

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 140,1 (2017)	30-Sep-2015

$Q(\beta^-) = -14323.0$ 28; $S(n) = 15635.0$ 6; $S(p) = 8328.17$ 2; $Q(\alpha) = -7039.76$ 3 [2012Wa38](#)

$S(2n) = 28930.52$ 20, $S(2p) = 14709.51$ 20 ([2012Wa38](#)).

First identification of ^{40}Cl nuclide by A. J. Dempster (Phys. Rev., 20 (1922), p. 631).

Additional details of data for resonances in different reactions can be found in the following datasets:

$^{36}\text{Ar}(\alpha, \gamma)$: resonances: 24 resonances from $E\alpha(\text{lab}) = 5486$ to 13330 (excitation energy in $^{40}\text{Ca} = 11978\text{--}19038$).

$^{39}\text{K}(p, \gamma)$: excitation energies and γ -decays for about 160 resonances.

$^{39}\text{K}(p, p), (p, \alpha)$: resonances: 267 resonances from $E(p)(\text{lab}) = 1102\text{--}6660$ (excitation energy in $^{40}\text{Ca} = 9403\text{--}14680$).

$^{40}\text{Ca}(p, p\alpha), (p, 2p)$: resonances: two resonances with excitation energies (in ^{40}Ca) at 11700 and 12300.

Other reactions (giant resonances, properties of compound nucleus, reaction mechanism, etc.):

$^{12}\text{C}(^{28}\text{Si}, X)$ or $^{28}\text{Si}(^{12}\text{C}, X)$: [2002Ro35](#), [1995Na09](#), [1986Ha33](#), [1983Ra26](#), [1979Os01](#), [1979Cl02](#), [1979Ba49](#), [1973Ho37](#): reaction mechanisms.

Additional information 1.

$^{24}\text{Mg}(^{16}\text{O}, X)$: [1991Fo08](#), [1985Sa11](#), [1981Nu02](#), [1980Sa31](#), [1980Sa12](#), [1980Pa08](#), [1979Le02](#), [1979Cl02](#), [1973Ho37](#).

$^{27}\text{Al}(^{16}\text{O}, t)$: [1982Aw01](#), [1981Aw02](#): reaction mechanism.

$^{39}\text{K}(p, p), (p, \alpha)$: resonances: [1987WaZI](#), [1990Bu02](#), [1970De30](#): see dataset.

$^{40}\text{Ca}(^{40}\text{Ca}, X)$: [1997Sc40](#): giant quadrupole resonance.

$^{40}\text{Ca}(p, \pi^-)$: [1983Sh31](#): $E = 190$ MeV. Measured σ .

$^{40}\text{Ca}(p, p\alpha), (p, 2p)$: resonances: [2001Sc25](#): see dataset.

Photonuclear reactions: $^{40}\text{Ca}(\gamma, n), (\gamma, p), (\gamma, 2n), (\gamma, pn)$, etc: [1974Br15](#), [1972Br58](#), [1971Sh23](#), [1971Is06](#), [1968Go29](#), [1966An03](#), [1964Ba24](#).

$^{40}\text{Ca}(\gamma, \pi)$: [2002Kr02](#): deduced Δ' resonance. Others: [1988St12](#), [1982Do12](#).

$^{40}\text{Ca}(e, X)$: [1976Zi02](#).

$^{40}\text{Ca}(\mu^-, \nu)$: [2003Po09](#): photon asymmetry measured in radiative muon capture in ^{40}Ca .

$^{40}\text{Ca}(\pi^+, K^+)$: [1991Pi07](#).

$^{40}\text{Ca}(K, \pi^-)$: [1981Be17](#), [1989Ta16](#): hypernuclear production.

$^{40}\text{Ca}(p\text{-bar}, X)$: [2002Ha01](#), [2001Tr23](#), [2001Tr19](#): measured anti-protonic x-rays.

$^{40}\text{Ca}(p\text{-bar}, p\text{-bar})$: [1984Ga32](#).

$^{40}\text{Ca}(p, np)$: [1984Ah04](#) (also [1983AhZY](#)): deduced neutron hole states.

$^{40}\text{Ca}(\text{pol } p, \text{pol } n)$: [1986Wa28](#): deduced spin-flip probability.

$^{40}\text{Ca}(^{20}\text{Ne}, ^{16}\text{O}\alpha)$: [1986Sh30](#).

Hyperfine structure, isotope shifts, nuclear radius measurements: [2000Mu17](#), [2000Ga58](#), [1995Ku41](#), [1993Si20](#), [1992Ve02](#), [1992Ma20](#), [1991As06](#), [1990Go10](#), [1984Va08](#), [1983Lo13](#), [1982Ay02](#), [1982An15](#), [1980Be13](#), [1979KI01](#), [1978Br31](#), [1976Ne08](#).

Mesic atoms: [1983Ku10](#), [1981Wo02](#), [1980Po01](#), [1979Ba07](#), [1971Ku08](#), [1970Ma26](#), [1970Ku03](#), [1966Co02](#).

Mesic atoms, in most studies, deduced isotope shifts, root-mean square radius.

[1983Ku10](#), [1980Po01](#), [1979Ba07](#), [1970Ku03](#): measured pionic x rays.

[1981Wo02](#), [1970Ma26](#), [1966Co02](#): measured muonic x rays.

[1971Ku08](#): measured kaonic x rays.

Giant (dipole, quadrupole and octupole) resonances: see inelastic scattering datasets: $^{40}\text{Ca}(e, e')$; (π^+, π^+') , (π^-, π^-') ; (p, p') , $(\text{pol } p, p')$; (d, d') , $(\text{pol } d, d')$; $(^3\text{He}, ^3\text{He}')$; (α, α') ; (HI, HI') .

In XREF column, level population indicated by letter Z or z refers to the following level energies in different reactions:

^{41}Ti ϵp decay (80.4 ms): 0, 3353.62, 3737, 3904.

^{43}Cr $\beta 3p$ decay (21.2 ms): 0.

^{44}V $\epsilon \alpha$ decay (111 ms): 0.

$^{14}\text{N}(^{28}\text{Si}, d)$: 6930, 8098.

$^{36}\text{Ar}(^7\text{Li}, t)$: 3900, 5265, 5615, 6290, 6525, 7010.

$^{36}\text{Ar}(^{16}\text{O}, ^{12}\text{C})$: 3353, 3900, 5250, 6900, 9900, 12400.

Adopted Levels, Gammas (continued) $^{40}\text{Ca}(\text{p},\text{p}\alpha),(\text{p},2\text{p})$: resonances: 11700, 12300. $^{40}\text{Ca}(\text{t},\text{t}),(\text{pol t},\text{t})$: 0.

Inelastic scattering: 0, 3740, 3900, 4490, 5900, 6290, 6400, 6940, 7300. Giant resonances at 7.8, 10.7, 14.0, 17.6 and 26 MeV.

 $^{40}\text{Ca}(\text{n},\text{n}'),(\text{pol n},\text{n}')$: 0, 3353, 3737, 3904, 4491. $^{40}\text{Ca}(\pi^+,\pi^+'),(\pi^-,\pi^-')$: 0, 3353, 3736, 3908, 4492, 6256, 6583, 6700, 11700, 13400, 17500. $^{42}\text{Ca}(^{16}\text{O},^{18}\text{O})$: 0. ^{40}Ca LevelsCross Reference (XREF) Flags

A	$^{40}\text{K} \beta^-$ decay (1.248×10^9 y)	N	$^{40}\text{Ca}(\text{e},\text{e}')$	Others:
B	$^{40}\text{Sc} \varepsilon$ decay (182.3 ms)	O	$^{40}\text{Ca}(\text{n},\text{n}'\gamma)$	AA $^{43}\text{Cr} \beta^+ 3\text{p}$ decay (21.2 ms)
C	$^4\text{He}(^{36}\text{Ar},\alpha)$: resonances	P	$^{40}\text{Ca}(\text{p},\text{p}'\gamma)$	AB $^{44}\text{V} \varepsilon\alpha$ decay (111 ms)
D	$^{32}\text{S}(^{12}\text{C},\alpha)$	Q	$^{40}\text{Ca}(\text{p},\text{p}'),(\text{pol p},\text{p}')$	AC $^{14}\text{N}(^{28}\text{Si},\text{d})$
E	$^{36}\text{Ar}(\alpha,\gamma)$: resonances	R	$^{40}\text{Ca}(\text{d},\text{d}'),(\text{pol d},\text{d}')$	AD $^{36}\text{Ar}(^7\text{Li},\text{t})$
F	$^{36}\text{Ar}(^6\text{Li},\text{d})$	S	$^{40}\text{Ca}(^3\text{He},^3\text{He}')$	AE $^{36}\text{Ar}(^{16}\text{O},^{12}\text{C})$
G	$^{38}\text{Ar}(^3\text{He},\text{n})$	T	$^{40}\text{Ca}(\alpha,\alpha'\gamma)$	AF $^{40}\text{Ca}(\text{p},\text{p}\alpha),(\text{p},2\text{p})$: resonances
H	$^{39}\text{K}(\text{p},\gamma)$	U	$^{40}\text{Ca}(\alpha,\alpha')$	AG $^{40}\text{Ca}(\text{t},\text{t}),(\text{pol t},\text{t})$
I	$^{39}\text{K}(\text{p},\text{p}),(\text{p},\alpha)$: resonances	V	$^{41}\text{Ca}(\text{d},\text{t})$	AH $^{40}\text{Ca}(\text{n},\text{n}'),(\text{pol n},\text{n}')$
J	$^{39}\text{K}(\text{d},\text{n})$	W	$^{41}\text{Ca}(^3\text{He},\alpha)$	AI $^{40}\text{Ca}(\pi^+,\pi^+'),(\pi^-,\pi^-')$
K	$^{39}\text{K}(^3\text{He},\text{d})$	X	$^{42}\text{Ca}(\text{p},\text{t})$	AJ $^{42}\text{Ca}(^{16}\text{O},^{18}\text{O})$
L	$^{39}\text{K}(^3\text{He},\text{d}\gamma)$	Y	$(\text{HI},\text{xn}\gamma)$	AK Inelastic scattering
M	$^{40}\text{Ca}(\gamma,\gamma')$	Z	$^{41}\text{Ti} \varepsilon\text{p}$ decay (80.4 ms)	

<u>E(level)[†]</u>	<u>J^π</u>	<u>T_{1/2}^{#@}</u>	<u>XREF</u>	<u>Comments</u>
0.0	0 ⁺	stable	AB DEFGH JK MNOPQRSTUVWXYZ	XREF: Others: AA, AB, AG, AH, AI, AJ, AK Double β decay ($\varepsilon\varepsilon$) is possible, but only limits have been set on half-life from measurements. T _{1/2} : experimental limits from $2\varepsilon\varepsilon$ decay (2001Be79,1999Be64): $>3.0 \times 10^{21}$ y for 0-neutrino mode; $>5.9 \times 10^{21}$ y for 2-neutrino mode. Evaluated rms charge radius = 3.4776 fm <i>19</i> (2013An02). Additional information 2.
3352.62 ^{&} 9	0 ⁺	2.17 ns 8	D FGH JKL NOPQRSTUVWXYZ	XREF: Others: AE, AH, AI XREF: T(?). J ^π : L(α,α')=L($^3\text{He},\text{n}$)=L(p,t)=0 from 0 ⁺ ; E0 excitation in (e,e'). T _{1/2} : weighted average of 2.21 ns <i>10</i> in (n,n') and 2.15 ns <i>8</i> in (p,p'γ). Additional information 3.
3736.69 5	3 ⁻	41 ps 4	B D F H JKL NOPQRSTUVWXYZ	XREF: Others: AH, AI, AK $\mu=+1.6$ <i>3</i> (2014StZZ,1979Ni04,1976Ja16) T=0 (1972Sc19) J ^π : L(α,α')=L($^3\text{He},\text{n}$)=L(p,t)=3 from 0 ⁺ ; E3 excitation in (e,e'). μ : from tilted-foil hyperfine field IPAC in (α,α') (1979Ni04) and recoil into gas in (α,α') (1976Ja16). Other: 1.56 <i>30</i> (IMPAC, relative to g-factor for 4491 level in (α,α'), 1987Ma25). T _{1/2} : from (p,p'γ). Additional information 4.
3904.38 ^{&} 3	2 ⁺	35 fs 7	D FGH JKLMNOPQR TU XYZ	XREF: Others: AD, AE, AH, AI, AK J ^π : L(α,α')=L($^3\text{He},\text{n}$)=L(p,t)=2 from 0 ⁺ ; E2 excitation in (e,e') and (γ,γ').

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF	Comments
4491.43 4	5 ⁻	289 ps 8	B D F H JKL NOPQRSTUVWXYZ	T _{1/2} : weighted average of 40 fs 7 in (p,γ), 29 fs +10-6 in (γ,γ'), 36 fs 14 in (n,n'γ), and 33 fs 7 in (p,p'γ). Additional information 5. XREF: Others: AH, AI, AK μ=+2.6 5 (2014StZZ,1974He13) T=0 (1972Sc19) J ^π : L(α,α')=L(p,t)=5 from 0 ⁺ ; E5 excitation in (e,e'). T _{1/2} : weighted average of 295 ps 5 in (α,α'γ), 272 ps 8 in (p,p'γ), and 0.38 ns 8 in (HI,xnγ). μ: IPAD method in (p,p'γ) (1974He13). Additional information 6.
5211.56 ^d 17	0 ⁺	1.02 ps 21	D fgH KL OPQ XY	J ^π : L(p,t)=L(⁶ Li,d)=0 from 0 ⁺ . T _{1/2} : from (p,p'γ).
5248.79 5	2 ⁺	83 fs +11-9	d fgH KLMNOPQ S U XY	XREF: Others: AD J ^π : L(p,t)=L(⁶ Li,d)=L(p,p')=2 from 0 ⁺ ; E2 excitation in (e,e'). T _{1/2} : weighted average of 0.15 ps 7 in (p,γ) and 94 fs 17 in (p,p'γ) and 79 fs +11-9 in (γ,γ').
5278.80 ^{&} 6	4 ⁺	0.21 ps 4	d FgH KL OPQ U Y	XREF: Others: AD, AE J ^π : L(⁶ Li,d)=L(p,p')=4 from 0 ⁺ ; γ(θ) in (p,γ'). T _{1/2} : weighted average of 0.19 ps 4 in (n,n'γ), 0.225 ps 35 in (p,p'γ), and 0.16 ps +13-4 in (p,γ).
5613.52 3	4 ⁻	0.69 ps 11	B d H JKL OPQ sT VW Y	XREF: Others: AD J ^π : spin from γ(θ) in (HI,xnγ) and γγ(θ) in (p,γ); parity from L(d,n)=L(³ He,d)=3 from 3/2 ⁺ and L(d,t)=L(³ He,α)=2 from 7/2 ⁻ . T _{1/2} : from (p,p'γ). Other: 69 fs 55 in (p,γ). Additional information 7.
5629.41 ^d 6	2 ⁺	40 fs 15	d F H MNOPQ stU XY	XREF: Others: AD XREF: N(5610). J ^π : L(p,t)=2 from 0 ⁺ ; E2 excitation in (e,e'). T _{1/2} : weighted average of 42 fs 15 from (p,p'γ) and 38 fs +20-10 from (γ,γ').
5902.63 7	1 ⁻	15.8 fs 22	D F H JKLMNOPQ U WX	XREF: Others: AK XREF: D(5900)N(5940). J ^π : L(p,t)=L(⁶ Li,d)=1 from 0 ⁺ . T _{1/2} : weighted average of 42 fs 14 from (p,p'γ) and 15.2 fs +23-18 (γ,γ'). 2004To07 in (HI,xnγ) propose this as 1 ⁻ member of K ^π =0 ⁻ band, not observed by 2004To07. Additional information 8.
6025.47 5	2 ⁻	171 fs 21	f H JKL OPQ uVWx	J ^π : L(³ He,d)=3 and L(d,n)=1+3 from 3/2 ⁺ ; analyzing power in (pol p,p'). T _{1/2} : from (p,p'γ). Additional information 9.
6029.71 ^b 6	3 ⁺	0.40 ps 8	f H OP u xY	J ^π : 780.8γ and 2124.4γ E2(+M1) to 2 ⁺ ; band assignment in (HI,xnγ). T _{1/2} : from (p,p'γ).
6160	(3 ⁻)		N TU	XREF: T(6100). J ^π : L(α,α')=(3).
6285.15 4	3 ⁻	0.33 ps 4	D F H JKL NOPQ STU WX	XREF: Others: AD, AI, AK J ^π : L(α,α')=L(p,t)=L(⁶ Li,d)=3 from 0 ⁺ . T _{1/2} : weighted average of 0.27 ps 8 in (p,γ) and 0.35 ps 4 in (p,p'γ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{40}Ca Levels (continued)					
E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
					2004To07 in (HI,xnγ) propose this as (3 ⁻) member of K ^π =0 ⁻ band, not observed by 2004To07.
6422.4 10	2 ⁺	12 fs +5-3	M	Q	Additional information 10. XREF: Others: AK J ^π : from (pol p,p'). T _{1/2} : from (γ,γ').
6507.87 13	4 ⁺	128 fs 21	d F H	OPQ U XY	XREF: Others: AD J ^π : L(p,t)=L(⁶ Li,d)=L(pol p,p')=4 from 0 ⁺ . T _{1/2} : from (p,p'γ).
6542.80 ^d 9	4 ⁺	121 fs 21	d F H	OPQ Y	XREF: Others: AD XREF: O(?). J ^π : L(⁶ Li,d)=4 from 0 ⁺ ; 913.3γ stretched E2 to 2 ⁺ ; band assignment in (HI,xnγ). T _{1/2} : from (p,p'γ).
6582.47 10	3 ⁻	0.173 fs 28	B d F H JKL NOPQ STUVWX		XREF: Others: AI XREF: O(?)T(6560). J ^π : L(α,α')=L(p,t)=L(⁶ Li,d)=L(pol p,p')=3. T _{1/2} : from (p,p'γ). 2004To07 in (HI,xnγ) propose this as possible (3 ⁻) member of K ^π =0 ⁻ band, not observed by 2004To07.
6750.41 7	2 ⁻	96 fs 28	F H JKL	OPQ UVWX	Additional information 11. XREF: Others: AI J ^π : from analyzing power in (pol p,p') with L=3; L(³ He,d)=1 and L(d,n)=1+3 from 7/2 ⁺ . T _{1/2} : from (p,p'γ).
6908.70 8	2 ⁺	2.41 fs +29-23	d F H	MNOPQ X	Additional information 12. XREF: Others: AD J ^π : L(p,t)=L(⁶ Li,d)=L(p,p')=2 from 0 ⁺ . T _{1/2} : from (γ,γ'). Others: <35 fs from (p,γ), <10 fs from (p,p'γ).
6930.2 ^{&} 3	6 ⁺	0.34 ps +9-17	d F	l O v Y	XREF: Others: AC, AD, AE, AK J ^π : L(⁶ Li,d)=6; γ(θ) and band assignment in (HI,xnγ).
6931.29 6	3 ⁻	1.4 ps 6	d H	l nOPQ stuvW	T _{1/2} : from (HI,xnγ) by DSAM. XREF: Others: AD, AK J ^π : L(³ He,α)=2 from 7/2 ⁻ ; 2439.8γ to 5 ⁻ , 1301.8γ, 1682.4γ and 3026.8γ to 2 ⁺ . T _{1/2} : from (p,γ). Other: 104 fs 28 from (p,p'γ).
6938.0 18	(1 ⁻ to 5 ⁻)	0.42 fs 17	d	n P stuv	XREF: Others: AD, AK J ^π : γ to 3 ⁻ . T _{1/2} : from (p,p'γ).
6950.48 7	1 ⁻	1.01 fs 5	d GH JKLMNOPQ	tuvWX	XREF: Others: AD, AK J ^π : L(p,t)=L(³ He,n)=1 from 0 ⁺ . T _{1/2} : from (γ,γ'). Other: <10 fs from (p,p'γ).
7100	(2 ⁺)			N	Additional information 13. XREF: Others: AD
7113.1 10	1 ⁻	55 fs 28	H jK	P x	E(level),J ^π : from (e,e'). XREF: Others: AD J ^π : 1899.8γ and 7112.9γ to 0 ⁺ , 1485γ and 3206.8γ to 2 ⁺ ; L(³ He,d)=1 from 3/2 ⁺ ; L(d,n)=1(+3) from 3/2 ⁺ .

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
7113.73 5	4 ⁻	50 fs 21	H jKL	PQ	UVWx	T _{1/2} : from (p,p'γ). XREF: Others: AD XREF: K(7117)U(7120). J ^π : L(p,p')=5 from 0 ⁺ ; L(d,t)=L(³ He,α)=0+2 from 7/2 ⁻ . T _{1/2} : weighted average of 35 fs 21 in (p,p'γ) and 76 fs 28 in (p,γ).
7239.07 8	(3 ⁻ ,4,5 ⁻)	0.10 ps 5	d H	PQ		J ^π : 3501.4γ to 3 ⁻ and 2746γ to 5 ⁻ . T _{1/2} : from (p,p'γ).
7277.82 8	(2,3) ⁺	49 fs 35	d f H	PQ		XREF: Others: AK J ^π : 3541.0γ to 3 ⁻ ; L(p,p')=2 from 0 ⁺ for 7278+7301.
7300.67 11	0 ⁺	118 fs 35	d f H	PQ	U X	T _{1/2} : from (p,p'γ). XREF: Others: AK J ^π : L(α,α')=L(p,t)=L(⁶ Li,d)=0.
7397.2 ^b 10	(5 ⁺)	0.47 ps 14		PQ	Y	T _{1/2} : from (p,p'γ). J ^π : γ to 4 ⁺ and band assignment in (HI,xnγ). 2004To07 in (HI,xnγ) proposed this as (5 ⁻) member of K ^π =0 ⁻ band.
7421.9 15		0.20 ps 14		PQ	X	T _{1/2} : from (p,p'γ). XREF: X(7433).
7446.23 6	3 ⁺ ,4 ⁺	0.14 ps 5	H	PQ	X	T _{1/2} : from (p,p'γ). J ^π : L(p,p')=4 from 0 ⁺ ; γ to 2 ⁺ .
7466.35 7	2 ⁺	8 fs 4	F H	PQ	TU X	T _{1/2} : from (p,p'γ). XREF: T(7500)U(?). J ^π : L(p,t)=L(p,p')=2 from 0 ⁺ ; 4113.5γ and 7465.6γ to 0 ⁺ .
7481?			H			T _{1/2} : from (p,γ). Other: <10 fs in (p,p'γ).
7532.26 5	2 ⁻	0.16 ps 4	H JKL	PQ	W	J ^π : L(³ He,d)=1 from 3/2 ⁺ ; L(³ He,α)=2; L(p,p')=3; not 3 ⁻ from (p,γ).
7561.17 7	4 ⁺	0.17 ps 4	F H	PQR	U X	T _{1/2} : weighted average of 0.22 ps 7 in (p,γ) and 0.149 ps 35 in (p,p'γ). XREF: U(?). J ^π : L(⁶ Li,d)=4. Note that L(p,t)=(2) is inconsistent and tentative.
7623.11 8	(2 ⁻ ,3,4 ⁺)	0.111 ps 28	H	PQ	X	T _{1/2} : from (p,p'γ). Other: 0.18 ps +10-5 in (p,γ). Additional information 14 . XREF: X(7625). J ^π : 1993.6γ and 2374.2γ to 2 ⁺ and 2009.5γ to 4 ⁻ . However, L(p,t)=0 for a level at 7625 could indicate there may be a separate level, if this assignment is correct.
7658.23 5	4 ⁻	<10 fs	B H jKL	PQ	vWX	T _{1/2} : from (p,p'γ). T=1 J ^π : log ft=3.3 from 4 ⁻ ; analog of g.s. in ⁴⁰ K (see 1966Er05 , 1966An01).
7676.6 5	(6 ⁺)	0.20 ps 5	H j	PQ	uv Y	T _{1/2} : from (p,p'γ). J ^π : 2399.2γ (E2) to 4 ⁺ .
7694.08 4	3 ⁻	<6 fs	H JKL	PQ	uvW	T _{1/2} : from (p,p'γ). T=1 J ^π : L(d,n)=1 and L(³ He,d)=3 from 3/2 ⁺ ; 2080.6γ to 4 ⁻ ; analog of the 29.8, 3 ⁻ level in ⁴⁰ K, see 1966Er05 in (³ He,d). T _{1/2} : from (p,γ). Other: <10 fs in (p,p'γ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF					Comments
7701.8 4	0 ⁺	166 fs 35	F H	Q	u	X		J ^π : L(⁶ Li,d)=L(p,t)=0.
7769.4 10	(3,4,5 ⁻)		H	PQ		X		XREF: X(7757).
								J ^π : 2155.8γ to 4 ⁻ and 4032.5γ to 3 ⁻ ; J=(3,4,5) from γ feeding in (p,γ) (1990Ki07).
7814.7 6	0 ⁺		G	PQ		X		T _{1/2} : from (p,p'γ).
								E(level): from (p,p').
7870	3 ⁻	2.44 fs +24-20	F					J ^π : L(³ He,n)=0.
7872.18 9	2 ⁺		H	Mn PQ	U	X		J ^π : L(⁶ Li,d)=3.
								XREF: Others: AK
								J ^π : L(p,t)=L(α,α')=2 from 0 ⁺ .
7928.42 10	4 ⁺	49 fs 35	H	n PQ	s U	X		T _{1/2} : from (γ,γ'). Other: <14 fs from (p,p'γ).
								XREF: Others: AK
								J ^π : L(α,α')=L(p,p')=4 from 0 ⁺ . Note that L(p,t)=(3) is inconsistent and tentative.
7972.5	(≤3) ⁻	21 fs 21	d	J	s	x		T _{1/2} : from (p,p'γ).
7974.4 ^d 8	(6 ⁺)		H			Y		J ^π : L(d,n)=1.
7976.55 3	2 ⁺		d		PQ s	x		E(level): band assignment in (HI,xnγ).
8018.8 10	0 ⁺		d		PQ	X		J ^π : 4624γ and 7977γ to 0 ⁺ and 2699γ to 4 ⁺ .
								T _{1/2} : from (p,p'γ).
8051.8 6		2.94 fs +20-18			Q			E(level): from (p,p').
8091.61 17	2 ⁺		d FGH	M PQ	U	X		XREF: F(8050)G(8050).
								J ^π : L(α,α')=L(⁶ Li,d)=L(³ He,n)=L(p,p')=2 from 0 ⁺ ; E2 excitation in (γ,γ'); but L(p,t)=4 from 0 ⁺ for a level at 8085 is inconsistent and it could imply that there may be a separate level if the assignment is correct.
8100.1 ^a 7	8 ⁺	12.5 ps 17	d			Y		T _{1/2} : from (γ,γ'). Other: <28 fs in (p,p'γ).
								XREF: Others: AC
8113.2 5	1 ⁻	30 fs +20-9	d F	j M PQ		X		J ^π : 1168.8γ ΔJ=2, E2 to 6 ⁺ .
								T _{1/2} : from (HI,xnγ) by recoil-distance method.
								XREF: F(8150).
8134.77 10	(3 ⁻)	<28 fs	d H j	PQ				J ^π : spin=1 from dipole excitation in (γ,γ'); L(p,p')=3 and L(⁶ Li,d)=1 from 0 ⁺ .
								T _{1/2} : from (γ,γ'). Other: <14 fs in (p,p'γ).
8187.5 8	(3,4,5 ⁻)	<17 fs	H j	PQ		x		J ^π : 2505.3γ and 4229.4γ to 2 ⁺ and 2521.2γ to 4 ⁻ . Possible 3643.1γ to 5 ⁻ would disfavor 2 ⁻ and 3 ⁺ . L(d,n)=1+3 from 3/2 ⁺ for 8113 and 8135 doublet.
								T _{1/2} : from (p,p'γ).
8195.9 6		(≤3) ⁻			Q	x		J ^π : 4451.6γ to 3 ⁻ ; J=(3,4,5) based on γ feeding in (p,γ) (1990Ki07).
8271 1			J L	PQ	U			T _{1/2} : from (p,p'γ).
								E(level): from (p,p').
								XREF: U(?).
								E(level): from (p,p').
								J ^π : L(d,n)=1 from 3/2 ⁺ ; 1315γ and 2364γ to 1 ⁻ .
								But L(⁶ Li,d)=4 from 0 ⁺ is suggested for a 8270 group.
8276 1	0 ⁺	58 fs 21	FG	PQ		X		J ^π : L(p,t)=L(³ He,n)=L(⁶ Li,d)=0 from 0 ⁺ .
8323.16 8	(1 ⁻ ,2 ⁺)		d H	PQ				J ^π : 8322.2γ to 0 ⁺ , 2038.0γ and 4586.2γ to 3 ⁻ .
								T _{1/2} : weighted average of 83 fs 28 in (p,γ) and 42 fs 21 in (p,p'γ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{40}Ca Levels (continued)									
E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF				Comments		
8338.0 3	(2 ⁺ ,3,4)		d	H	Q	X	J ^π : 1795.2γ and 1830.1γ to 4 ⁺ ; J=(2,3,4) based on γ feeding in (p,γ) (1990Ki07).		
8358.9 6	(0,1,2) ⁻	104 fs 2I	d	J	L	PQ	XREF: J(8371). J ^π : L(d,n)=1 from 3/2 ⁺ ; 1405γ to 1 ⁻ is unlikely to be Mult=Q, ΔJ=2 based on RUL.		
8364 5	(3 ⁻ to 7 ⁻)				P		T _{1/2} : from (p,p'γ).		
8373.94 15	4 ⁺		F	H	Q	U WX	J ^π : 3872γ to 5 ⁻ . XREF: F(8380).		
8424.81 11	2 ⁻	<17 fs	H	JKL	N PQ	vW	J ^π : L(α,α')=L(p,t)=L(⁶ Li,d)=4 from 0 ⁺ . T=1 (1990Ki07) XREF: K(8435).		
8439.0 5	0 ⁺		FgH		PQ s	X	J ^π : L(³ He,α)=2 from 7/2 ⁻ , L(p,p')=3 from 0 ⁺ , L(d,n)=1+3 from 3/2 ⁺ ; M2 excitation in (e,e'); analog of the 800, 2 ⁻ level in ⁴⁰ K, see 1966Er05 in (³ He,d).		
8484.02 13	(1 ⁻ ,2 ⁻ ,3 ⁻)	24 fs 14	gH	k	PQ s	vWX	T _{1/2} : from (p,p'γ). XREF: F(8420). J ^π : L(p,t)=L(⁶ Li,d)=0 from 0 ⁺ . J ^π : 2581.3γ to 1 ⁻ , 4747.0γ to 3 ⁻ ; L(³ He,α)=(2) from 7/2 ⁻ . But L(p,t)=0 from 0 ⁺ for a level at 8483 is inconsistent and it is unlikely the same level based on RUL for the 4747.0γ, unless L(p,t)=0 is questionable.		
8540 4	1,2 ⁺	14 fs 14	f		P	vw	T _{1/2} : from (p,p'γ). J ^π : 5188γ and 8540γ to 0 ⁺ ; M2 is ruled out by RUL for these transitions.		
8551.1 7	5 ⁻	<17 fs	f	JK	N PQ	v X	T _{1/2} : from (p,p'γ). T=1 XREF: N(8500). J ^π : L(p,t)=L(p,p')=5 from 0 ⁺ , L(d,n)=L(³ He,d)=3 from 3/2 ⁺ ; analog of the 891, 5 ⁻ level in ⁴⁰ K, see 1966Er05 in (³ He,d).		
8578.80 9	2 ⁺	3.6 fs +I3-8	d f H	M	PQ	u x	T _{1/2} : from (p,p'γ). J ^π : L(p,p')=2 from 0 ⁺ ; E2 excitation in (γ,γ').		
8587 2	(2 ⁺ ,3)		d f		P	u x	T _{1/2} : from (γ,γ'). Other: <21 fs from (p,p'γ).		
8633 6					PQ		J ^π : 2562γ to 2 ⁻ , 3904γ to 2 ⁺ , 3308γ to 4 ⁺ .		
8665.3 8	1 ⁻			J	PQ		E(level): from ⁴⁰ Ca(p,p'γ). XREF: P(8671).		
8678.29 10	4 ⁺	42 fs 35	H		P	X	E(level): from (p,p'). J ^π : L(d,n)=1; 8665γ to 0 ⁺ . J ^π : L(p,t)=4.		
8701 1	(6 ⁻)					Y	T _{1/2} : from (p,γ). J ^π : suggested in (HI,xnγ); 3088γ to 4 ⁻ and 4209γ to 5 ⁻ .		
8717 8					P				
8748.22 9	2 ⁺	5.8 fs +I1-8	f H j	M	PQ	T	XREF: P(8756)T(8700). J ^π : L(p,p')=2 from 0 ⁺ ; E2 excitation in (γ,γ').		
8764.18 6	3 ⁻		d	H j	P	X	T _{1/2} : from (γ,γ'). XREF: P(8769)X(8752).		
8810 7	2 ⁺		d f		PQ	U	J ^π : L(p,t)=3. XREF: P(8819).		
8850.6 9	6 ⁻ ,7 ⁻ ,8 ⁻			J	PQ	X	J ^π : L(α,α')=2 from 0 ⁺ for a 8780 group. XREF: P(8860).		
							E(level): from (p,p'). J ^π : L(p,p')=7 from 0 ⁺ . J ^π =(0) ⁻ is proposed for a		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

⁴⁰ Ca Levels (continued)						
E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
8909.0 9				Q	X	8860 group in (d,n). E(level): from (p,p').
8934.81 7	2 ⁺		F H j	P		XREF: P(8922). J ^π : L(⁶ Li,d)=2 from 0 ⁺ ; 3722.1γ, 5581.8γ and 8933.7γ to 0 ⁺ , 2352.2γ and 5197.8γ to 3 ⁻ , 2905.0γ to 3 ⁺ .
8935.8 ^b 9	(7 ⁺)				Y	J ^π : band assignment in (HI,xnγ).
8938.4 9	0 ⁺		J	PQ	X	XREF: P(8949). E(level): from (p,p'). J ^π : L(p,t)=0. But L(d,n)=1 from 3/2 ⁺ is suggested for a level at 8931.
8978 6	5 ⁺ ,6 ⁺ ,7 ⁺		H	Q	V x	XREF: H(?)V(?). E(level): from (p,p').
8982.5 5	2 ⁺	4.5 fs +39-14	j M	r	UV x	J ^π : L(p,p')=6 from 0 ⁺ . XREF: U(8970)V(?). J ^π : E2 excitation in (γ,γ').
8994.50 11	(1 ⁻ ,2 ⁺)		H j	PQr	x	T _{1/2} : from (γ,γ'). XREF: P(9011). J ^π : 5641.5γ and 8993.4γ to 0 ⁺ , 2411.0γ, 2709.3γ to 3 ⁻ .
9031.9 3	4 ⁻		H	Q	VWX	J ^π : L(d,t)=L(³ He,α)=0 from 7/2 ⁻ , L(p,p')=5 from 0 ⁺ . 2004To07 in (HI,xnγ) propose (7 ⁻) for this level, but γ's to 3 ⁻ and 4 ⁻ states are inconsistent with this assignment.
9033? ^c 1	(7 ⁻)				Y	E(level): it is possible that this level is the same as the 9031.9 seen in other reactions and the 4542γ reported by 2004To07 in (HI,xnγ) could correspond to 4540.2γ in (p,γ). But the most intense 3418γ from 9031.9 level is not reported by 2004To07.
9050.1 10				Q		J ^π : band assignment in (HI,xnγ). E(level): from (p,p').
9080.3 11				Q	w	E(level): from (p,p').
9091.70 6	3 ⁻		H k	Q	w	T=(0) (1990Ki07) J ^π : 1977.9γ to 4 ⁻ and 3812.7γ to 4 ⁺ , 5187.0γ to 2 ⁺ and 3066.1γ to 2 ⁻ , 3188.9γ to 1 ⁻ .
9135.66 5	2 ⁻ ,3 ⁻		f H Jk	Q	Wx	T=0 (1990Ki07) J ^π : L(d,n)=1 from 3/2 ⁺ , L(p,p')=3 from 0 ⁺ .
9162.1 11			f k	Q	x	Additional information 15. E(level): from (p,p').
9185.3 12			k	Q		E(level): from (p,p').
9209.77 3	(2,3) ⁻		H j	Q	w	T=0 (1990Ki07) J ^π : 2096.0γ to 4 ⁻ , 2259.2γ and 3307.0γ to 1 ⁻ ; L(d,n)=1 from 3/2 ⁺ .
9226.69 5	(1 ⁻ ,2,3 ⁻)		H j	q	w	Additional information 16. J ^π : 2276.1γ to 1 ⁻ and 2941.4γ to 3 ⁻ . Possible 9225.6γ to 0 ⁺ would disfavor 3 ⁻ .
9227.43 7	(1,2 ⁺)		H j	q	w	Additional information 17. J ^π : 5874.4γ to 0 ⁺ and 3201.8γ to 2 ⁻ .
9246.0 12	(7 ⁻)		F	Q	X	XREF: X(9250). E(level): from (p,p'). J ^π : L(p,p')=7. But L(⁶ Li,d)=6 for a 9240 group.
9274.5 12				Q	X	Additional information 18. XREF: X(9263). E(level): from (p,p').

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF				Comments
9304 5	0 ⁺				X		T=1 (1972Sc19) J ^π : L(p,t)=0.
9305.2 & 8	(8 ⁺)				Y		J ^π : band assignment in (HI,xnγ).
9362.54 6	3 ⁻		B	F H k	U x		T=0 (1990Ki07) XREF: U(9340). J ^π : log ft=5.4 from 4 ⁻ ; 937.7γ to 2 ⁻ , 4113.5γ to 2 ⁺ . Γ _α /Γ _p =0.0119 5 from ^{40}Sc ε decay.
9377.7 2	2 ⁻ ,3 ⁻ ,4 ⁻			H k	Q	x	E(level): from (p,γ). J ^π : L(p,p')=3 from 0 ⁺ .
9388.20 19	2 ⁺			H k			J ^π : 2087.4γ, 4176.3γ and 9387.0γ to 0 ⁺ , and 2845.3γ, 2880.3γ and 4109.2γ to 4 ⁺ .
9395.6 3				H jk			E(level): from (p,γ).
9404.85 19	2 ⁻	0.14 keV		HIJk			T=1 XREF: J(9408). J ^π : 9403.7γ to 0 ⁺ , 2822.2γ, 3119.6γ and 5667.7γ to 3 ⁻ , 2291.1γ to 4 ⁻ ; L(p,p)=1 from 3/2 ⁺ ; γγ(θ) in (p,γ) give J=2.
9406.3 6	0 ⁺			GH k		X	T _{1/2} : from (p,p),(p,α): resonances. T=1 XREF: G(9380). E(level): from (p,γ). J ^π : L(^3He ,n)=L(p,t)=0 from 0 ⁺ .
9412.3 2				H Jk	q		XREF: J(9408).
9418.8 2	3 ⁻		B	H Jk	q		E(level): from (p,γ). T=1 XREF: J(9408).
9429.11 5	(3,4) ⁻		B	H Jk		w	J ^π : log ft=5.6 from 4 ⁻ ; 3516.0γ to 1 ⁻ . T=0 (1990Ki07) XREF: J(9431).
9432.46 18	1 ⁻	0.23 keV		HIJk		w	J ^π : log ft=5.5 from 4 ⁻ ; L(^3He ,α)=(0) from 7/2 ⁻ . T=1 (1990Ki07) XREF: J(9431).
9453.95 5	3 ⁻	0.09 keV	B	HIJk	Q	W	J ^π : L(p,p)=1 from 3/2 ⁺ ; 9431.3γ to 0 ⁺ . T _{1/2} : from (p,p),(p,α):resonances. T=0 XREF: Q(?).
9499.9 15	2 ⁺			F H		U	J ^π : log ft=5.2 from 4 ⁻ ; L(d,n)=1 from 3/2 ⁺ . T _{1/2} : from (p,p),(p,α):resonances. E(level): from (p,γ).
9536.24 16				H			J ^π : L(^6Li ,d)=2 from 0 ⁺ .
9537.8 5	1 ⁻	0.4 keV		HIJ	Q		E(level): from (p,γ). XREF: Q(?).
							E(level): from (p,γ). Other: 9535.2 14 in (p,p):resonances.
9564 5	(2 ⁺)			G		WX	J ^π ,T _{1/2} : from (p,p),(p,α):resonances. L(p,p)=L(d,n)=1 from 3/2 ⁺ . T=(1) XREF: G(9600).
9603.0 4	3 ⁻	0.4 keV	B	HIj	T	wx	J ^π : L(^3He ,n)=2 for a 9600 group. T=1 J ^π : log ft=5.6 from 4 ⁻ ; L(p,p)=1 from 3/2 ⁺ ; γγ(θ) in (p,γ) gives J=3.
							T _{1/2} : from (2J+1)×Γ=3.4 keV for the 9603+9605 levels in (p,p),(p,α):resonances, and Γ=0.19 keV 5 from (γ,γ') for the 9605 level.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
9604.6 4	1 ⁻	0.19 keV 5	HI j	M	wx	T=1 T _{1/2} : from (γ,γ'). Other: 1.3 keV from (p,p),(p,α):resonances.
9632.7? 11			H			E(level): from (p,γ).
9640.89 7	2 ⁻		H		wX	T=1 XREF: X(9620). J ^π : spin from γγ(θ) and parity from a resonance formation fit in (p,γ).
9655.5 9			H	q	WX	XREF: W(9647)X(9665). E(level): from (p,γ).
9662.2 2	≤3 ⁻		Hi j	q	WX	XREF: W(9647)X(9665). E(level): from (p,γ).
9668.71 8	3 ⁻		F Hi jK		WX	J ^π : L(p,p)=(d,n)=1 from 3/2 ⁺ for 9662+9669. T=1 XREF: F(9700)K(9700)W(9673)X(9665). J ^π : L(⁶ Li,d)=3 from 0 ⁺ .
9779.47 7	3		H			T=1 J ^π : from γγ(θ) in (p,γ).
9785.3 2	(1,2 ⁺)		H			J ^π : 2484.5γ, 6432.1γ and 9784.0γ to 0 ⁺ .
9802.1 7	≤3 ⁻		HI			E(level): from (p,γ). J ^π : L(p,p)=1 from 3/2 ⁺ .
9807.2? 11			H			
9811.0 2	(3 ⁻ ,4 ⁻ ,5 ⁻)		B H			E(level): from (p,γ). J ^π : log ft=6.1 from 4 ⁻ .
9829.43 16			B H			E(level): from (p,γ).
9834.97 19			B H			
9853.5 ^d 8	(8 ⁺)				Y	XREF: Others: AE J ^π : band assignment in (HI,xny).
9854.43 17	≤3 ⁻		HI			E(level): from (p,γ). J ^π : L(p,p)=1 from 3/2 ⁺ . J ^π : L(p,p')=5 from 0 ⁺ .
9859.6 3	4 ⁻ ,5 ⁻ ,6 ⁻		H		Q	T=1 J ^π : from γγ(θ) in (p,γ).
9865.15 11	1	0.100 keV 24	ef H	M		T _{1/2} : from (γ,γ').
9869.3 4	1 ⁺ ,2 ⁺	0.90 keV 21	ef H	MN	Q U	XREF: Q(9877)U(9870). J ^π : γ's to 0 ⁺ and 2 ⁺ ; M1 or E2 excitation in (e,e'). L(⁶ Li,d)=2 for a 9870 group and a doublet at 9868 suggested by 1980St17 in (e,e') could indicate there is a separate level with J ^π =2 ⁺ .
9898.5 3			H			T _{1/2} : from (γ,γ').
9921.3 2	(3 ⁻ ,4 ⁻ ,5 ⁻)		B f H			E(level): from (p,γ). J ^π : log ft=6.3 from 4 ⁻ .
9939.7 2			f H			
9954.00 9	4 ⁺		B f H			T=0 J ^π : spin=4 from γγ(θ) in (p,γ); observed α decay from this level in ⁴⁰ Sc ε decay implies π=natural.
9977.09 17	(3,4,5)		B f H			E(level): from (p,γ). J ^π : log ft=7.0 from 4 ⁻ .
9993.6 15			H			
10040.54 9	(2 ⁻ ,3 ⁻)		H j		v	T=1 J ^π : γ's to 1 ⁻ and 4 ⁻ .
10045.6 5	(3 ⁻ to 7 ⁻)		H j		v	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J $\pi^{\ddagger}$	T _{1/2} ^{#@}	XREF				Comments
10049.38 7	4 ⁻		B	H jK	q	vw	T=1 XREF: K(?). J π : log ft=6.3 from 4 ⁻ ; γ 's to 2 ⁻ and 5 ⁻ ; L(p,p')=5 from 0 ⁺ , L(³ He, α)=0 from 7/2 ⁻ .
10057.9 3				f H j	q	vw	
10065 2	(1 ⁻ ,2 ⁺)			f I	q	v	T=0
10080.6 2				f H		Uv	E(level): from (p, γ).
10130.59 19	(3 ⁻ ,4 ⁺)		B	f HI		v	T=0 E(level): from (p, γ).
10154 8	(3 ⁻ ,4 ⁺ ,5 ⁻)		B	f			T=0 E(level): from ⁴⁰ Sc ε decay. J π : log ft=7.3 from 4 ⁻ ; observed α decay from this level in ⁴⁰ Sc ε decay implies π =natural.
10193 7	(3 ⁻ ,4 ⁺ ,5 ⁻)		b				T=0 J π : log ft=7.5 from 4 ⁻ ; observed α decay from this level in ⁴⁰ Sc ε decay implies π =natural.
10199.1 4	1 ⁻			HI			T=0 E(level): from (p, γ).
10205.0 8				H			
10210.5 2	3 ⁻ ,4 ⁻		B	H		W	E(level): from (p, γ). J π : log ft=5.7 from 4 ⁻ ; L(³ He, α)=0 from 7/2 ⁻ .
10232.7 7				H			
10262.53 10	3 ⁻			HI			T=0+1. J π : γ 's to 1 ⁻ , 3 ⁻ , 3 ⁺ ; L(p,p)=1 from 3/2 ⁺ for 10263+10268; π =natural from (p, α):resonances.
10267.6 5	1 ⁻	0.9 keV		HI			T=0 J π , T _{1/2} : from (p,p),(p, α):resonances for a 10265 group.
10274.7 3	3 ⁺ ,4 ⁺ ,5 ⁺			H	Q		XREF: Q(10287). J π : L(p,p')=4 from 0 ⁺ .
10277.8 2	(1 ⁻)	1.6 keV		HI	Q		T=0 XREF: I(10275)Q(10290). E(level): from (p, γ).
10284.9 3	1 ⁻	1.1 keV		Hi	Q		XREF: Q(10290). E(level): from (p, γ).
10318.8 4	1 ⁺	26 eV 7	E	H	MN	Q	T=1 XREF: Q(10328). J π : M1 excitation in (e,e'). T _{1/2} : from (γ , γ').
10333.7 5	(3 ⁻)	0.11 keV	B	HI	Q		T=0 XREF: Q(10344). J π : (1,3) ⁻ from (p,p),(p, α):resonances; log ft=7.1 from 4 ⁻ .
10340 20	4 ⁺				Q	U	XREF: Q(10344). J π : L(α , α')=4.
10358.5 15				F H			XREF: F(10340). J π : L(⁶ Li,d)=8 for a level at 10340 could indicate there may be a different level.
10361.4 15			B	H			T=0
10362.8 5	1 ⁻	0.60 keV		I			E(level): could be the same level as the 10361.4 level in (p, γ).
10364.8 5	(1,3) ⁻			I			
10376.6 5	1 ⁻	0.6 keV		HI			
10383.79 16	(1 ⁻ ,2 ⁺)			HI K			T=0 XREF: K(?).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
10415.06 6	3			H		T=1 J ^π : 2853.8γ to 4 ⁺ , 3301.2γ to 4 ⁻ , 2948.6γ to 2 ⁺ , 3664.5γ to 2 ⁻ .
10420.4 5	1 ⁻	0.5 keV		HI		T=0 E(level): from (p,γ).
10430.47 19	(2 ⁺)			HI		T=0 E(level): from (p,γ).
10441.3 6				H		E(level): from (p,γ).
10443.8 2	2 ⁻	4.0 keV		HI		E(level): from (p,γ). 10443.5 5 in (p,p),(p,α):resonances.
10447.0 5	3 ⁻	0.44 keV	B	f	I	T=0 E(level): \$ from (p,p),(p,α):resonances. J ^π : (1,3) ⁻ in (p,p),(p,α):resonances with L(p)=1 from 3/2 ⁺ ; log ft=6.2 from 4 ⁻ .
10469.9 15	(3,5) ⁻		B	f	H	E(level): from (p,γ). J ^π : log ft=5.7 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
10474 2	(8 ⁻)					Y J ^π : proposed in (HI,xnγ).
10478.6 15				H		
10503.0 15	(3,4,5) ⁻		B	H		E(level): from (p,γ). J ^π : log ft=5.5 from 4 ⁻ .
10514.7 15	(3 ⁻ ,4 ⁺ ,5 ⁻)		B	H		XREF: B(10519). J ^π : log ft=6.7 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
10516.5 5	1 ⁻	1.2 keV		I		T=0 E(level): could be the same level as the 10514.7 level in (p,γ).
10517.4 5	1 ⁽⁺⁾	0.30 keV		I		
10529.8 5	(1 ⁺)	0.40 keV		HI		E(level): from (p,p),(p,α):resonances. 10527.8 15 from (p,γ).
10541.7 5	2 ⁺	0.19 keV		HI		Additional information 19. T=0 E(level): from (p,p),(p,α):resonances. 10540.0 15 from (p,γ).
10552.1 15				H		
10582 5	(3,4,5)		B			J ^π : log ft=6.3 from 4 ⁻ .
10596.4 5	3 ⁻	0.16 keV	B	F	I	T=0 XREF: F(10590). E(level): from (p,p),(p,α):resonances.
10598.6 5	(1 ⁺)	0.20 keV		I		
10607.6 5	0 ⁽⁺⁾	0.20 keV		g	I	
10618.8 5	2 ⁻	3.5 keV		I		
10621.6 5	0 ⁺	0.04 keV		g	I	T=0
10633.8 5	(1,3) ⁻	1.1 keV		HI		E(level): from (p,p),(p,α):resonances. 10632.7 2 in (p,γ).
10639.07 7	(3 ⁻ ,4,5 ⁻)			H		T=1 J ^π : 3707.6γ and 4056.3γ to 3 ⁻ , 6147.7γ to 5 ⁻ .
10646.3 4	NATURAL			gHI		T=0 E(level): from (p,γ).
10653.12 16				H		
10656.1 5	(1 ⁻)	0.60 keV		I		T=0
10657.6 5	2 ⁺	0.35 keV		I		T=0
10666.6 5	2 ⁻	2.0 keV		I		
10670.3 3				H		
10673.58 17	2 ⁻			H	N	J ^π : M2 excitation in (e,e').
10675.6 5	1 ⁻	1.6 keV		HI		T=0

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
						E(level): from (p,p),(p,α):resonances. 10673.69 15 in (p,γ).
10690.9 3				H		XREF: Others: AK
10693.1 5	1 ⁺	1.1 keV		I		XREF: Others: AK
10699.50 10	3		B	H	N	XREF: Others: AK
						XREF: N(10680).
						J ^π : 2325.5γ to 4 ⁺ , 5085.6γ to 4 ⁻ , 2607.8γ to 2 ⁺ , 3167.1γ to 2 ⁻ .
10701.1 5	0 ⁺	0.60 keV		I		
10720.7 3	(3,5) ⁻		B	H		XREF: Others: AK
						E(level): from (p,γ).
						J ^π : log ft=5.7 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
10722.3 5	1 ⁺	1.1 keV		I		
10737.7 3	1 ⁻			F H		T=0+1
						XREF: F(10700).
						J ^π : 10736.2γ to 0 ⁺ , 3043.4 and 4452.3γ to 3 ⁻ ; L(^{6}Li ,d)=1 from 0 ⁺ .
10740.3 5	1 ⁻	2.2 keV		I		
10747.8 4	(4 ⁺)			HI		T=0
						J ^π : (1 ⁻ ,2,3,4 ⁺) from 5118.0γ and 6842.8γ to 2 ⁺ , 7010.5γ to 3 ⁻ ; J ^π =(4 ⁺ ,5 ⁻) from (p,p),(p,α):resonances for a level at 10751.
10749.0 5	0 ⁺	0.31 keV		I		
10753.74 18	(3,4,5)		B	H		J ^π : log ft=6.5 from 4 ⁻ .
10770.2 3	(1 ⁺)	0.05 keV		HI		XREF: I(10772.3).
						E(level): from (p,γ).
10776.2 3	(1 ⁻)			H	N	J ^π : possible E1 excitation in (e,e') for 10776.
10778.3 5	2 ⁺	0.18 keV		I		T=0
10780.7 5	3 ⁻	1.0 keV	B	HI		T=0
						E(level): from (p,p),(p,α):resonances. 10780.9 3 in (p,γ).
10783.2 5	(0 ⁻)	0.70 keV		I		
10787.6 3				F H	u	XREF: F(?).
10799.9 10				H	u	
10802.8 5	0 ⁽⁺⁾	0.70 keV		I		T=0
10813.6 5	(3 ⁻ ,4 ⁺ ,5 ⁻)		B	f H	u	T=0
						J ^π : log ft=6.3 from 4 ⁻ ; L(^{6}Li ,d)=5 for 10800 group; α decay of this level in ^{40}Sc ε decay implies π=natural.
10816.4 5	2 ⁻	6.0 keV		I		
10816.6 5	3 ⁺	0.50 keV		I		
10829.9 6				f H		
10833.2 5	3 ⁻	0.026 keV		f I		T=0
10848.4 4	(3,4,5) ⁻		B	f H		J ^π : log ft=5.8 from 4 ⁻ .
10849.3 5	2 ⁻	11 keV		I		
10852.2 5	1 ⁻	2.5 keV		I		T=0
10861.4 5	2 ⁺	0.045 keV		I		T=0
10869.0 5	1 ⁻	26 keV		HI		E(level): from (p,p),(p,γ):resonances. 10868.8 4 in (p,γ).
10869.7 5	0 ⁺	0.40 keV		I		
10873.9 5	1 ⁻	4.0 keV		I		
10895 ^c 1	(9 ⁻)				Y	J ^π : band assignment in (HI,xnγ).
10899.3 5	1 ⁺	0.41 keV		I		
10910.0 4	(3,4,5 ⁻)		B	f H		E(level): from (p,γ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
						J ^π : log ft=6.8 from 4 ⁻ ; 7172.6γ to 3 ⁻ ; L(⁶ Li,d)=3 for 10900 group. T=0
10914.8 5	1 ⁻	5.0 keV		I		
10915.7 5	3 ⁺	0.70 keV		I		
10921.1 4	(2 ⁺ ,3,4 ⁻)		f	H		J ^π : 4895.3γ to 2 ⁻ and 5641.9γ to 4 ⁺ . T=0
10932.7 5	1 ⁻	2.0 keV		I		
10933.2 5	2 ⁻	0.10 keV		I		
10934.3 5				H		
10946.9 5	2 ⁺	0.23 keV		I		T=0
10950.8 5	1 ⁻	7.0 keV		HI		T=0 E(level): from (p,p),(p,α):resonances. 10951.5 4 in (p,γ). T=0
10953.6 5	0 ⁽⁺⁾	0.22 keV		I		
10956.0 4	3 ⁻		B	H		E(level): from (p,γ). J ^π : 5676.8γ to 4 ⁺ , 5342.1γ to 4 ⁻ , 5053.0γ to 1 ⁻ . J ^π : log ft=6.0 from 4 ⁻ . E(level): from (p,γ). J ^π : log ft=7.2 from 4 ⁻ ; α decay of this level in ⁴⁰ Sc ε decay implies π=natural; 4079.1γ, 5358.2γ to 2 ⁺ .
10976.2 5	(3,4,5)		B	H	n	
10988.0 4	(3 ⁻ ,4 ⁺)		B	H	n	
10988.7 5	2 ⁻	9.0 keV		I		
10989.4 5	(1 ⁺)	0.4 keV		I		
10994.7 4	(2 ⁺ ,3,4 ⁺)			H		J ^π : 5715.5γ to 4 ⁺ , 5745.3γ to 2 ⁺ .
10995 3	(1 ⁻)	6.7 keV		I		
10998.9 5	(1,3) ⁻	0.20 keV		I		T=0
11002.3 5				H	n	
11003.0 ^a 9	(10 ⁺)				Y	J ^π : band assignment in (HI,xnγ).
11007.2 5	1 ⁻	5.0 keV		I		
11011.0 4	3 ⁻			H	n	T=0+1 J ^π : 6519.0γ to 5 ⁻ , 11009.4γ to 0 ⁺ . T=0
11024.0 5	(1 ⁻ ,3 ⁻)	0.11 keV		HI		
11036.3 5	(1 ⁺)	0.10 keV		I		
11037 7	(3,4,5)		B			J ^π : log ft=6.4 from 4 ⁻ . J ^π : 7136.9γ to 2 ⁺ and 7304.6γ to 3 ⁻ . T=0
11042.0 5	(1 ⁻ to 4 ⁺)			H		
11044.5 5	2 ⁺	0.50 keV		I		J ^π : 5456.1γ to 4 ⁻ , 5790.7γ to 4 ⁺ , 5820.7γ to 2 ⁺ .
11070.6 4	(3,4 ⁺)			H		
11073.5 5	2 ⁺	0.66 keV		I		
11078.4 5	1 ⁻	1.2 keV	f	HI		T=0 E(level): from (p,p),(p,α):resonances. T=0 XREF: F(11100). T=0 E(level): from 1970De30 in (p,p),(p,α):resonance. 11088 12 in ⁴⁰ Sc ε decay. J ^π : log ft=7.1 from 4 ⁻ ; 4+(1 ⁻ ,3 ⁻) for a 11901 level from 1970De30 in (p,p),(p,α):resonance.
11083.6 5	(1 ⁺)	0.35 keV		I		
11089.3 5	0 ⁽⁺⁾	0.10 keV		F I		
11091 3	(3 ⁻ ,4 ⁺)		B	I		
11107.0 5	1 ⁻	3.9 keV		I		
11112 3	0 ⁻	5.2 keV		I		
11117.0 5			b	H		
11119.0 5	2 ⁺	0.046 keV	b	I	U	XREF: U(11100).
11127.1 5				H		
11129.1 5	4 ⁺	0.11 keV		I		T=0
11142 6	(3,4,5) ⁻		B			J ^π : log ft=5.8 from 4 ⁻ .
11145.2 5	1 ⁽⁻⁾	0.20 keV		I		
11145.8 5	1 ⁺	0.20 keV		I		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
11157.2 5	2 ⁻	48 keV	I		
11161.5 5	4 ⁽⁺⁾	0.040 keV	I	V	T=0
11162.9 5	2 ⁺	3.5 keV	I		
11165.2 4			H		
11167.4 5	4 ⁺	0.083 keV	I		T=0
11187.6 5	3 ⁻	1.4 keV	I k		
11202.9 5	(3) ⁻		B I k	v	T=0 E(level): from (p,p),(p,α):resonances. J ^π : log ft=5.5 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural; (1,2 ⁻ ,3) from (p,p),(p,α):resonances. J ^π : L(^{6}Li ,d)=0.
11210	(0 ⁺)		F k		
11212.6 5	3 ⁻	2.8 keV	I k		
11217 3	3 ⁻	25 keV	B k	v	J ^π : log ft=5.2 from 4 ⁻ .
11217.8 5	4 ⁺	1.4 keV	I k		
11231.4 5	2 ⁻	3.0 keV	I	v	
11236 3	1 ⁻	3.9 keV	I	v	
11246.8 5	3 ⁻	0.092 keV	I	v	T=0
11255.9 5	1 ⁺	0.30 keV	I		
11260.8 5	(0 ⁻)	6.0 keV	I		
11264.4 5	2 ⁺	0.34 keV	I		T=0
11284.3 5	(2 ⁻)	0.60 keV	I		
11289.8 5	1 ⁺	1.0 keV	I		
11300.3 5	1 ⁺	0.40 keV	I		
11302.5 5	(1 ⁻)	1.2 keV	I		
11311 4	(3 ⁻ ,4 ⁺ ,5 ⁻)		B F	v	J ^π : log ft=6.2 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11320.0 5	(0 ⁻)	1.8 keV	I		
11322.0 5	2 ⁺	0.52 keV	I		T=0
11329.3 5	2 ⁺		I		
11330.7 5	1 ⁻	4.0 keV	f I		T=0
11338.7 5	(1 ⁺)	0.20 keV	I		
11342.6 5	2 ⁻	40 keV	I		
11346.4 5	4 ⁽⁺⁾	0.020 keV	I		T=0
11351.5 5	1 ⁺	0.80 keV	I		
11362.4 5	1 ⁺	1.2 keV	I		
11366.0 5	2 ⁺	0.19 keV	I		T=0
11367.0 5	2 ⁻	4.4 keV	I		
11368.3 5	4 ⁽⁺⁾	0.021 keV	I		
11370	(5 ⁻)		F		J ^π : L(^{6}Li ,d)=5.
11371.4 5	2 ⁺	1.4 keV	I		T=0
11382.1 5	2 ⁺	2.6 keV	I		T=0
11393.0 5	1 ⁽⁻⁾	0.10 keV	I		
11404.2 5	1 ⁻	3.5 keV	I		T=0
11407.0 5	1 ⁺	0.22 keV	I		
11414.8 5	4 ⁺	0.10 keV	B I		T=0
11420.3 5	3 ⁻	0.30 keV	I		
11432.7 5	1 ⁻	0.30 keV	I		T=0
11436.8 5	2 ⁺	0.22 keV	I		T=0
					Additional information 20.
11447.2 5	1 ⁻	5.3 keV	I		T=0
11451.4 5	1 ⁺	0.60 keV	I		
11455.4 5	3 ⁻	0.060 keV	b I	U	T=0 XREF: U(11470).
11460.4 5	2 ⁺	1.17 keV	I		T=0

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
11465.1 5	2 ⁽⁺⁾	0.13 keV		I	T=0
11468 3	(3 ⁻ ,4 ⁺ ,5 ⁻)		B	F	T=0
					J ^π : log ft=6.2 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11468.7 5	2 ⁻	0.40 keV		I	
11479.8 5	1 ⁺	0.30 keV		I	
11486.7 5	0 ⁺	0.11 keV		I	
11489.6 5	1 ⁺	0.40 keV		I	
11514.6 5	2 ⁺	0.62 keV		I	
11515.2 5	1 ⁽⁻⁾	4.23 keV		I	
11519.0 5	2 ⁺	0.70 keV		I	
11537.9 5	2 ⁻	8.0 keV		I	
11542.2 5	2 ⁺	0.62 keV		I	
11543.7 5	(1 ⁺)	0.90 keV		I	
11546.7 5	2 ⁻	18 keV		I	
11549 6	(3,5) ⁻		B		J ^π : log ft=5.9 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11554.5 5	1 ⁻	31 keV		I	
11559.1 5	(2 ⁺)	0.40 keV		I	
11563.5 5	(2 ⁻)	0.40 keV		I	
11577.9 5	2 ⁻	1.0 keV		I	
11578.0 5	2 ⁺	0.23 keV		I	
11585.6 5	2 ⁻	0.15 keV		I	
11597.2 5	(2 ⁺)	0.30 keV		I	
11602.3 5	2 ⁺	0.30 keV		I	
11603.4 5	2 ⁺	0.28 keV		I	
11605.3 5	1 ⁻	13 keV		I	
11611.1 5	1 ⁻	0.86 keV		I	
11614.0 5	(2 ⁻)	0.50 keV		I	
11616 10	(3,4,5)		B		J ^π : log ft=6.3 from 4 ⁻ .
11628.5 5	(3 ⁺)	0.70 keV		I	
11629.1 5	2 ⁺	0.085 keV		I	
11638.1 5	1 ⁻	0.09 keV		I	
11645.0 5	(2 ⁻)	0.60 keV		I	
11646.9 5	2 ⁺	0.60 keV		I	
11650.8 5	2 ⁽⁺⁾	0.18 keV		I	
11652.2 5	3 ⁻			I	
11653.5 5	2 ⁺	1.59 keV		I	
11661.7 5	1 ⁻	1.56 keV		I	
11663 7	(3 ⁻ ,4 ⁺ ,5 ⁻)		B		T=0
					J ^π : log ft=6.2 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11672.8 5	(2 ⁻)	0.20 keV		I	
11677.1 5	2 ⁺	0.96 keV		I	U
11685.8 & 9	(10 ⁺)				Y
11687.5 5	(1 ⁺)	0.50 keV		I	J ^π : from band assignment in (HI,xnγ).
11689.2 5	(2 ⁻)	0.60 keV		I	
11690	7 ⁻		F		J ^π : L(^6Li ,d)=7.
11692.8 5	4 ⁽⁺⁾	0.021 keV		I	
11696.3 5	0 ⁽⁻⁾	0.60 keV		I	
11703.6 5	0 ⁺	4.65 keV		I	
11704.6 5	2 ⁻	3.0 keV		I	
11707.8 5	1 ⁻	0.30 keV		I	
11708.7 ^b 12	(9 ⁺)				Y
					J ^π : from band assignment in (HI,xnγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
11713.6 5	1 ⁺	0.20 keV	I		
11715.7 5	2 ⁻	1.5 keV	I		
11721.2 5	1 ⁺	1.5 keV	I		
11724.1 5	3 ⁽⁻⁾	0.060 keV	I		
11726 5	(3,5) ⁻		B	v	XREF: Others: AI T=0 J ^π : log ft=5.7 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11731.0 5	1 ⁽⁻⁾	3.6 keV	I		
11731.1 5	1 ⁺	0.40 keV	I		
11738.8 5	2 ⁺	3.0 keV	I		
11742.8 5	4 ⁺	1.07 keV	I		
11744.6 5	1 ⁽⁻⁾	0.55 keV	I		
11749.5 5	2 ⁻	2.57 keV	I		
11753.4 5	3 ⁻		I		
11754.0 5	1 ⁺	0.35 keV	I		
11757.3 5	2 ⁻	0.60 keV	I		
11760 10	1 ⁺		N		J ^π : M1 excitation in (e,e').
11768.0 5	2 ⁻	15 keV	I		
11782.6 5	3 ⁽⁻⁾	0.041 keV	I		
11788.5 5	2 ⁺	2.5 keV	I		
11792.4 5	1 ⁺	0.46 keV	I		
11799.2 5	4 ⁽⁺⁾	0.18 keV	B	v	XREF: Others: AI
11804.1 5	0 ⁺	0.26 keV	I		
11809.0 5	(1 ⁺)	1.1 keV	I		
11810.9 5	2 ⁺	1.8 keV	I		
11811.6 5	3 ⁻	0.26 keV	I		
11820.6 5	3 ⁻	3.5 keV	I		
11830.8 5	2 ⁺	0.30 keV	I		
11839.2 5	0 ⁺	1.05 keV	I		
11841 6	(3 ⁻ ,4 ⁺ ,5 ⁻)		B	F	T=0 XREF: F(11800). J ^π : log ft=5.9 from 4 ⁻ ; α decay of this level in ^{40}Sc ε decay implies π=natural.
11844.1 5	1 ⁺	0.78 keV	I		
11855.8 5	2 ⁺	0.39 keV	I		
11857.3 5	(1 ⁺)	1.3 keV	I		
11863.3 5	(3 ⁻)	0.41 keV	I		
11864.7 5	(0 ⁺)	1.6 keV	I		
11868.8 5	(4 ⁺)	0.032 keV	I		
11870.0 5	3 ⁻	0.040 keV	I		
11872.2 5	2 ⁺	0.87 keV	I		
11878.0 5	1 ⁻	0.32 keV	I		
11884.5 5	1 ⁺	0.80 keV	I		
11888.3 5	4 ⁺	0.13 keV	I		
11890.9 5	1 ⁻	20 keV	I		
11894.0 5	(2 ⁻)	1.0 keV	I		
11901.4 5	1 ⁺	0.70 keV	I		
11915.9 5	3 ⁻	1.0 keV	I		
11924.6 5	2 ⁺	2.2 keV	I		
11930.0 5	4 ⁽⁺⁾	0.030 keV	I		
11933.3 5	1 ⁻	16.1 keV	I		
11935.0 5	1 ⁺	0.9 keV	I		
11937.3 5	2 ⁻	0.60 keV	I		
11940.4 5	1 ⁺	0.40 keV	I		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π _‡	T _{1/2} ^{#@}	XREF		Comments
11942.8 5	3 ⁻	0.48 keV	I		
11945.0 5	1 ⁻	0.40 keV	I		
11948.4 5	0 ⁺	0.31 keV	I		
11958.7 5	(2 ⁺)	1.0 keV	I	U	XREF: U(11940).
11962.9 5	0 ⁺	0.30 keV	I		
11969.8 5	1 ⁺	0.80 keV	I		
11971.0 5	2 ⁺	0.26 keV	I		
11975.1 5	1 ⁻	0.055 keV	E I		
11983.3 5	(2 ⁻)	1.0 keV	I		
11987.1 5	3 ⁻	0.38 keV	E I		
11988 1	0 ⁺	81 eV 10	E G	X	T=2 J ^π : L(³ He,n)=0; IAR state. %α=93 9 to ³⁶ Ar g.s.; %α<3% to first 2 ⁺ in ³⁶ Ar; %p<5% ro ³⁹ K g.s.
11994.0 5	0 ⁻	3.0 keV	E I		
12000 5	(3,5) ⁻		B		T=0 J ^π : log ft=5.4 from 4 ⁻ ; α decay of this level in ⁴⁰ Sc ε decay implies π=natural.
12001.3 5	(2 ⁺)	1.02 keV	E I		
12007.4 5	1 ⁺	0.55 keV	I		
12010.4 5	2 ⁻	6.0 keV	I		
12012.2 5	4 ⁺	0.010 keV	I		
12023.6 5	1 ⁺	0.90 keV	I		
12026.9 5	4 ⁺	0.22 keV	I		
12033.8 5	3 ⁻	0.31 keV	I		
12038 3	(3,4,5) ⁻		B H	Q	J ^π : log ft=5.8 from 4 ⁻ .
12047.7 5	2 ⁺	2.65 keV	f HI	N	
12056.4 5	1 ⁻	2.0 keV	f I		
12058.9 5	2 ⁺	1.11 keV	I		
12067.3 5	2 ⁺	1.15 keV	I		
12067.8 5	4 ⁺	1.11 keV	I		
12068 3	(3,5) ⁻		B H		T=0 J ^π : log ft=5.6 from 4 ⁻ ; α decay of this level in ⁴⁰ Sc ε decay implies π=natural.
12076.8 5	2 ⁻	3.07 keV	HI		
12082.0 5	4 ⁽⁺⁾	0.021 keV	I		
12086.1 5	4 ⁽⁺⁾	0.011 keV	I		
12088.8 5	2 ⁻	10 keV	I		
12089.7 5	2 ⁺	24 keV	f I		
12093.1 5	4 ⁽⁺⁾	0.060 keV	I		
12095.1 5	2 ⁺	9.4 keV	Ef HI		
12106.0 5	4 ⁽⁺⁾	0.090 keV	I		
12110.7 5	2 ⁺	2.0 keV	f HI		
12115.1 5	3 ⁻	0.78 keV	I		
12125.9 5	(3 ⁺)		I		
12132.7 5	(4 ⁺)	0.13 keV	I		
12134.9 5	(4 ⁺)	0.10 keV	I		
12141.2 5	2 ⁺	1.24 keV	I		
12152.3 5	4 ⁺	0.36 keV	I		
12157.8 5	4 ⁽⁺⁾	0.12 keV	I		
12159.4 5	4 ⁽⁺⁾	0.083 keV	I		
12177.7 5	1 ⁽⁻⁾	0.22 keV	I		
12180.2 5	2 ⁺	1.50 keV	F I		XREF: F(12170).
12184.5 5	2 ⁻	2.0 keV	I		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
12192.7 5	2 ⁺	1.24 keV		I		
12196.3 5	1 ⁽⁻⁾	0.95 keV		I		
12201.2 5	3 ⁻	2.1 keV	E	HI	N	E(level): from (p,p),(p,α):resonances. J ^π : from (p,p),(p,α):resonances and E3 excitation in (e,e').
12209.3 5	0 ⁻	1.0 keV		I		
12211.9 5	4 ⁺	0.021 keV		I		
12217.7 5	1 ⁺	1.5 keV		I		
12224.3 5	1 ⁻	1.46 keV		I		
12226.4 5	2 ⁺	0.43 keV		I		
12237.7 5	1 ⁺	2.0 keV		I		
12244.0 5	4 ⁺	0.030 keV		I		
12245.2 5	1 ⁻	2.0 keV		I		
12256 4		5.5 keV		I		
12270 4	(2 ⁺)	5.8 keV		I		
12280 4		4.2 keV		I		
12292 4		4.0 keV		I		
12299 4	(2 ⁺)	4.0 keV		I		XREF: Others: AF
12305 4	(1 ⁻)	6.7 keV		I		
12331 4	2 ⁺	7.3 keV		HI		
12334.9 ^d 10	(10 ⁺)				Y	XREF: Others: AE J ^π : from band assignment in (HI,xnγ).
12340	5 ⁻		F			J ^π : L(⁶ Li,d)=5.
12350 10	2 ⁻				N	J ^π : M2 excitation in (e,e').
12357 4	(3 ⁻ ,1 ⁻)	5.5 keV		I		
12368 4		6.7 keV		I		
12376 4		5.9 keV		I		
12381 4		4.0 keV		I		
12399 4	(2 ⁺ ,1 ⁻)	6.7 keV		I		
12406 4		3.5 keV		I		
12411 4		4.0 keV		I		
12419 4		5.4 keV		HI		
12420	(1 ⁻)	<0.05 MeV	C			J ^π : L(³⁶ Ar,α)=1.
12425 4		6.4 keV		I		
12450	(4 ⁺)		F		U	J ^π : L(⁶ Li,d)=4, but L(α,α')=3 for a 12450 group is inconsistent and could indicate there may be a separate level.
12488	2 ⁻				N	J ^π : M2 excitation in (e,e').
12490 10	1 ⁺				N	J ^π : M1 excitation in (e,e').
12503	2 ⁻				N	J ^π : M2 excitation in (e,e').
12530	1 ⁻	<0.03 MeV	C	F		XREF: F(12520). J ^π : L(³⁶ Ar,α)=1.
12580	1 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=1.
12591.9 10	(10 ⁺)				Y	XREF: Others: AE J ^π : proposed in (HI,xnγ).
12604				H		
12622	(2)				N	J ^π : from (e,e').
12650	7 ⁻		F	H		J ^π : L(⁶ Li,d)=7.
12668	1 ⁻	<0.05 MeV	C	H		J ^π : L(³⁶ Ar,α)=1.
12688				H		
12720	3 ⁻		F			J ^π : L(⁶ Li,d)=3.
12750 10	2 ⁻				N	J ^π : M2 excitation in (e,e').
12830 10	1 ⁺ ,(2 ⁻)				N	J ^π : most likely M1 excitation in (e,e').
12875				H		
12900	4 ⁺		F			J ^π : L(⁶ Li,d)=4.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
12923 ^c 2	(11 ⁻)			Y	J ^π : from band assignment in (HI,xnγ).
12965	2 ⁺	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=2.
12980			E	H	
12996				H	
13050 10	1 ⁺			N	J ^π : M1 excitation in (e,e').
13050	4 ⁺		F		J ^π : L($^6\text{Li},d$)=4.
13086				H	
13113				H	
13115.1 ^a 10	(12 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
13125	2 ⁺	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=2.
13150 10	2 ⁻			N	J ^π : M2 excitation in (e,e').
13170	3 ⁻	<0.02 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13194				H	
13195	(10 ⁻)			Y	J ^π : proposed in (HI,xnγ).
13200	4 ⁺		F		J ^π : L($^6\text{Li},d$)=4.
13203				H	
13250			E		
13289				H	
13300	4 ⁺		F		J ^π : L($^6\text{Li},d$)=4.
13301	2 ⁺	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=2.
13345	3 ⁻	<0.03 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13400	0 ⁺		f	U	XREF: Others: AI J ^π : L(α,α')=0.
13410	3 ⁻	<0.04 MeV	C	f	J ^π : L($^{36}\text{Ar},\alpha$)=3.
13445	2 ⁻			N q	XREF: Others: AI
13470	4 ⁺		F	q	J ^π : M2 excitation in (e,e'). XREF: Others: AI
13480	3 ⁻	<0.03 MeV	C		J ^π : L($^6\text{Li},d$)=4.
13480 10	1 ⁺		E	N	J ^π : L($^{36}\text{Ar},\alpha$)=3. XREF: Others: AI
13520	3 ⁻	<0.04 MeV	C		J ^π : M1 excitation in (e,e'). J ^π : L($^{36}\text{Ar},\alpha$)=3.
13535.5 ^b 13	(11 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
13570	3 ⁻	<0.05 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13.6×10 ³ 4				N	
13610	1 ⁺ ,2 ⁺ ,3 ⁺			Q	J ^π : L(p,p')=2 from 0 ⁺ .
13620	6 ⁺		C		J ^π : L($^6\text{Li},d$)=6.
13620	3 ⁻	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13645	3 ⁻	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13670 10	2 ⁻			N	J ^π : M2 excitation in (e,e').
13710	3 ⁻	<0.03 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13720	6 ⁺		EF		J ^π : L($^6\text{Li},d$)=6.
13760	3 ⁻	<0.04 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13822				H	
13830	7 ⁻		F		J ^π : L($^6\text{Li},d$)=7.
13830	(1 ⁺ ,2 ⁺ ,3 ⁺)			Q	J ^π : L(p,p')=(2) from 0 ⁺ .
13850	3 ⁻	<0.03 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13890	(0 ⁺ ,1 ⁺)			Q	J ^π : L(p,p')=(0) from 0 ⁺ .
13900	2 ⁺			N	J ^π : E2 excitation in (e,e').
13910	3 ⁻	<0.02 MeV	C		J ^π : L($^{36}\text{Ar},\alpha$)=3.
13913				H	
13921 15	4			QR	T=(0) J ^π : $\sigma(\theta)$ in (p,p').

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF			Comments
13952	4 ⁺		E			J ^π : L(⁶ Li,d)=4.
13960	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
13993				H		
14000	4 ⁺		F			J ^π : L(⁶ Li,d)=4.
14005	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14020	(2 ⁻ ,3 ⁻ ,4 ⁻)			Q		J ^π : L(p,p')=(3) from 0 ⁺ .
14047	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14070 50	(0 ⁺)			U		J ^π : L(α,α')=(0).
14096			E			
14100	1 ⁺ ,2 ⁺ ,3 ⁺			Q		J ^π : L(p,p')=2 from 0 ⁺ .
14150	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14177	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14190	4 ⁺		F			J ^π : L(⁶ Li,d)=4.
14200	0 ⁺ ,1 ⁺			S		XREF: Others: AK
						J ^π : L(³ He, ³ He')=0.
14210	(2 ⁻ ,3 ⁻ ,4 ⁻)			Q		J ^π : L(p,p')=(3) from 0 ⁺ .
14225	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14232.4 & 10	(12 ⁺)				Y	J ^π : from band assignment in (HI,xnγ).
14262	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14283 15	(6)			Q		T=1
						J ^π : σ(θ) in (p,p').
14292	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14312	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14320	(2 ⁻ ,3 ⁻ ,4 ⁻)			Q		J ^π : L(p,p')=(3) from 0 ⁺ .
14335	3 ⁻	<0.02 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14370	6 ⁺		F I			XREF: F(14380).
						J ^π : L(⁶ Li,d)=6.
14390	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14410	2 ⁻ ,3 ⁻ ,4 ⁻		E	Q		XREF: E(14420).
						J ^π : L(p,p')=3 from 0 ⁺ .
14419			E			
14435	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14460	(2 ⁺)			I qr		J ^π : L(p,p')=2 for 14500 group; L(d,d')=0+2 for 14500 group;
14490	3 ⁻	<0.04 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14530	(6 ⁺)		EF I	qr		XREF: E(14509)F(14500).
						J ^π : L(⁶ Li,d)=6.
14540	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14600	(1,2 ⁺ ,3 ⁻ ,4 ⁺)			I N r		J ^π : from (e,e').
14605	3 ⁻	<0.04 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14640	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14660	1 ⁺ ,2 ⁺ ,3 ⁺		f	Qr		J ^π : L(p,p')=2 from 0 ⁺ .
14680			f I	r		J ^π : 1 ⁺ for a 15000 group in (d,d').
14690	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14725	3 ⁻	<0.05 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14750	4 ⁺		F			J ^π : L(⁶ Li,d)=4.
14760	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14780	1 ⁺ ,2 ⁺ ,3 ⁺			Q		J ^π : L(p,p')=2 from 0 ⁺ .
14790	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14835	3 ⁻	<0.03 MeV	C			J ^π : L(³⁶ Ar,α)=3.
14869	(9 ⁻)		EF			XREF: F(14850).
						J ^π : L(⁶ Li,d)=(9).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
14888	3 ⁻	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=3.
14942	3 ⁻	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15002	3 ⁻	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15080			F	Qr	
15101	3 ⁻	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15140			F	r	
15150	3 ⁻	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15152.4 ^a 12	(13 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
15220	3 ⁻	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15250			F		
15260	3 ⁻	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=3.
15267.1 ^d 14	(12 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
15285	4 ⁺	<0.05 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15306 ^c 2	(13 ⁻)			Y	J ^π : from band assignment in (HI,xnγ).
15330			F		
15345	4 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15384	4 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15435	4 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15490	4 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15525	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15550	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15580	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15600			F		
15620	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15670	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15700			F		
15707	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15748.1 14	(12 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
15790	4 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15840	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15875	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15900	3 ⁻			U	J ^π : L(α,α')=3.
15915	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15950	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
15960	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16000	5 ⁻	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=5.
16000 50	3 ⁻	0.63 MeV 10		U	J ^π : L(α,α')=3 from 0 ⁺ .
16020	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16065	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16110	5 ⁻	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=5.
16120	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16160	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16210	4 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16255	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16290	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16360	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16395	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16450	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16510	4 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=4.
16529.4 ^{&} 12	(14 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
16545	5 ⁻	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=5.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

E(level) [†]	J π [‡]	T _{1/2} ^{#@}	XREF	Comments
16579.7 ^b 16	(13 ⁺)			Y J π : from band assignment in (HI,xn γ).
16585	5 ⁻	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=5.
16610	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16640	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16665	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16700	(2 ⁻ ,3 ⁻ ,4 ⁻)	0.90 MeV 2		S J π : L($^3\text{He},^3\text{He}'$)=(3).
16735	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16810	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16910	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
16945	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17010	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17065	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17113	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17170	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17210	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17280	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17320	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17360	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17410	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17450	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17513	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17590	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17669			E	XREF: Others: AI, AK XREF: AI(17500). E(level): possibly GQR.
17670	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17698.6 14	(14 ⁺)			Y J π : from band assignment in (HI,xn γ).
17700	2 ⁺			U J π : L(α,α')=2.
17730	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17790	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17855	6 ⁺	<0.04 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17859			E	
17915	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
17950	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18000 50	2 ⁺	2.25 MeV 20		U J π : L(α,α')=2 from 0 ⁺ .
18010	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18054.6 14	(14 ⁺)			Y J π : proposed in (HI,xn γ).
18077	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18139	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18146			E	
18174	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18200	2 ⁺		N RS	XREF: N(18400).
18215? ^c 2	(15 ⁻)			Y J π : L(d,d')=0+2; L($^3\text{He},^3\text{He}'$)=2(+0).
18260 5	1		H	J π : from band assignment in (HI,xn γ).
18260	6 ⁺	<0.05 MeV	C	J π : 18256 γ D to 0 ⁺ .
18326			E	J π : L($^{36}\text{Ar},\alpha$)=6.
18328	6 ⁺	<0.05 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18406	6 ⁺	<0.03 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.
18452			E	
18485	6 ⁺	<0.02 MeV	C	J π : L($^{36}\text{Ar},\alpha$)=6.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{40}Ca Levels (continued)					
E(level) [†]	J ^π [‡]	T _{1/2} ^{#@}	XREF		Comments
18497.2 ^d 17	(14 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
18547	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18605	6 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18659	6 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18680 5	1		H		J ^π : 18675γ D to 0 ⁺ .
18705	6 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18719.2 17	(14 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
18731			E		
18765	6 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18865	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
18930	6 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19020	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19037			E		
19070 5	1		H		J ^π : 19065γ D to 0 ⁺ .
19080	6 ⁺	<0.05 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19150	6 ⁺	<0.07 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19.18×10 ³ 37	0 ⁺	4.9 MeV 6		U	J ^π : L(α,α')=0.
19195.6 ^a 16	(15 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
19230	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19280	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19385	6 ⁺	<0.03 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19450 5	1		H		J ^π : 19445γ D to 0 ⁺ .
19467	6 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19525	6 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19597	6 ⁺	<0.02 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19667	6 ⁺	<0.04 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19780	6 ⁺	<0.06 MeV	C		J ^π : L(³⁶ Ar,α)=6.
19850 5	1		H		J ^π : 19845γ D to 0 ⁺ .
20130 5			H		
20430 5	1		H		J ^π : 19845γ D to 0 ⁺ .
20578.6 ^{&} 15	(16 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
20650 5	1		H		J ^π : 20644γ D to 0 ⁺ .
20940 5	1		H		J ^π : 20934γ D to 0 ⁺ .
21000 50				U	J ^π : L(α,α')=0+2.
21490			H		
21690			H		
22060			H		
22060.4 ^d 20	(16 ⁺)			Y	J ^π : from band assignment in (HI,xnγ).
23360	1 ⁻		M	U	XREF: Others: AK
					J ^π : L(α,α')=1; GDR.
31×10 ³ 2	2 ⁻ , 3 ⁻ , 4 ⁻			Q	J ^π : L(p,p')=3 from 0 ⁺ .
35.3×10 ³ 5			N		
42.0×10 ³			N		
58.4×10 ³ 11			N		

[†] From (p,γ), ⁴⁰Sc ε decay, (γ,γ') or (HI,xnγ) based on γ-ray energies. In other cases, a large number of excitation energies are from (p,p),(p,α):resonances. When levels are known from transfer particle-reactions, weighted averages of available values are taken. The following reactions have imprecise excitation energies above ≈8 MeV, hence level correspondence between various reactions (as given in XREF column) is considered (by the evaluator) as tentative: resonances in (α,γ); (⁶Li,d); (³He,n); (d,d'), (³He,³He'); (α,α'); (HI,HI') and (d,t).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{40}Ca Levels (continued)

- ‡ When no arguments are given (above 9600), the assignments are based on J^π 's determined in $^{39}\text{K}(\text{p},\gamma)$ or $^{39}\text{K}(\text{p},\text{p}),(\text{p},\alpha)$:resonances. For high-spin structures ($J>6$), assignments are based on $\gamma(\theta)$ data and expected band associations. In particle-transfer reactions, target (^{39}K) $J^\pi=3/2^+$ for (d,n) and ($^3\text{He},\text{d}$) reactions; target (^{41}Ca) $J^\pi=7/2^-$ for ($^3\text{He},\alpha$) and (d,t) reactions. In arguments based on γ decays, RUL (for E2 and M2 transitions) is also used when level lifetimes are known. For some of the high-energy levels populated only in (e,e'), J^π assignments are from measurements of $\sigma(\theta)$ and deduced transition strengths in that reaction.
- # Lifetimes are available from DSAM in (p,p' γ), (p, γ) and (HI,xn γ), and measured widths in (γ,γ'). Widths are from (γ,γ'), (p, γ) and (p,p),(\text{p},\alpha):resonances and for some levels, values are for Γ_{p} or deduced from (p,p) resonance strengths by assuming $\Gamma_{\text{p}}/\Gamma=1$ if spin values is firmly assigned. Consult individual data sets for corresponding resonance strengths.
- @ [Additional information 21](#).
- & Band(A): 4p-4h, 0^+ band. $Q(\text{transition})=0.74$ *I4* from life-time data; corresponds to $\beta_2\approx 0.27$.
- ^a Band(B): γ sequence based on 8^+ .
- ^b Band(C): 3^+ band.
- ^c Band(D): $K^\pi=0^-$ band ([2004To07](#)) (?). This band is proposed ([2004To07](#)) as a partner of 4p-4h band based on the 3353, 0^+ state; the 1^- , 3^- and 5^- members of this band are proposed at 5902, 1^- ; 6280, 3^- or 6580, 3^- ; and 7399, (5^-), respectively. However, the 7399 level is assigned (5^+) in another in-beam γ -ray study. Assignment of (7^-) by [2004To07](#) for 9033 level is inconsistent with $L(\text{p},\text{p}')=5$ for a 9029 5 group and γ 's to 3^- and 4^- states seen in (p, γ). The 7^- assignment is only possible if the 9033 level in [2004To07](#) is different from a 9032 seen in other reactions.
- ^d Band(E): SD band ([2001Id01,2003Ch22](#)). $Q(\text{transition})=1.30$ *I5* over the whole band; $1.81 +46-33$ for high-spin states; 1.18 *I4* for low-spin states ([2003Ch22](#)). $Q(\text{transition})=1.80 +39-29$ ([2001Id01](#)). $Q(\text{transition})$ from [2001Id01](#) corresponds to $\beta_2=0.59 +11-7$. Configuration= $8\text{p}-8\text{h}$ defined by $\pi 3^4\nu 3^4$, where superscripts are the number of protons and neutrons occupying the $N=3$ ($f_{7/2}$) intruder orbital.

Adopted Levels, Gammas (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	$\delta^\#$	$\gamma(^{40}\text{Ca})$	Comments
3352.62	0 ⁺	3352.6		0.0	0 ⁺	E0			Decay is mainly by e ⁺ e ⁻ pair emission. Monopole strength: $\rho^2(E0)=0.0256\ 7$ (2005Ki02, deduced from T _{1/2}). Other: 0.025 8 in (e,e') deduced from measured matrix element.
3736.69	3 ⁻	3736.5 3	100	0.0	0 ⁺	E3			B(E3)(W.u.)=31 +4-3 E _γ : weighted average of 3735.6 8 from ⁴⁰ Sc ε decay, 3736.8 3 from ³⁹ K(p,γ), 3737 2 from ⁴⁰ Ca(n,n'γ), 3736.7 3 from ⁴⁰ Ca(p,p'γ), and 3736.1 3 from (HI,xnγ). Mult.: from γ(θ) in (p,p'γ), M3 ruled out by RUL.
3904.38	2 ⁺	551.8	<0.10	3352.62	0 ⁺	[E2]			B(E2)(W.u.)<49 E _γ : from (p,γ). I _γ : from (p,γ). Others: <1.5 in (p,p'γ).
		3903.9 1	100	0.0	0 ⁺	E2			B(E2)(W.u.)=2.2 +6-4 E _γ : weighted average of 3904.5 3 from ³⁹ K(p,γ), 3903.8 1 from ⁴⁰ Ca(γ,γ'), 3904.2 4 from ⁴⁰ Ca(n,n'γ), 3904.4 4 from ⁴⁰ Ca(p,p'γ), and 3904.0 3 from (HI,xnγ). Mult.: Q from γ(θ) in (p,p'γ) and (HI,xnγ), M2 ruled out by RUL.
4491.43	5 ⁻	754.8 2	100	3736.69	3 ⁻	E2			B(E2)(W.u.)=0.98 3 E _γ : weighted average of 755.6 8 from ⁴⁰ Sc ε decay, 754.8 3 from ³⁹ K(p,γ), 755 2 from ⁴⁰ Ca(n,n'γ), 754.7 2 from ⁴⁰ Ca(p,p'γ), and 754.8 2 from (HI,xnγ). Mult.: from γγ(θ) and γ(pol) in in (p,γ).
5211.56	0 ⁺	1307.7 3	100	3904.38	2 ⁺	[E2]			δ(O/Q)=-0.01 2 from (p,γ), +0.05 5 in (p,p'γ). B(E2)(W.u.)=17 +4-3 E _γ : from (p,p'γ).
5248.79	2 ⁺	1344.4 3	19.4 12	3904.38	2 ⁺	M1+E2	+13 +6-3		B(M1)(W.u.)=8×10 ⁻⁵ +11-6; B(E2)(W.u.)=25 +8-6 E _γ , Mult., δ: from (p,p'γ). I _γ : weighted average of 18.9 11 from ³⁹ K(p,γ), 27 7 from ⁴⁰ Ca(n,n'γ), and 25 5 from ⁴⁰ Ca(p,p'γ).
		1896.1	6.3 8	3352.62	0 ⁺	(E2)			B(E2)(W.u.)=1.5 +6-4 E _γ : from (p,γ), 1897 2 from (n,n'γ). I _γ : weighted average of 6.4 8 from ³⁹ K(p,γ), 7 4 from ⁴⁰ Ca(n,n'γ), and 5.2 26 from ⁴⁰ Ca(p,p'γ). Mult.: from (p,p'γ).
		5248.9 3	100.0 15	0.0	0 ⁺	E2			B(E2)(W.u.)=0.143 +35-24 E _γ : weighted average of 5248.9 6 from ³⁹ K(p,γ), 5247.9 6 from ⁴⁰ Ca(p,p'γ), 5249.2 3 from ⁴⁰ Ca(γ,γ'), and 5249 2 from ⁴⁰ Ca(n,n'γ). I _γ : from (p,γ). δ: from (p,p'γ).
5278.80	4 ⁺	787.4	3.1 15	4491.43	5 ⁻	[E1]			B(E1)(W.u.)=6×10 ⁻⁵ +7-5 E _γ , I _γ : from (p,γ). B(E2)(W.u.)=67 +17-12 E _γ : unweighted average of 1374.5 4 from ³⁹ K(p,γ), 1374.0 2 from ⁴⁰ Ca(n,n'γ), 1373.1 1 from ⁴⁰ Ca(p,p'γ), and 1374.30 20 from (HI,xnγ).
		1374.0 3	100.0 15	3904.38	2 ⁺	E2			

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (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>Mult.[#]</u>	<u>δ[#]</u>	<u>Comments</u>
5613.52	4 ⁻	1122.7 2	41.4 28	4491.43	5 ⁻	M1+E2	-0.7 2	I _{γ} : from (p, γ). Mult.: from $\gamma\gamma(\theta)$ and $\gamma(\text{pol})$ in (p, γ). $\delta(\text{O/Q})=+0.02$ 4 from (p,p' γ), -0.02 5 from (p, γ). B(M1)(W.u.)=0.0046 +23-16; B(E2)(W.u.)=6 +4-3 E _{γ} : weighted average of 1126 3 from ⁴⁰ Sc ε decay, 1121.5 6 from ³⁹ K(p, γ), 1122 2 from ⁴⁰ Ca(n,n' γ), and 1122.8 2 from ⁴⁰ Ca(p,p' γ). I _{γ} : weighted average of 48 8 from ⁴⁰ Sc ε decay, 41.8 28 from ³⁹ K(p, γ), and 39 4 from ⁴⁰ Ca(p,p' γ). Mult., δ : from $\gamma(\text{pol})$ in (p, γ). B(M1)(W.u.)=0.0033 +8-6; B(E2)(W.u.)=0.21 +15-9 E _{γ} : weighted average of 1877.8 7 from ⁴⁰ Sc ε decay, 1877.0 3 from ³⁹ K(p, γ), 1877 2 from ⁴⁰ Ca(n,n' γ), and 1876.9 2 from ⁴⁰ Ca(p,p' γ). I _{γ} : from (p, γ). Mult., δ : from $\gamma(\text{pol})$ in (p, γ). B(E2)(W.u.)=3.3 +23-11 E _{γ} : weighted average of 2275 2 from ⁴⁰ Ca(n,n' γ) and 2277.5 10 from ⁴⁰ Ca(p,p' γ). I _{γ} : weighted average of 14.0 10 from ³⁹ K(p, γ), and 14 6 from ⁴⁰ Ca(p,p' γ). Other: 48 12 from ⁴⁰ Ca(n,n' γ), B(E2)(W.u.)=0.26 +15-7 E _{γ} : weighted average of 5628.5 2 from ⁴⁰ Ca(γ , γ'), 5629 2 from ⁴⁰ Ca(n,n' γ), and 5628.3 5 from ⁴⁰ Ca(p,p' γ). I _{γ} : from (p, γ). Mult.: from $\gamma(\theta)$ in (p,p' γ) and RUL. B(E1)(W.u.)=6.7 $\times 10^{-5}$ +34-17 E _{γ} : weighted average of 5902.0 2 from ⁴⁰ Ca(γ , γ'), 5903 2 from ⁴⁰ Ca(n,n' γ), and 5902.6 15 from ⁴⁰ Ca(p,p' γ). Mult.: D from $\gamma\gamma(\theta)$ in (p,p' γ), polarity from level-parity change determined from other experimental evidence. B(E1)(W.u.)=6.1 $\times 10^{-5}$ +19-15 E _{γ} : from (p,p' γ). I _{γ} : from (p, γ). B(M1)(W.u.)=0.0010 +7-4; B(E2)(W.u.)=4.7 +11-9 E _{γ} : from (p,p' γ). I _{γ} : from (p, γ). Mult., δ : D+Q from $\gamma\gamma(\theta)$ in (p,p' γ), polarity from no level-parity change determined from other experimental evidence. E _{γ} ,I _{γ} : from (p, γ). Other: I _{γ} <3.4 in (p,p' γ). B(M1)(W.u.)<0.0037; B(E2)(W.u.)>77 E _{γ} : from (p,p' γ).
5629.41	2 ⁺	2277.0 10	14.0 10	3352.62	0 ⁺	[E2]		
		5628.5 2	100.0 10	0.0	0 ⁺	E2		
5902.63	1 ⁻	5902.0 2	100	0.0	0 ⁺	E1		
6025.47	2 ⁻	2121.0 6	23 3	3904.38	2 ⁺	[E1]		
		2289.0 3	100 3	3736.69	3 ⁻	M1+E2	-2.8 5	
6029.71	3 ⁺	750.9 780.7 4	<1.2 20 4	5278.80 4 ⁺ 5248.79 2 ⁺		E2(+M1)	>2	

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)								Comments
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.#	$\delta^\#$	
6029.71	3 ⁺	2124.4 3	100 4	3904.38	2 ⁺	E2(+M1)	>4	I_γ : weighted average of 25 4 from $^{39}\text{K}(\text{p},\gamma)$, 18 6 from $^{40}\text{Ca}(\text{n},\text{n}'\gamma)$, and 15 5 from $^{40}\text{Ca}(\text{p},\text{p}'\gamma)$. Mult., δ : Q(+D) from $\gamma\gamma(\theta)$ in (p,p' γ); M2(+E1) is ruled out by RUL. B(M1)(W.u.)<0.00027; B(E2)(W.u.)>3.0 E_γ : from (p,p' γ). I_γ : from (p, γ). Mult., δ : Q(+D) from $\gamma\gamma(\theta)$ in (p,p' γ); M2(+E1) is ruled out by RUL. E_γ, I_γ : from (p, γ). Other: I_γ <23 in (p,p' γ). E_γ, I_γ : from (p, γ) only. B(E2)(W.u.)=8.2 +14-13 E_γ : weighted average of 1793.9 6 from $^{39}\text{K}(\text{p},\gamma)$, 1793 2 from $^{40}\text{Ca}(\text{n},\text{n}'\gamma)$, and 1793.3 2 from $^{40}\text{Ca}(\text{p},\text{p}'\gamma)$. I_γ : from (p, γ). Mult.: Q(+O) from $\gamma\gamma(\theta)$ in (p,p' γ), M2 ruled out by RUL. $\delta(\text{O}/\text{Q})=-0.03$ 17 from (p,p' γ), +0.03 2 from (p, γ). B(E1)(W.u.)=2.6 $\times 10^{-5}$ +5-4 E_γ : from (p,p' γ). I_γ : from (p, γ). Others: 80 33 from (n,n' γ), 30 7 from (p,p' γ), and 33 7 from ($\alpha,\alpha'\gamma$). Mult.: D from $\gamma\gamma(\theta)$ in (p,p' γ), polarity from level-parity change determined from other experimental evidence. E_γ, I_γ : from (p, γ). Other: I_γ <13 in (p,p' γ). B(E3)(W.u.)=4.2 +13-10 E_γ, I_γ : from (p, γ). B(E2)(W.u.)=0.49 +22-12 E_γ : from (γ,γ'). E_γ, I_γ : from (p,p' γ). Other: I_γ <3.5 in (p, γ). B(E2)(W.u.)=24 +13-9 E_γ : from (p, γ). I_γ : weighted average of 18 4 from $^{39}\text{K}(\text{p},\gamma)$ and 15 4 from $^{40}\text{Ca}(\text{p},\text{p}'\gamma)$. B(E2)(W.u.)=3.7 +11-8 E_γ : from (p,p' γ). I_γ : from (p, γ). Mult.: O(+Q) from $\gamma\gamma(\theta)$ in (p,p' γ), M2 ruled out by RUL. $\delta(\text{O}/\text{Q})=-0.09$ 9 from (p,p' γ). B(E2)(W.u.)=1.7 $\times 10^2$ +7-5 E_γ, I_γ : from (p, γ). Other: I_γ =17 4 in (p,p' γ). Mult.: from $\gamma\gamma(\theta)$ in (p,p' γ) and RUL. B(E2)(W.u.)>100 consistent with 6543, 4 ⁺ state as a member of SD band. E_γ, I_γ : from (p, γ). Other: I_γ =10 4 in (p,p' γ). B(E2)(W.u.)=22 +10-7
		2293.0 671.6 1793.4 2	<8 1.3 3 100.0 11	3736.69 3 ⁻ 5613.52 4 ⁻ 4491.43 5 ⁻	3 ⁻ 4 ⁻ 5 ⁻	E2		
6285.15	3 ⁻	2380.0 5	27.4 7	3904.38	2 ⁺	E1		
		2548.4 6284.6	4.4 6 5.8 7	3736.69 3 ⁻ 0.0 0 ⁺	3 ⁻ 0 ⁺	[E3]		
6422.4	2 ⁺	6420.6 9	100	0.0	0 ⁺	[E2]		
6507.87	4 ⁺	1229.0 & 1259.0	4 3 17 4	5278.80 4 ⁺ 5248.79 2 ⁺	4 ⁺ 2 ⁺	[E2]		
		2603.2 3	100 4	3904.38	2 ⁺	E2		
6542.80	4 ⁺	913.3	32 3	5629.41	2 ⁺	E2		
		1264.0 1294.0	14 3 24 3	5278.80 4 ⁺ 5248.79 2 ⁺	4 ⁺ 2 ⁺	(E2)		

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}^{$\dagger$}</u>	<u>I_{γ}^{$\ddagger$}</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.[#]</u>	<u>δ[#]</u>	<u>Comments</u>
6542.80	4 ⁺	2638.1 3	100 3	3904.38	2 ⁺	E2(+M3)	-0.07 7	E _{γ} , I _{γ} : from (p, γ). Other: I _{γ} =12 4 in (p,p' γ). Mult.: (Q) from (HI,xn γ), M2 ruled out by RUL. B(E2)(W.u.)=2.6 +8-6 E _{γ} : from (p,p' γ). I _{γ} : from (p, γ). Mult.: Q(+O) from $\gamma\gamma(\theta)$ in (p,p' γ), M2 ruled out by RUL. $\delta(\text{O/Q})=-0.07$ 7 from (p,p' γ). E _{γ} , I _{γ} : from (p, γ). Other: I _{γ} =7.5 30 in (p,p' γ). B(E2)(W.u.)=0.39 +36-24 E _{γ} : from (p, γ). I _{γ} : from (p, γ). Other: 7.5 30 from (p,p' γ). B(E1)(W.u.)=2.8 $\times 10^{-5}$ +11-7 E _{γ} : from (p, γ). I _{γ} : weighted average of 24.2 18 from ³⁹ K(p, γ), and 34 8 from ⁴⁰ Ca(p,p' γ). B(M1)(W.u.)=0.00034 +60-26; B(E2)(W.u.)=1.3 +5-4 E _{γ} : from (p,p' γ). I _{γ} : from (p, γ). Mult., δ : D+Q from $\gamma\gamma(\theta)$ in (p,p' γ), M2 ruled out by RUL.
6582.47	3 ⁻	969.0 2091.0	26 5 <1.1	5613.52 4 ⁻ 4491.43 5 ⁻	[E2]			
		2678.1	24.7 21	3904.38	2 ⁺	[E1]		
		2845.1 3	100.0 20	3736.69	3 ⁻	M1+E2	+3.1 +26-11	
6750.41	2 ⁻	2848.4 & 10 3014.0 3	<10 100	3904.38 2 ⁺ 3736.69 3 ⁻		M1+E2	-0.84 16	E _{γ} : from (p,p' γ). Other: 2845.9 from (p, γ). I _{γ} : from (p, γ). Others: 22 10 in (n,n' γ), 18 in (p,p' γ). B(M1)(W.u.)=0.0047 +36-17; B(E2)(W.u.)=1.1 +10-5 E _{γ} : from (p,p' γ). Mult., δ : from $\gamma\gamma(\theta)$ in (p,p' γ) and RUL.
6908.70	2 ⁺	6907.6 1	100	0.0 0 ⁺	[E2]			B(E2)(W.u.)=2.1 +5-4 E _{γ} : from (γ , γ'). B(E2)(W.u.)=17 +17-4
6930.2	6 ⁺	1651.8 4	100	5278.80	4 ⁺	E2		E _{γ} : weighted average of 1651.9 7 from (HI,xn γ) and 1651.7 4 from (³ He,d γ). Other: 1651 2 from (n,n' γ). Mult.: from $\gamma(\theta)$ and $\gamma(\text{DCO})$ in (HI,xn γ) and RUL.
6931.29	3 ⁻	1301.8	7.0 4	5629.41	2 ⁺	[E1]		B(E1)(W.u.)=1.1 $\times 10^{-5}$ +10-4 E _{γ} , I _{γ} : from (p, γ). E _{γ} , I _{γ} : from (p, γ). B(E1)(W.u.)=5.3 $\times 10^{-6}$ +47-19 E _{γ} , I _{γ} : from (p, γ). B(E2)(W.u.)=0.008 +10-4 E _{γ} , I _{γ} : from (p, γ). B(E1)(W.u.)=3.0 $\times 10^{-7}$ +37-15 E _{γ} , I _{γ} : from (p, γ). E _{γ} , I _{γ} : from (p, γ). Other: E _{γ} =3190.0 15 in (p,p' γ), 3193 2 in (n,n' γ).
		1317.7	2.4 4	5613.52	4 ⁻			
		1682.4	7.4 4	5248.79	2 ⁺	[E1]		
		2439.8	1.7 4	4491.43	5 ⁻	[E2]		
		3026.8	2.4 6	3904.38	2 ⁺	[E1]		
		3194.5	100.0 9	3736.69	3 ⁻			

Adopted Levels, Gammas (continued)

							$\gamma(^{40}\text{Ca})$ (continued)
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	Comments
6938.0	(1 ⁻ to 5 ⁻)	3201.0 15	100	3736.69	3 ⁻		E_γ : from (p,p' γ).
6950.48	1 ⁻	6949.7 8	100	0.0	0 ⁺	[E1]	B(E1)(W.u.)=0.0019 +4-3 E_γ : weighted average of 6949.3 7 from $^{40}\text{Ca}(\gamma,\gamma')$, 6949 2 from $^{40}\text{Ca}(n,n'\gamma)$, and 6952.2 15 from $^{40}\text{Ca}(p,p'\gamma)$.
7113.1	1 ⁻	1485	5	5629.41	2 ⁺	[E1]	B(E1)(W.u.)=0.00010 +11-4 E_γ, I_γ : (p,p' γ) only.
		1899.8 7	22	5211.56	0 ⁺	[E1]	B(E1)(W.u.)=0.00022 +23-8 E_γ, I_γ : (p,p' γ) only.
		3206.8 6	28	3904.38	2 ⁺	[E1]	B(E1)(W.u.)=5.8 $\times 10^{-5}$ +60-20 E_γ, I_γ : from (p,p' γ). Other: E_γ =3208.5 in (p, γ).
		7112.9 10	100	0.0	0 ⁺	[E1]	B(E1)(W.u.)=1.9 $\times 10^{-5}$ +20-7 E_γ, I_γ : from (p,p' γ). Other: E_γ =7113.3 in (p, γ).
7113.73	4 ⁻	1088.2	1.7 5	6025.47	2 ⁻	[E2]	B(E2)(W.u.)=7 +8-4 E_γ, I_γ : from (p, γ).
		1500.2	10.3 11	5613.52	4 ⁻		E_γ, I_γ : from (p, γ).
		1834.9	2.6 5	5278.80	4 ⁺	[E1]	B(E1)(W.u.)=2.1 $\times 10^{-5}$ +22-9 E_γ, I_γ : from (p, γ).
		2623.2 3	40.7 20	4491.43	5 ⁻		E_γ : from (p,p' γ). Other: 2622.2 in (p, γ).
		3378.5 3	100.0 14	3736.69	3 ⁻		I_γ : from (p, γ). E_γ : from (p,p' γ). Other: 3376.9 in (p, γ).
7239.07	(3 ⁻ ,4,5 ⁻)	1624.5 7	50	5613.52	4 ⁻		I_γ : from (p, γ). E_γ, I_γ : from (p,p' γ) only.
		2746	100	4491.43	5 ⁻		E_γ, I_γ : from (p,p' γ) only.
		3501.4 5	100	3736.69	3 ⁻		E_γ, I_γ : from (p,p' γ). Other: E_γ =3502.2 in (p, γ).
7277.82	(2,3) ⁺	3541.0	100	3736.69	3 ⁻	[E1]	B(E1)(W.u.)=0.00027 +67-11 E_γ : from (p, γ).
7300.67	0 ⁺	1671.3	5.3 16	5629.41	2 ⁺	[E2]	B(E2)(W.u.)=1.8 +18-10 E_γ, I_γ : from (p, γ).
		2050.3 5	100.0 16	5248.79	2 ⁺	[E2]	B(E2)(W.u.)=16 +8-4 E_γ : from (p,p' γ). Other: 2051.9 in (p, γ).
7397.2	(5 ⁺)	1369		6029.71	3 ⁺	(E2)	E_γ : from (HI,xn γ) only.
		2119.2 6		5278.80	4 ⁺	(D)	Mult.: (Q) from (HI,xn γ), M2 ruled by RUL. E_γ : from (p,p' γ). Mult.: from (HI,xn γ).
7421.9		3684.9 12	100	3736.69	3 ⁻		E_γ : from (p,p' γ).
7446.23	3 ⁺ ,4 ⁺	1816.8	30.0 17	5629.41	2 ⁺		E_γ, I_γ : from (p, γ).
		1831.5 10	48.5 19	5613.52	4 ⁻	[E1]	B(E1)(W.u.)=0.00014 +10-5 E_γ : from (p,p' γ). Other: 1832.7 in (p, γ).
		2167.4	56 3	5278.80	4 ⁺		I_γ : from (p, γ). E_γ, I_γ : from (p, γ). Other: E_γ =2169.1 15 in (p,p' γ).

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. #	Comments
7446.23	3 ⁺ , 4 ⁺	2198.0 10	100 3	5248.79	2 ⁺		E_γ : from (p,p' γ). Other: 2197.4 in (p, γ). I_γ : from (p, γ).
7466.35	2 ⁺	2217.5	24 3	5248.79	2 ⁺		E_γ, I_γ : from (p, γ).
		3561.8	36.0 25	3904.38	2 ⁺		E_γ, I_γ : from (p, γ).
		4113.5	21.0 18	3352.62	0 ⁺	[E2]	B(E2)(W.u.)=0.9 +12-4 E_γ, I_γ : from (p, γ).
		7465.6	100 4	0.0	0 ⁺	[E2]	B(E2)(W.u.)=0.21 +24-8 E_γ, I_γ : from (p, γ). Other: E_γ =7467.8 10 in (p,p' γ).
7481?		7480		0.0	0 ⁺		
7532.26	2 ⁻	1247.1	23.1 21	6285.15	3 ⁻		E_γ, I_γ : from (p, γ).
		1506.8	11.3 10	6025.47	2 ⁻		E_γ, I_γ : from (p, γ).
		1629.6	8.0 24	5902.63	1 ⁻		E_γ, I_γ : from (p, γ).
		1917.6 10	57 3	5613.52	4 ⁻	[E2]	B(E2)(W.u.)=4.1 +19-12 E_γ : from (p,p' γ). Other: 1918.7 in (p, γ). I_γ : from (p, γ).
		3627.7	36 3	3904.38	2 ⁺	[E1]	B(E1)(W.u.)=1.2 $\times 10^{-5}$ +6-4 E_γ, I_γ : from (p, γ).
7561.17	4 ⁺	3795.4 10	100 4	3736.69	3 ⁻		E_γ, I_γ : from (p, γ).
		1531.4	44 5	6029.71	3 ⁺		E_γ, I_γ : from (p, γ).
		2312.1 10	100 13	5248.79	2 ⁺	[E2]	B(E2)(W.u.)=3.9 +17-11 E_γ : unweighted average of 2313.0 6 from ³⁹ K(p, γ) and 2311.1 3 from ⁴⁰ Ca(p,p' γ). I_γ : from (p, γ).
		3824.3	14 3	3736.69	3 ⁻	[E1]	B(E1)(W.u.)=5.4 $\times 10^{-6}$ +41-23 E_γ, I_γ : from (p, γ).
7623.11	(2 ⁻ , 3, 4 ⁺)	1993.6	100 3	5629.41	2 ⁺		E_γ, I_γ : from (p, γ).
		2009.5 7	90 3	5613.52	4 ⁻		E_γ : from (p,p' γ). I_γ : from (p, γ).
		2374.2	31.5 20	5248.79	2 ⁺		E_γ, I_γ : from (p, γ).
7658.23	4 ⁻	3886.2	57.4 20	3736.69	3 ⁻		E_γ, I_γ : from (p, γ).
		1373.1	33 5	6285.15	3 ⁻		E_γ, I_γ : from (p, γ).
		2045.6 7	100 6	5613.52	4 ⁻		E_γ : weighted average of 2045.8 7 from ⁴⁰ Sc ϵ decay and 2045.0 10 from ⁴⁰ Ca(p,p' γ). Other: 2045.6 in (p, γ). I_γ : from ⁴⁰ Sc ϵ decay.
		3167.9 7	52 8	4491.43	5 ⁻		E_γ : from ⁴⁰ Sc ϵ decay. Other: 3166.7 in (p, γ). I_γ : weighted average of 47 8 from ⁴⁰ Sc ϵ decay and 56 8 from ³⁹ K(p, γ).
		3920.0 10	59 8	3736.69	3 ⁻		E_γ : from ⁴⁰ Sc ϵ decay. Other: 3921.3 in (p, γ). I_γ : weighted average of 51 8 from ⁴⁰ Sc ϵ decay and 67 8 from ³⁹ K(p, γ).
7676.6	(6 ⁺)	2399.2 5	100	5278.80	4 ⁺	(E2)	B(E2)(W.u.)=4.4 +15-9 E_γ : from (p,p' γ). Mult.: (Q) from $\gamma(\theta)$ in (HI,xn γ), M2 ruled out by RUL.

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	Comments
7694.08	3^-	2080.6 3957.5 5	10.1 13 100.0 13	5613.52 3736.69	4^- 3^-		E_γ, I_γ : from (p, γ). E_γ : from (p,p' γ). Other: 3957.3 in (p, γ). I_γ : from (p, γ).
7701.8	0^+	3797.2	100	3904.38	2^+		E_γ : from (p, γ).
7769.4	(3,4,5 $^-$)	2155.8 4032.5	52 9 100 9	5613.52 3736.69	4^- 3^-		E_γ, I_γ : from (p, γ). E_γ, I_γ : from (p, γ).
7814.7	0^+	2565 3908	43 100	5248.79 3904.38	2^+ 2^+		E_γ, I_γ : from (p,p' γ). E_γ, I_γ : from (p,p' γ).
7872.18	2^+	7871.1 1	100	0.0	0^+	[E2]	B(E2)(W.u.)=0.89 +22-15 E_γ : from (γ, γ'). Others: 7871.4 in (p, γ), 7872.9 10 in (p,p' γ). I_γ : 1982Mo05 in (γ, γ') report $\Gamma_0/\Gamma=0.84$ 6 without indicating the observation of other γ branches other than the ground transition and no other γ branches were observed in other studies. So this value is not considered.
7928.42	4^+	2314.8	100 18	5613.52	4^-	[E1]	B(E1)(W.u.)=0.00046 +151-25 E_γ, I_γ : from (p, γ). Other: $E_\gamma=2313.7$ 17 in (p,p' γ).
		3436.8	100 18	4491.43	5^-	[E1]	B(E1)(W.u.)=0.00014 +46-8 E_γ, I_γ : from (p, γ). E_γ, I_γ : from (p, γ). Other: $I_\gamma=20$ in (p,p' γ).
7974.4	(6 $^+$)	4191.5 1432	<14	3736.69 6542.80	3^- 4^+	(Q)	$E_\gamma, \text{Mult.}$: from (HI,xn γ).
		2695		5278.80	4^+	(Q)	$E_\gamma, \text{Mult.}$: from (HI,xn γ).
7976.55	2^+	2699 4072.1 6	20 100	5278.80 3904.38	4^+ 2^+	[E2]	B(E2)(W.u.)>1.2
		4624	60	3352.62	0^+	[E2]	B(E2)(W.u.)>0.24
		7977	20	0.0	0^+	[E2]	B(E2)(W.u.)>0.0051
8018.8	0^+	2770	100	5248.79	2^+		
8091.61	2^+	8090.6 2	100	0.0	0^+	[E2]	B(E2)(W.u.)=0.72 +9-7 E_γ : from (γ, γ'). Other: 8092.4 20 in (p,p' γ).
8100.1	8^+	1168.8 3	100	6930.2	6^+	E2	B(E2)(W.u.)=2.6 +4-3 E_γ : from (HI,xn γ). Mult.: from $\gamma\gamma(\theta)$ and $\gamma(\text{DCO})$ in (HI,xn γ) and RUL.
8113.2	1^-	8111.0 6	100	0.0	0^+	[E1]	B(E1)(W.u.)=6.0 $\times 10^{-5}$ +39-17 E_γ : from (γ, γ').
8134.77	(3 $^-$)	2505.3 2521.2 3643.1 & 4229.4 10	82 9 24 9 <15 100 30	5629.41 5613.52 4491.43 3904.38	2^+ 4^- 5^- 2^+		E_γ, I_γ : from (p, γ). E_γ, I_γ : from (p, γ). E_γ, I_γ : from (p, γ). E_γ, I_γ : from (p, γ). Other: $I_\gamma=100$ in (p,p' γ). E_γ : from (p,p' γ). Other: 4230.1 in (p, γ). I_γ : from (p, γ).
8187.5	(3,4,5 $^-$)	4451.6 8	100	3736.69	3^-		E_γ : from (p,p' γ). Other: 4450.7 in (p, γ).
8271	(≤ 3) $^-$	1321	100	6950.48	1^-		E_γ, I_γ : from (p,p' γ).
		2368	67	5902.63	1^-		E_γ, I_γ : from (p,p' γ).
8276	0^+	2646	100	5629.41	2^+		

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	Comments
8323.16	(1 ⁻ ,2 ⁺)	1572.7	12.5 10	6750.41	2 ⁻		
		2038.0	2.2 5	6285.15	3 ⁻		
		2297.6	26.3 17	6025.47	2 ⁻		
		2420.5	1.9 12	5902.63	1 ⁻		
		3074.2	4.5 9	5248.79	2 ⁺		
		4586.2	100 3	3736.69	3 ⁻		
		8322.2	3.4 12	0.0	0 ⁺		Unobserved intensity=18 3 in (p, γ).
8338.0	(2 ⁺ ,3,4)	1795.2	100 10	6542.80	4 ⁺		
		1830.1	42 10	6507.87	4 ⁺		Unobserved intensity=25 13 in (p, γ).
8358.9	(0,1,2) ⁻	1405	100	6950.48	1 ⁻		E_γ : from (p,p' γ).
8364	(3 ⁻ to 7 ⁻)	3872	100	4491.43	5 ⁻		
8373.94	4 ⁺	4469.3	100	3904.38	2 ⁺		
8424.81	2 ⁻	2399.3	19 4	6025.47	2 ⁻		
		2522.1	24 4	5902.63	1 ⁻		
		4687.8	100 6	3736.69	3 ⁻		E_γ : from (p, γ). Other: 4688.2 15 in (p,p' γ).
8439.0	0 ⁺	2809.5	100	5629.41	2 ⁺		
8484.02	(1 ⁻ ,2 ⁻ ,3 ⁻)	2581.3	59 11	5902.63	1 ⁻		
		4747.0	100 11	3736.69	3 ⁻		Additional information 22.
8540	1,2 ⁺	5188	67	3352.62	0 ⁺		E_γ, I_γ : from (p,p' γ).
		8540 4	100	0.0	0 ⁺		E_γ, I_γ : from (p,p' γ).
8551.1	5 ⁻	4060.8 15		4491.43	5 ⁻		E_γ, I_γ : from (p,p' γ).
8578.80	2 ⁺	8577.7 2	100	0.0	0 ⁺	[E2]	B(E2)(W.u.)=0.54 +7-6
							E_γ : from (γ, γ').
8587	(2 ⁺ ,3)	2562	25	6025.47	2 ⁻		E_γ, I_γ : from (p,p' γ).
		3308	25	5278.80	4 ⁺		E_γ, I_γ : from (p,p' γ).
		4682	17	3904.38	2 ⁺		E_γ, I_γ : from (p,p' γ).
		4850	100	3736.69	3 ⁻		E_γ, I_γ : from (p,p' γ).
8665.3	1 ⁻	8665	100	0.0	0 ⁺		
8678.29	4 ⁺	2393.1	20 8	6285.15	3 ⁻	[E1]	B(E1)(W.u.)=0.00017 +145-12
		4941.3	100 23	3736.69	3 ⁻	[E1]	B(E1)(W.u.)=0.00010 +53-5
							Unobserved intensity=34 25 in (p, γ).
8701	(6 ⁻)	3088		5613.52	4 ⁻		
		4209		4491.43	5 ⁻		
8748.22	2 ⁺	8748.4 2	100	0.0	0 ⁺	[E2]	B(E2)(W.u.)=0.26 +4-3
							E_γ : from (γ, γ'). Other: 8747.2 in (p, γ).
8764.18	3 ⁻	2734.4	47 18	6029.71	3 ⁺		
		3134.6	56 21	5629.41	2 ⁺		
		3485.2	100 30	5278.80	4 ⁺		
		4859.5	65 18	3904.38	2 ⁺		Unobserved intensity $\approx$ 26 in (p, γ).
8934.81	2 ⁺	1402.5	12.2 11	7532.26	2 ⁻		
		1657.0	3.5 5	7277.82	(2,3) ⁺		
		1821.0	1.7 4	7113.1	1 ⁻		

Adopted Levels, Gammas (continued)

<u>$\gamma(^{40}\text{Ca})$ (continued)</u>							Comments
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.#	
8934.81	2^+	1984.3	5.6 8	6950.48	1^-		
		2184.3	5.6 8	6750.41	2^-		
		2352.2	1.9 3	6582.47	3^-		
		2905.0	3.2 11	6029.71	3^+		
		2909.2	17.6 19	6025.47	2^-		
		3032.1	1.7 5	5902.63	1^-		
		3305.2	2.9 5	5629.41	2^+		
		3685.8	5.6 24	5248.79	2^+		
		3722.9	3.5 8	5211.56	0^+		
		5030.1	100 5	3904.38	2^+		
		5197.8	2.9 13	3736.69	3^-		
		5581.8	21.8 21	3352.62	0^+		
		8933.7	77 5	0.0	0^+		
		8935.8		7397.2	(5^+)	(Q)	
		2004		6930.2	6^+	(D)	
8982.5	2^+	8981.4 5	100	0.0	0^+	[E2]	B(E2)(W.u.)=0.38 +6-5 E $_\gamma$: from (γ, γ').
8994.50	$(1^-, 2^+)$	1880.7	0.44 11	7113.1	1^-		
		2085.7	0.62 15	6908.70	2^+		
		2244.0	0.60 8	6750.41	2^-		
		2411.9	0.44 14	6582.47	3^-		
		2709.3	0.64 16	6285.15	3^-		
		2968.9	1.5 3	6025.47	2^-		
		3364.9	8.7 7	5629.41	2^+		
		3782.6	8.2 7	5211.56	0^+		
		5089.8	8.3 8	3904.38	2^+		
		5257.4	2.4 4	3736.69	3^-		
		5641.5	2.1 6	3352.62	0^+		
		8993.4	100.0 22	0.0	0^+		
		1337.7	25 8	7694.08	3^-		
		2746.6	25 8	6285.15	3^-		
		3418.2	100 13	5613.52	4^-		
9031.9	4^-	3752.9	30 13	5278.80	4^+		
		4540.2	70 13	4491.43	5^-		
		4542.8		4491.43	5^-		
		1397.5	3.7 3	7694.08	3^-		
		1468.6	1.31 16	7623.11	$(2^-, 3, 4^+)$		
9033? 9091.70	(7^-) 3^-	1625.3	0.71 5	7466.35	2^+		
		1813.8	2.17 24	7277.82	$(2, 3)^+$		
		1852.6	1.26 17	7239.07	$(3^-, 4, 5^-)$		
		1977.9	0.95 16	7113.73	4^-		
							E $_\gamma$: this γ may correspond to 4540.2 γ from 9031.9 level.

Adopted Levels, Gammas (continued)

 $\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]
9091.70	3 ⁻	2341.2	0.98 24	6750.41	2 ⁻	9226.69	(1 ⁻ ,2,3 ⁻)	2941.4	27.8 15	6285.15	3 ⁻	
		2509.1	1.79 24	6582.47	3 ⁻			3323.9	<3.0	5902.63	1 ⁻	
		2806.4	8.8 5	6285.15	3 ⁻			3977.7	<14	5248.79	2 ⁺	
		3061.9	4.3 7	6029.71	3 ⁺			5321.9	<3.1	3904.38	2 ⁺	
		3066.1	5.0 9	6025.47	2 ⁻			5489.6	39 3	3736.69	3 ⁻	
		3188.9	2.6 4	5902.63	1 ⁻			9225.6	<97	0.0	0 ⁺	
		3812.7	14.6 7	5278.80	4 ⁺	9227.43	(1,2 ⁺)	3201.8	35.0 13	6025.47	2 ⁻	
		3842.7	7.7 4	5248.79	2 ⁺			3324.7	<1.0	5902.63	1 ⁻	
		5187.0	16.2 7	3904.38	2 ⁺			3978.4	<4.7	5248.79	2 ⁺	
		5354.6	100.0 17	3736.69	3 ⁻			5322.7	<1.0	3904.38	2 ⁺	
9135.66	2 ⁻ ,3 ⁻	710.8	1.72 15	8424.81	2 ⁻			5874.4	100 3	3352.62	0 ⁺	
		1263.5	0.55 9	7872.18	2 ⁺			9226.3	<33	0.0	0 ⁺	
		1441.5	8.9 4	7694.08	3 ⁻	9305.2	(8 ⁺)	1628		7676.6	(6 ⁺)	(Q)
		1603.4	6.3 4	7532.26	2 ⁻			2375		6930.2	6 ⁺	(Q)
		1857.8	0.43 7	7277.82	(2,3) ⁺	9362.54	3 ⁻	937.7	4.4 7	8424.81	2 ⁻	
		2021.9	3.13 21	7113.73	4 ⁻			1668.4	100.0 25	7694.08	3 ⁻	
		2185.1	0.78 14	6950.48	1 ⁻			1704.3	26.6 20	7658.23	4 ⁻	
		2385.2	1.06 15	6750.41	2 ⁻			1739.4	3.9	7623.11	(2 ⁻ ,3,4 ⁺)	
		2553.0	3.5 3	6582.47	3 ⁻			2412.0	3.2	6950.48	1 ⁻	
		2850.4	23.5 7	6285.15	3 ⁻			2612.0	3.7	6750.41	2 ⁻	
		3110.1	0.43 17	6025.47	2 ⁻			2779.9	6.3 7	6582.47	3 ⁻	
		3232.9	5.1 4	5902.63	1 ⁻			3077.3	9.5 25	6285.15	3 ⁻	
		3522.0	0.51 17	5613.52	4 ⁻			3748.8	29.8 22	5613.52	4 ⁻	
		3886.7	0.8 3	5248.79	2 ⁺			4113.5	10.7 20	5248.79	2 ⁺	
		5230.9	13.6 7	3904.38	2 ⁺			5457.8	14.4 20	3904.38	2 ⁺	
		5398.6	100.0 15	3736.69	3 ⁻			5625.4	8.3 15	3736.69	3 ⁻	
9209.77	(2,3) ⁻	725.7	1.53 16	8484.02	(1 ⁻ ,2 ⁻ ,3 ⁻)	9388.20	2 ⁺	1694.0	7	7694.08	3 ⁻	
		785.0	5.4 3	8424.81	2 ⁻			2087.4	2.5	7300.67	0 ⁺	
		1515.6	7.3 3	7694.08	3 ⁻			2845.3	28	6542.80	4 ⁺	
		2096.0	2.60 20	7113.73	4 ⁻			2880.3	9	6507.87	4 ⁺	
		2259.2	4.5 3	6950.48	1 ⁻			3102.9	3.2	6285.15	3 ⁻	
		2459.3	3.2 3	6750.41	2 ⁻			3362.6	6	6025.47	2 ⁻	
		2627.1	3.6 3	6582.47	3 ⁻			3758.6	19	5629.41	2 ⁺	
		2924.5	6.5 3	6285.15	3 ⁻			4109.2	15	5278.80	4 ⁺	
		3184.2	2.6 3	6025.47	2 ⁻			4139.2	8	5248.79	2 ⁺	
		3307.0	17.4 5	5902.63	1 ⁻			4176.3	28	5211.56	0 ⁺	
		3580.2	3.4 3	5629.41	2 ⁺			5483.4	8	3904.38	2 ⁺	
		5305.0	4.7 5	3904.38	2 ⁺			5651.1	17	3736.69	3 ⁻	
		5472.7	100.0 16	3736.69	3 ⁻			9387.0	100	0.0	0 ⁺	
9226.69	(1 ⁻ ,2,3 ⁻)	1694.4	100 5	7532.26	2 ⁻	9404.85	2 ⁻	1872.5	43	7532.26	2 ⁻	
		2276.1	15.9 14	6950.48	1 ⁻			2127.0	2.2	7277.82	(2,3) ⁺	
		2476.2	24.1 15	6750.41	2 ⁻			2291.1	20	7113.73	4 ⁻	

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. #	$\delta^\#$	Comments
9404.85	2^-	2454.3	4	6950.48	1^-			
		2496.1	8	6908.70	2^+			
		2822.2	10	6582.47	3^-			
		3119.6	100	6285.15	3^-	M1		Mult.: $\delta(Q/D)=0.0$ 3 in (p, γ), polarity from no level-parity change determined from other experimental evidence.
		3502.1	20	5902.63	1^-			
		5500.1	7	3904.38	2^+			
		5667.7	49	3736.69	3^-	M1+E2	-0.03 2	Mult.: D+Q in (p, γ), polarity from no level-parity change determined from other experimental evidence.
9418.8	3^-	9403.7	7	0.0	0^+			
		1724.6	10	7694.08	3^-			
		1760.5	7	7658.23	4^-			
		1795.6	4	7623.11	($2^-,3,4^+$)			
		1886.5	5	7532.26	2^-			
		2305.0	62	7113.73	4^-			
		2668.3	6	6750.41	2^-			
		3133.5	100	6285.15	3^-			
		3393.2	5	6025.47	2^-			
		3516.0	12	5902.63	1^-			
		3805.1	5	5613.52	4^-			
		4169.8	4	5248.79	2^+			
		5681.7	18	3736.69	3^-			
		1734.9	21 3	7694.08	3^-			
9429.11	$(3,4)^-$	1770.8	100 6	7658.23	4^-			
		1806.0	3.3 11	7623.11	($2^-,3,4^+$)			
		2315.3	3.6 8	7113.73	4^-			
		2846.5	26 5	6582.47	3^-			
		3143.8	9.4 17	6285.15	3^-			
		4937.3	81 6	4491.43	5^-			
		5692.0	33 6	3736.69	3^-			
9432.46	1^-	1900.2	2.5	7532.26	2^-			
		2481.9	0.8	6950.48	1^-			
		2681.9	1.0	6750.41	2^-			
		3406.8	2.3	6025.47	2^-			
		5527.7	1.1	3904.38	2^+			
		9431.3	100	0.0	0^+			
		1029.1	4.9 6	8424.81	2^-			
9453.95	3^-	1759.8	73.2 23	7694.08	3^-			
		1795.7	23.4 20	7658.23	4^-			
		1830.8	5.9 10	7623.11	($2^-,3,4^+$)			
		1921.6	3.3 7	7532.26	2^-			
		2007.7	2.3 7	7446.23	$3^+,4^+$			

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	$\delta^\#$	Comments
9453.95	3 ⁻	2340.2	34.7 17	7113.73	4 ⁻			
		2703.4	6.9 7	6750.41	2 ⁻			
		3168.7	100.0 23	6285.15	3 ⁻			
		3428.3	5.9 10	6025.47	2 ⁻			
		3824.3	8.3 10	5629.41	2 ⁺			
		3840.2	33.7 20	5613.52	4 ⁻			
		4174.9	5	5278.80	4 ⁺			
		5549.2	16.2 20	3904.38	2 ⁺			
		5716.8	11.2 13	3736.69	3 ⁻			
9603.0	3 ⁻	2489.2	61	7113.73	4 ⁻			
		3317.7	100	6285.15	3 ⁻	M1+E2	0.42 6	Mult., δ : D+Q from (p, γ), polarity form no level-parity change determined from other experimental evidence.
		5865.8	24	3736.69	3 ⁻	M1+E2	+0.18 3	Mult., δ : D+Q from (p, γ), polarity form no level-parity change determined from other experimental evidence.
9604.6	1 ⁻	2072.3	6	7532.26	2 ⁻			
		2654.0	1.3	6950.48	1 ⁻			
		2854.1	2.0	6750.41	2 ⁻			
		3579.0	5	6025.47	2 ⁻			
		5699.8	1.0	3904.38	2 ⁺			
		6251.4	1.4	3352.62	0 ⁺			
		9603.4	100	0.0	0 ⁺			
9640.89	2 ⁻	2174.5	16.7 6	7466.35	2 ⁺			
		2690.3	0.32 6	6950.48	1 ⁻			
		2732.1	1.06 11	6908.70	2 ⁺			
		3355.6	0.99 23	6285.15	3 ⁻			
		4011.2	9.94 21	5629.41	2 ⁺			
		5736.1	100.0 11	3904.38	2 ⁺			
		5903.7	82.5 11	3736.69	3 ⁻			
		9639.6	3.2	0.0	0 ⁺			
9668.71	3 ⁻	1974.5	1.5 3	7694.08	3 ⁻			
		2136.4	4.1 4	7532.26	2 ⁻			
		2222.4	1.53 25	7446.23	3 ⁺ ,4 ⁺			
		2554.9	60.6 16	7113.73	4 ⁻			
		2759.9	1.5 3	6908.70	2 ⁺			
		2918.2	4.6 4	6750.41	2 ⁻			
		3383.4	100.0 14	6285.15	3 ⁻			
		3643.1	6.8 7	6025.47	2 ⁻			
		5176.9	6.76 23	4491.43	5 ⁻			
		5763.9	8.1 5	3904.38	2 ⁺			
		5931.6	29.7 14	3736.69	3 ⁻			
9779.47	3	1031.3	17.1 15	8748.22	2 ⁺			
		1101.2	16.6 20	8678.29	4 ⁺			

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.#	$\delta^\#$	Comments
9779.47	3	1200.7	25.1 15	8578.80	2 ⁺			
		1644.7	13.6 10	8134.77	(3 ⁻)			
		1851.0	26.6 15	7928.42	4 ⁺			
		1907.3	28.6 25	7872.18	2 ⁺			
		2218.2	95 4	7561.17	4 ⁺			
		2313.1	15	7466.35	2 ⁺			
		2870.7	21.1 25	6908.70	2 ⁺			
		3196.8	7.5 20	6582.47	3 ⁻			
		3236.6	6.5 15	6542.80	4 ⁺			
		3271.5	3.5 10	6507.87	4 ⁺			
		3749.6	6	6029.71	3 ⁺			
		4149.8	10.1 10	5629.41	2 ⁺			
		4165.7	100 4	5613.52	4 ⁻	D+Q	+0.07 4	Mult., δ : from (p, γ).
		4500.4	27.1 20	5278.80	4 ⁺			
		4530.4	3.5 10	5248.79	2 ⁺			
		5874.7	73 5	3904.38	2 ⁺			
		6042.3	27 3	3736.69	3 ⁻			
9785.3	(1,2 ⁺)	2484.5	2.6	7300.67	0 ⁺			
		2876.5	0.8	6908.70	2 ⁺			
		5880.5	2.9	3904.38	2 ⁺			
		6432.1	11	3352.62	0 ⁺			
9853.5	(8 ⁺)	9784.0	100	0.0	0 ⁺			
		1880		7974.4	(6 ⁺)	(Q)		
		2176		7676.6	(6 ⁺)	(Q)		
9865.15	1	2921		6930.2	6 ⁺	(Q)		
		1426.1	0.25 7	8439.0	0 ⁺			
		1773.5	1.02 11	8091.61	2 ⁺			
		1992.9	0.29 4	7872.18	2 ⁺			
		2163.3	0.74 25	7701.8	0 ⁺			
		2398.7	0.57 9	7466.35	2 ⁺			
		2564.3	4.5 3	7300.67	0 ⁺			
		2587.2	0.28 10	7277.82	(2,3) ⁺			
		2914.6	0.45 6	6950.48	1 ⁻			
		2956.3	1.54 14	6908.70	2 ⁺			
		3114.6	0.29 3	6750.41	2 ⁻			
		3962.3	0.48 7	5902.63	1 ⁻			
		4235.5	0.57 10	5629.41	2 ⁺			
		4616.1	0.35 4	5248.79	2 ⁺			
		4653.2	0.64 10	5211.56	0 ⁺			
		5960.3	7.1 3	3904.38	2 ⁺	D+Q	-0.18 3	Mult., δ : from (p, γ).
		6512.0	21.0 7	3352.62	0 ⁺			
		9863.8 20	100.0 17	0.0	0 ⁺			

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	$\delta^\#$	Comments
9869.3	$1^+, 2^+$	2167.4	1.1	7701.8	0^+			
		2568.5	3.0	7300.67	0^+			
		2960.5	1.2	6908.70	2^+			
		4620.2	1.1	5248.79	2^+			
		4657.3	0.8	5211.56	0^+			
		5964.4	7	3904.38	2^+			
		6516.1	17	3352.62	0^+			
		9868.0	100	0.0	0^+			
		1580.0	6.5 5	8373.94	4^+			
		3022.6	5.2 5	6931.29	3^-			
9954.00	4^+	3371.3	2.1 5	6582.47	3^-			
		3411.1	18.2 10	6542.80	4^+			
		3446.0	7.2 4	6507.87	4^+			
		4340.2	8.2 7	5613.52	4^-			
		4674.9	100 3	5278.80	4^+	M1+E2	+0.04 3	Mult., δ : from $\gamma(\text{pol})$ in (p, γ).
		5462.2	4.6 7	4491.43	5^-			
		6216.8	11.2 10	3736.69	3^-			
		10040.54	1276.3 10.4 14	8764.18	3^-			
		1556.5	3.5 6	8484.02	$(1^-, 2^-, 3^-)$			
		1717.3	100.0 19	8323.16	$(1^-, 2^+)$			
10040.54	$(2^-, 3^-)$	2417.4	4.4 6	7623.11	$(2^-, 3, 4^+)$			
		2508.2	1.8 4	7532.26	2^-			
		2762.6	16.1 6	7277.82	$(2, 3)^+$			
		2926.7	8.5 6	7113.73	4^-			
		3089.9	12.8 12	6950.48	1^-			
		3457.8	2.7 4	6582.47	3^-			
		4014.9	3.9 4	6025.47	2^-			
		4137.7	26.3 12	5902.63	1^-			
		6303.3	3.9 4	3736.69	3^-			
		10049.38	1017.5 26.3 12	9031.9	4^-			
10049.38	4^-	1861.6	1.17 12	8187.5	$(3, 4, 5^-)$			
		2279.9	5.4 3	7769.4	$(3, 4, 5^-)$			
		2810.2	1.7 3	7239.07	$(3^-, 4, 5^-)$			
		2935.5	32.0 9	7113.73	4^-			
		3466.7	16.7 7	6582.47	3^-			
		3764.0	2.88 21	6285.15	3^-			
		4023.7	2.97 23	6025.47	2^-			
		4435.6	2.17 21	5613.52	4^-			
		5557.5	37.3 9	4491.43	5^-			
		6312.2	100.0 21	3736.69	3^-			
10262.53	3^-	2639.3	3.9 6	7623.11	$(2^-, 3, 4^+)$			
		2796.1	43.3 25	7466.35	2^+			

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]	$\delta^\#$	Comments
10262.53	3^-	2816.2	13.1 11	7446.23	$3^+, 4^+$			
		3148.7	3.9 8	7113.1	1^-			
		3679.8	11.4 8	6582.47	3^-			
		4232.6	45 4	6029.71	3^+			
		4359.7	7.5 11	5902.63	1^-			
		4632.8	8.1 11	5629.41	2^+			
		5013.4	10.0 11	5248.79	2^+			
		6357.6	100 3	3904.38	2^+			
		6525.3	32 3	3736.69	3^-			
		2616.9	0.86 9	7701.8	0^+			
10318.8	1^+	3368.2	0.50 9	6950.48	1^-			
		4689.1	0.33 9	5629.41	2^+			
		5106.8	0.93 7	5211.56	0^+			
		6413.9	4.12 24	3904.38	2^+	M1+E2	-0.16 3	Mult., δ : D+Q from (p, γ), polarity from no level-parity change determined from other evidence.
		6965.5	14.4 5	3352.62	0^+			
10415.06	3	10317.4	100.0 9	0.0	0^+			
		2720.8	2.3 12	7694.08	3^-			
		2791.8	96 3	7623.11	$(2^-, 3, 4^+)$			
		2853.8	6.5 6	7561.17	4^+			
		2948.6	33.9 12	7466.35	2^+			
		2968.7	100.0 23	7446.23	$3^+, 4^+$			
		3137.1	5.1 8	7277.82	$(2, 3)^+$			
		3301.2	9.0 10	7113.73	4^-			
		3483.6	23.0 12	6931.29	3^-			
		3506.2	90.2 23	6908.70	2^+			
		3664.5	14.4 6	6750.41	2^-			
		3832.3	7.7 8	6582.47	3^-			
		3907.0	5.9 9	6507.87	4^+			
		4129.7	2.1 5	6285.15	3^-			
		4389.3	33.9 17	6025.47	2^-			
		4785.3	4.7 9	5629.41	2^+			
		4801.2	39.7 17	5613.52	4^-			
		5135.9	15.5 12	5278.80	4^+			
		5165.9	9.7 10	5248.79	2^+			
		6510.1	20.1 17	3904.38	2^+			
10474 10639.07	(8^-) $(3^-, 4, 5^-)$	6677.8	40.8 23	3736.69	3^-			
		1773		8701	(6^-)			
		2504.2	3.1 5	8134.77	(3^-)			
		3525.2	9.5 7	7113.73	4^-			
		3707.6	100 3	6931.29	3^-			
		4056.3	3.8 5	6582.47	3^-			

Adopted Levels, Gammas (continued)

<u>$\gamma(^{40}\text{Ca})$ (continued)</u>						
<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>$E_\gamma^\dagger$</u>	<u>$I_\gamma^\ddagger$</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[#]</u>
10639.07	(3 ⁻ ,4,5 ⁻)	4096.1	6.89 24	6542.80	4 ⁺	
		4131.0	9.5 5	6507.87	4 ⁺	
		5025.2	32.3 14	5613.52	4 ⁻	
		5359.9	10.5 10	5278.80	4 ⁺	
		6147.1	8.6 7	4491.43	5 ⁻	
10699.50	3	6901.7	53.4 24	3736.69	3 ⁻	
		2325.5	2.0 3	8373.94	4 ⁺	
		2607.8	1.40 18	8091.61	2 ⁺	
		3167.1	2.0 3	7532.26	2 ⁻	
		3233.0	1.8 4	7466.35	2 ⁺	
		3253.1	1.8 3	7446.23	3 ⁺ ,4 ⁺	
		3790.6	5.1 4	6908.70	2 ⁺	
		4156.5	3.9 4	6542.80	4 ⁺	
		4414.1	2.7 4	6285.15	3 ⁻	
		4669.5	7.4 6	6029.71	3 ⁺	
		5069.7	10.7 6	5629.41	2 ⁺	
		5085.6	3.9 4	5613.52	4 ⁻	
		5420.3	17.9 10	5278.80	4 ⁺	
		6794.5	100 3	3904.38	2 ⁺	
		6962.2	16 3	3736.69	3 ⁻	
		3043.4	17 3	7694.08	3 ⁻	
		3828.8	8 3	6908.70	2 ⁺	
		4452.3	14.2 24	6285.15	3 ⁻	
		10736.2	100 6	0.0	0 ⁺	
10747.8	(4 ⁺)	5118.0	14.8 11	5629.41	2 ⁺	
		6842.8	100.0 12	3904.38	2 ⁺	
		7010.5	3.8 7	3736.69	3 ⁻	
10770.2	(1 ⁺)	3656.3	7.9 17	7113.1	1 ⁻	
		3861.3	14.3 17	6908.70	2 ⁺	
		5521.0	100 5	5248.79	2 ⁺	
		10768.6	76 5	0.0	0 ⁺	
10895	(9 ⁻)	1862		9033?	(7 ⁻)	(Q)
10910.0	(3,4,5 ⁻)	7172.6	100	3736.69	3 ⁻	
10921.1	(2 ⁺ ,3,4 ⁻)	4895.3	20	6025.47	2 ⁻	
		5641.9	100	5278.80	4 ⁺	
10956.0	3 ⁻	2768.2	11	8187.5	(3,4,5 ⁻)	
		3474.8	23	7481?		
		5053.0	23	5902.63	1 ⁻	
		5342.1	18	5613.52	4 ⁻	
		5676.8	100	5278.80	4 ⁺	
		7218.6	57	3736.69	3 ⁻	

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. [#]
10988.0	(3 ⁻ ,4 ⁺)	2010 ^{&}	12	8978	5 ⁺ ,6 ⁺ ,7 ⁺	
		4079.1	12	6908.70	2 ⁺	
		4702.6	25	6285.15	3 ⁻	
		5358.2	25	5629.41	2 ⁺	
		7083.0	100	3904.38	2 ⁺	
		7250.6	88	3736.69	3 ⁻	
10994.7	(2 ⁺ ,3,4 ⁺)	5715.5		5278.80	4 ⁺	
		5745.3		5248.79	2 ⁺	
		7257.3		3736.69	3 ⁻	
11003.0	(10 ⁺)	1698		9305.2	(8 ⁺)	(Q)
		2902		8100.1	8 ⁺	(Q)
11011.0	3 ⁻	2672.9	27 7	8338.0	(2 ⁺ ,3,4)	
		3334.3	16 4	7676.6	(6 ⁺)	[E3]
		6519.0	100 7	4491.43	5 ⁻	[E2]
		7273.6	29	3736.69	3 ⁻	
		11009.4	14	0.0	0 ⁺	[E3]
11042.0	(1 ⁻ to 4 ⁺)	7136.9		3904.38	2 ⁺	
		7304.6		3736.69	3 ⁻	
11070.6	(3,4 ⁺)	5456.1	8	5613.52	4 ⁻	
		5790.7	15	5278.80	4 ⁺	
		5820.7	15	5248.79	2 ⁺	
		7164.9	100	3904.38	2 ⁺	
		7332.6	15	3736.69	3 ⁻	
11078.4	1 ⁻	11078		0.0	0 ⁺	
11685.8	(10 ⁺)	2381		9305.2	(8 ⁺)	(Q)
		3585		8100.1	8 ⁺	(Q)
11708.7	(9 ⁺)	2773		8935.8	(7 ⁺)	(Q)
11988	0 ⁺	1666.5 [@] 4	75 9	10318.8	1 ⁺	
		2119.5 4	100 9	9869.3	1 ⁺ ,2 ⁺	
12201.2	3 ⁻	12202		0.0	0 ⁺	[E3]
12331	2 ⁺	12332		0.0	0 ⁺	
12334.9	(10 ⁺)	2481		9853.5	(8 ⁺)	(Q)
		3030		9305.2	(8 ⁺)	(Q)
12591.9	(10 ⁺)	3287		9305.2	(8 ⁺)	(Q)
		4491		8100.1	8 ⁺	(Q)
12604		12602		0.0	0 ⁺	
12668	1 ⁻	9314		3352.62	0 ⁺	
		12666		0.0	0 ⁺	
12688		12686		0.0	0 ⁺	
12875		9521		3352.62	0 ⁺	
		12873		0.0	0 ⁺	

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	E_f	J_f^π	Mult. [#]	Comments
12923	(11 ⁻)	2028	10895	(9 ⁻)		
12980		12978	0.0	0 ⁺		
12996		9642	3352.62	0 ⁺		
13086		13084	0.0	0 ⁺		
13113		9759	3352.62	0 ⁺		
		13111	0.0	0 ⁺		
13115.1	(12 ⁺)	1429	11685.8	(10 ⁺)	(Q)	
		2112	11003.0	(10 ⁺)	(Q)	
13194		9840	3352.62	0 ⁺		
		13192	0.0	0 ⁺		
13195	(10 ⁻)	2300	10895	(9 ⁻)		
13203		13201	0.0	0 ⁺		
13289		9935	3352.62	0 ⁺		
		13287	0.0	0 ⁺		
13535.5	(11 ⁺)	1827	11708.7	(9 ⁺)	(Q)	
13822		13819	0.0	0 ⁺		
13913		10559	3352.62	0 ⁺		
		13910	0.0	0 ⁺		
13993		10639	3352.62	0 ⁺		
		13990	0.0	0 ⁺		
14232.4	(12 ⁺)	2547	11685.8	(10 ⁺)	(Q)	
		3229	11003.0	(10 ⁺)	(Q)	
15152.4	(13 ⁺)	1617	13535.5	(11 ⁺)	(Q)	
		2037	13115.1	(12 ⁺)	(D)	
15267.1	(12 ⁺)	2932	12334.9	(10 ⁺)	(Q)	
15306	(13 ⁻)	2383	12923	(11 ⁻)		
15748.1	(12 ⁺)	3156	12591.9	(10 ⁺)	(Q)	
16529.4	(14 ⁺)	2297	14232.4	(12 ⁺)	(Q)	
		3414	13115.1	(12 ⁺)	(Q)	
16579.7	(13 ⁺)	3044	13535.5	(11 ⁺)	(Q)	
17698.6	(14 ⁺)	3466	14232.4	(12 ⁺)	(Q)	
18054.6	(14 ⁺)	3822	14232.4	(12 ⁺)	(Q)	
18215?	(15 ⁻)	2909 ^{&}	15306	(13 ⁻)		
18260	1	18256	0.0	0 ⁺	D	Mult.: from $\gamma(\theta)$ in (p, γ).
18497.2	(14 ⁺)	3230	15267.1	(12 ⁺)	(Q)	
18680	1	18675	0.0	0 ⁺	D	
18719.2	(14 ⁺)	3452	15267.1	(12 ⁺)	(Q)	
19070	1	19065	0.0	0 ⁺	D	
19195.6	(15 ⁺)	4043	15152.4	(13 ⁺)	(Q)	
19450	1	19445	0.0	0 ⁺	D	
19850	1	19845	0.0	0 ⁺	D	

Adopted Levels, Gammas (continued)

$\gamma(^{40}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	E_f	J_f^π	Mult. [#]	$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	E_f	J_f^π	Mult. [#]
20130		20125	0.0	0 ⁺		21490		21484	0.0	0 ⁺	
20430	1	20424	0.0	0 ⁺	D	21690		21684	0.0	0 ⁺	
20578.6	(16 ⁺)	4049	16529.4	(14 ⁺)	(Q)	22060		22053	0.0	0 ⁺	
20650	1	20644	0.0	0 ⁺	D	22060.4	(16 ⁺)	3563	18497.2	(14 ⁺)	(Q)
20940	1	20934	0.0	0 ⁺	D						

[†] Values with uncertainties are averaged values from different γ -ray studies. A large number of values without uncertainties are from $^{39}\text{K}(\text{p},\gamma)$, which are from level-energy differences since most γ -ray energies are not available. In $^{39}\text{K}(\text{p},\gamma)$, many γ rays are shown with upper limits on intensities, these are not given here. See $^{39}\text{K}(\text{p},\gamma)$ for details.

[‡] Averaged values from different γ -ray studies if available, but most values are available only from $^{39}\text{K}(\text{p},\gamma)$.

[#] From $\gamma(\theta)$ in (HI,xn γ) and (p,p' γ), unless otherwise noted.

[@] Poor fit. Level-energy difference=1669.2.

[&] Placement of transition in the level scheme is uncertain.

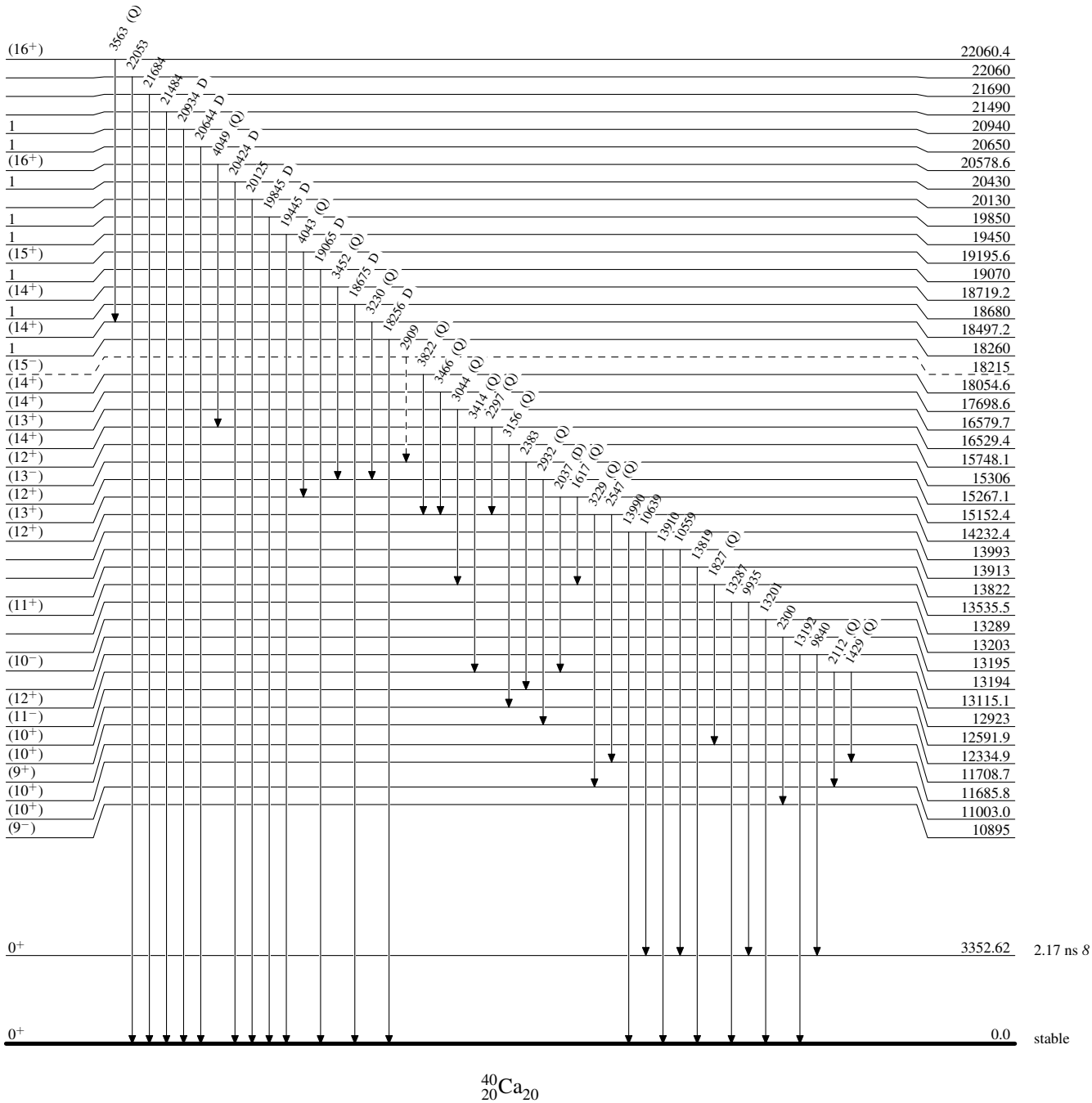
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

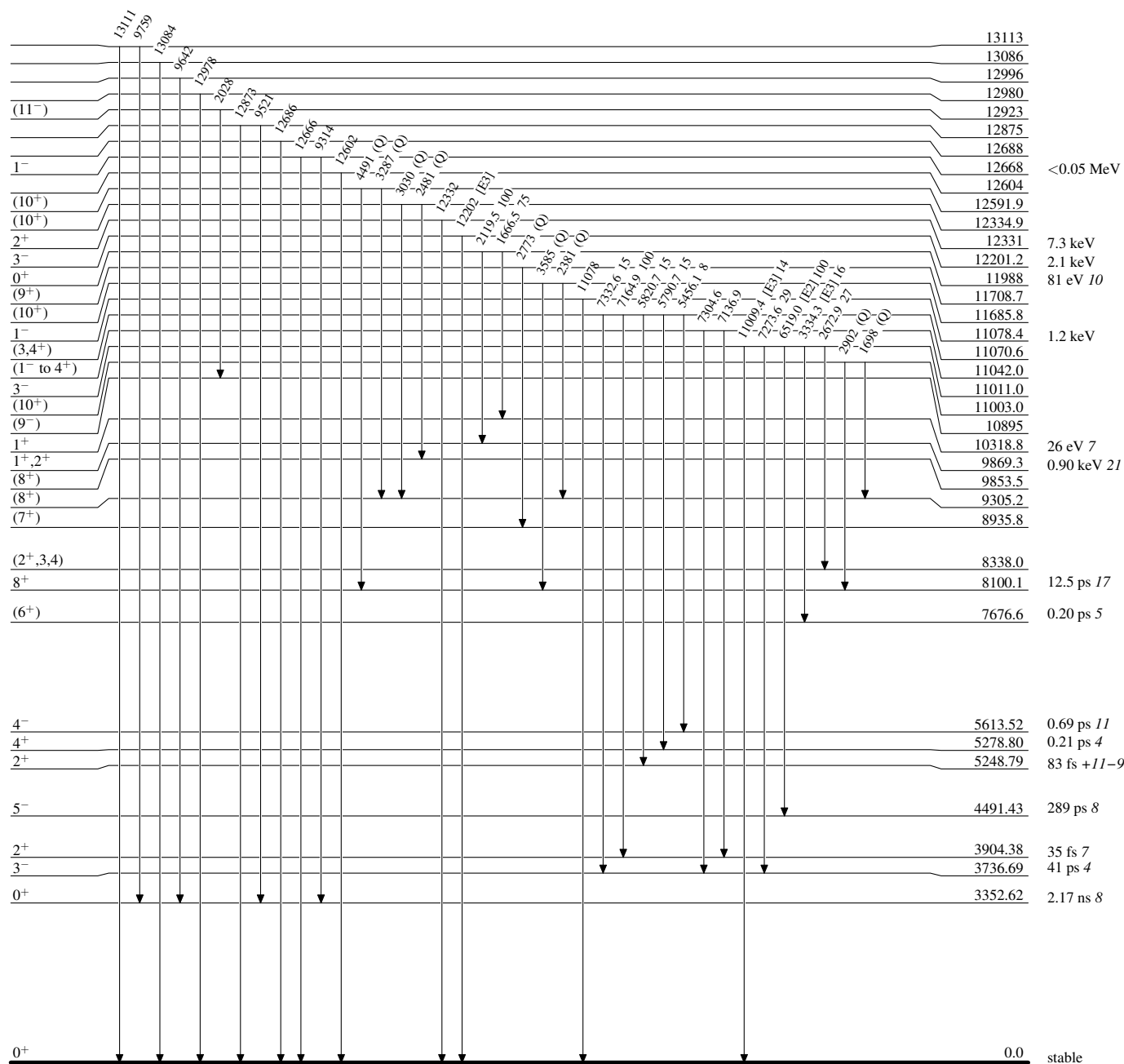
-----▶ γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

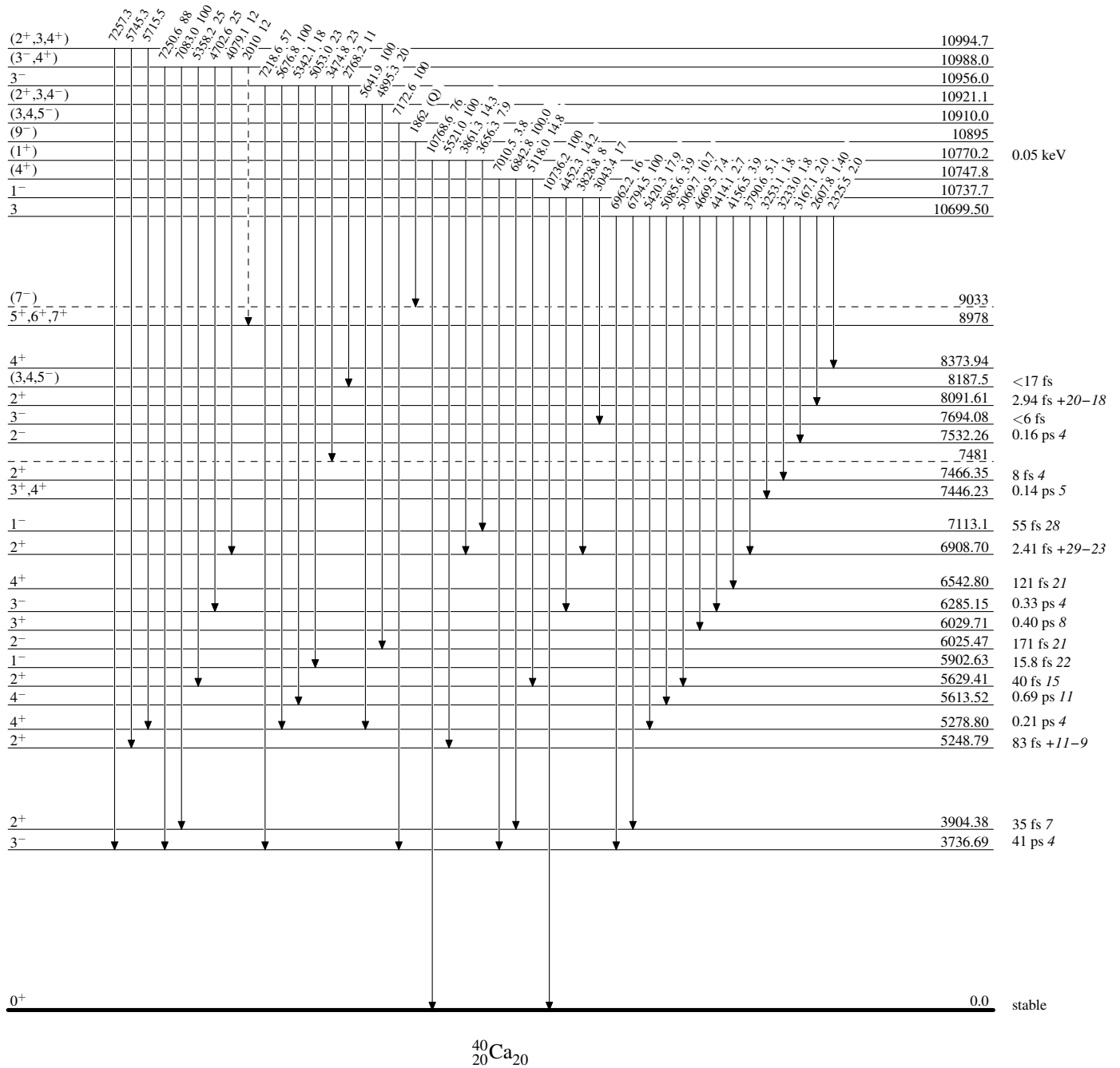


Adopted Levels, Gammas

Legend

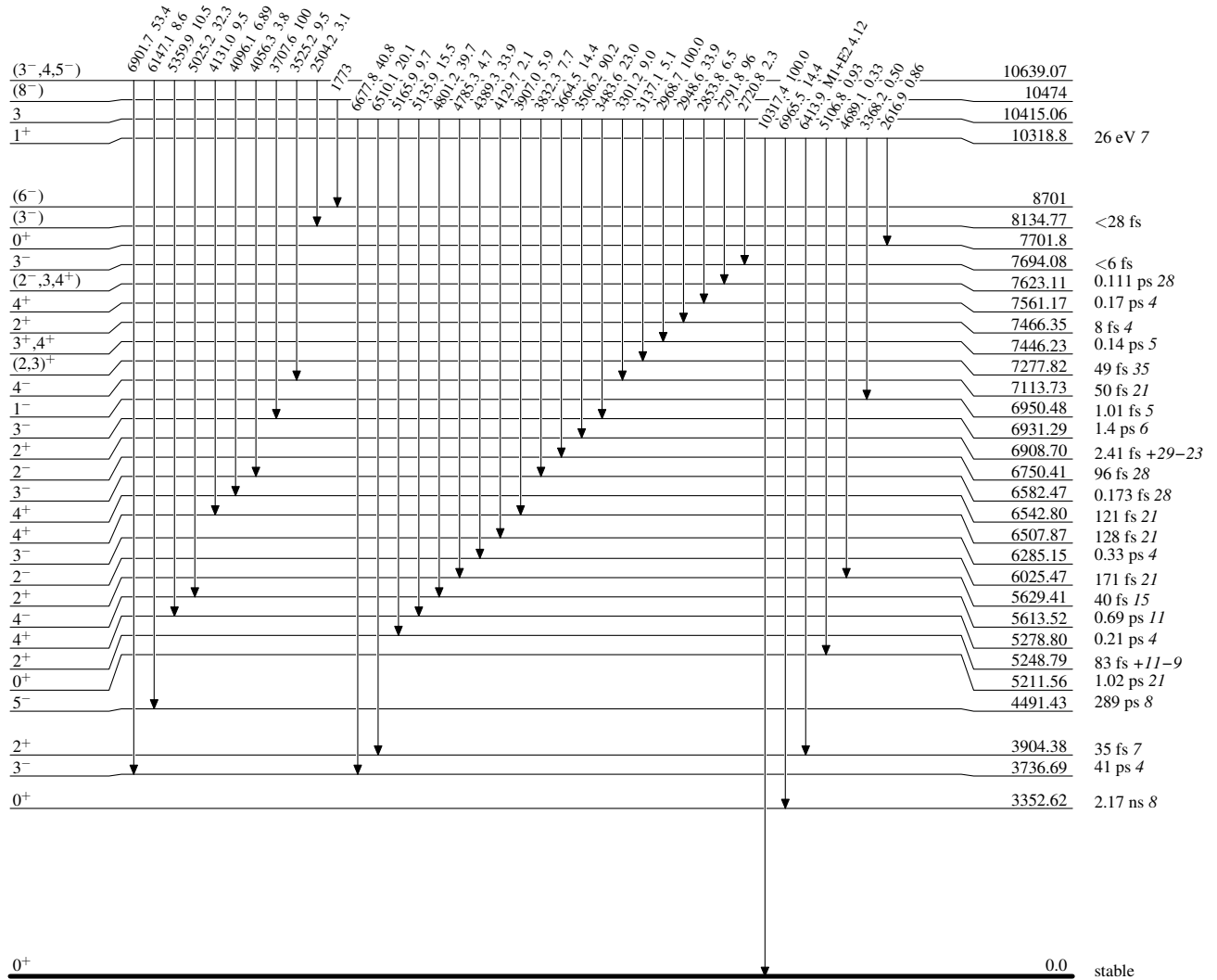
Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

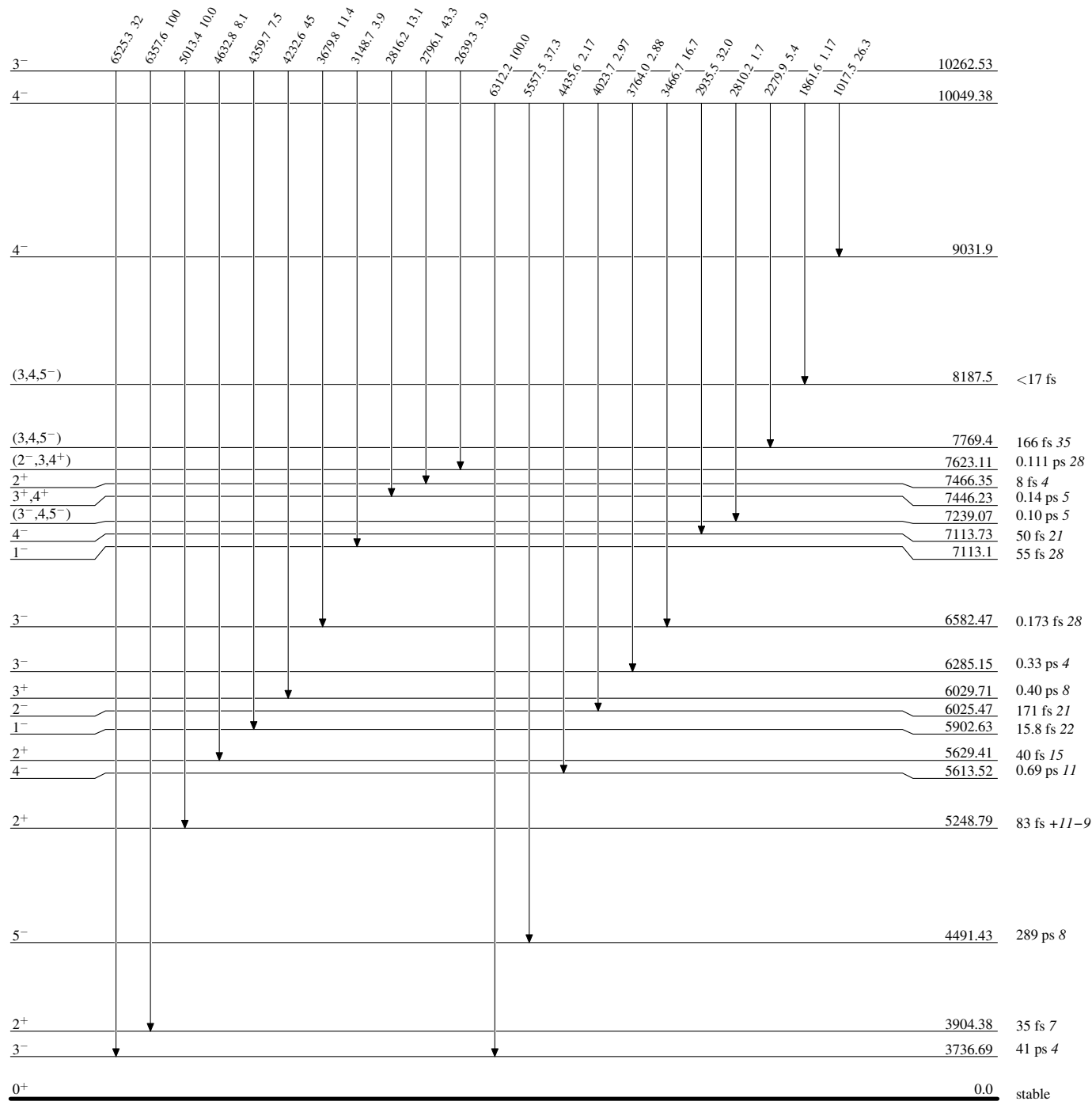
Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, GammasLevel Scheme (continued)

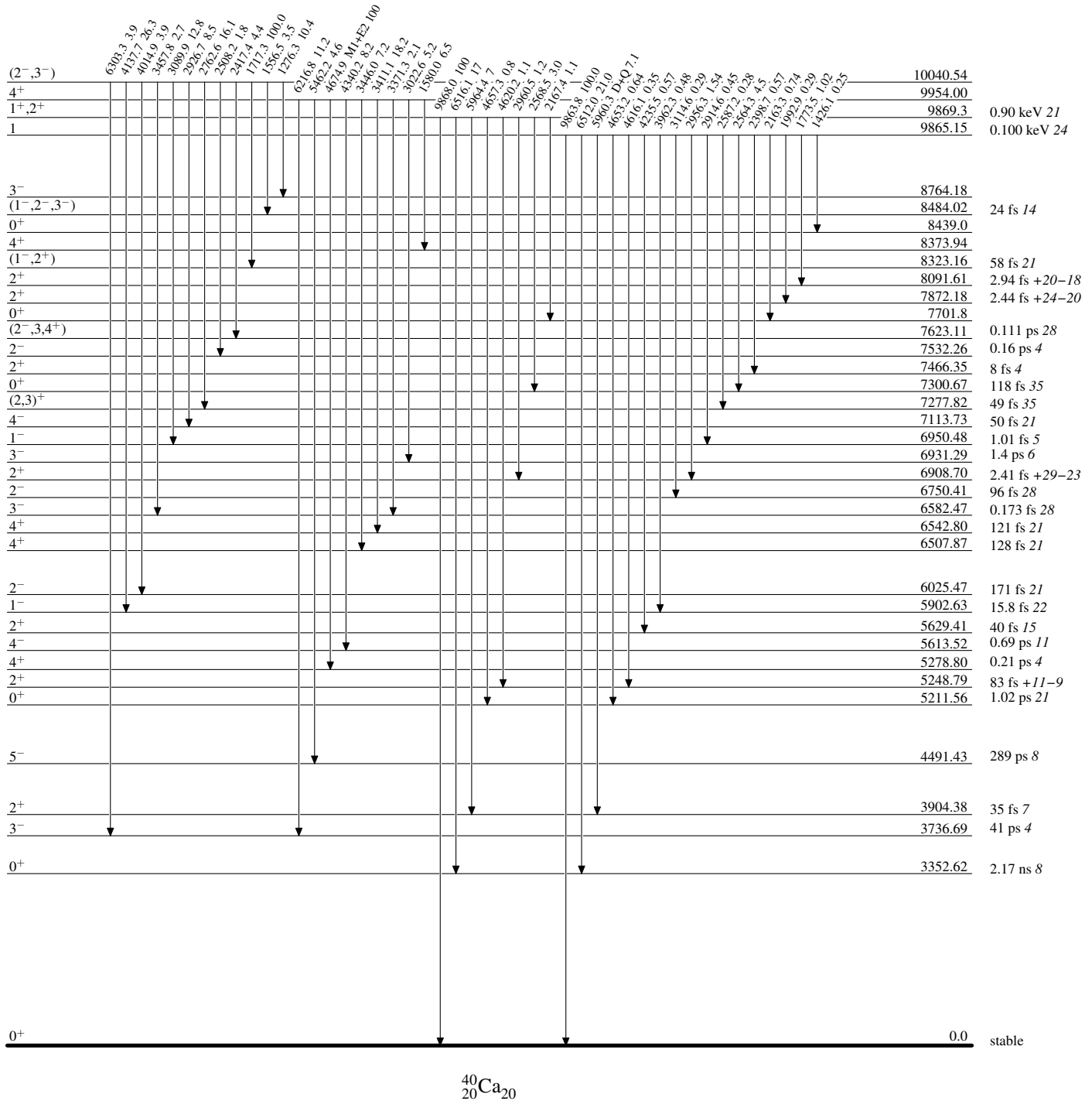
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

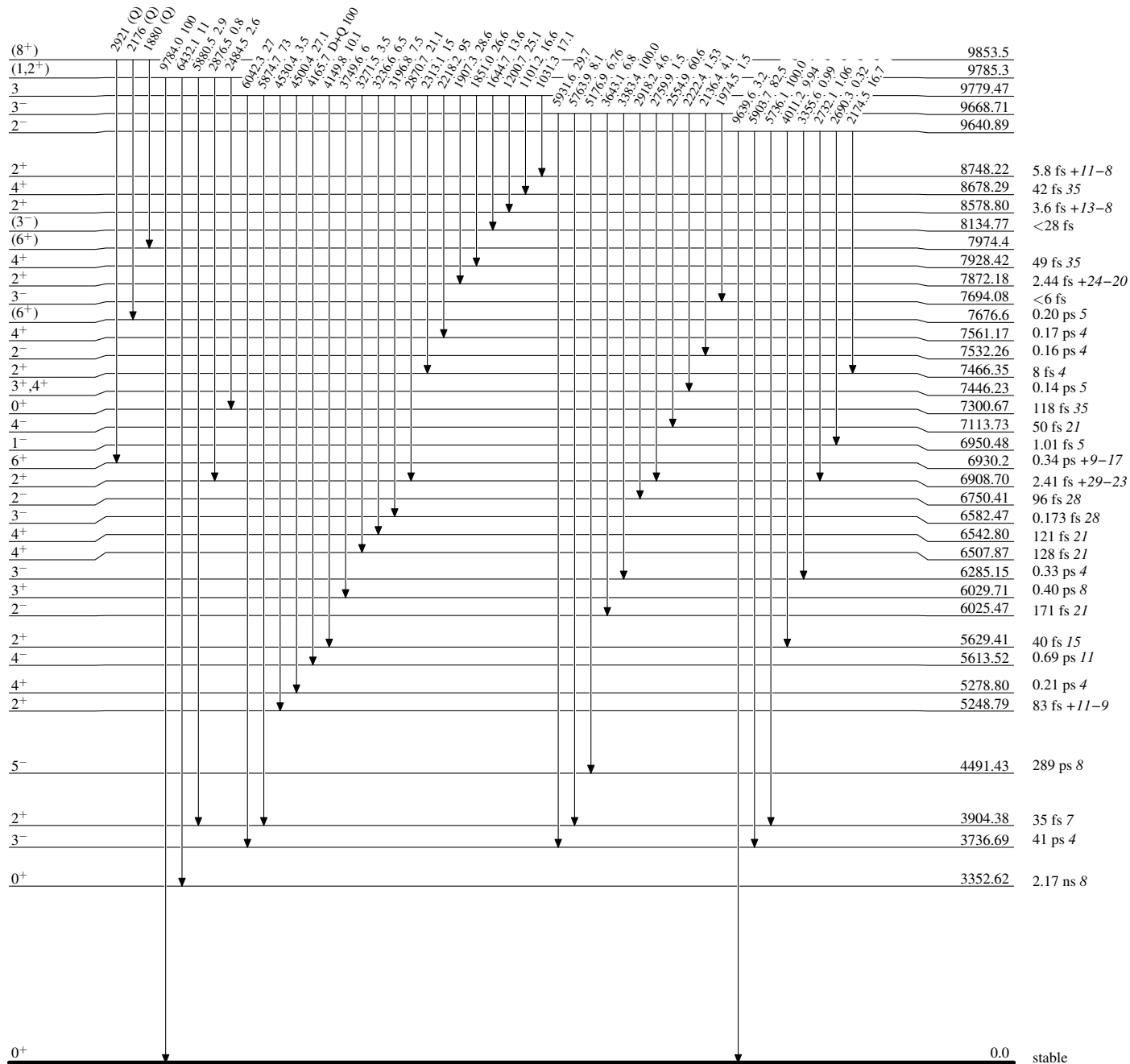
Level Scheme (continued)

Intensities: Relative photon branching from each level



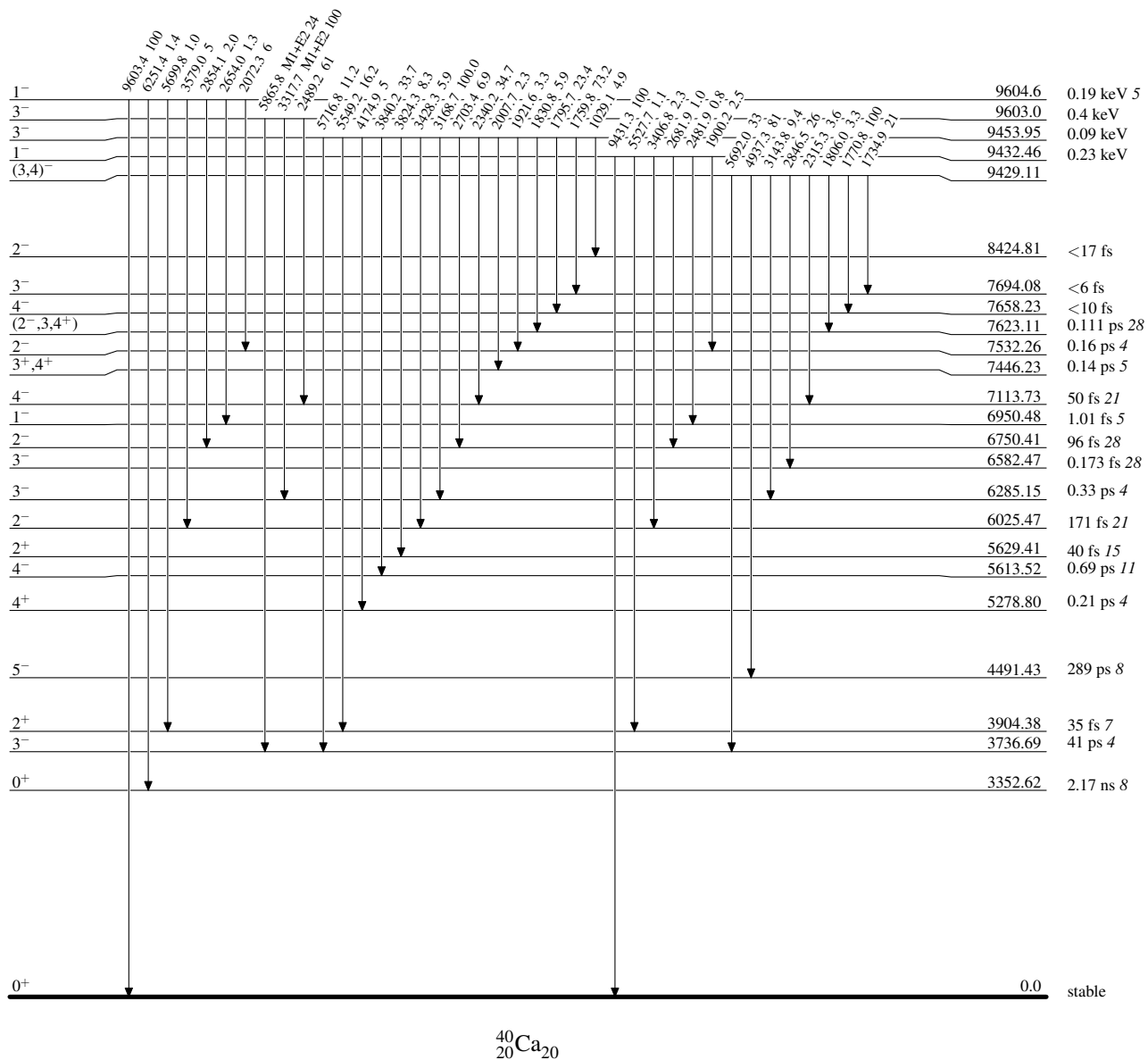
Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level



Adopted Levels, GammasLevel Scheme (continued)

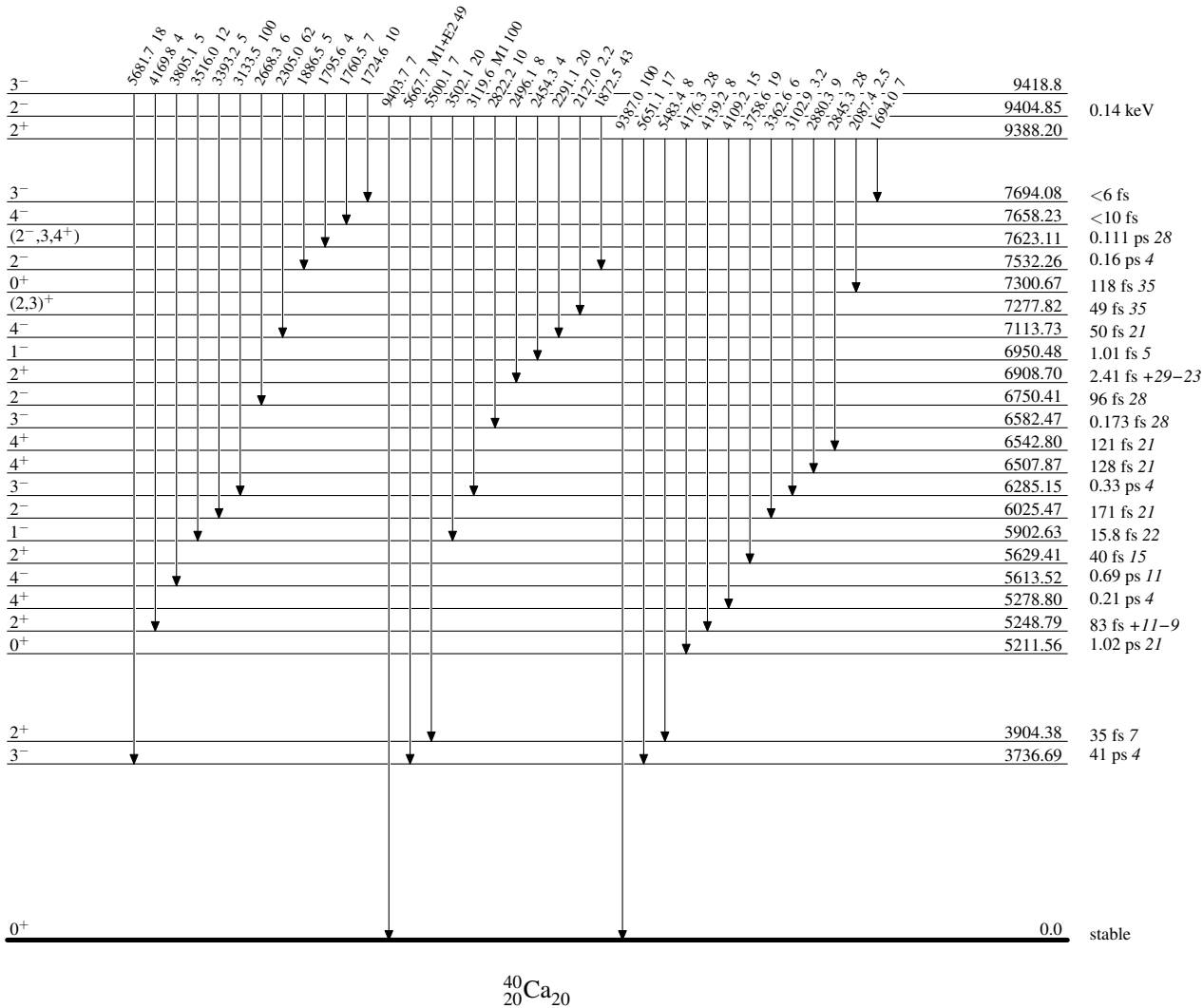
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

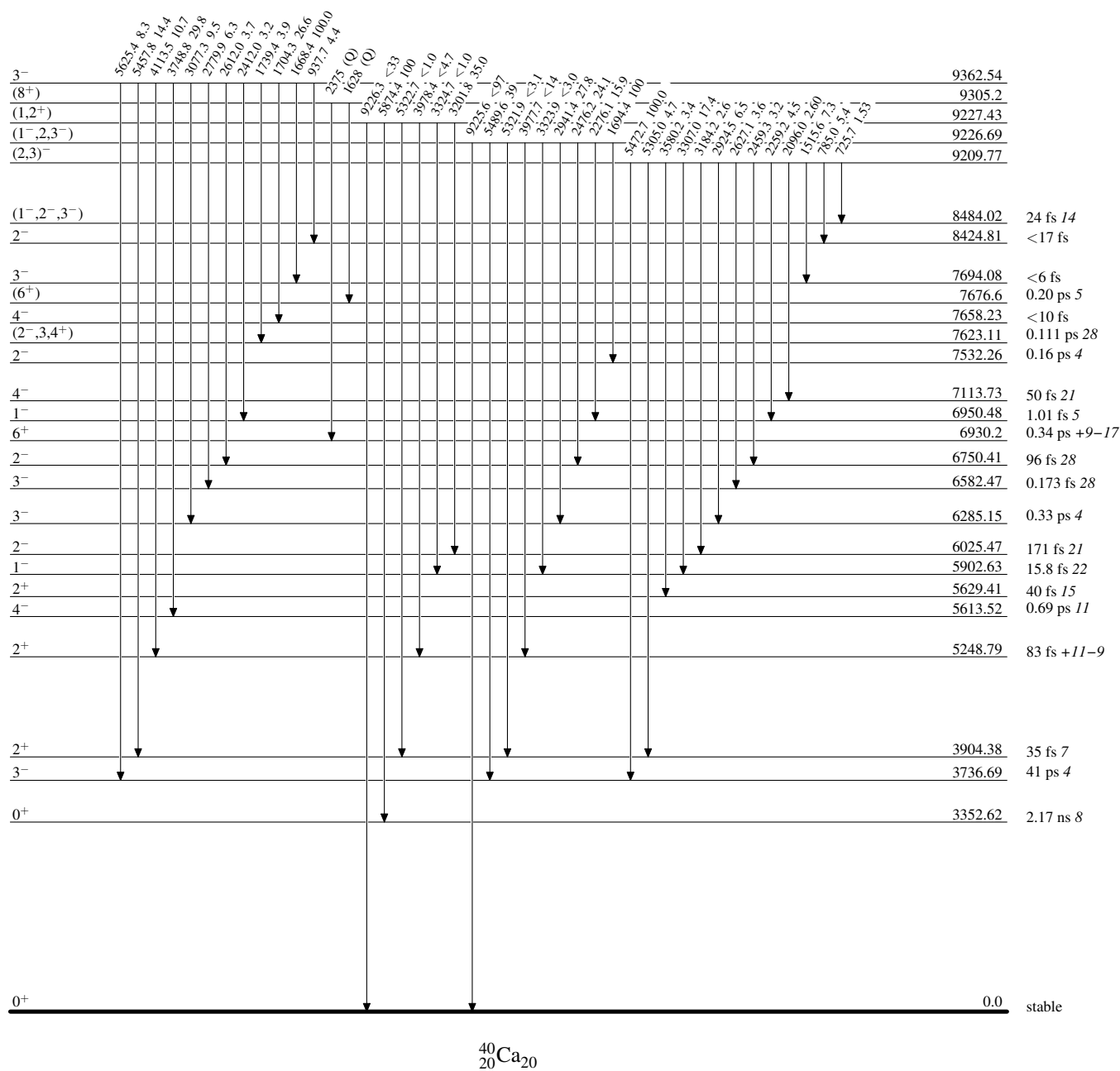
Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level

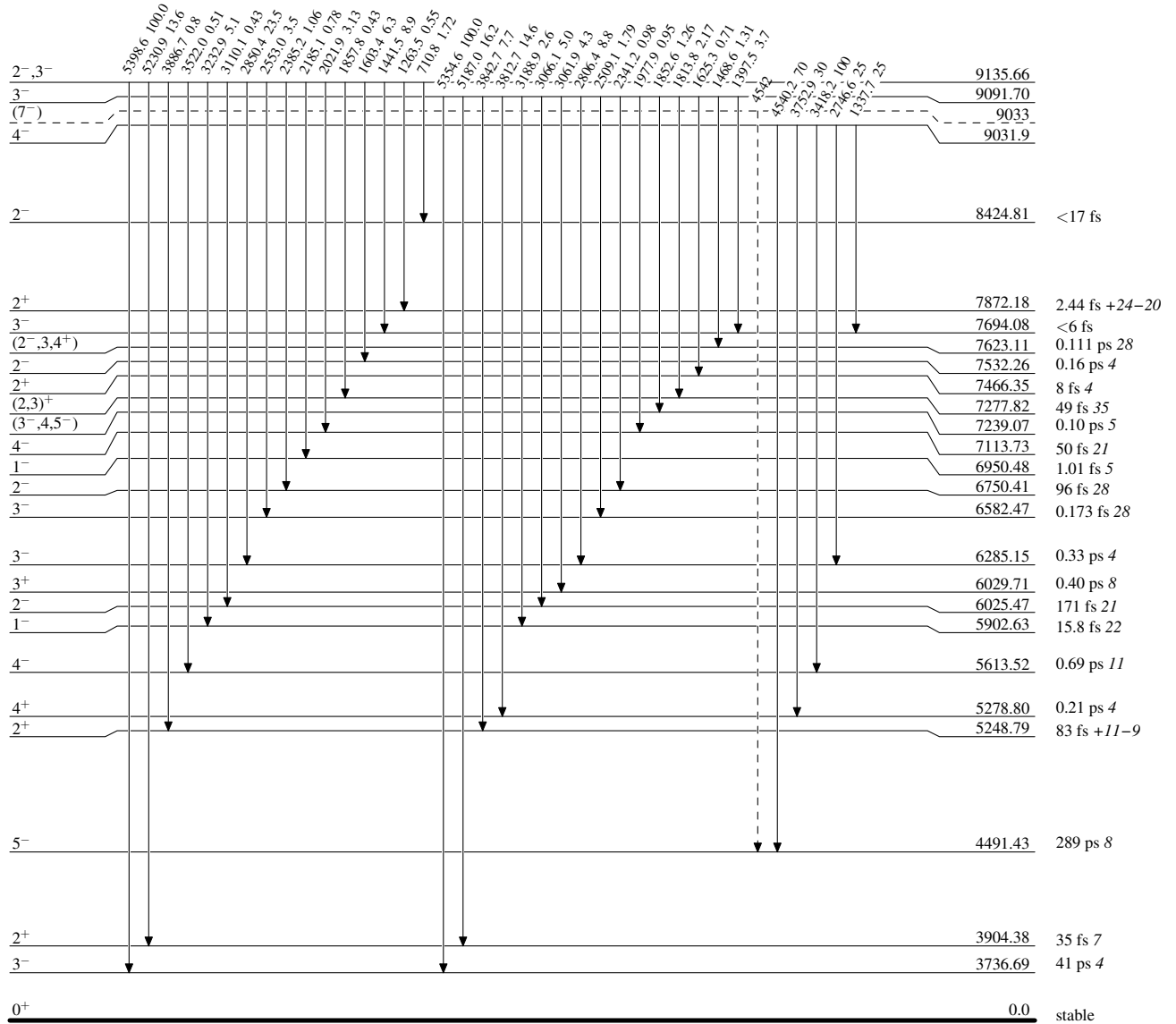


Adopted Levels, Gammas

Legend

Level Scheme (continued)

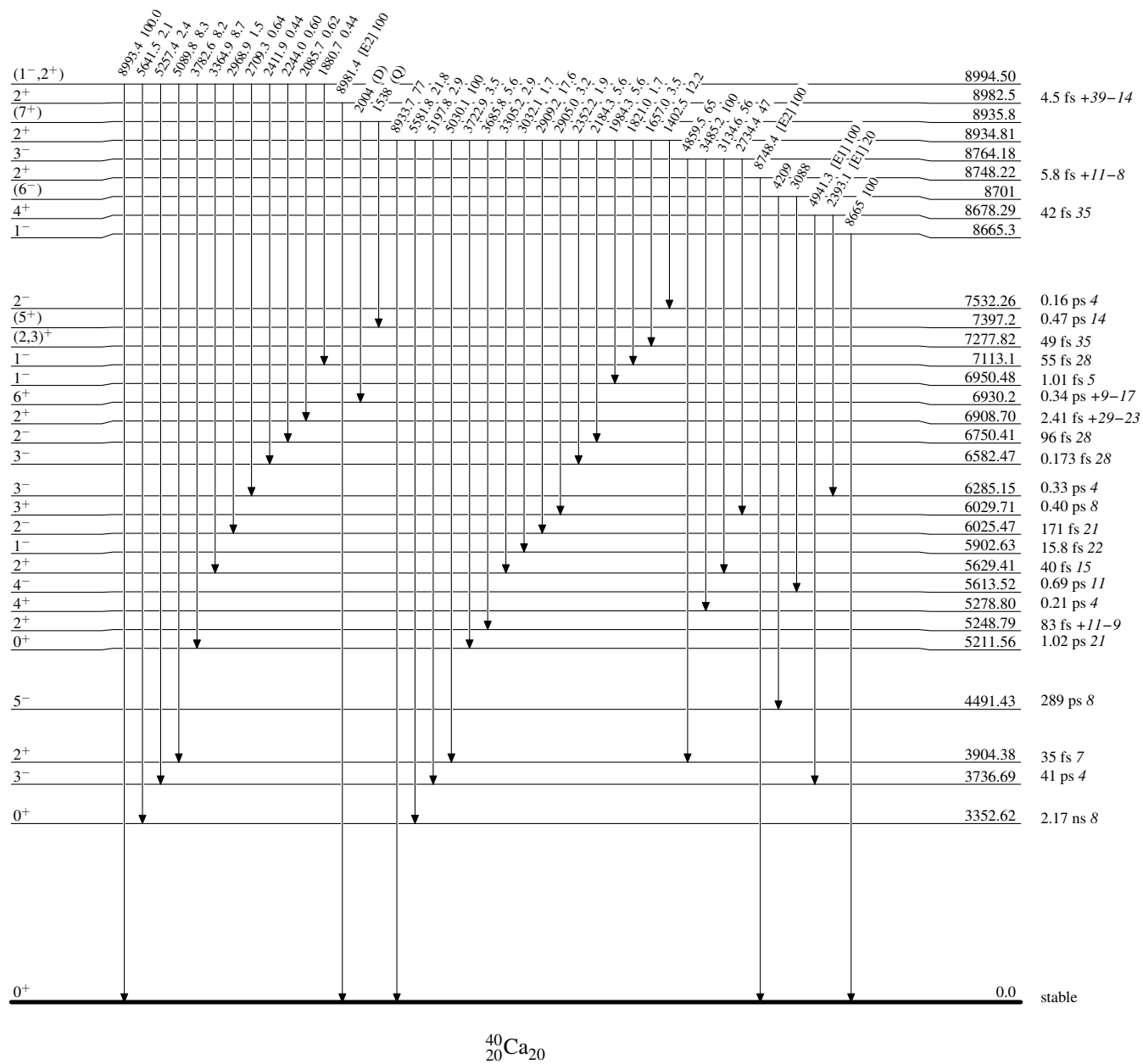
Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

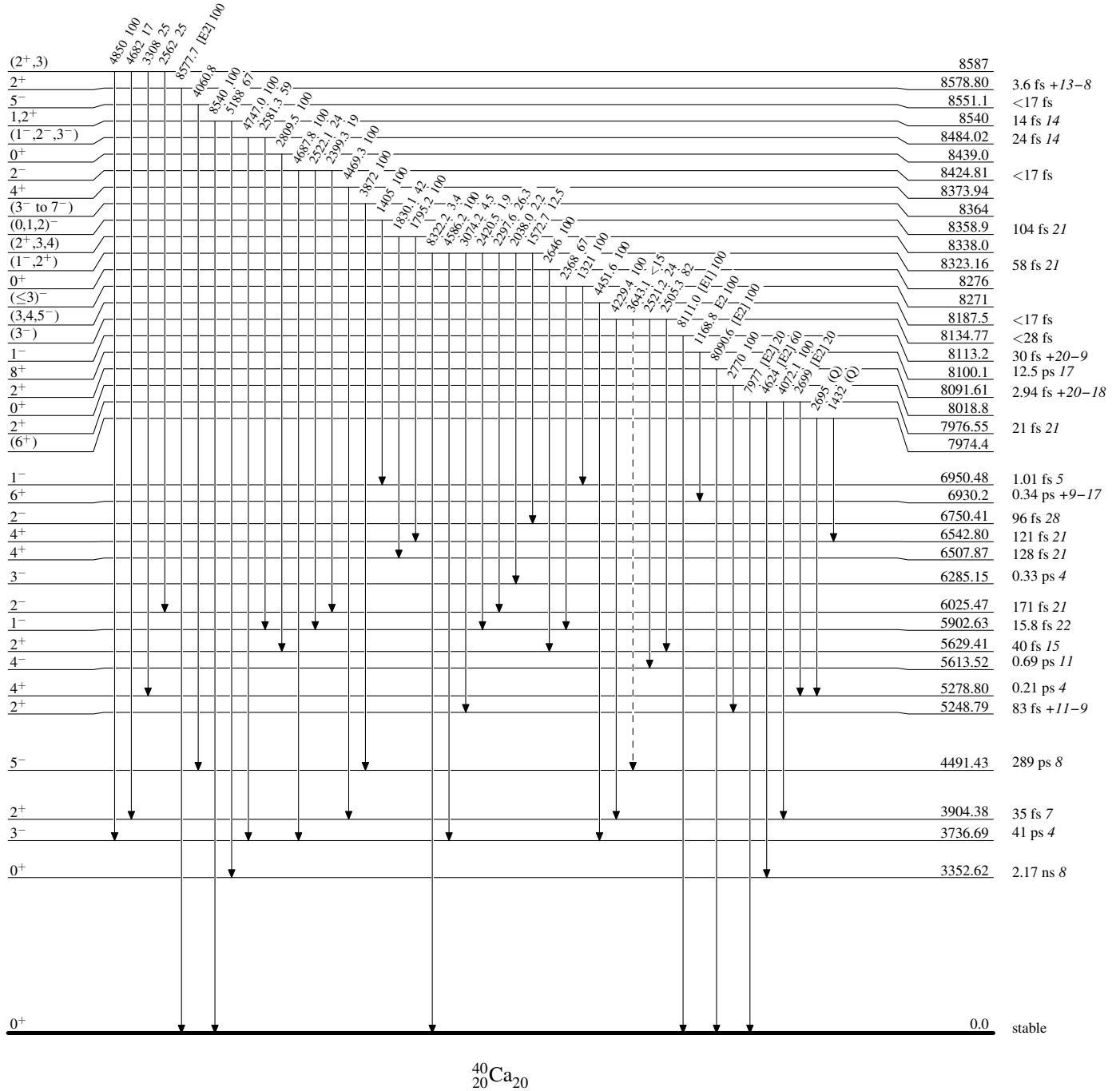


Adopted Levels, Gammas

Legend

Level Scheme (continued)

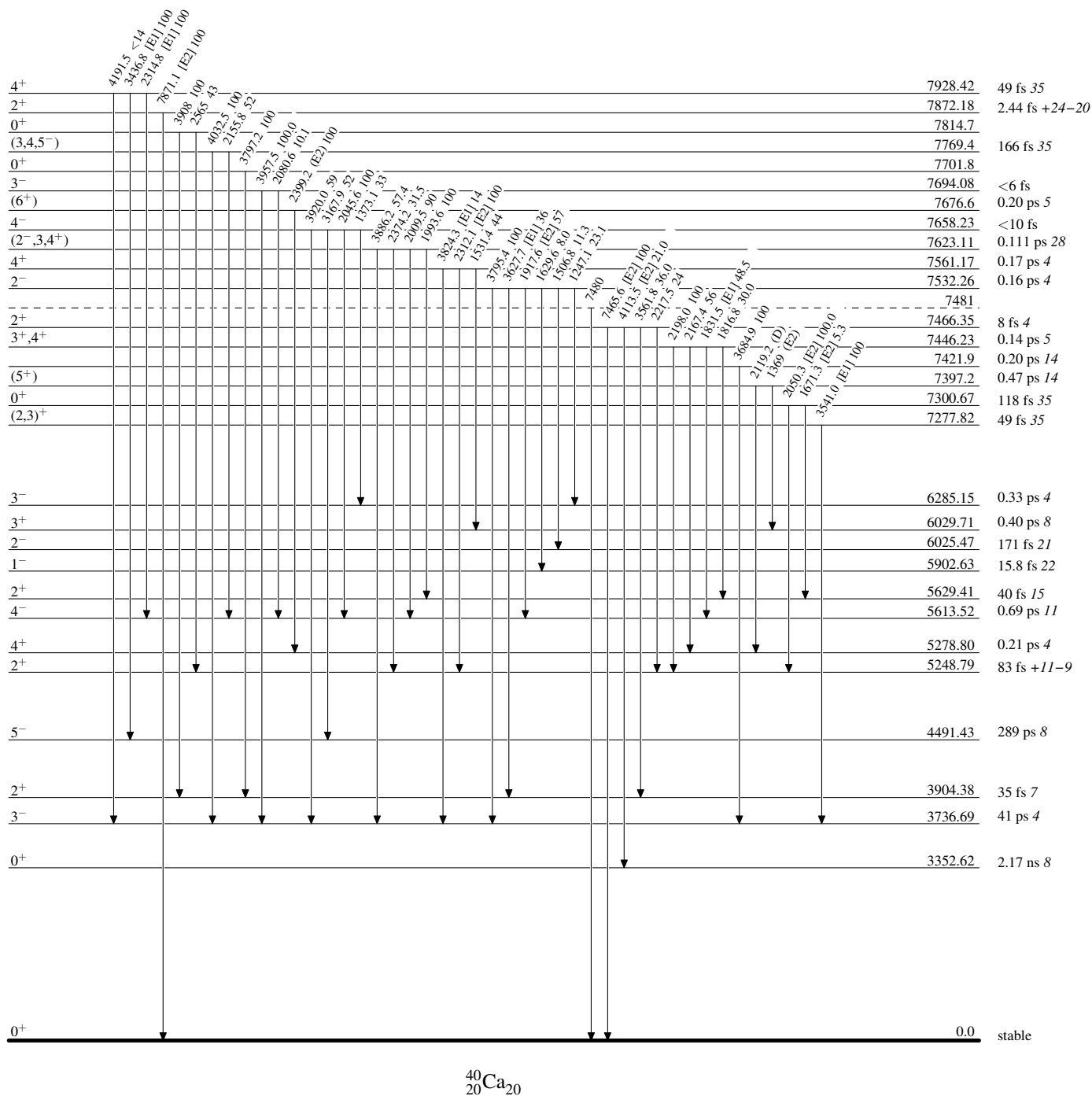
Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

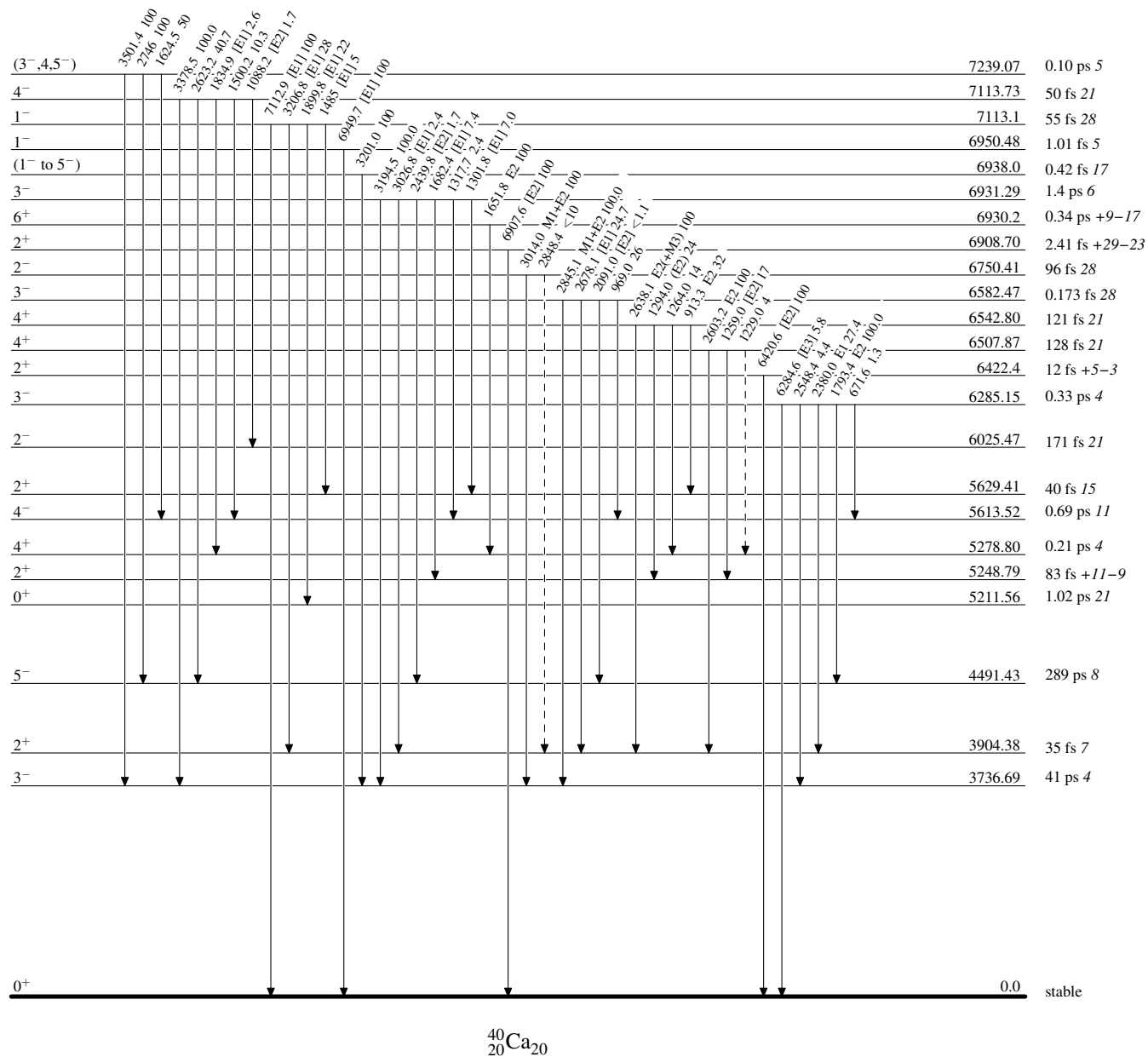


Adopted Levels, Gammas

Legend

Level Scheme (continued)

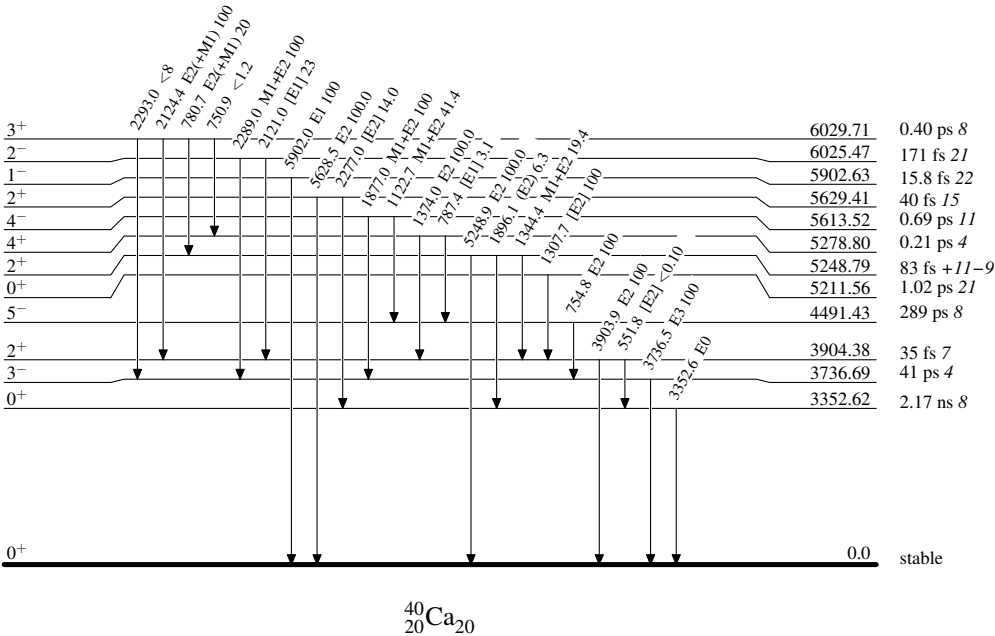
Intensities: Relative photon branching from each level

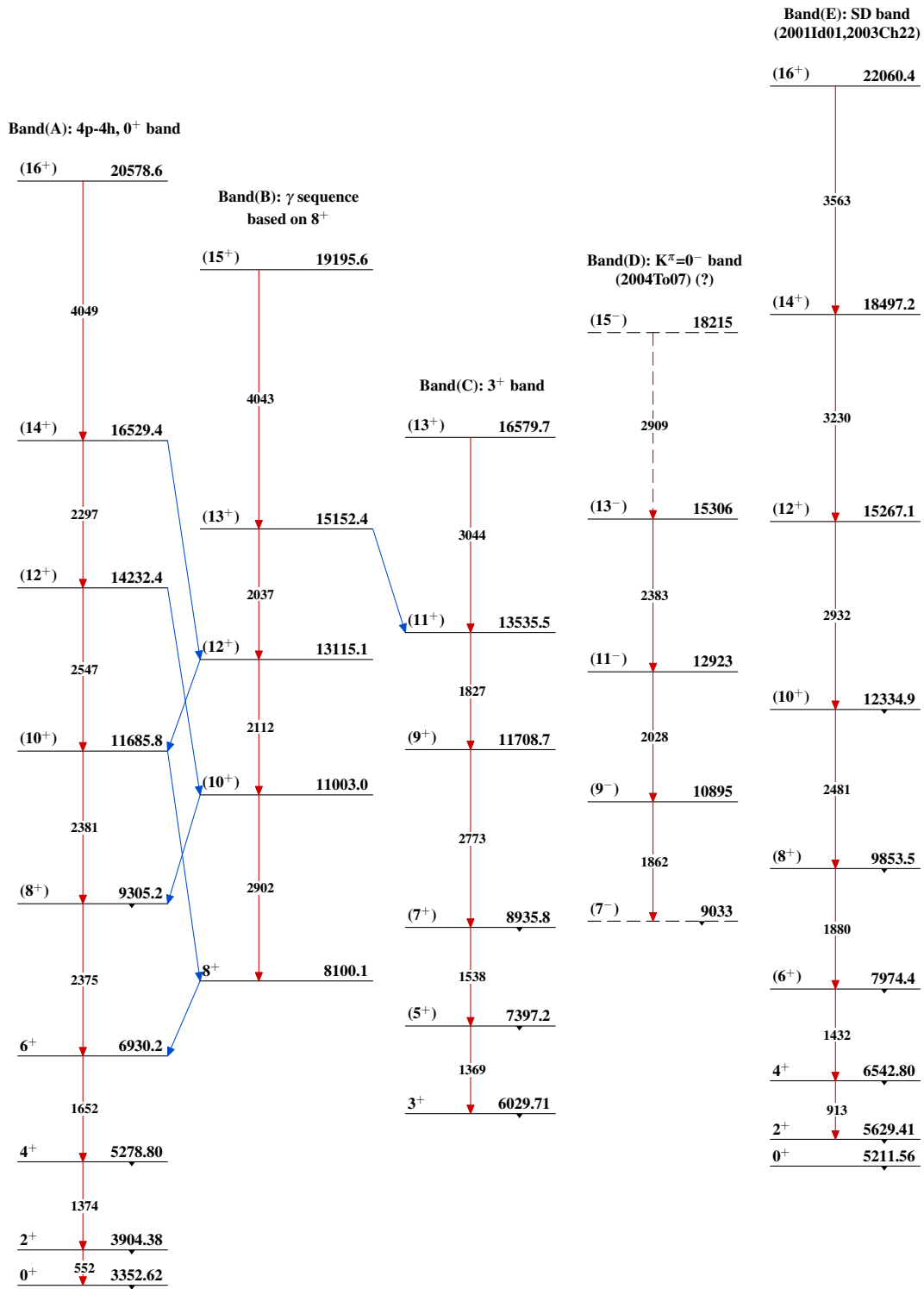
-----► γ Decay (Uncertain)


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas $^{40}_{20}\text{Ca}_{20}$