that of 1993LiZR; it differs from that of 1993LiZX only due to the placement of a 63-keV γ in the cascade in the 3-quasiparticle band and a revision of the transitions connecting that band with the π=− and π=+ yrast bands. It does, however, differ from the level scheme deduced from the ^{68}Zn(^{19}F,α2nγ) reaction in several significant respects; see comment on level scheme in Adopted Levels.

E(level)[†]	J$^\pi$[‡]	Comments
0[d]	3/2$^-$	
86.3[g]	9/2$^+$	Additional information 1. E(level): rounded-off value from Adopted Levels.
153.2[e]	5/2$^-$	
433.4[f]	(7/2$^+$)[@]	J$^\pi$: 11/2$^+$ in 1993LiZR.
611.6[d]	7/2$^-$	
708.3[g]	13/2$^+$	
912.1[e]	9/2$^-$	
986.3[f]	(11/2$^+$)[@]	J$^\pi$: 15/2$^+$ in 1993LiZR.
1415.2[d]	11/2$^-$	
1582.5[g]	17/2$^+$	
1737.8[e]	13/2$^-$	
1773.5[f]	(15/2$^+$)[@]	J$^\pi$: 19/2$^+$ in 1993LiZR.
2271.2[a]	11/2$^-$	Level and band assignment not adopted; deexciting 857γ not included in Adopted Levels, Gammas.
2292.8[d]	15/2$^-$	
2480.5[&]	13/2$^-$	Level not adopted; deexciting gammas absent or differently placed in Adopted Levels, Gammas.
2573.7[e]	17/2$^-$	
2606.1[g]	21/2$^+$	
2635.5[a]	15/2$^-$	
2654.4[c]	17/2$^-$	
2697.2[&]	17/2$^-$	
2707.9[f]	(19/2$^+$)[@]	J$^\pi$: 23/2$^+$ in 1993LiZR.
2997.4[a]	19/2$^-$	
3052.7	19/2$^+$[b]	
3192.7[d]	19/2$^-$	
3292.6[e]	21/2$^-$	
3427.4[&]	21/2$^-$	
3494.4[c]	21/2$^-$	
3762.3[g]	25/2$^+$	
3952.2	23/2$^+$[b]	
3991.5[a]	23/2$^-$	
4314.1[e]	25/2$^-$	
4492.8[c]	25/2$^-$	
4589.7[&]	25/2$^-$	
5057.3	27/2$^+$[b]	

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^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR (continued)

^{81}Rb Levels (continued)

E(level)[†]	J$^\pi$[‡]	Comments
5066.8[g]	29/2$^+$	
5241.7[a]	27/2$^-$	
5493.3[e]	29/2$^-$	
5640.7[c]	29/2$^-$	
5930.8[&]	29/2$^-$	
6255.6	31/2$^+$[b]	
6561.3[g]	33/2$^+$	
6681.8[a]	31/2$^-$	
6789.5[e]	33/2$^-$	
6900.4[c]	33/2$^-$	
7517.6	35/2$^+$[b]	
8190.4	37/2$^-$[#]	Possible 5-quasiparticle bandhead (1993LiZR).
8236.3[g]	37/2$^+$	
9736.4	41/2$^-$	
10023.3[g]	41/2$^+$	

[†] From a least-squares fit to Eγ, assuming ΔE=0.5 keV for all definitely placed gammas and holding 86.3 keV level energy fixed.
[‡] From 1993LiZR, except otherwise noted. Proposed J$^\pi$ in 1993LiZR are based on unenumerated DCO ratios and the regular progression of the transition energies within proposed bands. Unless noted to the contrary (see comment on $g_{9/2}$ yrast band), values are consistent with adopted J^π, but many adopted values have parentheses added.
[#] No DCO data were obtained for 1290γ and 1401γ deexciting this level; however, strong dipole transitions are unlikely at the tops of the bands these gammas feed (1993LiZR).
[@] From Adopted Levels, see the band footnote. Adopted values are 2$\hbar$ lower.
[&] Band(A): 3-quasiparticle band, α=+1/2. Possibly K^π=11/2$^-$ arising from odd p coupled to aligned pair of $g_{9/2}$ neutrons (1993LiZR).
[a] Band(B): 3-quasiparticle band, α=−1/2. Possibly K^π=11/2$^-$ arising from odd p coupled to aligned pair of $g_{9/2}$ neutrons (1993LiZR).
[b] Band(R): π=+, α=−1/2 band. Configuration possibly includes (ν $g^2_{9/2}$) (1993LiZR). However, note that adopted π=− for this band.
[c] Band(C): π=− yrare band. Configuration possibly includes (π $g^2_{9/2}$) (1993LiZR).
[d] Band(D): Near-yrast π=− band,α=−1/2.
[e] Band(E): Near-yrast π=− band, α=+1/2. For J≥17/2, configuration possibly includes (ν $g^2_{9/2}$) (1993LiZR).
[f] Band(F): π $g_{9/2}$ yrast band, α=−1/2. Note that the authors′ J assignments in this band are obviously in error; adopted values are 2$\hbar$ lower, consistent with observed γ feeding patterns in the present reaction (typographical error assumed). "Corrected" values of J are shown here.
[g] Band(G): π $g_{9/2}$ yrast band, α=+1/2.

γ(^{81}Rb)

E$_\gamma$[†]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
63	2697.2	17/2$^-$	2635.5	15/2$^-$	
153.3	153.2	5/2$^-$	0	3/2$^-$	
154.9[‡]	2635.5	15/2$^-$	2480.5	13/2$^-$	
191[‡#]	1773.5	(15/2$^+$)	1582.5	17/2$^+$	
210.2	2480.5	13/2$^-$	2271.2	11/2$^-$	Placed differently (i.e., from 2636 level) in Adopted Levels, Gammas.
277.7	986.3	(11/2$^+$)	708.3	13/2$^+$	
281	2573.7	17/2$^-$	2292.8	15/2$^-$	
300.3	2997.4	19/2$^-$	2697.2	17/2$^-$	

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^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR (continued)

γ(^{81}Rb) (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
300.5	912.1	9/2$^-$	611.6	7/2$^-$	
321.9	1737.8	13/2$^-$	1415.2	11/2$^-$	
347.0	433.4	(7/2$^+$)	86.3	9/2$^+$	
361.3[‡]	2997.4	19/2$^-$	2635.5	15/2$^-$	May be the same γ as the 361.8γ, placed from 2656 level, in Adopted Levels, Gammas.
391[‡]	2997.4	19/2$^-$	2606.1	21/2$^+$	
429.5	3427.4	21/2$^-$	2997.4	19/2$^-$	
458.4	611.6	7/2$^-$	153.2	5/2$^-$	
502.4	1415.2	11/2$^-$	912.1	9/2$^-$	
552.7	986.3	(11/2$^+$)	433.4	(7/2$^+$)	
556[‡]	2292.8	15/2$^-$	1737.8	13/2$^-$	
564.5	3991.5	23/2$^-$	3427.4	21/2$^-$	
598.1	4589.7	25/2$^-$	3991.5	23/2$^-$	
611.3	611.6	7/2$^-$	0	3/2$^-$	
619	3192.7	19/2$^-$	2573.7	17/2$^-$	
622.1	708.3	13/2$^+$	86.3	9/2$^+$	
652.1[‡]	5241.7	27/2$^-$	4589.7	25/2$^-$	
689[‡]	5930.8	29/2$^-$	5241.7	27/2$^-$	
718.8	3292.6	21/2$^-$	2573.7	17/2$^-$	
729.8[‡]	3427.4	21/2$^-$	2697.2	17/2$^-$	Placed from 2697 level in Adopted Levels, Gammas.
740[‡]	2480.5	13/2$^-$	1737.8	13/2$^-$	
758.9	912.1	9/2$^-$	153.2	5/2$^-$	
786.9	1773.5	(15/2$^+$)	986.3	(11/2$^+$)	
803.4	1415.2	11/2$^-$	611.6	7/2$^-$	
824.7	1737.8	13/2$^-$	912.1	9/2$^-$	
836.5	2573.7	17/2$^-$	1737.8	13/2$^-$	
840.6	3494.4	21/2$^-$	2654.4	17/2$^-$	
855[‡]	3427.4	21/2$^-$	2573.7	17/2$^-$	
857[‡]	2271.2	11/2$^-$	1415.2	11/2$^-$	
874.2	1582.5	17/2$^+$	708.3	13/2$^+$	
876.6	2292.8	15/2$^-$	1415.2	11/2$^-$	
899.5	3952.2	23/2$^+$	3052.7	19/2$^+$	
900.0	3192.7	19/2$^-$	2292.8	15/2$^-$	
900.2	986.3	(11/2$^+$)	86.3	9/2$^+$	
917.3	2654.4	17/2$^-$	1737.8	13/2$^-$	
920[‡]	3494.4	21/2$^-$	2573.7	17/2$^-$	
934.9	2707.9	(19/2$^+$)	1773.5	(15/2$^+$)	
958	2697.2	17/2$^-$	1737.8	13/2$^-$	
994.0	3991.5	23/2$^-$	2997.4	19/2$^-$	
998.5	4492.8	25/2$^-$	3494.4	21/2$^-$	
1021.5	4314.1	25/2$^-$	3292.6	21/2$^-$	
1023.0	2606.1	21/2$^+$	1582.5	17/2$^+$	
1054[‡]	2635.5	15/2$^-$	1582.5	17/2$^+$	
1065.9	1773.5	(15/2$^+$)	708.3	13/2$^+$	
1105.1	5057.3	27/2$^+$	3952.2	23/2$^+$	
1125	2707.9	(19/2$^+$)	1582.5	17/2$^+$	
1147.9	5640.7	29/2$^-$	4492.8	25/2$^-$	
1156.1	3762.3	25/2$^+$	2606.1	21/2$^+$	
1162.5[‡]	4589.7	25/2$^-$	3427.4	21/2$^-$	
1179.1	5493.3	29/2$^-$	4314.1	25/2$^-$	
1198.3	6255.6	31/2$^+$	5057.3	27/2$^+$	
1250.1[‡]	5241.7	27/2$^-$	3991.5	23/2$^-$	

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^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR (continued)

$\gamma(^{81}Rb)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
1259.8	6900.4	$33/2^-$	5640.7	$29/2^-$	1440.0[‡]	6681.8	$31/2^-$	5241.7	$27/2^-$
1262.0	7517.6	$35/2^+$	6255.6	$31/2^+$	1470.2	3052.7	$19/2^+$	1582.5	$17/2^+$
1290.0	8190.4	$37/2^-$	6900.4	$33/2^-$	1494.5	6561.3	$33/2^+$	5066.8	$29/2^+$
1296.2	6789.5	$33/2^-$	5493.3	$29/2^-$	1546.0	9736.4	$41/2^-$	8190.4	$37/2^-$
1304.5	5066.8	$29/2^+$	3762.3	$25/2^+$	1570[‡]	2480.5	$13/2^-$	912.1	$9/2^-$
1341.1[‡]	5930.8	$29/2^-$	4589.7	$25/2^-$	1675.0	8236.3	$37/2^+$	6561.3	$33/2^+$
1346	3952.2	$23/2^+$	2606.1	$21/2^+$	1787.0	10023.3	$41/2^+$	8236.3	$37/2^+$
1385[‡]	3991.5	$23/2^-$	2606.1	$21/2^+$	1927	2635.5	$15/2^-$	708.3	$13/2^+$
1400.8	8190.4	$37/2^-$	6789.5	$33/2^-$					

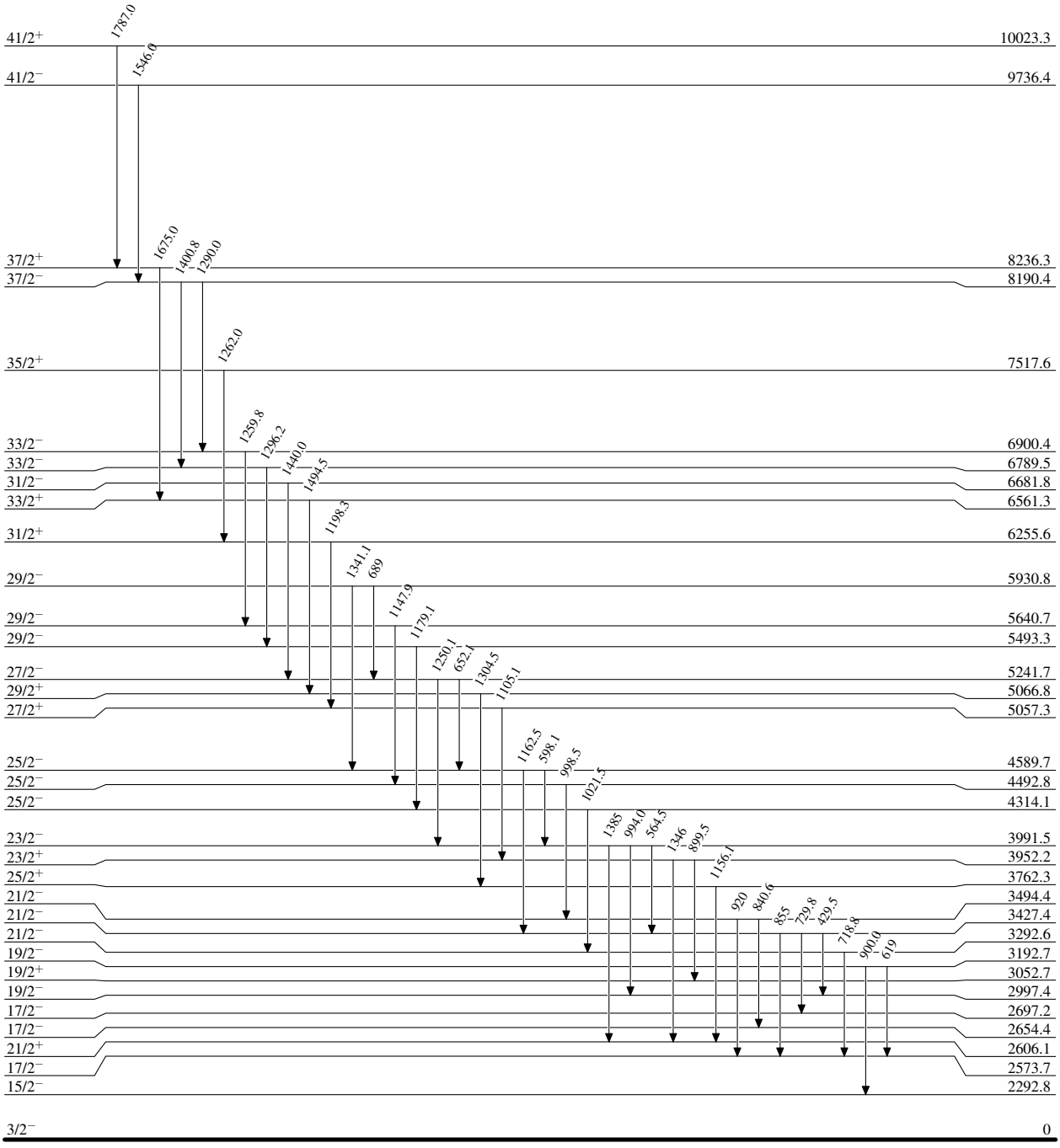
† From 1993LiZX; ΔE unstated by authors. Eγ values appear to be slightly lower than those in ^{68}Zn(^{19}F,α2nγ).

‡ Transition has not been confirmed in a subsequent (^{19}F,α2nγ) study with superior statistics. Since the present study has not been published, the evaluator has chosen not to include this transition in Adopted Gammas.

Placement of transition in the level scheme is uncertain.

^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR

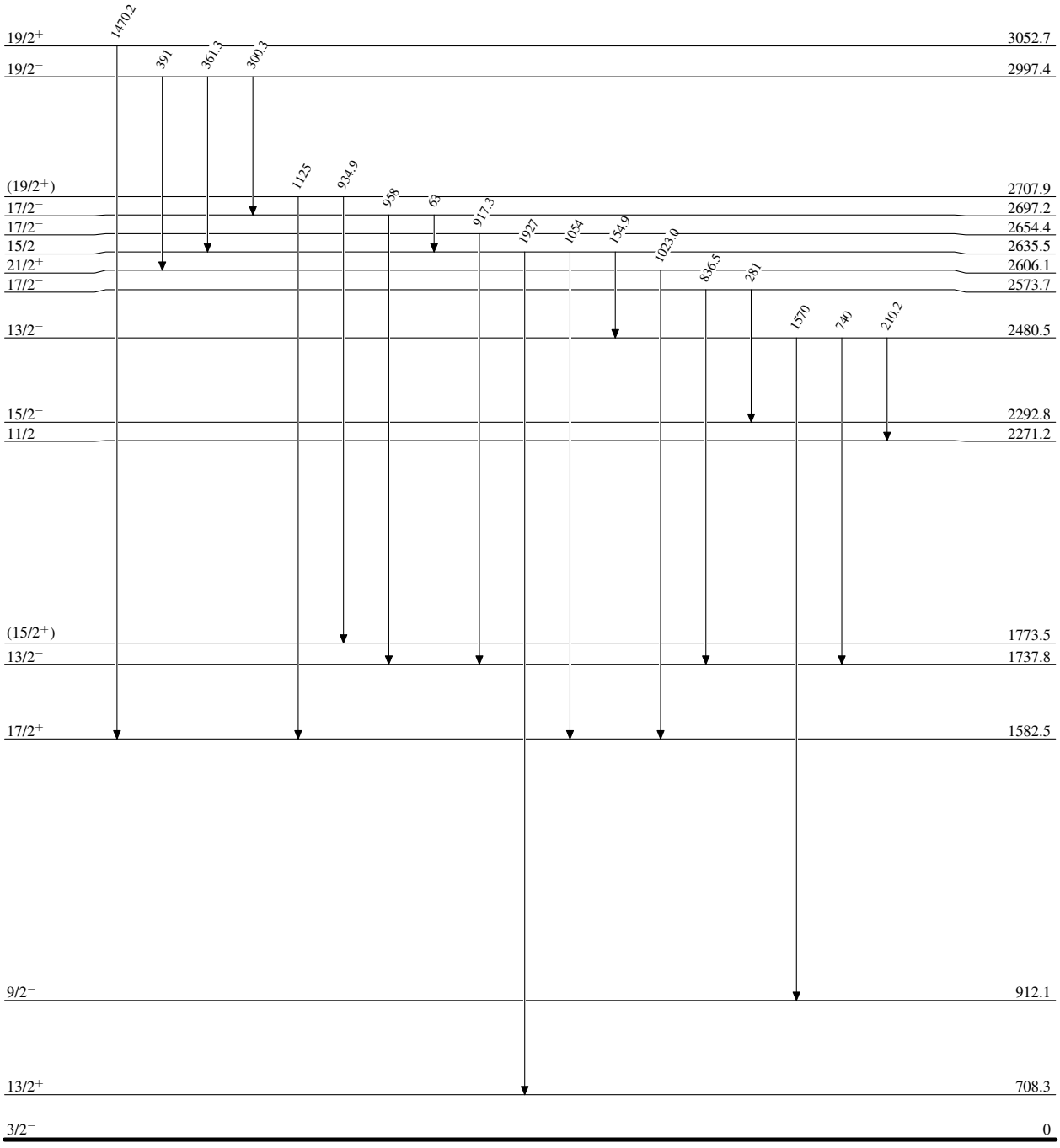
Level Scheme



$^{81}_{37}Rb_{44}$

^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR

Level Scheme (continued)



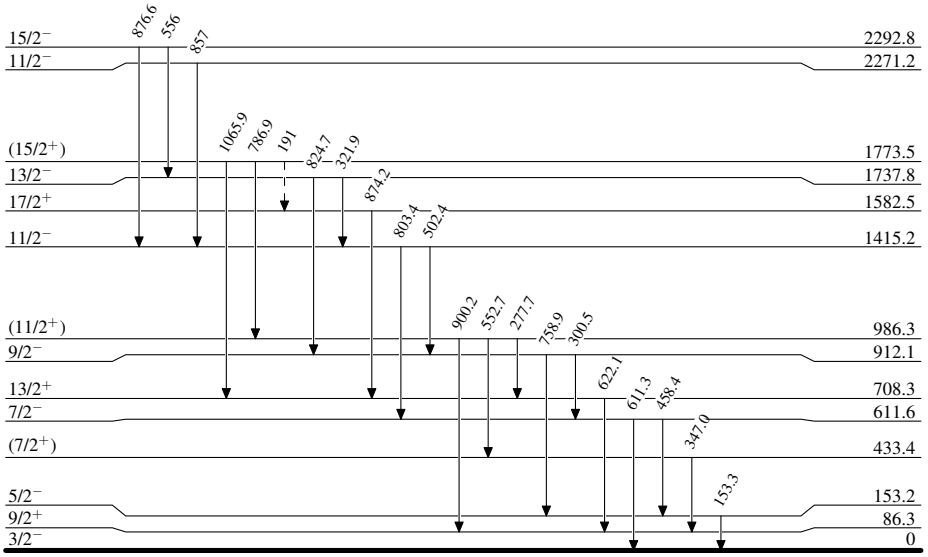
$^{81}_{37}Rb_{44}$

^{53}Cr(^{31}P,2pnγ) 1993LiZX,1993LiZR

Legend

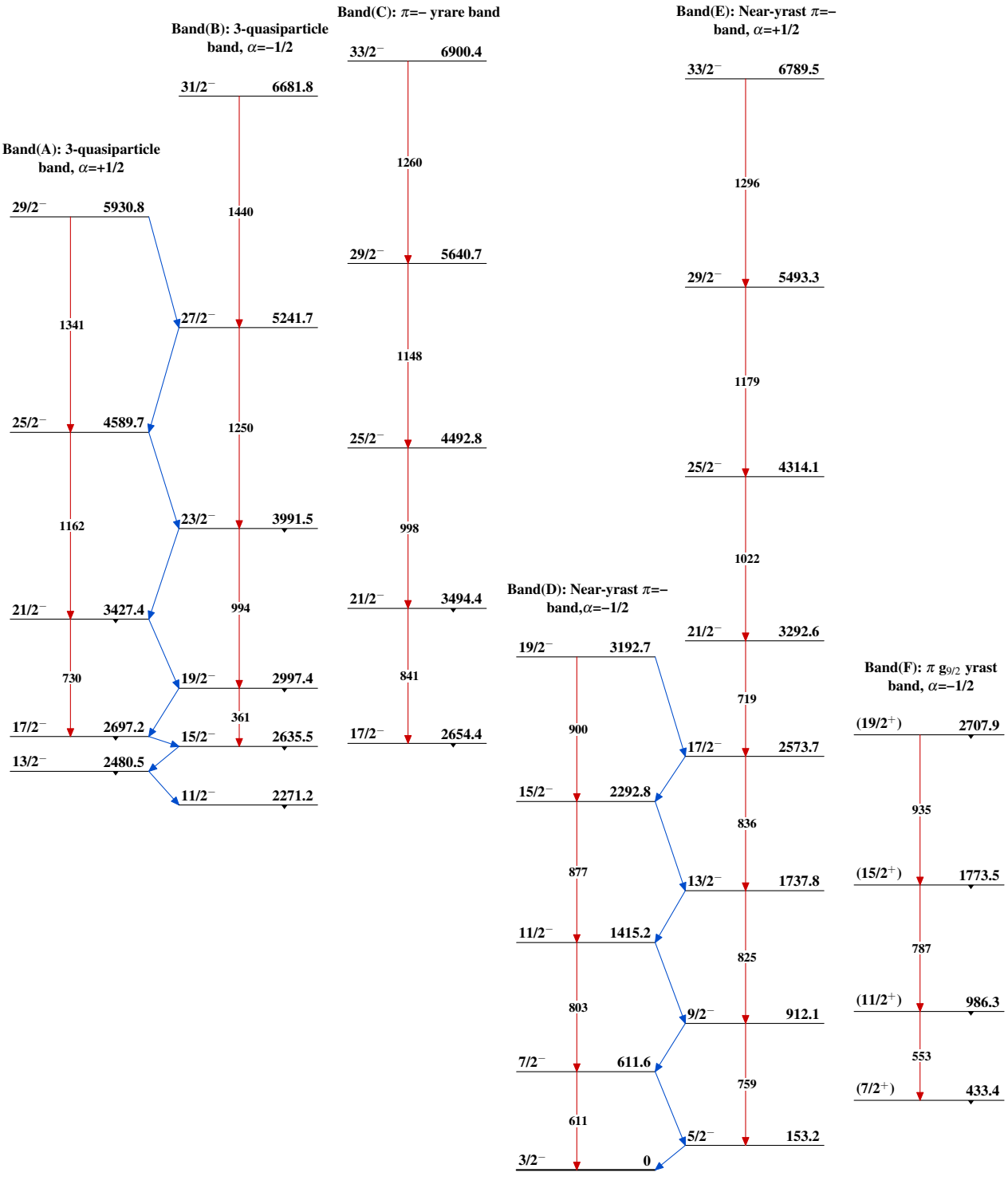
Level Scheme (continued)

γ Decay (Uncertain)



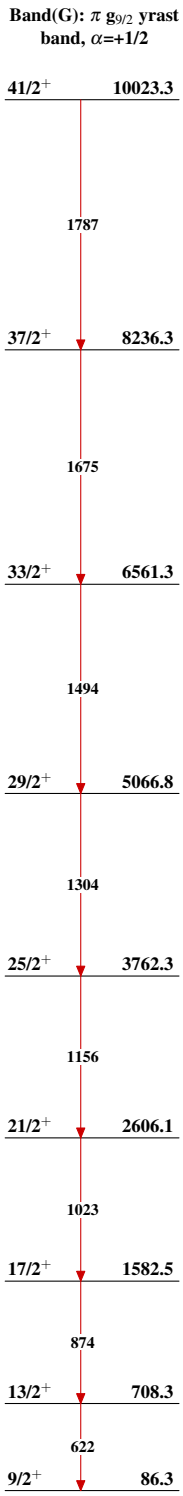
$^{81}_{37}Rb_{44}$

$^{53}Cr(^{31}P,2pn\gamma)$ 1993LiZX,1993LiZR



$^{81}_{37}Rb_{44}$

$^{53}Cr(^{31}P,2pn\gamma)$ 1993LiZX,1993LiZR (continued)



$^{81}_{37}Rb_{44}$