^{186}W(^{136}Xe,^{136}Xe′γ) 2021Pr11

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. C. Batchelder and A. M. Hurst, M. S. Basunia	NDS 183, 1 (2022)	1-Mar-2022

^{136}Xe beam, E=725 to 800 MeV, delivered by the ATLAS accelerator at ANL, impinged a target of ^{186}W (99.8% enriched, thickness 250- μg/cm^2). Scattered beam- and target-like ions were detected and identified with the upgraded Rochester-Livermore 4π compact heavy-ion counter, CHICO2. Prompt γ rays were detected by the Gammasphere array, comprised of 91 Compton-suppressed high-purity germanium (HPGe) detectors. Measured Eγ, γ-ray branching, particle-γ coin, γ-γ coin, γ-γ-γ coin, DCO ratio, anisotropy, etc.. Deduced excited levels, level scheme, rotational band, spin-parity, γ ray multipolarity, etc.

^{186}W Levels

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0.0‡	0+	1045.406[a] *21*	3−	1713.5[a] *4*	7−	2750.4‡ *7*	12+
122.637‡ *16*	2+	1171.62& *5*	4−	1903.96# *22*	8+	2806.5[a] *7*	11−
396.557‡ *19*	4+	1197.31@ *3*	5+	1979.0& *5*	8−	2887.4@ *6*	11+
737.944# *22*	2+	1298.93[b] *3*	4+	2001.9‡ *5*	10+	3188.2# *5*	12+
809.26‡ *3*	6+	1322.14[a] *3*	5−	2142.7[b] *5*	8+	3237.8& *8*	12−
862.302@ *21*	3+	1349.0‡ *4*	8+	2212.0[a] *6*	9−	3371.2[b] *8*	12+
883.60[b] *3*	0+	1398.09# *4*	6+	2220.2@ *4*	9+	3483.3[a] *8*	13−
952.72& *3*	2−	1514.63& *25*	6−	2511.0# *4*	10+	3561.9‡ *8*	14+
1006.740# *20*	4+	1652.76@ *19*	7+	2555.8& *7*	10−	3913.3# *7*	14+
1030.237[b] *16*	2+	1672.4[b] *3*	6+	2707.1[b] *7*	10+		

† From a least-squares fit to γ-ray energies.
‡ Band(A): G.S. band.
# Band(B): K=2+ band: α=0. γ band.
@ Band(b): K=2+ band: α=1. γ band.
& Band(C): K=2− band: α=0. Octupole band.
[a] Band(c): K=2− band: α=1. Octupole band.
[b] Band(D): K=0+ band.

γ(^{186}W)

E_i(level)	J_i^π	E_γ†	I_γ	E_f	J_f^π	Mult.#	Comments
122.637	2+	122.64‡ *2*	100	0.0	0+	Q	R_{DCO}=0.925 *5*. Mult.: E2 in 2021Pr11 from literature.
396.557	4+	273.93‡ *5*	100	122.637	2+	Q	R_{DCO}=1.006 *6*. Mult.: E2 in 2021Pr11 from literature.
737.944	2+	341.0‡ *10*	0.9 *1*	396.557	4+		
		615.31‡ *2*	96 *3*	122.637	2+		
		737.97‡ *8*	100	0.0	0+		
809.26	6+	412.69‡ *2*	100	396.557	4+	Q	R_{DCO}=1.000 *4*. Mult.: E2 in 2021Pr11 from literature.
862.302	3+	465.70‡ *2*	32.7 *11*	396.557	4+		
		739.73‡ *3*	100	122.637	2+	D+Q	R_{DCO}=0.797 *24*. Mult.: (M1+E2) in 2021Pr11 from literature.

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^{186}W(^{136}Xe,^{136}Xe′γ) 2021Pr11 (continued)

γ(^{186}W) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ	E_f	J_f^π	Mult.[#]	Comments
883.60	0^+	760.96[‡] *2*	100	122.637	2^+		
952.72	2^-	90.6 *3*	20.3 *11*	862.302	3^+		
		214.75[‡] *4*	100	737.944	2^+	E1	
		830.11[‡] *3*	3.3 *5*	122.637	2^+		
1006.740	4^+	144.5 *3*	0.7 *1*	862.302	3^+		
		268.85[‡] *5*	6.3 *2*	737.944	2^+		
		610.22[‡] *2*	100	396.557	4^+		
		884.08[‡] *2*	58.7 *17*	122.637	2^+	Q	R_{DCO}=1.204 *42*. Mult.: E2 in 2021Pr11 from literature.
1030.237	2^+	146.6 *3*	<3	883.60	0^+		
		292.4 *6*	14.4 *9*	737.944	2^+		
		633.70[‡] *2*	59 *3*	396.557	4^+		
		907.58[‡] *2*	100	122.637	2^+		
		1030.23[‡] *2*	67.7 *24*	0.0	0^+		
1045.406	3^-	92.7[‡] *3*	<3	952.72	2^-		
		183.08[‡] *2*	32.1 *10*	862.302	3^+		
		307.51[‡] *6*	100	737.944	2^+		
		922.77[‡] *2*	9.5 *5*	122.637	2^+		
		1045[‡]	<3	0.0	0^+		
1171.62	4^-	126.31[‡] *20*	<4	1045.406	3^-		
		164.77[‡] *7*	10.1 *5*	1006.740	4^+		
		218.93[‡] *6*	35.5 *14*	952.72	2^-		
		309.38[‡] *8*	100	862.302	3^+		
1197.31	5^+	190.6 *3*	<1	1006.740	4^+		
		335.04[‡] *5*	30.3 *10*	862.302	3^+		
		388.17[‡] *13*	3.5 *2*	809.26	6^+		
		800.74[‡] *2*	100	396.557	4^+	D+Q	R_{DCO}=0.634 *13*.
1298.93	4^+	268.5 *4*	72 *3*	1030.237	2^+		
		292.2 *6*	7.1 *6*	1006.740	4^+		
		902.40[‡] *3*	73 *3*	396.557	4^+	D+Q	R_{DCO}=0.900 *78*.
		1176.27[‡] *3*	100	122.637	2^+		
1322.14	5^-	150.5 *3*	9.9 *4*	1171.62	4^-		
		276.72[‡] *2*	100	1045.406	3^-		
		315.44[‡] *3*	77 *4*	1006.740	4^+	D+Q	R_{DCO}=0.638 *61*.
1349.0	8^+	540[‡]	100	809.26	6^+	Q	R_{DCO}=1.077 *6*. Mult.: E2 in 2021Pr11 from literature.
1398.09	6^+	200.7 *3*	5.2 *2*	1197.31	5^+		
		391.46[‡] *5*	100	1006.740	4^+		
		588.70[‡] *5*	69.3 *21*	809.26	6^+	D	R_{DCO}=0.493 *12*.
		1001.55[‡] *6*	54.3 *17*	396.557	4^+	Q	R_{DCO}=0.995 *27*.
1514.63	6^-	192.5 *3*	<5	1322.14	5^-		
		343.0 *4*	100	1171.62	4^-		
1652.76	7^+	254.6 *3*	<1	1398.09	6^+		
		455.6 *4*	100	1197.31	5^+	Q	R_{DCO}=0.925 *37*.
		843.4 *4*	49.4 *23*	809.26	6^+	D	R_{DCO}=0.479 *29*.
1672.4	6^+	373.6 *4*	100	1298.93	4^+		
		1275.7 *4*	66 *3*	396.557	4^+		
1713.5	7^-	391.4 *4*	100	1322.14	5^-		
1903.96	8^+	251.2 *3*	<1	1652.76	7^+		

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^{186}W(^{136}Xe,^{136}Xe′γ) 2021Pr11 (continued)

γ(^{186}W) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ	E_f	J_f^π	Mult.[#]	Comments
1903.96	8^+	506.1 *4*	100	1398.09	6^+	Q	R_{DCO}=0.946 *18*.
		554.9 *4*	6.6 *2*	1349.0	8^+	D	R_{DCO}=0.442 *24*.
		1094.5 *4*	5.0 *2*	809.26	6^+	Q	R_{DCO}=1.005 *67*.
1979.0	8^-	464.4 *4*	100	1514.63	6^-		
2001.9	10^+	653[‡]	100	1349.0	8^+	Q	R_{DCO}=1.003 *10*. Mult.: E2 in 2021Pr11 from literature.
2142.7	8^+	470.3 *4*	100	1672.4	6^+		
2212.0	9^-	498.5 *4*	100	1713.5	7^-		
2220.2	9^+	567.3 *4*	100	1652.76	7^+	Q	R_{DCO}=1.129 *87*.
		871.2 *4*	15 *4*	1349.0	8^+		
2511.0	10^+	509.1 *4*	14.1 *18*	2001.9	10^+	D	R_{DCO}=0.552 *22*.
		607.1 *4*	100	1903.96	8^+	Q	R_{DCO}=1.163 *55*.
		1161.9 *4*	<4	1349.0	8^+		
2555.8	10^-	576.8 *4*	100	1979.0	8^-		
2707.1	10^+	564.4 *4*	100	2142.7	8^+		
2750.4	12^+	748.5 *4*	100	2001.9	10^+	Q	R_{DCO}=1.002 *18*.
2806.5	11^-	594.5 *4*	100	2212.0	9^-		
2887.4	11^+	667.2 *4*	100	2220.2	9^+		
3188.2	12^+	677.1 *4*	100	2511.0	10^+		
		1186.3 *4*	<20	2001.9	10^+		
3237.8	12^-	682.0 *4*	100	2555.8	10^-		
3371.2	12^+	664.1 *4*	100	2707.1	10^+		
3483.3	13^-	676.8 *4*	100	2806.5	11^-		
3561.9	14^+	811.5 *4*	100	2750.4	12^+	Q	R_{DCO}=1.073 *45*.
3913.3	14^+	725.1 *4*	100	3188.2	12^+		

[†] Eγ uncertainty is mentioned as 0.3 keV in the text and listed for some in Table I. The evaluator propagated these uncertainties in quadrature. Eγ in Table I without uncertainty were taken from the literature, as noted by the authors. Here those are taken from the Adopted Gammas.

[‡] From Adopted Gammas.

[#] Assinged in 2021Pr11, based on R_{DCO}=[Iγ(0°−20°)/ Iγ(80°−100°)]. The ratio values were normalized to the measured ratio for the stretched Q transition, 6_1^+ to 4_1^+. Expected $R_{DCO} \approx 1$ for stretched Q and $R_{DCO} \approx 0.5$ for stretched dipole.

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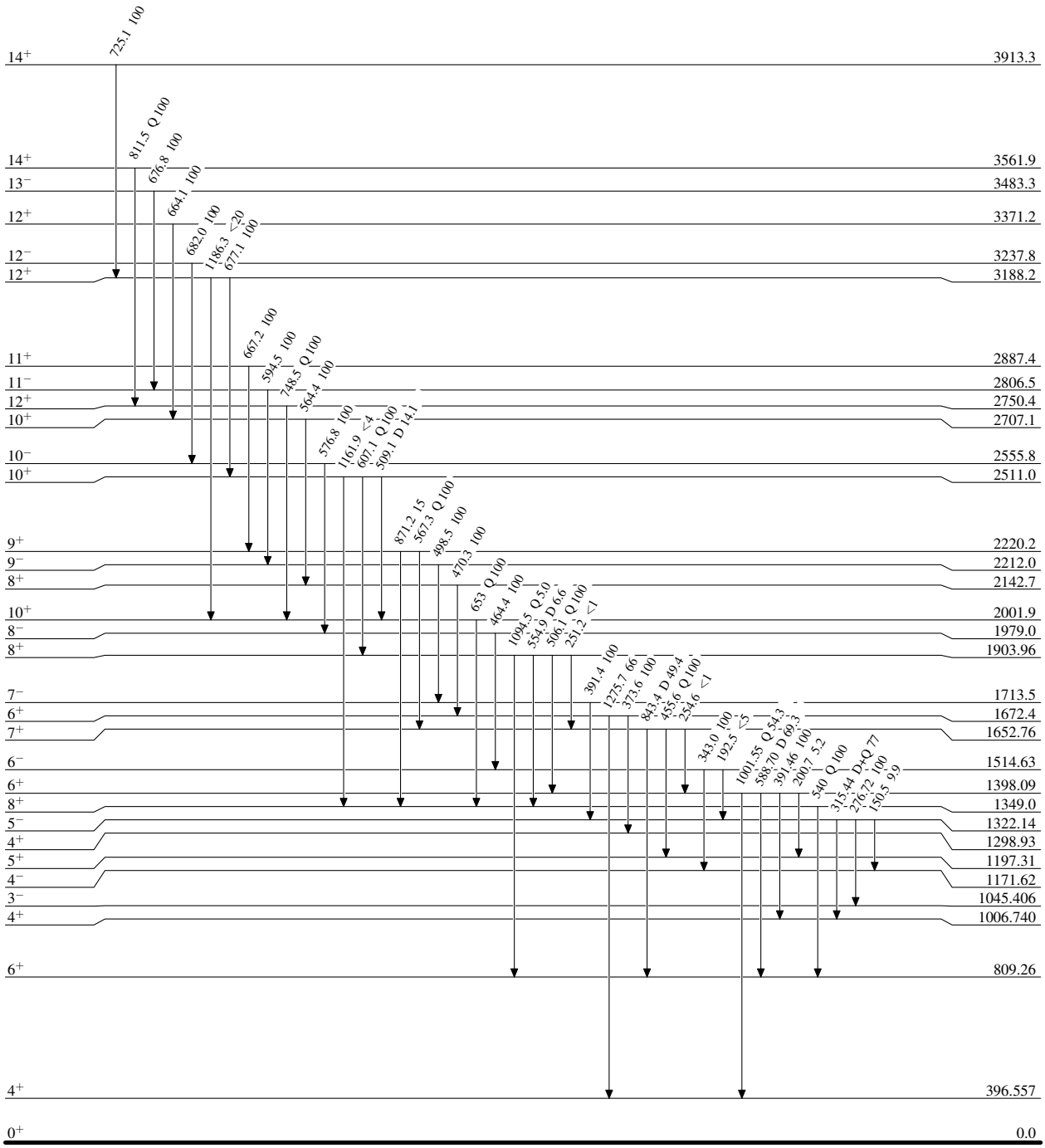
Level Scheme

Intensities: Relative photon branching from each level

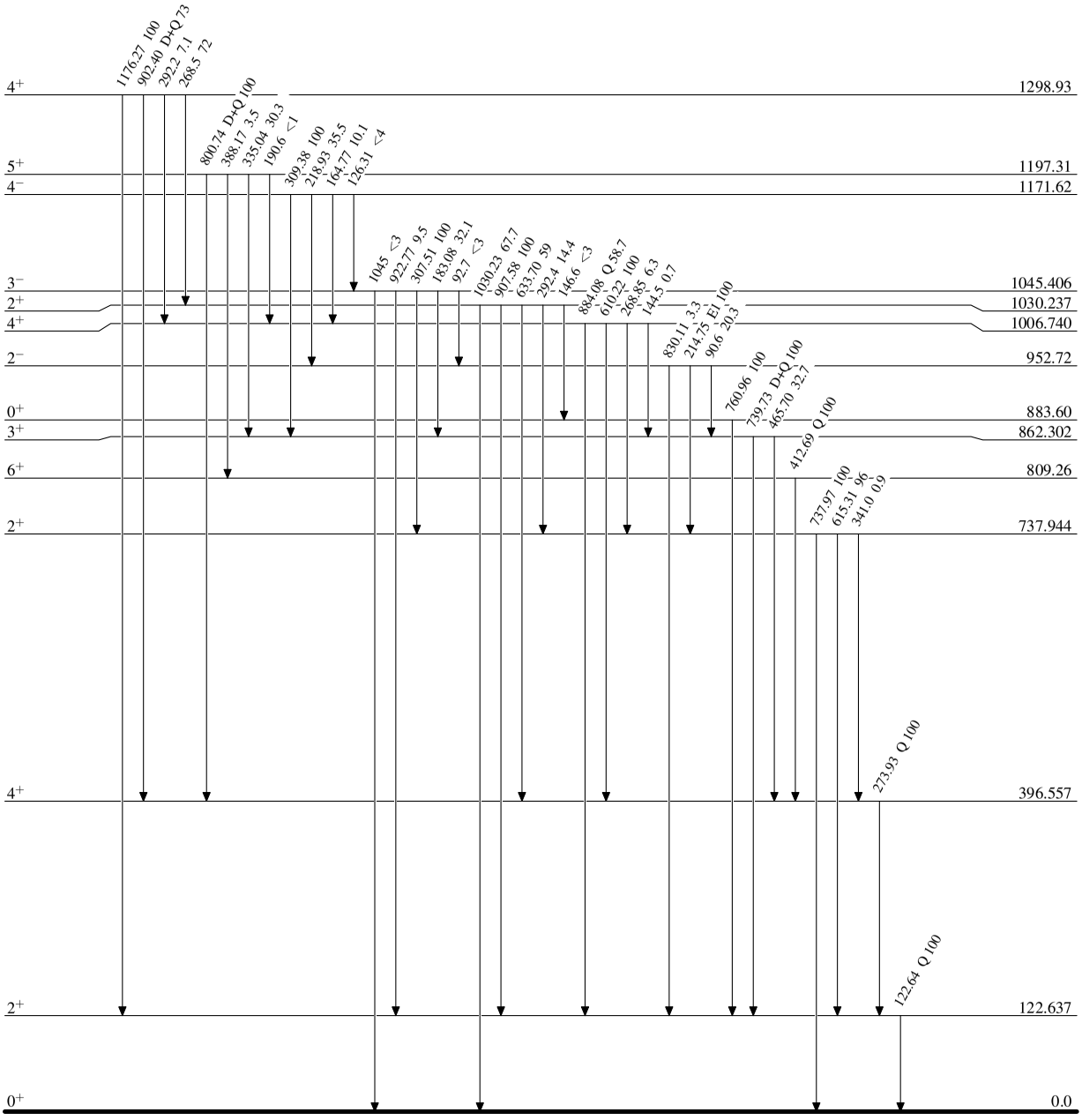


$^{186}_{74}W_{112}$

^{186}W(^{136}Xe,^{136}Xe′γ) 2021Pr11

Level Scheme (continued)

Intensities: Relative photon branching from each level



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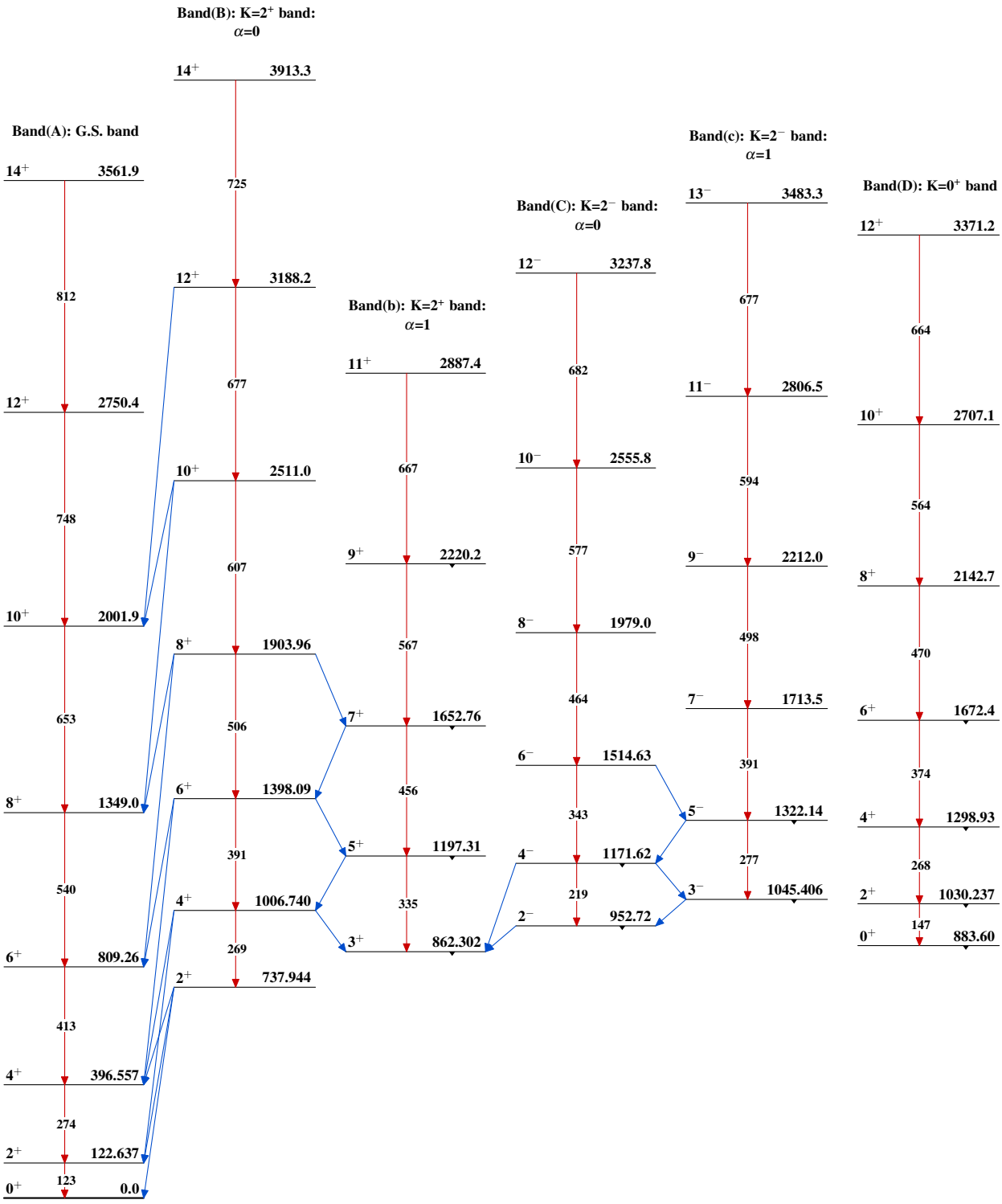

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