

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Yang Dong, Huo Junde		NDS 128, 185 (2015)	10-Jul-2015

$Q(\beta^-) = -4711.2$ 19; $S(n) = 12038.4$ 9; $S(p) = 10503.4$ 9; $Q(\alpha) = -9351.3$ 6 [2012Wa38](#)
 Other reactions: $^{48}\text{Ti}(\alpha, \gamma)$ E=6-12 MeV, [1976Fo04](#); $^{48}\text{Ti}(^{16}\text{O}, ^{12}\text{C})$ E=120 MeV ([1979Da07](#)); $^{53}\text{Cr}(^{12}\text{C}, ^{13}\text{C})$ E=18.5-33 MeV ([1974PaZZ](#)); $^{54}\text{Fe}(^{18}\text{O}, ^{20}\text{Ne})$ E=48,50 MeV ([1972SiYD](#), [1975PeZM](#)).

 ^{52}Cr LevelsCross Reference (XREF) Flags

A	$^{52}\text{V} \beta^-$ decay (3.743 min)	M	$^{52}\text{Cr}(\gamma, \gamma')$, (pol γ, γ')	Y	$^{52}\text{Cr}(^{16}\text{O}, ^{16}\text{O}'), (^{18}\text{O}, ^{18}\text{O}')$
B	$^{52}\text{Mn} \varepsilon$ decay (5.591 d)	N	$^{52}\text{Cr}(e, e')$	Z	Coulomb excitation
C	$^{52}\text{Mn} \varepsilon$ decay (21.1 min)	O	$^{52}\text{Cr}(\pi^+, \pi^+), (\pi^+, \pi^+')$	Others:	
D	(HI, xn γ)	P	$^{52}\text{Cr}(n, n')$	AA	$^{50}\text{Cr}(\alpha, ^2\text{He})$
E	$^{50}\text{Ti}(^3\text{He}, n)$	Q	$^{52}\text{Cr}(n, n'\gamma)$	AB	$^{53}\text{Cr}(p, d)$
F	$^{52}\text{Cr}(p, p'\gamma)$	R	$^{50}\text{V}(\alpha, d)$	AC	$^{53}\text{Cr}(d, t)$, (pol d, t)
G	$^{52}\text{Cr}(p, p')$	S	$^{50}\text{Ti}(^{16}\text{O}, ^{14}\text{C})$	AD	$^{53}\text{Cr}(^3\text{He}, \alpha)$
H	$^{50}\text{Cr}(t, p)$	T	$^{52}\text{Cr}(d, d')$	AE	$^{54}\text{Cr}(p, t)$
I	$^{51}\text{V}(p, \gamma)$ E=res:IAR	U	$^{52}\text{Cr}(^3\text{He}, ^3\text{He}')$	AF	$^{55}\text{Mn}(\mu^-, ^3n\gamma)$
J	$^{51}\text{V}(^3\text{He}, d)$	V	$^{52}\text{Cr}(\alpha, \alpha')$	AG	$^{51}\text{V}(\alpha, t)$
K	$^{51}\text{V}(^3\text{He}, d\gamma)$	W	$^{52}\text{Cr}(^7\text{Li}, ^7\text{Li}')$	AH	$^{56}\text{Fe}(d, ^6\text{Li})$
L	$^{55}\text{Mn}(p, \alpha)$	X	$^{52}\text{Cr}(^{12}\text{C}, ^{12}\text{C}'), (^{13}\text{C}, ^{13}\text{C}')$	AI	$\text{Ni}(K^-, x \text{ ray}\gamma), (\pi^+, x\gamma), (\pi^-, X\gamma)$

E(level) [†]	J^π	$T_{1/2}^m$	XREF	Comments
0.0 ^P	0 ⁺	stable	ABCDEFGHIJKLMNO Q S UVWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF, AG, AH, AI rms charge radius=3.6424 fm 21 (2004An14). others: rms charge radius=3.61 fm 8, muonic x-ray (1962Jo05), rms charge radius=3.674 fm 15 (1976Li19) (e, e').
1434.091 ^P 14	2 ⁺	0.783 ps 21	ABCDEFGHIJKLMNO PQ STUVWXYZ	XREF: Others: AB, AC, AD, AE, AF, AG, AH, AI $\mu = +2.41$ 13 (2000Er01) $Q = -0.082$ 16 (1989Ra17) J^π : E2 γ to 0 ⁺ . $T_{1/2}$: From Coulomb Ecitation. Other: 0.69 PS +31-17 ($^3\text{He}, d\gamma$) and >0.49 ps (n, n γ). μ : Others: +3.0 5 (1987St07) and +3.2 22 (1987Pa28).
2369.630 ^P 18	4 ⁺	6.7 ps +35-17	ABCD FG IJKL NOPQ ST VW Z	XREF: Others: AB, AC, AD, AE, AF, AG, AH $B(E4)\uparrow = 0.00066$ 8 XREF: K(2368)L(2371)T(2372)AD(2380). J^π : $L(\alpha, \alpha') = 4$. $B(E4)\uparrow$: from weighted average of 0.00067 12 in (e, e') and 0.00066 10 in ($\pi^+, \pi^+), (\pi^+, \pi^+')$. $T_{1/2}$: From DSAM (Coulomb Ecitation). Others: 9.4 ps +24-16, DSAM (HI, xn γ), 1.04 PS +35-17 ($^3\text{He}, d\gamma$) DSAM.
2646.9 6	0 ⁺		A FGH L NO Q S V	XREF: Others: AB, AC, AE, AH XREF: H(2660)L(2650)N(2650)O(2650)S(2640)V(2650)AC(2640)AH(2650). J^π : $L(p, p') = L(e, e') = L(t, p) = L(p, t) = 0$.
2767.767 21	4 ⁺	1.9 ps 5	ABCD FG IJKL NO Q ST VW	XREF: Others: AA, AB, AC, AD, AE, AG XREF: N(2770)O(2770)V(2770)AA(2770)AC(2770)AD(

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF	Comments
2964.786 17	2 ⁺	0.42 ps 8	A C FGHIJKL NO Q ST V	J ^π : L(α,α')=4. T _{1/2} : DSAM, from weighted average of values 1.4 ps +5-3 (³ He,dγ) and 2.5 ps 6 (HI,xny). XREF: Others: AB XREF: H(2974)N(2970)O(2960)V(2960). J ^π : E2 γ to 0 ⁺ . T _{1/2} : from (p,p'γ). Others: 0.47 ps +22-13, DSAM (³ He,dγ), 0.42 ps 21 (n,n'γ).
3113.858 ^p 21	6 ⁺	41.4 ps 14	B D G IJKL N Q S VW	XREF: Others: AA, AB, AG, AH XREF: N(3110)V(3110)AA(3110)AG(3110)AH(3110). J ^π : L(p,p')=6, E2 γ to 4 ⁺ .
3161.74 6	2 ⁺	0.035 ⁿ ps 7	A C FGHI KLMNO Q VW	T _{1/2} : RDM. Other: >1.8 ps (³ He,dγ), DSAM. XREF: Others: AB, AE, AH XREF: H(3175)AE(3168). J ^π : L(α,α')=2.
3415.32 ^g 3	4 ⁺	0.26 ps 7	AB D FG IJKL O Q V	T _{1/2} : Others: 0.08 ps +4-3 (³ He,dγ) and 33 fs 5 (p,p'γ). XREF: Others: AB, AD XREF: J(3420)O(3420)V(3450)AB(3432)AD(3418). J ^π : L(p,p')=4.
3472.25 15	3 ⁺	7.2 ps 8	A CD FG I KL Q S	T _{1/2} : from weighted average of values 0.22 ps +8-5 (³ He,dγ) and 0.33 ps 9 (HI,xny). XREF: Others: AB, AC, AD, AG XREF: S(3440)AB(3494)AC(3460)AG(3440). J ^π : 1968Mo19 propose the existence of two levels in this vicinity separated by 3.0 keV, one decaying by 703γ and having a spin of 3, 5 (from p,p'γ(θ)), and another with spin 2 decaying by 2038γ. Subsequent work (1977Ya08, 1974Br04) shows that a single level at 3472.2 emits two γ's (704.6 (78%) and 2038.0 (22%)) and suggests that the two-level hypothesis was a result of an error in the energy assigned to the 704γ by 1968Mo19. Furthermore, the p,p'γ(θ) data on the 2038γ (1968Mo19) were found to be consistent with 3. T _{1/2} , together with L in transfer, suggest π=+. One further complication is the assignment of L=4 to the level by 1970Pr08 in (p,p'). L(p,p')=2+3. Thus existence of a J ^π =4 ⁺ level at 3472 is tentatively ruled out.
3615.924 22	5 ⁺	2.6 ps 12	B D G IJKL	T _{1/2} : RDM. Other: >1.9 ps (³ He,dγ), DSAM, GT 0.49 ps (n,n'γ). XREF: Others: AB XREF: J(3620)L(3619). J ^π : log ft=6.15 from 6 ⁺ , γ(θ) in (HI,xny); π from L(³ He,d)=1.
3739.6 ^a	1 ⁺ , 1 ⁻ , 2 ⁺		M	T _{1/2} : from 1.4 ps < T _{1/2} < 3.8 ps, lower limit, DSAM; upper, RDM. Other: >0.76 ps in (³ He,dγ), and 0.10 ps 7 (n,n'γ). J ^π : From (γ,γ') (1998En05), based on values of reduced transition strengths(↑).
3771.72 14	2 ⁺	9 fs 2	A C EFGH JKLMNO Q S V	XREF: Others: AB, AC, AD, AG XREF: E(3700)H(3781)S(3780)V(3780)AB(3767)AC

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Adopted Levels, Gammas (continued)

^{52}Cr Levels (continued)				
E(level) [†]	J^π	$T_{1/2}^m$	XREF	Comments
3947.5 6	2 ⁺	0.014 ⁿ ps 7	G I KL Q	J^π : L(α, α')=2, L($^3\text{He}, d$)=1. B(E2) \uparrow =0.0071 8 (2007En02). $T_{1/2}$: from weighted average of values 9 fs 3 (n, n' γ) and 9 fs 4 (p, p' γ). XREF: Others: AB XREF: G(3949)AB(3926).
3951.2 10	2 ⁺		C GH J	J^π : L(p, p')=2, $T_{1/2}$: other: 0.10 ps +4-3 ($^3\text{He}, d\gamma$). XREF: G(3949)H(3957).
4015.51 ^q 3	5 ⁺	0.61 ps +27-19	B D G IJKL	J^π : L(p, p')=2, L($^3\text{He}, d$)=1 from 7/2 ⁻ . XREF: Others: AD XREF: J(4020)AD(4017).
4039.1 11	4 ⁺	26 ⁿ fs 4	D G IJKL NO V	J^π : log ft =6.6 from 6 ⁺ , π from L($^3\text{He}, d$)=1. $T_{1/2}$: from weighted average of values 0.58 ps +32-19 ($^3\text{He}, d\gamma$) and 0.7 ps 5 (HI, xn γ). XREF: Others: AB XREF: J(4033)V(4010)AB(4030).
4.10×10 ^{3c} 10	3 ⁻		P	J^π : L(p, p')=L(α, α')=4. $T_{1/2}$: other: 0.51 ps +25-14 ($^3\text{He}, d\gamma$). XREF: Others: AC, AG XREF: P(4200)AC(4090).
4470	3 ⁻			U
4563.0 8	3 ⁻	40 ⁿ fs 6	C GH JKL NOPQ S V X	J^π : L(n, n')=3. E(level): from ($^3\text{He}, ^3\text{He}'$). J^π : L($^3\text{He}, ^3\text{He}'$)=3. B(E3) \uparrow =0.0066 3 XREF: H(4572)P(4600)V(4560). J^π : L(α, α')=L(e, e')=3. $T_{1/2}$: other: 0.27 ps +12-6 ($^3\text{He}, d\gamma$). B(E3) from weighted average of values 0.0065 4 in (e, e') and 0.0068 5 in (π^+, π^+), (π^+, π^+).
4584.0 7	(6 ⁺)		D	J^π : From (HI, xn γ), γ to 6 ⁺ .
4611	(3, 4) ⁺		I	XREF: Others: AD XREF: AD(4605).
4627.32 19	4 ⁺		B G J L O	J^π : L($^3\text{He}, \alpha$)=3 on 3/2 ⁻ . XREF: Others: AG XREF: G(4630)L(4630)O(4630)AG(4680).
4702 5	2 ⁺		E G J L O	J^π : L(p, p')=4. XREF: E(4710)L(4706)O(4710).
4730 ^f	4 ⁺		J	J^π : L(α, α')=4, L($^3\text{He}, d$)=1.
4742.3 11	0 ⁺		GHI L S	XREF: G(4738)H(4745). J^π : L(t, p)=0.
4750.31 ^p 20	8 ⁺	0.08 ⁿ ps 10	D QR	XREF: Others: AA XREF: AA(4770). $T_{1/2}$: Other: 0.64 ps +20-17 (HI, xn γ). J^π : $\gamma(\theta)$ in (HI, xn γ), E2 γ to 6 ⁺ .
4800.1 ^a	1 ⁺ , 1 ⁻ , 2 ⁺		M	J^π : From (γ, γ') (1998En05).
4805.96 ^q 24	6 ⁺	0.49 ps +28-14	D G I L	XREF: Others: AA XREF: I(4808)L(4808)AA(4770). J^π : L($\alpha, ^2\text{He}$)=4, 6, $\gamma(\theta)$ in (HI, xn γ), M1+E2 γ to 5 ⁺ .
4815.69 9	1 ⁺ , 2 ⁺		C	XREF: Others: AD XREF: ad(4830).
4841.3 ^a 11	1 ⁺ , 1 ⁻ , 2 ⁺		G IJ LM	J^π : log ft =5.55 from 2 ⁺ , γ to 0 ⁺ . XREF: Others: AD

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF			Comments
4951 4	4 ⁺		G	L	S	XREF: G(4832)ad(4830). J ^π : From (γ,γ') (1998En05). XREF: L(4950)S(4980). J ^π : L(p,p')=4.
5054.3 11	4 ⁺		I		V	XREF: V(5070). J ^π : L(α,α')=4.
5095 5	4 ⁺		G	J L	V	XREF: Others: AG XREF: V(5070)AG(5120). J ^π : L(³ He,d)=L(α,t)=1, L(p,p')=L(α,α')=4.
5098.6 ^a 4	1	0.045 ^o eV 10	I	M		J ^π : excitation in (γ,γ').
5139 5	(6 ⁺)		G	J L		J ^π : L(p,p')=5,6, L(³ He,d)=(3) from 7/2 ⁻ .
5213.7 ^a 5	1	0.013 ^o eV 3	G	LM	S	J ^π : excitation in (γ,γ').
5285 5			G	J L		XREF: L(5281). J ^π : L(³ He,d)=0 from 7/2 ⁻ , L(p,p')=5,6.
5346 4	4 ⁺ ,6 ⁺		G	L		XREF: Others: AA XREF: AA(5320). J ^π : L(α, ² He)=4,6.
5396.9 ^q 3	7 ⁺	0.14 ps +12-9	D			J ^π : γ(θ) in (HI,xnγ), M1+E2 γ to 6 ⁺ , E2 γ to 5 ⁺ .
5410 4	(2 ⁺)		GH	j L		XREF: Others: AD XREF: H(5423)j(5420)AD(5400). J ^π : L(t,p)=(2).
5425 5	4 ⁺		G	j L		XREF: j(5420)L(5422). J ^π : L(p,p')=4.
5432 6			G			
5446.4 5	4 ⁺		HIJ	L	V	XREF: Others: AG XREF: H(5443)J(5450)L(5450)V(5450)AG(5450). J ^π : L(α,α')=4.
5490.8 ^a	1 ⁺ ,1 ⁻ ,2 ⁺		g	LM		XREF: g(5494). J ^π : excitation in (γ,γ').
5500 ^b	3 ⁻		g	N		XREF: g(5494). J ^π : L(e,e')=3.
5526.0 ^a 5	1	0.016 ^o eV 3		M		J ^π : excitation in (γ,γ').
5541 5	4 ⁺		G	L		XREF: L(5538). J ^π : L(p,p')=4.
5544.7 ^a 10	(1 ⁺)	0.112 ^o eV 7	G	LM		XREF: Others: AD XREF: G(5546)AD(5560). J ^π : L(³ He,α)=(1) from 3/2 ⁻ , D γ to 0 ⁺ .
5563.5 8	+		G	I L		XREF: G(5569)L(5571). J ^π : L(³ He,d)=1 from 7/2 ⁻ .
5584 6	+		G	J L		XREF: J(5594). J ^π : L(³ He,d)=1 from 7/2 ⁻ .
5600 [#] 15	0 ⁺		E	H		XREF: E(5650). J ^π : L(t,p)=L(³ He,n)=0.
5633.4 11	(8 ⁺)		D		V	XREF: V(5640). J ^π : From (HI,xnγ), γ to (6 ⁺).
5664.4 11	(2 ⁺)		G	I J L		XREF: Others: AD XREF: G(5661)J(5660)AD(5670). J ^π : L(p,p')=2, L(³ He,d)=1+3 from 7/2 ⁻ .
5725.3 12	+		G	I J L	S	XREF: Others: AD XREF: G(5727)J(5720)S(5700)AD(5710). J ^π : L(³ He,α)=3 from 3/2 ⁻ .
5737.5 11	(4 ⁺)		G	I		J ^π : L(p,p')=(4).
5755 [#] 15	+		H	j		XREF: j(5751). J ^π : L(t,p)=0. But L(³ He,d)=1 from 7/2 ⁻ .

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

<u>E(level)[†]</u>	<u>J^π</u>	<u>T_{1/2}^m</u>	<u>XREF</u>				<u>Comments</u>
5796.0 ^a	1 ⁺ ,2 ⁺		G	J	LM		XREF: J(5790). J ^π : 1,2 ⁺ from excitation in (γ,γ'), PI=- ruled out by L(³ He,d)=1+3 from 7/2 ⁻ . J ^π : L(p,p')=5,6.
5811 5	5,6 ⁺		G				
5818 6			G				
5824.7 ^q 4	8 ⁺	1.0 ps +6-4	D				J ^π : γ(θ) in (HI,xnγ), M1+E2 γ to 7 ⁺ . XREF: Others: AG XREF: G(5853)J(5828)AG(5830). J ^π : L(³ He,d)=L(α,t)=1 from 7/2 ⁻ .
5860.5 11	+		G	IJ			
5865 6			G				
5873 5	3 ⁻		G				J ^π : L(p,p')=3.
5891 ^{&}	3 ⁻ ,4 ⁻			J		V	XREF: V(5910). J ^π : L(³ He,d)=0 from 7/2 ⁻ .
5919 5	5,6 ⁺		G				J ^π : L(p,p')=5,6.
5953 5	2 ⁺		G	J		S	XREF: J(5945). J ^π : L(p,p')=2.
5960 5			G				
5996 5	3 ⁻		G	J	L		XREF: Others: AA XREF: J(5992)AA(5990). J ^π : L(p,p')=3.
6026 6	+		GH	J			J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6035.3 12			G	I			
6055 5	2 ⁺		G				J ^π : L(p,p')=2.
6065 7			GH				XREF: H(6069).
6106 6	0 ⁺		E	G	J	S	XREF: E(6100)J(6089)S(6130). J ^π : L(³ He,n)=0.
6137.0 ^a 10	2 ⁺		G		M		J ^π : L(p,p')=2. Excitation in (γ,γ').
6153 8	2 ⁺		GH				J ^π : L(t,p)=2.
6164 12	3 ⁻		G			V	XREF: V(6160). J ^π : L(α,α')=3.
6175 7	2 ⁺		G				XREF: Others: AD XREF: AD(6180). J ^π : L(p,p')=2.
6193 6	+		G	J			J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6205.4 12			G	I			
6210 10			G				
6220 6			G				
6233 10	+		G	J			J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6243 5	3 ⁻		G				J ^π : L(p,p')=3.
6252 6			G				
6272 6			G				
6293 7			G				
6324 10			G			S	XREF: S(6330).
6349 5	+		G	J			XREF: J(6364). J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6356.6 12	(9 ⁺)		D				J ^π : γ(θ) in (HI,xnγ).
6365.3 ^p 11	(10 ⁺)		D				J ^π : γ(θ) in (HI,xnγ).
6375.4 12			G	I			XREF: G(6372).
6381.0 10	(6 ⁺)		D				J ^π : From γ(θ) in (HI,xnγ).
6389.9 ^a 5	1 ⁺	0.069 ^o eV 7	G	J	LM		XREF: J(5790). J ^π : 1 from excitation in (γ,γ'), PI=- ruled out by L(³ He,d)=1 from 7/2 ⁻ .
6392 10	3 ⁻		G				J ^π : L(p,p')=3.
6426 5			G				
6437 10			G				

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF				Comments
6453.4 ^g 4	9 ⁺	0.14 ps +9-8	D				J ^π : γ(θ) in (HI,xnγ), M1+E2 γ to 8 ⁺ .
6462.4 ^a 5	1	0.074 ^o eV 7	G	M			J ^π : From excitation in (γ,γ').
6482 5	5,6 ⁺		G				J ^π : L(p,p')=5,6.
6493 ^e 10	2 ⁺		G	J	S		XREF: Others: AD XREF: J(6500)AD(6490).
6495.5 ^a 5	1	0.131 ^o eV 9		M			J ^π : L(p,p')=2. L(³ He,α)=0 from 3/2 ⁻ .
6541 10	3 ⁻		G		V		J ^π : From excitation in (γ,γ').
6568 10			G				J ^π : L(α,α')=3.
6580 5			G	J	N		XREF: J(6610)N(6600).
6637 5			G	J			XREF: J(6625).
6678 5	+		E	G	J		XREF: E(6670).
6700 ^g 20	-						J ^π : L(³ He,n)=0, L(³ He,d)=1 from 7/2 ⁻ . XREF: Others: AD
6704 5	5,6 ⁺		G	J			J ^π : L(³ He,α)=2 from 3/2 ⁻ . XREF: J(6720).
6752.0 ^a 5	1 ⁺	0.089 ^o eV 10		J	M	S	J ^π : L(p,p')=5. XREF: J(6760)S(6740)V(6760).
6795.4 12	3 ⁻		G	I	O	V	XREF: G(6786).
6810 30	2 ⁺		G	J			J ^π : L(p,p')=3. XREF: Others: AA, AD XREF: J(6814)AA(6800)AD(6790).
6871 5	5 ⁻		G				J ^π : L(p,p')=2. J ^π : L(p,p')=5.
6894 ^{&} +	+			J			J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6928 ^{&} +	+			J			J ^π : L(³ He,d)=1 from 7/2 ⁻ .
6956 5	5,6 ⁺		G				J ^π : L(p,p')=5,6.
6993 5	3 ⁻		G	J	S		J ^π : L(p,p')=3.
7014.5 ^a 4	1	0.210 ^o eV 30			M		
7030 ^b 10	1 ⁺			J	N		XREF: J(6993). J ^π : Dipole excitation in (e,e'). PI=- ruled out by L(³ He,d)=1 from 7/2 ⁻ .
7090.8 ^a 5	1 ⁺	0.062 ^o eV 11	G	J	M		J ^π : from excitation in (γ,γ').
7100 ^f 3 ⁻	3 ⁻				N	V	J ^π : L(α,α')=L(e,e')=3.
7140 ⁱ 7	+		G		N		J ^π : M1 excitation in (e,e'). L(p,p')=4.
7166.2 ^a 5	+	0.054 ^o eV 11		J	MN		XREF: N(7170).
7217 10	2 ⁺		G	J			J ^π : M1 excitation in (e,e'). L(³ He,d)=1 from 7/2 ⁻ . XREF: J(7210).
7223 ^{&} +	+			J			J ^π : L(p,p')=2.
7237.9 ^g 6	10 ⁺	0.16 ps +15-8	D				J ^π : L(³ He,d)=1 from 7/2 ⁻ .
7260 ^b 10	+			J	N		J ^π : From γ(θ) in (HI,xnγ), M1+E2 γ to 9 ⁺ . J ^π : L(³ He,d)=1+3 from 7/2 ⁻ , but M1, (M2) excitation in (e,e').
7278 10	4 ⁺		G	J	S		XREF: J(7273)S(7290).
7310 ^{&} +	+			J			J ^π : L(p,p')=4.
7322 ^{&} +	+			J			J ^π : L(³ He,d)=1+3 from 7/2 ⁻ .
7342 ⁱ 7	1 ⁺		G	J	N		J ^π : L(³ He,d)=1 from 7/2 ⁻ .
7368.8 ^a 5	1 ⁺	0.229 ^o eV 18		J	M		XREF: J(7350)N(7340). J ^π : M1 excitation in (e,e'). L(p,p')=2.
7376 10	5 ⁻		G				J ^π : 1 from excitation in (γ,γ'), PI=- ruled out by L(³ He,d)=1 from 7/2 ⁻ .
7395 10	5 ⁺			J			J ^π : L(p,p')=5. XREF: Others: AA

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF		Comments
					XREF: J(7400)AA(7390). J ^π : L(α, ² He)=5,7, L(³ He,d)=1 from 7/2 ⁻ . E(level): From average of values in (³ He,d) and (α, ² He). J ^π : From (HI,xnγ), γ to (10 ⁺).
7401.6 ¹⁵	(12 ⁺)		D		
7403.2 ^a ⁵	1	0.107 ^o eV ¹⁵		M	B(M1)=0.069 ¹⁰ , B(E1)=0.76×10 ⁻⁵ ¹¹ .
7409 ¹⁰	3 ⁻		G	O	J ^π : L(p,p')=3.
7450 ^{‡h} ⁵⁰	0 ⁺ ,2 ⁺		E		J ^π : L(³ He,n)=0+2.
7458 ¹⁰	5,6 ⁺		G		J ^π : L(p,p')=5,6.
7482 ¹⁰	3 ⁻		G		J ^π : L(p,p')=3.
7487	+			J	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
7524.1 ^a ⁵	1 ⁺ ^j	0.400 ^o eV ²⁸	g	j MN	XREF: N(7520). J ^π : L(p,p')=0.
7560 ^b ²⁰	+		g	j N S	XREF: g(7540)j(7536)S(7570). J ^π : from L(³ He,d)=1 from 7/2 ⁻ .
7585 ¹⁰	3 ⁻		G	J	J ^π : L(p,p')=3.
7590	+			J	J ^π : L(³ He,d)=1+3 from 7/2 ⁻ .
7679 ¹⁰	5,6 ⁺		G	J	XREF: J(7686). J ^π : L(p,p')=5,6, L(³ He,d)=1+3 from 7/2 ⁻ .
7700 ^b ¹⁰	1 ⁺			N	J ^π : M1 excitation in (e,e').
7731.9 ^a ⁵	1 ⁻ ^j	0.960 ^o eV ²⁴		J M	B(E1)=5.96×10 ⁻⁵ ⁴⁰ . Γ _{γ0} ² /Γ=1.75 eV ³² (1979Ku14). J ^π : L(p,p')=3.
7738 ¹⁰	3 ⁻		G		XREF: Others: AA
7750	+			J	XREF: J(7729). J ^π : L(³ He,d)=1 from 7/2 ⁻ , L(α, ² He)=5,7.
7760 ^{&}	+			J	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
7810 ^c	-				XREF: Others: AG J ^π : L(α,t)=4.
7820 ¹⁰	1 ⁺		G	J	XREF: J(7815). J ^π : M1 excitation in (e,e').
7823 ^{&} ¹⁰	3 ⁻		G		J ^π : L(p,p')=3.
7854 ⁱ ⁷	4 ⁺		G	J N S	XREF: G(7848)N(7860)S(7870). J ^π : L(p,p')=4. L(³ He,d)=1 from 7/2 ⁻ .
7865.1 ^a ⁵	1 ⁺	0.435 ^o eV ²⁷		M	
7889.0 ^a ⁵	1	0.480 ^o eV ⁴⁵		M	J ^π : from excitation in (γ,γ').
7893 ¹⁰	4 ⁺		G	J	XREF: J(7905). J ^π : L(p,p')=4. L(³ He,d)=1 from 7/2 ⁻ .
7897.4 ^a ⁵	1 ⁻ ^j	3.38 ^o eV ¹⁷		M	J ^π : π based on asymmetries for different g.s. dipole transition in (γ,γ').
7900 ^b	3 ⁻			N V	J ^π : L(e,e')=3.
7920 ^{&}	+			J	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
7930 [‡] ⁵⁰	+		E	J	XREF: J(7967). J ^π : L(³ He,n)=0, L(³ He,d)=1 from 7/2 ⁻ .
7967 ¹⁰	3 ⁻		G		J ^π : L(p,p')=3.
8010	+		G	J	XREF: Others: AG XREF: J(7967). J ^π : L(³ He,d)=1 from 7/2 ⁻ , L(α,t)=4 from 7/2 ⁻ .
8015.4 ^a ⁴	1	0.260 ^o eV ⁵⁹		M	B(M1)=0.131 ³⁰ , B(E1)=1.45×10 ⁻⁵ ³³ .
8022 ¹⁰	2 ⁺		G	J	J ^π : L(p,p')=2 and L(³ He,d)=1 from 7/2 ⁻ .
8083	+			J MN	XREF: N(8080). J ^π : L(³ He,d)=1 from 7/2 ⁻ .
8087 ^{&} ⁹	3 ⁻		G		J ^π : L(p,p')=3.

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF	Comments
8091.3 ^a 5	1	0.734 ^o eV 44	M	J ^π : from excitation in (γ,γ').
8100 20	8 ⁻		N	J ^π : M8 excitation in (e,e').
8121 10	+		G J	XREF: J(8130).
8179.3 ^a 4	1 ⁺	0.90 ^o eV 18	G J M O	J ^π : L(³ He,d)=1 from 7/2 ⁻ , L(p,p')=0.
8190 ^c	+			XREF: J(8183).
8213 10	0 ⁺		G	J ^π : L(p,p')=0.
8216.4 ^q 9	11 ⁺	0.24 ps +17-9	D J	XREF: J(8234).
8250 ^{&}	+		J	J ^π : from γ(θ) in (HI,xny), M1+E2 γ to 10 ⁺ , E2 γ to 9 ⁺ .
8281 ^e 10	3 ⁻		G	J ^π : L(³ He,d)=1+3 from 7/2 ⁻ .
8283	+		J	J ^π : L(p,p')=3.
8337 ^e 10	(4 ⁺)		G J	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
8350 ^{&}	+		J	XREF: J(8330).
8374 ^e 10	3 ⁻		G	J ^π : L(p,p')=4,5, L(³ He,d)=1+3 from 7/2 ⁻ .
8390 ^b 10	+		J N	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
8412 ^e 10	+		G J O	J ^π : L(p,p')=3.
8420 ^c	6 ⁻		N	XREF: J(8371).
8451 ^{&}	+		J	J ^π : L(³ He,d)=1 from 7/2 ⁻ .
8457 10	3 ⁻		G	J ^π : L(p,p')=3.
8505 10	3 ⁻		G	J ^π : L(p,p')=3.
8569 10	0 ⁺		G J S	XREF: J(8579)S(8580).
8600 ^b 10	3 ⁻		N	J ^π : L(p,p')=0.
8617 10			G J	B(E3)↑=0.0022 3 (1964Be32)
8679 ^e 10	3 ⁻		G	J ^π : L(e,e')=3.
8710 ^{‡h} 50	+		E J N	XREF: J(8614).
8728 10	3 ⁻		G	J ^π : L(p,p')=2,3,4. L(³ He,d)=1+3 from 7/2 ⁻ .
8765.9 ^a 5	1	0.441 ^o eV 37	M	J ^π : L(p,p')=3.
8778 10	3 ⁻		G	J ^π : from excitation in (γ,γ').
8790 10	2		N	J ^π : L(p,p')=3.
8827 10			G	J ^π : Q excitation in (e,e').
8860 10	1 ⁺ ,(2 ⁻)		N	J ^π : M1,(M2) excitation in (e,e').
8890 20	1 ⁺ ,(2 ⁻)		N S	J ^π : M1,(M2) excitation in (e,e').
8940 20	(8 ⁻ ,6 ⁻)		N	J ^π : (M8,M6) excitation in (e,e').
8958.4 ^a 5	1	0.233 ^o eV 36	M	J ^π : from excitation in (γ,γ').
9004 ⁱ 9	1 ⁺	^o	G N	XREF: G(9020).
9050 ^{&} 10	1 ⁺ ,(2 ⁻)		N	J ^π : M1 excitation in (e,e'). L(p,p')=0.
9080 20	(8 ⁻)		N	J ^π : M1,(M2) excitation in (e,e').
9140.3 ^{aq} 5	1 ⁺ ^j	2.65 ^o eV 15	G MN	J ^π : (M8) excitation in (e,e').
				B(M1)=0.90 5.

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	T _{1/2} ^m	XREF		Comments
9200 [@]	5 ⁻				J ^π : M1 excitation in (e,e'). L(p,p')=0, 1 ⁺ in (γ,γ'). XREF: Others: AA
9211.9 ^a 5	1 ⁺	2.11 ^o eV 14	G	MN	J ^π : L(α, ² He)=5. XREF: G(9221)N(9210).
9245 ^e 10	1 ⁺		G		J ^π : M1 excitation in (e,e'). J ^π : L(p,p')=0.
9327.0 ^a 5	1 ⁺ k	0.746 ^o eV 80	G	N	J ^π : M1 excitation in (e,e').
9370 20	1 ⁺ ,2 ⁻			N	J ^π : M1,M2 excitation in (e,e').
9429.0 ^a 5	1 ⁺	0.95 ^o eV 11	G	MN	XREF: G(9440). J ^π : M1 excitation in (e,e').
9438.5 ^q 9	12 ⁽⁺⁾		D	N	J ^π : from (HI,xnγ), γ to 10 ⁺ .
9450 20	8 ⁻			N	XREF: Others: AG XREF: AG(9480). J ^π : M8 excitation in (e,e').
9470 20	1 ⁺ ,2 ⁺			N	J ^π : M1, E2 excitation in (e,e').
9580 10	0 ⁺		E	N	J ^π : L(³ He,n)=0. But M1,(E1) excitation in (e,e').
9612 ⁱ 9	1 ⁺ k		G	N	XREF: G(9620). J ^π : M1 excitation in (e,e').
9660 20	8 ⁻			N	XREF: Others: AG XREF: AG(9630). J ^π : M8 excitation in (e,e').
9724 ⁱ 9	1 ⁺ k		G	MN	XREF: G(9740)M(9736)N(9720). J ^π : M1 excitation in (e,e').
9787 ^a 3	1 ⁻ j			M	J ^π : π based on asymmetries for different g.s. dipole transition in (γ,γ').
9830 10	1 ⁺			N	J ^π : M1 excitation in (e,e').
9878 ⁱ 9	1 ⁺ k		E G	N	XREF: E(9870)G(9870)N(9880). J ^π : M1 excitation in (e,e').
9910 20	8 ⁻			N	J ^π : M8 excitation in (e,e').
9981 ^a 3	(⁻)			M	J ^π : π: based on asymmetries for different g.s. dipole transition, see (γ,γ').(pol γ,γ').
10008 ⁱ 9	1 ⁺ k		G	N	XREF: G(10000)N(10010).
10110 20	(8 ⁻)			N	XREF: Others: AG XREF: AG(10130). J ^π : (M8) excitation in (e,e').
10130 20	1,2 ⁻			NO	J ^π : D,M2 excitation in (e,e').
10161.3 ^q 12	(13 ⁺)		D		J ^π : from γ(θ) in (HI,xnγ), E2 γ to 11 ⁺ .
10180 10	2 ⁻			N	J ^π : M2 excitation in (e,e').
10240 20	1			N	J ^π : E1, (M1) excitation in (e,e').
10270 20	1,(2 ⁻)			N	J ^π : D, (M2) excitation in (e,e').
10300 20				N	J ^π : M2, M3,E3 excitation in (e,e').
10330 20	6 ⁻			N	XREF: Others: AG XREF: AG(10280). J ^π : M6 excitation in (e,e'). J ^π : D excitation in (e,e').
10340 20	1			N	
10380 ⁱ 14	1 ⁺ k		G	N	
10433 ^a 4	1 ⁺			MN	J ^π : M1 excitation in (e,e').
10464 9	1 ⁺ k		G	N	XREF: G(10480)N(10460). J ^π : M1 excitation in (e,e').
10500 20	1			N	J ^π : D excitation in (e,e').
10510 20	(⁻)			N	J ^π : (M8, M6) excitation in (e,e').
10604 ⁱ 12	1 ⁺ k		G	N	XREF: G(10580)N(10610).
10710 10	1			N	J ^π : D excitation in (e,e').

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	XREF		Comments
10760 <i>l</i> 0	6 ⁺ ,8 ⁺		N	XREF: Others: AA XREF: AA(10750). J ^π : L(α, ² He)=6,8.
10790 <i>g</i> 9	1 ⁺ <i>k</i>	G	N	J ^π : M1 excitation in (e,e').
10800 <i>o</i> 20	(-)		N	J ^π : (M8,M6) excitation in (e,e').
10820 <i>l</i> 10	1 ⁺ ,2 ⁻		N	J ^π : M1, (M2) excitation in (e,e').
10927 ^a <i>o</i> 3	1 ⁺ ,2 ⁻		MN	XREF: N(10920). J ^π : M1, M2 excitation in (e,e').
10970 <i>o</i> 20	0 ⁺ <i>k</i>	G		J ^π : L(p,p')=0.
11000 <i>o</i> 20	8 ⁻		N	J ^π : M8 excitation in (e,e').
11070 <i>l</i> 10	1		N	J ^π : D excitation in (e,e').
11140 <i>l</i> 10	0 ⁺ <i>k</i>	G	N	XREF: G(11120). J ^π : L(p,p')=0.
11160 <i>o</i> 20	(1 ⁺),2		N	J ^π : (M1), Q excitation in (e,e').
11170 <i>o</i> 20	8 ⁻		N	XREF: Others: AG J ^π : M8 excitation in (e,e'). L(α,t)=4.
11229 <i>o</i> 3			I	
11256.5 <i>o</i> 7		e	I	XREF: e(11280).
11264.9 <i>o</i> 4	+ <i>l</i>	e	I	XREF: Others: AA T=3 XREF: e(11280)AA(11260). IAS (⁵² V g.s.). Some authors identify 11256.5 state as g.s. IAS. However, from a comparison of relative M1 transition rates from 11264.9 state with Gamow-Teller β decay matrix elements for ⁵² V g.s. 1973Fa12 concluded that most of the IAS strength lies in the 11265 state. The 11256 state might still be a fragment of the g.s. IAS.
11270 <i>o</i> 20	8 ⁻		NO	J ^π : M8 excitation in (e,e').
11274.6 ^d <i>o</i> 6	+ <i>l</i>	e	I	T=3 XREF: e(11280). Identified as fragment of IAS (⁵² V 23 keV).
11291.1 ^d <i>l</i> 10			I	XREF: Others: AD
11330 <i>o</i> 20	(1 ⁺),2 ⁻		N	J ^π : (M1), M2 excitation in (e,e').
11370 <i>o</i> 20	8 ⁻		N	XREF: Others: AG XREF: AG(11350). J ^π : M8 excitation in (e,e'). L(α,t)=4.
11400.0 ^d <i>o</i> 4	4 ⁺		I	T=3 Identified by 1974Ro44 as IAS (⁵² V 148 keV, 4 ⁺). J ^π : From γ(theta) in (p,γ).
11402 ⁱ <i>o</i> 9	1 ⁺	G	N	XREF: G(11410)N(11400). J ^π : M1 excitation in (e,e'). L(p,p')=0.
11510 <i>l</i> 10	2 ⁻		N	J ^π : M2 excitation in (e,e').
11550 <i>o</i> 20	8 ⁻		N	J ^π : M8 excitation in (e,e').
11570 <i>o</i> 20	(1 ⁺),2		N	J ^π : (M1),Q excitation in (e,e').
11610 <i>l</i> 10	2		N	J ^π : Q excitation in (e,e').
11656 ^d <i>o</i> 3	1 ⁺ ,2 ⁻	I	N	XREF: N(11650). J ^π : M1, M2 excitation in (e,e').
11660 <i>o</i> 20	8 ⁻		N	XREF: Others: AG J ^π : M8 excitation in (e,e').
11691.8 ^d <i>o</i> 4		I	N	T=3 IAS (⁵² V 437 keV, 2 ⁺).
11713 ^d <i>o</i> 3			I	
11725 ^d <i>o</i> 3			I	
11745 ^d <i>o</i> 3			I	

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	XREF	Comments
11765 ^a 3		M	
11770 20	8 ⁻	N	XREF: Others: AG XREF: AG(11790). J ^π : M8 excitation in (e,e').
11780 20	(1 ⁺),2 ⁻	N	J ^π : (M1),M2 excitation in (e,e').
11837 ^a 3		M	
11880 20	8 ⁻	N	J ^π : M8 excitation in (e,e').
11960 20	8 ⁻	N	J ^π : M8 excitation in (e,e').
12034.8 ^d 4	-	I N	XREF: Others: AG XREF: AG(12050). J ^π : L(α,t)=4 from 7/2 ⁻ .
12041.8 ^d 4	4 ^{+l}	I	T=3 IAS (^{52}V 793 keV, 3 ⁺).
12050	-		XREF: Others: AG J ^π : L(α,t)=4.
12099.9 4	4 ^{+l}	I	T=3 IAS (^{52}V 846 keV, 4 ⁺).
12130 20	(8 ⁻ ,6 ⁻)	N	J ^π : (M8,M6) excitation in (e,e').
12240 20	6 ⁻	N	J ^π : M6 excitation in (e,e').
12260 [@]	6 ⁺ ,8 ⁺		XREF: Others: AA J ^π : L(α, ^2He)=6,8.
12500 ^c	-		XREF: Others: AG J ^π : L(α,t)=4 from 7/2 ⁻ .
12560 20	1 ^{+k}	G	XREF: Others: AG
12665 ^d 6	3 ⁺	I	T=3 IAS (^{52}V 1419 keV, 3 ⁺)?
12730 20	-	N	XREF: Others: AG XREF: AG(12700). J ^π : L(α,t)=4 from 7/2 ⁻ .
12734 ^d 6		I	T=3 IAS (^{52}V 1493 keV, 7 ⁺)?
12794.8 7	4 ^{+l}	I	T=3 IAS (^{52}V 1559 keV, 4 ⁺)?
12900 20	1 ^{+k}	G	
12977 ^d 6	-l	I	XREF: Others: AG T=3 XREF: AG(13010). J ^π : L(α,t)=4 from 7/2 ⁻ . IAS (^{52}V 1733 keV, 3 ⁻ ,4 ⁻)?
12994 ^d 6	+l	I	IAS (^{52}V 1760 keV, 3 ⁺)?
13038 ^d 6	+l	I	IAS (^{52}V 1843 keV, +)?
13220 20	8 ⁻	N	J ^π : M8 excitation in (e,e').
13319 ^d		I	
13393 ^d	6 ⁻	I N	J ^π : M6 excitation in (e,e').
13419 ^d	0 ⁺	E I	T=3 J ^π : L(^3He ,n)=0.
13570 20	6 ⁻	N	J ^π : M6 excitation in (e,e').
13580 ^g 20	(1,2) ⁻		XREF: Others: AD J ^π : L(^3He ,α)=0 from 3/2 ⁻ .
13630 [‡] 10	0 ⁺	E	T=3 J ^π : L(^3He ,n)=0. IAS (^{52}V 2396 keV, 0 ⁺ , (1 ⁺)?)

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Adopted Levels, Gammas (continued) ^{52}Cr Levels (continued)

E(level) [†]	J ^π	XREF	Comments
13710 20	6 ⁻	N	J ^π : M6 excitation in (e,e').
13950 [‡] 50		E	
14030 20	6 ⁻	N	J ^π : M6 excitation in (e,e').
14110 [‡] 20	2 ⁺	E	T=3 J ^π : L(³ He,n)=2.
14340 20	6 ⁻	N	IAS (⁵² V 2881 keV, +)? J ^π : M6 excitation in (e,e').
14430 20	8 ⁻	N	XREF: Others: AG XREF: AG(11470). J ^π : M8 excitation in (e,e').
15270 20	6 ⁻	N	XREF: Others: AG XREF: AG(15280). J ^π : M6 excitation in (e,e'). L(α,t)=4.
15482 ^c 7	8 ⁻	N	XREF: Others: AG T=3 J ^π : M8 excitation in (e,e').
16400 20	6 ⁻	N	J ^π : M6 excitation in (e,e').
16690 20	(8 ⁻)	N	J ^π : (M8) excitation in (e,e').

[†] Levels connected by gammas are from least squares fit, others from $^{52}\text{Cr}(p,p')$ for E(level)<8830 keV and from $^{52}\text{Cr}(e,e')$ for E(level)>8830 keV, except as noted.

[‡] From $^{50}\text{Ti}(\text{}^3\text{He},n)$.

From $^{50}\text{Cr}(t,p)$.

@ From $^{50}\text{Cr}(\alpha, \text{}^2\text{He})$.

& From $^{51}\text{V}(\text{}^3\text{He},d)$.

^a From $^{52}\text{Cr}(\gamma, \gamma'), (\text{pol } \gamma, \gamma')$.

^b From $^{52}\text{Cr}(e, e')$.

^c From $^{51}\text{V}(\alpha, t)$.

^d From $^{51}\text{V}(p, \gamma)$.

^e From $^{52}\text{Cr}(p, p')$.

^f From $^{52}\text{Cr}(\alpha, \alpha')$.

^g From $^{53}\text{Cr}(\text{}^3\text{He}, \alpha)$.

^h Close doublet; not resolved in (³He,n) tof spectra, but separated in angular distribution procedure.

ⁱ From weighted average of values in $^{52}\text{Cr}(e, e')$ and $^{52}\text{Cr}(p, p')$.

^j Dipole transition in $^{52}\text{Cr}(\gamma, \gamma'), (\text{pol } \gamma, \gamma')$.

^k Based on $\sigma(\theta)$, DWIA calculations in $^{52}\text{Cr}(p, p')$.

^l IAS in $^{51}\text{V}(p, \gamma)$ E=res.

^m From (HI,xn γ), DSAM, except as noted.

ⁿ From (n, n' γ).

^o Partial decay width into ground state in $^{52}\text{Cr}(\gamma, \gamma'), (\text{pol } \gamma, \gamma')$.

^p Band(A): g.s. Band.

^q Band(B): Band based on 5⁺.

Adopted Levels, Gammas (continued)

E _i (level)	J ^π _i	γ(⁵² Cr)		E _f	J ^π _f	Mult. ^d	δ ^d	Comments
		E _γ [†]	I _γ [†]					
1434.091	2 ⁺	1434.068 ^b 14	100	0.0	0 ⁺	E2 [@]		B(E2)(W.u.)=10.3 3
2369.630	4 ⁺	935.538 ^b 11	100	1434.091	2 ⁺	E2 [@]		B(E2)(W.u.)=1.0×10 ⁻¹¹ +3-6
2646.9	0 ⁺	1212.8 6	100	1434.091	2 ⁺	E2		E _γ : from (p,p'γ).
2767.767	4 ⁺	398.08 [#] 9	1.76 14	2369.630	4 ⁺	E2 [@]		B(E2)(W.u.)=45 13 I _γ : other: 1.36 17 in ⁵² V β ⁻ decay.
		1333.649 17	100 1	1434.091	2 ⁺	E2 [@]		B(E2)(W.u.)=6.0 16
2964.786	2 ⁺	1530.67 [‡] 1	100 [‡] 4	1434.091	2 ⁺	M1+E2	-6.25 15	B(M1)(W.u.)=0.00036 8; B(E2)(W.u.)=13 3
		2965 [‡] 1	0.9 [‡] 6	0.0	0 ⁺	E2 [#]		B(E2)(W.u.)=0.005 4
3113.858	6 ⁺	346.02 4	1.09 1	2767.767	4 ⁺	E2		B(E2)(W.u.)=2.58 10
		744.233 13	100.0 9	2369.630	4 ⁺	E2		B(E2)(W.u.)=5.14 19
3161.74	2 ⁺	1727.53 [‡] 7	100 [‡] 5	1434.091	2 ⁺	M1+E2	-0.18 7	B(M1)(W.u.)=0.107 23; B(E2)(W.u.)=2.6 21
		3161.8 [‡] 1	10.0 [‡] 14	0.0	0 ⁺	E2		B(E2)(W.u.)=0.40 10
3415.32	4 ⁺	647.47 6	100 5	2767.767	4 ⁺	M1+E2 ^{@e}	0.22 ^{@e} 8	B(M1)(W.u.)=0.24 7; B(E2)(W.u.)=6.E+1 5
		766.0 ^{#f} 10		2646.9	0 ⁺			The γ's placement is highly suspect because ΔJ=4.
		1045.73 ^b 4	17 5	2369.630	4 ⁺			
		1981.12 4	8.5 8	1434.091	2 ⁺	[E2]		B(E2)(W.u.)=0.42 13
3472.25	3 ⁺	704.6 [‡] 2	100	2767.767	4 ⁺	M1+E2	-0.14 6	B(M1)(W.u.)=0.0059 7; B(E2)(W.u.)=0.5 5 I _γ : From (n,n'γ).
		2038.0 [‡] 2	44.2 12	1434.091	2 ⁺			I _γ : From (n,n'γ).
3615.924	5 ⁺	200.58 4	1.80 5	3415.32	4 ⁺			
		502.06 5	5.0 5	3113.858	6 ⁺			
		848.18 5	78.9 7	2767.767	4 ⁺	M1 [@]		B(M1)(W.u.)=0.006 3
		1246.278 15	100.0 14	2369.630	4 ⁺			
3771.72	2 ⁺	2337.44 ^c 19	100 [‡] 14	1434.091	2 ⁺	M1+E2	-0.20 8	B(M1)(W.u.)=0.15 5; B(E2)(W.u.)=2.4 20
		3771.7 [‡] 2	26 [‡] 6	0.0	0 ⁺	[E2]		B(E2)(W.u.)=1.5 5
3947.5	2 ⁺	1578 ^{&}		2369.630	4 ⁺			
3951.2	2 ⁺	3951 [‡] 1	[‡]	0.0	0 ⁺			
4015.51	5 ⁺	399.57 5	46.9 18	3615.924	5 ⁺			I _γ : other: 33.3 5 in (HI,xnγ).
		600.16 5	100 3	3415.32	4 ⁺	M1 [@]		B(M1)(W.u.)=0.062 +20-28
		901.89 18	11.3 11	3113.858	6 ⁺			
		1247.88 9	97 10	2767.767	4 ⁺	M1 [@]		B(M1)(W.u.)=0.0067 +23-31
		1645.82 4	12.1 8	2369.630	4 ⁺			
4039.1	4 ⁺	566.8 [@]	100 [@]	3472.25	3 ⁺			
4563.0	3 ⁻	791 ^{&}		3771.72	2 ⁺			
		3129 [‡] 1		1434.091	2 ⁺			
4584.0	(6 ⁺)	1470.1 [@] 7	100 [@]	3113.858	6 ⁺			
4627.32	4 ⁺	2257.42 19	100	2369.630	4 ⁺			

Adopted Levels, Gammas (continued)

$\gamma(^{52}\text{Cr})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. ^d	δ^d	Comments
4750.31	8 ⁺	1636.4@ 2	100@	3113.858	6 ⁺	E2@		B(E2)(W.u.)=5.E+1 +7-5
4805.96	6 ⁺	790.0@ 3	100@ 8	4015.51	5 ⁺	(M1+E2)@e	-0.16@e 5	B(M1)(W.u.)=(0.062 +19-37); B(E2)(W.u.)=(6 +4-5)
		1189.7@	20@ 5	3615.924	5 ⁺			
		1693.9@ 6	23@ 3	3113.858	6 ⁺			
4815.69	1 ⁺ ,2 ⁺	3381.5‡ 1	100‡ 20	1434.091	2 ⁺			
		4815.4‡ 2	100‡ 16	0.0	0 ⁺			
5098.6	1	3664.5 ^a 5	79 ^a 22	1434.091	2 ⁺			
		5098.3 ^a 5	100 ^a	0.0	0 ⁺			
5213.7	1	5213.4 ^a 5	100 ^a	0.0	0 ⁺			
5396.9	7 ⁺	590.9@ 3	100@ 6	4805.96	6 ⁺	M1+E2@e	-0.27@e 6	B(M1)(W.u.)=0.6 +4-6; B(E2)(W.u.)=2.9×10 ² +22-28
		1381.5@ 5	15.2@ 16	4015.51	5 ⁺	E2@		B(E2)(W.u.)=9 +6-8
5526.0	1	5525.7 5		0.0	0 ⁺			
5544.7	(1 ⁺)	5544.4 ^a	100 ^a	0.0	0 ⁺			
5633.4	(8 ⁺)	1049.4@ 8	100@	4584.0	(6 ⁺)			
5824.7	8 ⁺	427.9@ 3	100@	5396.9	7 ⁺	M1(+E2)@e	-0.03@e 4	$\alpha(\text{K})=0.00166$; $\alpha(\text{L})=0.00016$ B(M1)(W.u.)=(0.28 +12-17); B(E2)(W.u.)=(3 +9-3)
6137.0	2 ⁺	6136.6 ^a	100 ^a	0.0	0 ⁺			
6356.6	(9 ⁺)	725.5@f 12	100@	5633.4	(8 ⁺)			
6365.3	(10 ⁺)	1615.0@ 10	100@	4750.31	8 ⁺			
6381.0	(6 ⁺)	2765.0@	100	3615.924	5 ⁺			
6389.9	1 ⁺	6389.5 ^a 5	100 ^a	0.0	0 ⁺			
6453.4	9 ⁺	628.9@ 5	35@ 18	5824.7	8 ⁺	M1+E2@e	+0.22@e +15-8	B(M1)(W.u.)=0.13 11; B(E2)(W.u.)=4.E+1 +6-4
		1056.0@ 10	26@ 2	5396.9	7 ⁺			
		1702.9@ 5	100@ 5	4750.31	8 ⁺	M1+E2@e	-0.04@e +7-3	B(M1)(W.u.)=0.020 +12-13; B(E2)(W.u.)=0.02 +9-2
6462.4	1	6462.0 ^a 5	100 ^a	0.0	0 ⁺			
6495.5	1	6495.1 ^a 5	100 ^a	0.0	0 ⁺			
6752.0	1 ⁺	6751.5 ^a 5	100 ^a	0.0	0 ⁺			
7014.5	1	5580.5 ^a 5	24 ^a 6	1434.091	2 ⁺			
		7013.6 ^a 5	100 ^a	0.0	0 ⁺			
7090.8	1 ⁺	7090.3 ^a 5	100 ^a	0.0	0 ⁺			
7166.2	⁺	7165.7 ^a 5	100 ^a	0.0	0 ⁺			
7237.9	10 ⁺	784.5@ 5	100@ 12	6453.4	9 ⁺	M1+E2@e	-0.06@e +3-5	B(M1)(W.u.)=0.19 +10-18; B(E2)(W.u.)=2 +3-2
		883.7@f 10	28@ 3	6356.6	(9 ⁺)			
		1413.6@f 10	8@ 4	5824.7	8 ⁺	[E2]		B(E2)(W.u.)=2.9 +21-29
		1606.0@f 20	15@ 4	5633.4	(8 ⁺)	[E2]		B(E2)(W.u.)=2.9 +17-28
7368.8	1 ⁺	7368.2 ^a 5	100 ^a	0.0	0 ⁺			
7401.6	(12 ⁺)	1036.3@	100	6365.3	(10 ⁺)	(E2)@		

Adopted Levels, Gammas (continued)

$\gamma(^{52}\text{Cr})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. ^d	δ^d	Comments
7403.2	1	7402.6 ^a 5	100 ^a	0.0	0 ⁺			
7524.1	1 ⁺	7523.5 ^a 5	100 ^a	0.0	0 ⁺			
7731.9	1 ⁻	7731.3 ^a 5	100 ^a	0.0	0 ⁺			
7865.1	1 ⁺	7864.5 ^a 5	100 ^a	0.0	0 ⁺			
7889.0	1	7888.4 ^a 5	100 ^a	0.0	0 ⁺			
7897.4	1 ⁻	7896.8 ^a 5	100 ^a	0.0	0 ⁺			
8015.4	1	6580.9 ^a 5	54 ^a 16	1434.091	2 ⁺			
		8014.6 ^a 5	100 ^a	0.0	0 ⁺			
8091.3	1	8090.6 ^a 5	100 ^a	0.0	0 ⁺			
8179.3	1 ⁺	6744.8 ^a 5	326 ^a 50	1434.091	2 ⁺			E_γ : if 8179.2 level energy is correct, then E_γ should be 6744.8, not 6740.8 as listed in table I of 2013Pa38.
		8178.5 ^a 5	100 ^a	0.0	0 ⁺			
8216.4	11 ⁺	978.5 [@] 5	97 [@] 9	7237.9	10 ⁺	M1+E2 ^{@e}	+0.10 ^{@e} +5-8	B(M1)(W.u.)=0.048 +19-35; B(E2)(W.u.)=1.1 +12-11
		1763.3 [@] 10	100 [@] 11	6453.4	9 ⁺	E2 [@]		B(E2)(W.u.)=6.1 +25-44
8765.9	1	8765.1 ^a 5	100 ^a	0.0	0 ⁺			
8958.4	1	8957.6 ^a 5	100 ^a	0.0	0 ⁺			
9140.3	1 ⁺	9139.4 ^a 5	100 ^a	0.0	0 ⁺			
9211.9	1 ⁺	9211.0 ^a 5	100 ^a	0.0	0 ⁺			
9327.0	1 ⁺	9326.1 ^a 5	100 ^a	0.0	0 ⁺			
9429.0	1 ⁺	9428.1 ^a 5	100 ^a	0.0	0 ⁺			
9438.5	12 ⁽⁺⁾	1222.4 [@] 8	100 [@] 5	8216.4	11 ⁺			
		2200.0 [@] 10	16.8 [@] 11	7237.9	10 ⁺			
10161.3	(13 ⁺)	721.3 [@] 10	4.7 [@] 6	9438.5	12 ⁽⁺⁾			
		1943.6 [@] 7	100.0 [@] 17	8216.4	11 ⁺	E2 [@]		
11256.5		8291	100	2964.786	2 ⁺			
		8488	85	2767.767	4 ⁺			
11264.9	+	7648	<9	3615.924	5 ⁺			
		7792	<5	3472.25	3 ⁺			
		7850	39 7	3415.32	4 ⁺	(M1+E2) ^{@e}	+0.06 ^{@e} 9	
		8150	25 9	3113.858	6 ⁺			
		8299	<5	2964.786	2 ⁺			
		8496	11 7	2767.767	4 ⁺			
		8895	100 16	2369.630	4 ⁺	(M1+E2) ^{@e}	+0.9 ^{@e} +10-5	
		9830	34 5	1434.091	2 ⁺	(M1+E2) ^{@e}	-0.30 ^{@e} 6	
11274.6	+	4479	72 12	6795.4	3 ⁻			
		4899	24 8	6375.4				
		5069	36 12	6205.4				
		5239	20 8	6035.3				
		5549	100 12	5725.3	+			
		7258	60 12	4015.51	5 ⁺			
		7326	24 8	3947.5	2 ⁺			

Adopted Levels, Gammas (continued)

$E_i(\text{level})$	J_i^π	$\gamma(^{52}\text{Cr})$ (continued)					Mult. ^d	δ^d	Comments
		E_γ^\dagger	I_γ^\dagger	E_f	J_f^π				
11274.6	+	7859	8 4	3415.32	4 ⁺	(M1+E2) ^{@e}	+0.47 ^{@e} 10		
		8904	56 8	2369.630	4 ⁺	(M1+E2) ^{@e}	+0.19 ^{@e} 10		
11291.1		9856	100	1434.091	2 ⁺				
11400.0	4 ⁺	5836	61 5	5563.5	+				
		5953	29 5	5446.4	4 ⁺				
		7360		4039.1	4 ⁺				
		7384		4015.51	5 ⁺				
		7783	26 3	3615.924	5 ⁺				
		7985	21 3	3415.32	4 ⁺				
		8285	5 3	3113.858	6 ⁺				
		9030	100 5	2369.630	4 ⁺	(M1+E2) ^{@e}	0.5 ^{@e} 2	δ : from (p, γ), see 1974Ro44.	
		5302	33 3	6389.9	1 ⁺				
		6027	23 3	5664.4	(2) ⁺				
6245	53 3	5446.4	4 ⁺						
6637	13 7	5054.3	4 ⁺						
6854		4841.3	1 ⁺ , 1 ⁻ , 2 ⁺						
6883		4805.96	6 ⁺						
6949	37 3	4742.3	0 ⁺						
7652		4039.1	4 ⁺						
7676		4015.51	5 ⁺						
8219	30 7	3472.25	3 ⁺						
8277	7 3	3415.32	4 ⁺						
8529	13 3	3161.74	2 ⁺						
8726	27 7	2964.786	2 ⁺						
8923	10 3	2767.767	4 ⁺						
9322	27 3	2369.630	4 ⁺						
12034.8	-	10257	100 7	1434.091	2 ⁺				
		6471	22 4	5563.5	+				
		6588	22 4	5446.4	4 ⁺				
		7404	48 4	4627.32	4 ⁺				
		8562	17 9	3472.25	3 ⁺				
		8620	100 9	3415.32	4 ⁺				
		9069	17 9	2964.786	2 ⁺				
		9266	74 4	2767.767	4 ⁺				
		9665	78 4	2369.630	4 ⁺				
		10600	48 4	1434.091	2 ⁺				
12041.8	4 ⁺	6595	42 4	5446.4	4 ⁺				
		7233	19 4	4805.96	6 ⁺				
		8569	46 4	3472.25	3 ⁺				
		8627	19 4	3415.32	4 ⁺				
		8879	62 4	3161.74	2 ⁺				
		9076	7 4	2964.786	2 ⁺				
		9273	31 4	2767.767	4 ⁺				

Adopted Levels, Gammas (continued)

$\gamma(^{52}\text{Cr})$ (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[†]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[†]</u>	<u>E_f</u>	<u>J_f^π</u>
12041.8	4 ⁺	9672	100 4	2369.630	4 ⁺	12099.9	4 ⁺	8152	22 4	3947.5	2 ⁺
		10607	54 4	1434.091	2 ⁺			8483	26 4	3615.924	5 ⁺
12099.9	4 ⁺	6239	39 9	5860.5	⁺			8627	17 3	3472.25	3 ⁺
		6362	39 9	5737.5	(4 ⁺)			8685	52 9	3415.32	4 ⁺
		6653	30 9	5446.4	4 ⁺			9331	35 4	2767.767	4 ⁺
		7002	13 4	5098.6	1			9730	100 9	2369.630	4 ⁺
		7469	30 4	4611	(3,4) ⁺	12794.8	4 ⁺	9178	81	3615.924	5 ⁺
		8060	30 4	4039.1	4 ⁺			10424	100	2369.630	4 ⁺
		8084	13 2	4015.51	5 ⁺						

[†] E_γ<4 MeV from ⁵²Mn ε decay (5.591 d), E_γ>4 MeV from ⁵¹V(p,γ), except as noted.

[‡] From ⁵²Mn ε decay (21.1 min).

From ⁵²V β⁻ decay.

@ From (HI,xnγ).

& From ⁵¹V(³He,dγ).

^a From ⁵²Cr(γ,γ'),(pol γ,γ').

^b From weighted average of values in ⁵²Mn ε decay (5.591 d) and ⁵²V β⁻ decay.

^c From weighted average of values in ⁵²Mn ε decay (21.1 min) and ⁵²V β⁻ decay.

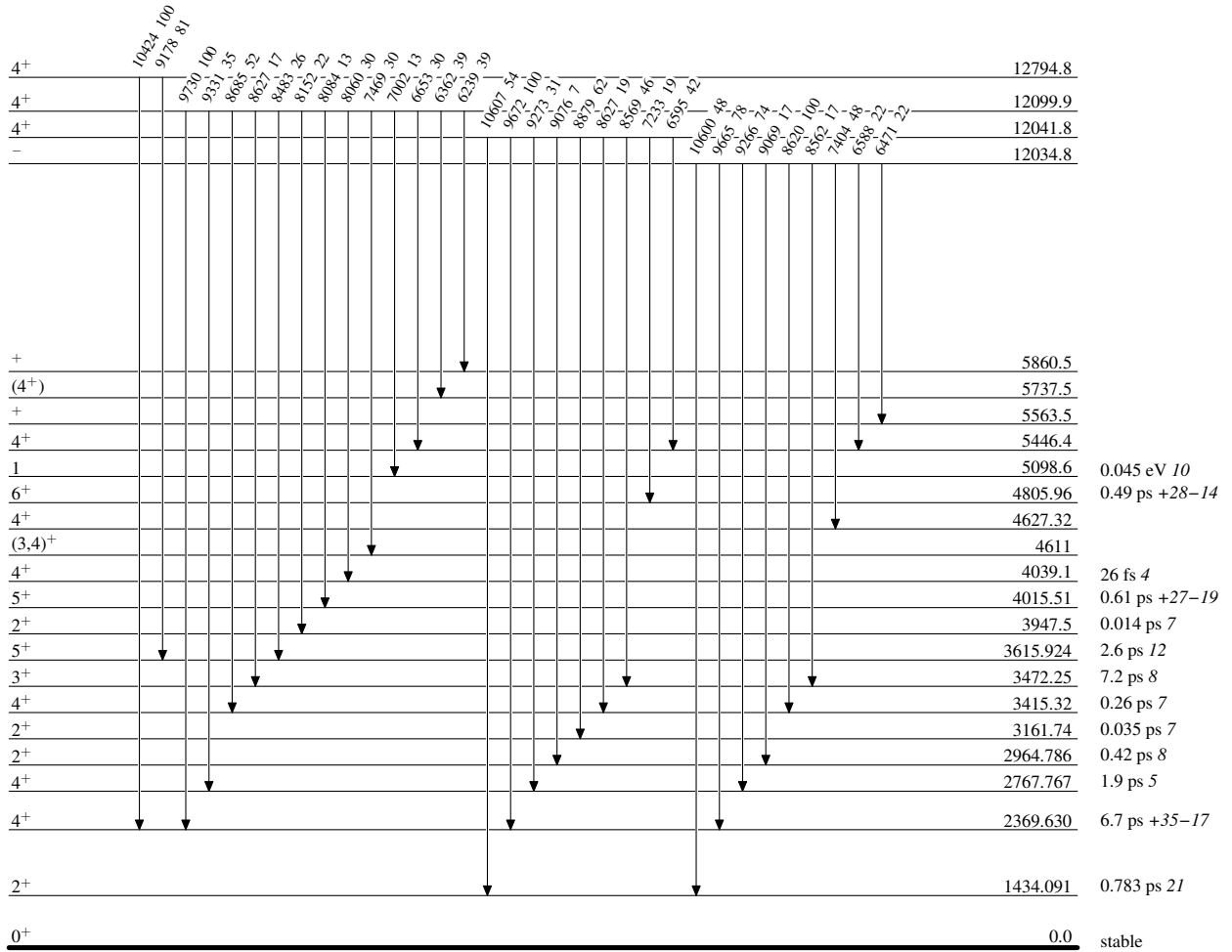
^d From γγ(θ) in ⁵²Cr(p,p'γ), except as noted.

^e From ⁵¹V(p,γ).

^f Placement of transition in the level scheme is uncertain.

Adopted Levels, GammasLevel Scheme

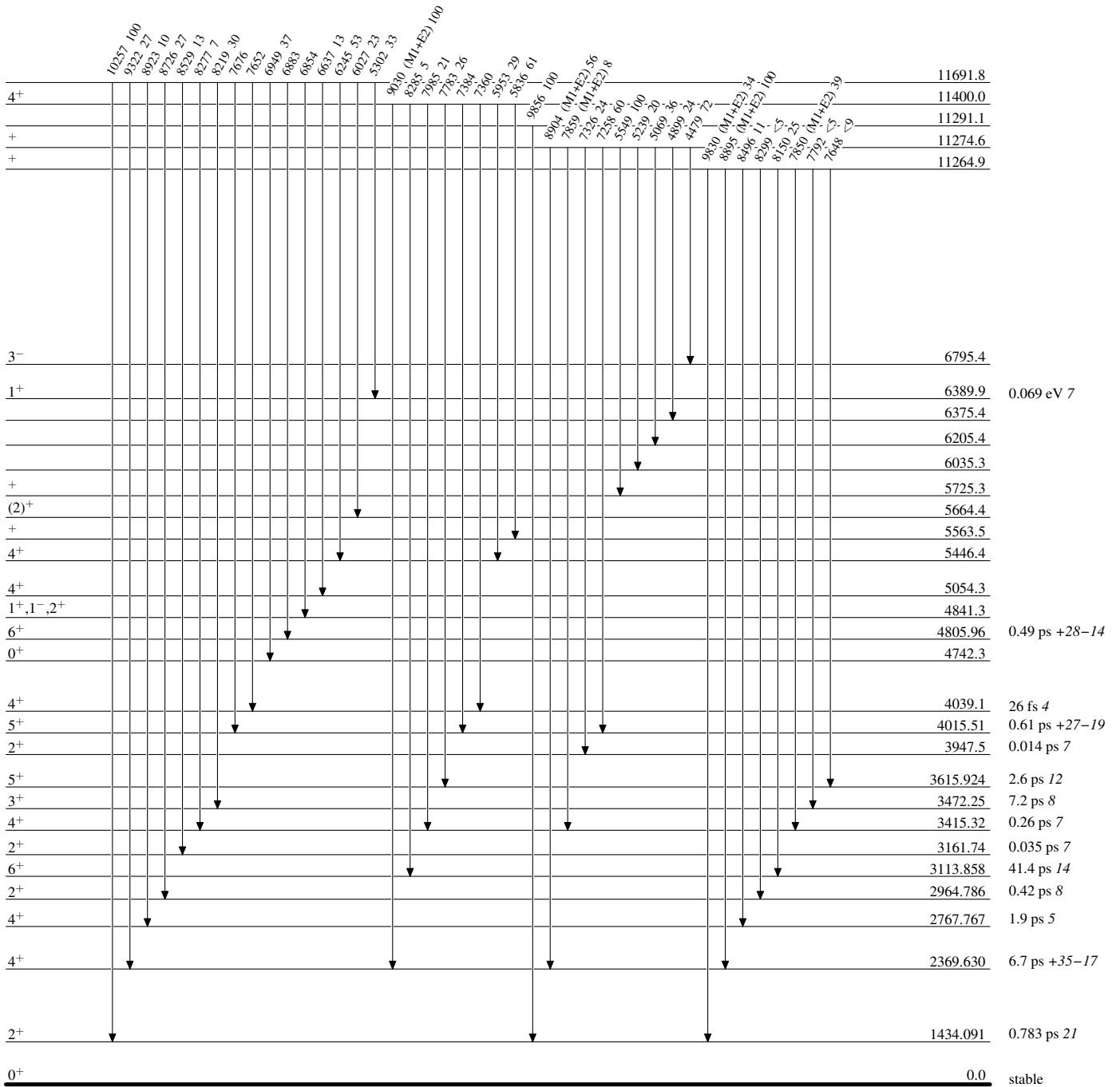
Intensities: Relative photon branching from each level

 $^{52}_{24}\text{Cr}_{28}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



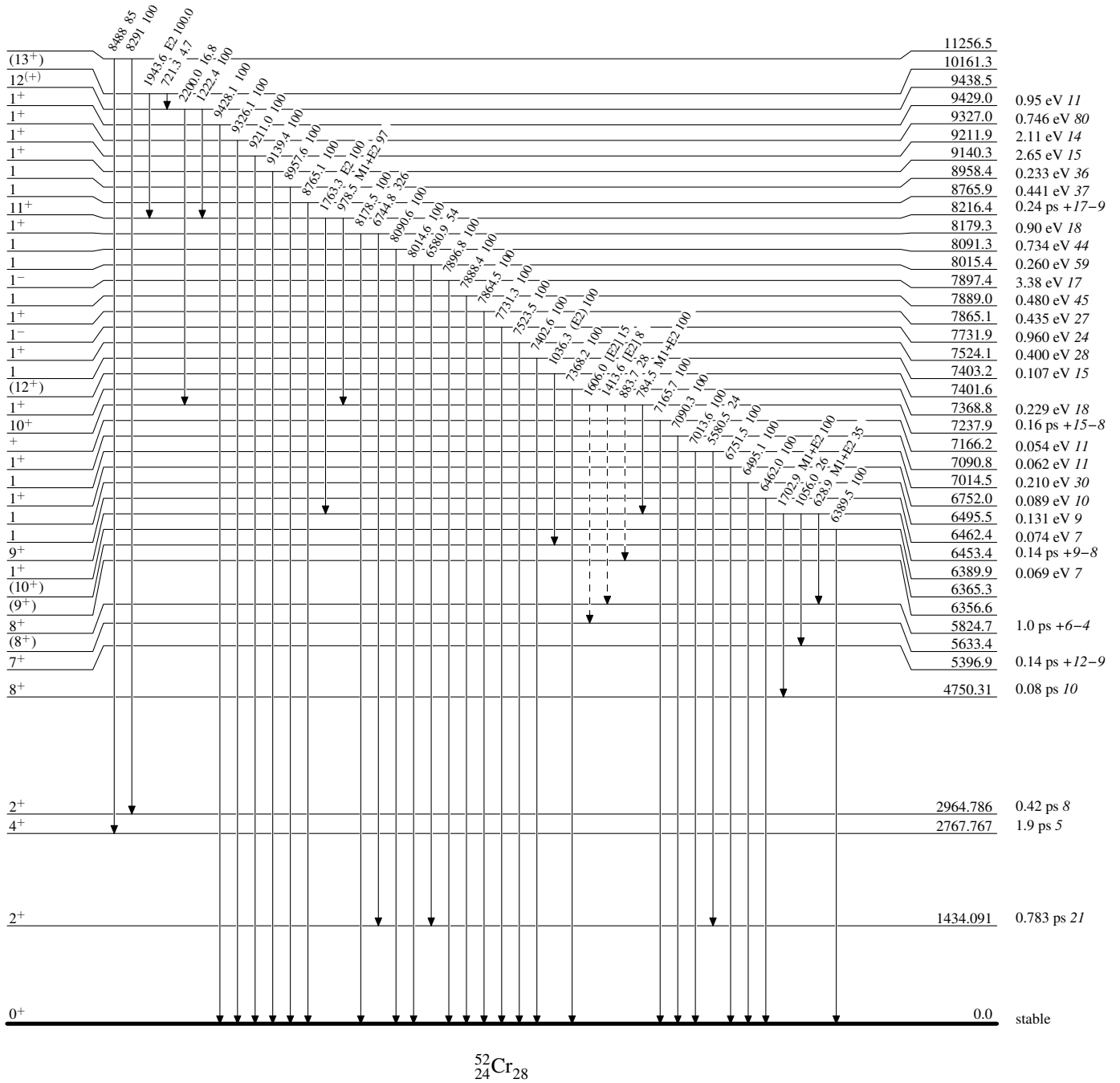
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)

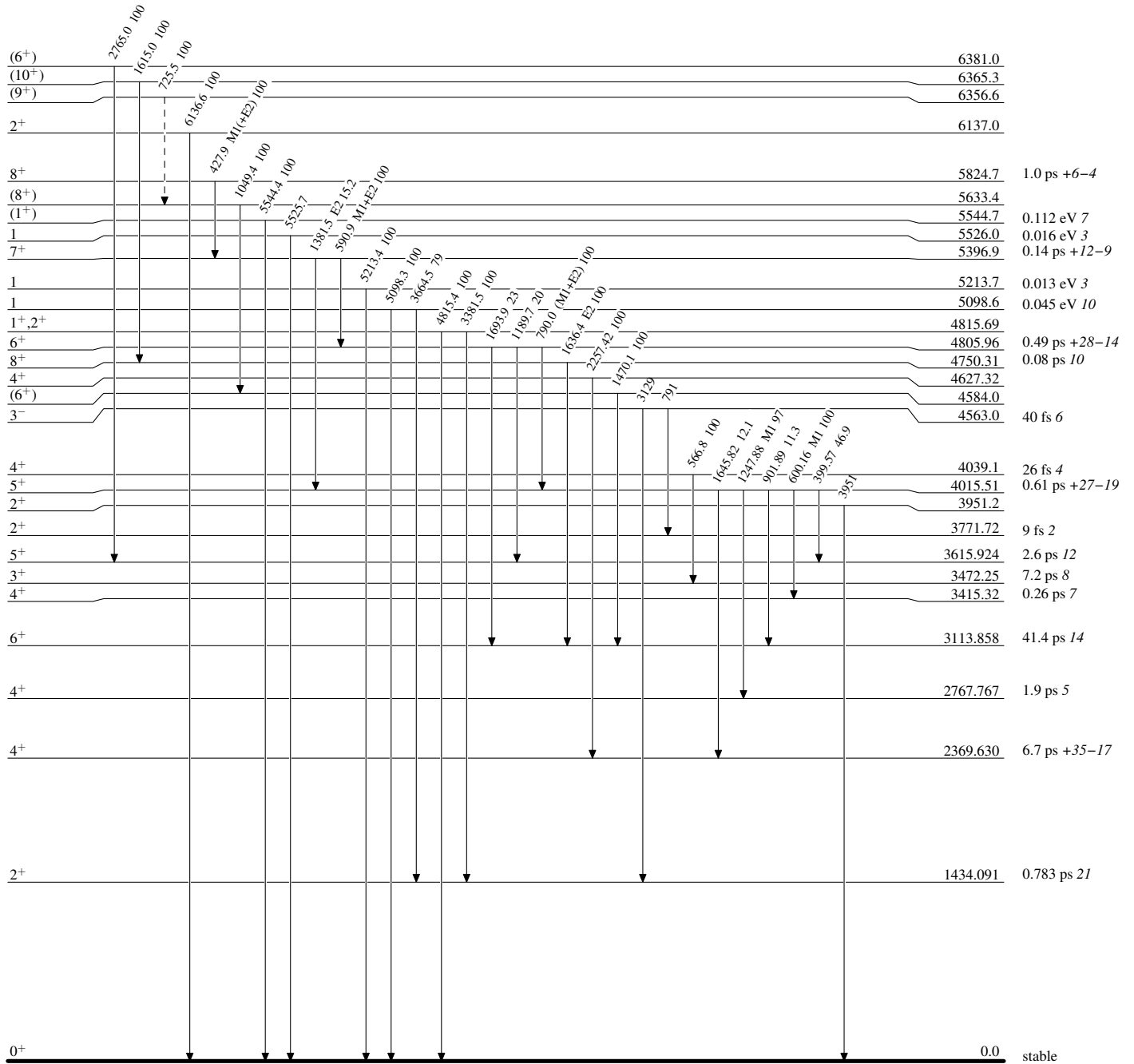


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----> γ Decay (Uncertain) $^{52}_{24}\text{Cr}_{28}$

Adopted Levels, Gammas

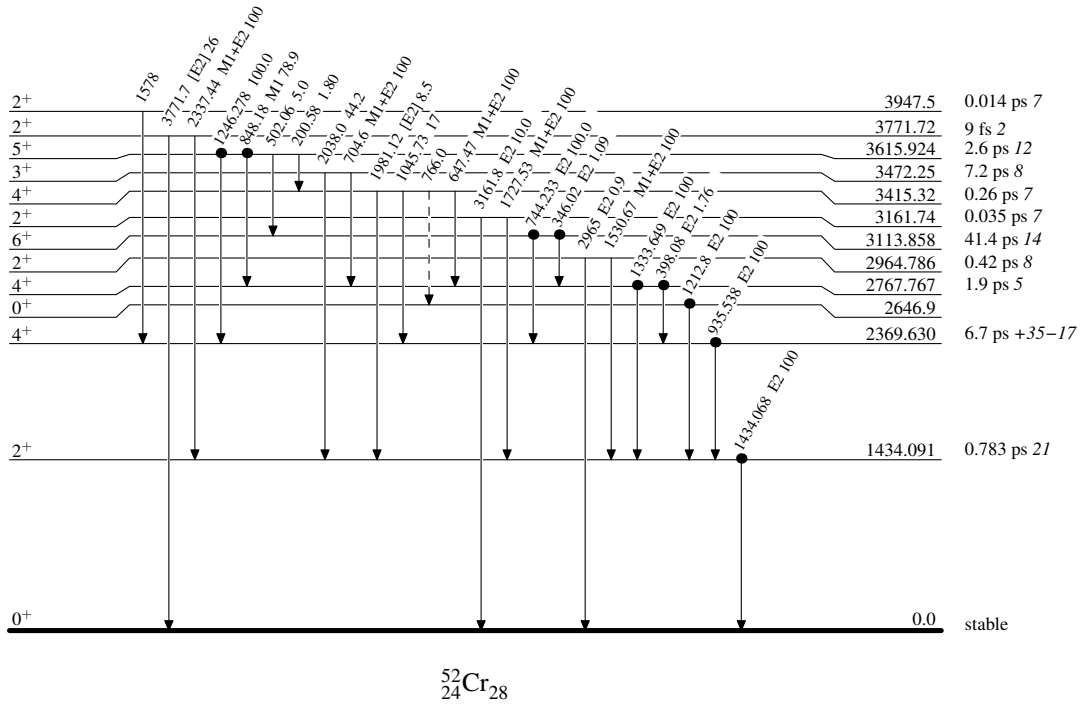
Legend

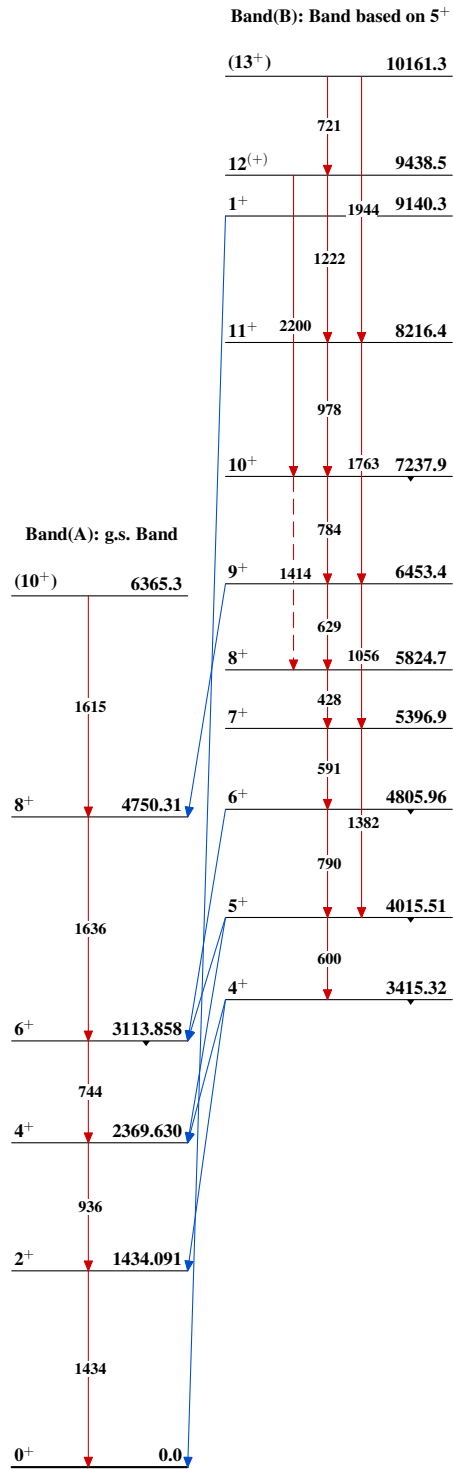
Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)

● Coincidence



Adopted Levels, Gammas $^{52}_{24}\text{Cr}_{28}$