^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 112, 1393 (2011)	31-Mar-2011

Parent: ^{33}Ar: E=0; J^{π}=1/2^{+}; $T_{1/2}$=173.0 ms *20*; Q(ε)=11619.1 *6*; %ε+%β^{+} decay=100.0

^{33}Ar-Q(ε): from 2009AuZZ. Other: 11619.3 *6* (2003Au03).

1993Sc16: neutron-deficient argon isotopes produced in spallation reactions of 600 MeV protons with a CaO-target and subsequently separated at ISOLDE-2. ^{33}Ar production rate: 2×10^{4}/s. Detectors: a silicon surface barrier detector (>150μg thick,50mm^{2} active area), FWHM=8 *1* keV at 3 MeV. Measured β^{+}p coincidence,$\sigma(E_p)$,I_p. Deduced levels, widths.

1987Bo21: neutron-deficient argon isotopes produced in spallation reactions of 600 MeV protons with a CaO-target and subsequently separated at ISOLDE-2. ^{33}Ar production rate: 2×10^{4}/s. Detectors: two silicon surface barrier detector (500μg thick,300mm^{2} active area), FWHM=25 *1* keV at 5 MeV. Measured β^{+}p coincidence,$\sigma(E_p)$, I_p. Deduced levels, Eγ,Iγ,Iβ.

2010Ad03: Isotopes of interest produced by projectile fragmentation of $^{36}Ar^{18+}$ primary beam with intensities between 4 μA and 8 μA provided by the coupled cyclotrons of GANIL. $^{33}Ar^{3+}$ beam was identified in the SPIRAL identification station, consisting of a silicon cube detector (6 double-sided silicon strips-DSSSD) for detecting protons and β particles and three high-efficiency for detecting γ-rays. Measured $\sigma(E_p)$, Eγ, Iγ, pγ-coincidence. Deduced levels, J^{π}, branching ratios.

Others:

1996Ho24: neutron-deficient argon isotopes produced in spallation reactions of 1 GeV protons with a CaO-target and subsequently separated at ISOLDE psb Facility. ^{33}Ar production rate: 1000 ions/s. Detectors: a silicon ΔE-E telescope, a gas-Si combination telescope, an annular Si for charged particles, a 70% germanium detector for γ-rays. Measured β^{+}p coincidence,$\sigma(E_p)$,I_p. Deduced levels, widths. Performed shell model calculations.

1971Ha05: ^{33}Ar produced by ^{32}S(^{3}He,2n) with ^{3}He beam from the Berkeley 88-inch cyclotron. Detectors: a silicon ΔE-E telescope for charged particles and a 2-in by 2-in NaI(Tl) crystal and a 45-cc Ge(Li) counter for γ-rays (FWHM=4 keV at E_{γ}=1 MeV). Measured pγ coincidence,$\sigma(E_p)$,I_p. Measured $T_{1/2}$ for^{33}Ar ground state. Deduced levels,Iβ.

^{33}Ar also decays to ^{32}S by εp (38.7% *10*) (1987Bo21).

Others: 1966Ha22.

The normalization of Iβ in 1998En04 is wrong because a value of 38.7% was mistakenly used for the Iβ of the decay branch to the 5544 keV level instead of the correct Iβ value 30.7% from 1987Bo21.

Comparison of proton energies (E_p)

	1987Bo21		1993Sc16		2010Ad03		adopted		E_x	
p1					761	10	761	10	5292	10
p1	1316	3	1320	3	1315	8	1318	3	5867	3
p0	1643	1	1643	14	1643	2	1643	1	3971	1
p2			1665	4	1663	6	1664	4	7771	4
p1	1697	6	1697	2	1689	6	1696	2	6256	2
p1			1750	2	1762	5	1752	2	6314	2
p0	1782	3	1780	2	1779	2	1780	2	4113	2
p1					2022	5	2022	5	6593	5
p0	2100	3	2097	2	2098	3	2098	2	4441	2
p0			2122	2			2122	2	4466	2
p2					2366	6	2366	6	8496	6
p1	2372	6	2366	2	2368	5	2367	2	6949	2
p0	2482	3	2480	2	2479	2	2480	2	4835	2
p1					2708	7	2708	7	7300	7
p0	2744	6	2743	2	2742	3	2743	2	5106	2
p1					2808	10	2808	10	7404	10
p1	2886	6	2885	2	2884	7	2885	2	7483	2
p0	2939	12	2930	2	2939	4	2932	2	5301	2
p1			2951	2	2955	7	2951	2	7551	2
p2					3014	10	3014	10	9166	10
p1	3074	12			3064	6	3066	6	7670	6
p0	3171	1	3171	12	3171	3	3171	1	5548	1
p0	3334	20	3351	3	3348	4	3350	3	5732	3
p1	3465	30			3467	6	3467	6	8083	6
p1			3512	3	3513	6	3512	3	8130	3
p1	3565	6			3574	5	3570	5	8190	5

p1	3695	6					3695	6	8318	6
p0	3856	3	3855	3	3855	3	3855	3	6253	3
p1	3924	6			3924	5	3924	5	8555	5
p1	4223	12			4207	5	4209	5	8849	5
p1	4325	12			4328	8	4327	8	8970	8
p1					4472	5	4472	5	9120	5
p1	4516	10			4503	6	4506	6	9155	6
p0					4717	5	4717	5	7142	5
p0	4856	10	4853	4	4858	4	4856	4	7286	4
p1					4921	6	4921	6	9583	6
p0	5043	6	5041	5	5037	4	5040	4	7476	4
p0	5106	7	5106	5	5099	4	5102	4	7540	4
p0	5225	7	5227	5	5223	4	5225	4	7666	4
p0	5320	9	5320	5	5315	3	5317	3	7761	3
p0	5626	11	5622	6	5621	3	5621	3	8075	3
p0	5727	11	5728	6	5721	3	5723	3	8180	3
p0	5849	12			5853	9	5852	9	8313	9
p0					6009	10	6009	10	8475	10
p0	6103	17			6098	10	6099	10	8568	10
p0	6315	18			6341	8	6337	8	8813	8
p0					6386	10	6386	10	8864	10
p0	6466	15			6477	10	6474	10	8955	10
p0	6611	15			6625	10	6621	10	9106	10
p0					6654	9	6654	9	9140	9
p0	6686	15			6712	9	6705	9	9193	9
p0					6850		6850		9343	
p0					6950		6950		9446	
p0					7050		7050		9549	
p0					7150		7150		9652	
p0					7250		7250		9755	
p0					7350		7350		9858	
p0					7450		7450		9962	
p0					7750		7750		10271	

Notes:

1. $E_x=E_p*1.031522+2276.7$ for decay to ^{32}S ground state.
2. In 1987Bo21, E_p after 3690 were corrected for pulse height effect by $E_p(new)=E_p*1.01611-52.3618$. The correction formula was obtained from the comparison of the 1987Bo21 data with 1993Sc16 data.
3. In 1993Sc16, E_p=1665 and 1750 from p0 decay but have been changed to p1 decay in En98.
4. In 2010Ad03, E_p=3066,3469, 3926, 4209, 4330, 4505 from p1 decay but from p0 decay in En98; E_p=1665 from p2 decay but from p1 decay in En98.
5. Adopted proton energy is from weighted average if applicable.
6. Adopted decay mode in 2010Ad03 because it has better pγ coincidence data.
7. All proton energies have been corrected for the internal calibration using the new values of the calibration peaks in 2010Ad03 (1643.4 (13) keV and 3171.1 (10) keV).

Comparison of proton intensities(I_p)

E_p	1987Bo21		1993Sc16		2010Ad03		adopted	
761					0.0202	17	0.0202	17
1318	0.191	8	0.180	3	0.168	9	0.18	3
1643	0.343	10	0.391	6	0.411	20	0.382	20
1664			0.0099	16	0.0060	11	0.0073	11
1696	0.046	6	0.0319	16	0.0332	32	0.0329	16
1752			0.022	3	0.0081	13	0.015	7
1780	0.434	10	0.459	6	0.471	22	0.453	6
2022					0.0043	7	0.0043	7
2098	2.373	20	2.368	20	2.73	12	2.375	20
2122			0.347	6			0.347	6

2366					0.0012	3	0.0012	3
2367	0.019	3	0.0158	31	0.0153	12	0.0158	12
2480	0.333	10	0.353	6	0.362	17	0.349	6
2708					0.0069	12	0.0069	12
2743	0.0454	50	0.0403	31	0.0483	44	0.0435	31
2808					0.00141	14	0.00141	14
2885	0.065	6	0.0341	31	0.0376	35	0.046	10
2932	0.122	8	0.0713	31	0.0748	55	0.089	16
2951			0.0434	31	0.0359	32	0.0398	31
3014					0.0007	2	0.0007	2
3066	0.071	20			0.00440	61	0.0044	6
3171	31.0	14	31.0	14	31.0	14	31.0	14
3350	0.757	40	0.031	6	0.0918	48	0.061	31
3467	0.414	40			0.0531	40	0.0531	40
3512			0.0065	16	0.0150	25	0.011	4
3570	0.101	10			0.0085	16	0.0085	10
3695	0.013	4					0.013	4
3855	0.808	20	0.716	6	0.735	34	0.753	28
3924	0.0192	40			0.0082	13	0.0137	55
4209	0.0172	30			0.00645	83	0.0118	54
4327	0.0081	20			0.00142	40	0.0048	33
4472					0.00367	55	0.00367	55
4506	0.0182	50			0.00467	62	0.00467	62
4717					0.00079	10	0.00079	10
4856	0.0232	30	0.0152	31	0.0097	8	0.016	4
4921					0.00066	16	0.00066	16
5040	0.333	10	0.217	6	0.224	12	0.258	38
5102	0.111	10	0.0589	31	0.0470	50	0.072	20
5225	0.0545	40	0.0288	16	0.0234	24	0.036	10
5317	0.0182	30	0.0133	12	0.0083	12	0.0133	29
5621	0.222	10	0.118	25	0.124	7	0.155	34
5723	0.172	10	0.062	15	0.092	5	0.109	33
5852	0.0121	20			0.00284	40	0.0075	46
6009					0.00100	15	0.00100	15
6099	0.0212	40			0.0138	15	0.0147	14
6337	0.005	2			0.00053	9	0.00053	9
6386					0.00027	8	0.00027	8
6474	0.0162	20			0.0103	11	0.0133	30
6621	0.004	2			0.00170	23	0.00173	23
6654					0.00049	10	0.00049	10
6705	0.0036	16			0.00100	12	0.00101	12
6850					0.00023	9	0.00023	9
6950					0.00007	3	0.00007	3
7050					0.00032	4	0.00032	4
7250					0.00012	3	0.00012	3
7350					0.00010	3	0.00010	3
7450					0.00008	3	0.00008	3
7750					0.00006	3	0.00006	3
8500					0.00004	3	0.00004	3

Evaluators' criteria for determining the adopted value:

1. If the data from different references are consistent within errors (reduced $\chi^2 \leq 5$), weighted average is taken.
2. If the discrepancy between data from different references is smaller than factor of 3, unweighted average is taken.
3. If any data are larger than others by more than factor of 3 and not consistent within error (reduced $\chi^2 > 5$), omit it and weighted or unweighted average is taken from the rest data depending on reduced χ^2.

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^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03 (continued)

^{33}Cl Levels

Additional information 1.

E(level)[†]	J^{π}[#]	Γ[&]	S	Comments
0	3/2+[@]	2.511 s *3*		
810.63 *20*	1/2+[@]			E(level): weighted average of Eγ from 1987Bo21 and 2010Ad03.
2352.3 *4*	3/2+[@]			E(level): weighted average of Eγ from 1987Bo21 and 2010Ad03.
3971 *1*	3/2+[@]	<2 keV		
4113 *2*	3/2(+)	<3 keV		
4441 *2*	1/2+[@]	2 keV *1*		
4466 *2*	3/2+[@]	<2 keV		
4835 *2*	3/2+[@]	<2 keV		
5106 *2*	3/2+[@]	<10 keV		
5300 *2*	(3/2)+	<10 keV		E(level): weighted average from 1987Bo21,1993Sc16,1996Ho24 and 2010Ad03. In 1996Ho24, E_p=768 *5* from p1 decay and 2927 *4* from p0 decay.
5548 *1*	1/2+[@]	<0.8 keV		E(level): Other: E_p(c.m.)=3269 *4* (1971Ha05).
5732 *3*	1/2+[@]	30 keV *10*		E(level): Other: E_p(c.m.)=3469 *30* (1971Ha05).
5869 *3*	1/2+,3/2+[@]	1.4 keV *5*		E(level): weighted average from 1987Bo21,1993Sc16,1996Ho24 and 2010Ad03 (p1 mode). In 1996Ho24, E_p=1322 *3* in p1 mode and 3485 in p0 mode. Others: E_p(c.m.)=1364 *30* (p1), 3592 *35* (p0) in 1971Ha05.
6255 *2*	1/2+[@]	2 keV *1*		E(level): weighted average of 6253 *3* (p0, E_p=3855 *3*) and 6256 *2* (p1,E_p=1696 *2*). Other: E_p(c.m.)=3973 *20* (1971Ha05).
6314 *2*	1/2,3/2[@]			
6593 *5*	1/2,3/2		0.0008	Additional information 2. E(level),J^{π}: from 2010Ad03, E_p=2024 *5* (p1).
6949 *2*	1/2+,3/2+[@]			
7142 *5*	1/2,3/2		0.0003	E(level): from 2010Ad03, E_p=4719 *5* (p0).
7289 *4*	(3/2)+[@]	10 keV *5*		E(level): weighted average of 7286 *4* (p0, E_p=4856 *4*) and 7300 *7* (p1,E_p=2708 *7*) (2010Ad03).
7404 *10*	1/2,3/2		0.0007	Additional information 3.
7482 *2*	1/2+	6.5 keV *20*		E(level): weighted average of 7476 *4* (p0, E_p=5040 *4*) and 7483 *2* (p1,E_p=2885 *2*). Other: E_p(c.m.)=5189 *20* (p0) and 2975 *40* (p1) (1971Ha05); E_p=5036 *4* (p0) (1996Ho24).
7540 *4*	1/2+,3/2+[@]	<4 keV		E(level): Other: E_p=5100 *4* (p0) (1996Ho24).
7551 *2*	1/2+,3/2+[@]	<10 keV		E(level): Other: E_p=2950 *5* (p1) (1996Ho24).
7667 *4*	1/2+,3/2+[@]	8 keV *4*		E(level): weighted average of 7666 *4* (p0, E_p=5225 *4*) and 7670 *6* (p1,E_p=3066 *2*). Other: E_p(c.m.)=3165 *30* (1971Ha05).
7765 *3*	(1/2)+[@]	10 keV *6*		E(level): weighted average of 7761 *3* (p0, E_p=5317 *3*) and 7771 *4* (p2,E_p=1664 *4*). Other: E_p(c.m.)=5486 *40* (1971Ha05).
8077 *3*	1/2+,3/2+[@]	34 keV *6*		E(level): weighted average of 8075 *3* (p0, E_p=5621 *3*) and 8083 *6* (p1,E_p=3467 *4*). Others: E_p(c.m.)=5803 *20* (p0), 3592 *35* (p1) and 2022 *30* (p2) (1971Ha05).
8130 *3*	1/2+,3/2+[@]			E(level): From p1 proton. Others: E_p=3502 *7* (p1) and 5658 *10* (p0) (1996Ho24); E_p(c.m.)=3592 *35* (p1) and 5902 *25* (p0) (1971Ha05).
8183 *3*	(1/2)+[@]	22 keV *6*		E(level): weighted average of 8180 *3* (p0, E_p=5723 *3*) and 8190 *5* (p1,E_p=3570 *5*).
8316 *6*	1/2+,3/2+[@]			E(level): weighted average of 8318 *6* (p1,E_p=3695 *6*) and 8313 *9* (p0,E_p=5852 *9*). Other: E_p(c.m.)=6029 *30* (p0) (1971Ha05).

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^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03 (continued)

^{33}Cl Levels (continued)

E(level)†	Jπ#	S	Comments
8490 *6*	(1/2)+	0.0071	E(level): weighted average of 8475 *10* (p0, E_p=6009 *10*) and 8496 *6* (p2,E_p=2366 *6*).
8558 *5*	(3/2)+ @		E(level): weighted average of 8568 *10* (p0, E_p=6099 *10*) and 8555 *5* (p1,E_p=3924 *5*).
8813 *8*	1/2,3/2@		
8849 *5*	1/2+,3/2+ @		
8864 *10*		0.0021	E(level): from 2010Ad03.
8964 *8*	(1/2)+ @		E(level): weighted average of 8955 *10* (p0, E_p=6474 *10*) and 8970 *8* (p1,E_p=4327 *8*). Other: E_p(c.m.)=6688 *30* (p0) (1971Ha05).
9117 *5*	(3/2)+ @		E(level): weighted average of 9106 *10* (p0, E_p=6621 *10*) and 9120 *5* (p1,E_p=4472 *8*).
9154 *6*	(3/2)+	0.0988	E(level): weighted average of 9140 *9* (p0, E_p=6654 *9*), 9155 *6* (p1,E_p=4506 *8*) and 9166 *10* (p2,E_p=3014 *10*) (2010Ad03).
9193 *9*	1/2+,3/2+ @		
9350‡ *50*		0.0068	E(level): energy range: 9300-9400 keV.
9450‡ *50*		0.0030	E(level): energy range: 9400-9500 keV.
9550‡ *50*		0.0194	E(level): energy range: 9500-9600 keV.
9583 *6*	1/2+,3/2+	0.0459	
9650‡ *50*		0	E(level): energy range: 9600-9700 keV.
9750‡ *50*		0.0175	E(level): energy range: 9700-9800 keV.
9850‡ *50*		0.0221	E(level): energy range: 9800-9900 keV.
9950‡ *50*		0.0315	E(level): energy range: 9900-10000 keV.
1025×10^1‡ *25*		0.1042	E(level): energy range: 10000-10500 keV.
1100×10^1‡ *50*		0.4966	E(level): energy range: 10500-11500 keV.

† From the table of comparison of proton energies above, unless otherwise noted.
‡ Pseudo level.
# From Adopted Levels, unless otherwise noted.
@ From log *ft* value from 1/2+ parent state, which is typical of allowed β-decay transition.
& From 1993Sc16, unless otherwise noted.

ε,β+ radiations

E(decay)	E(level)	Iβ+ †‡	Iε‡	Log *ft*	I(ε+β+)‡	Comments
(6×10^2 *5*)	11000		0.00004 *3*	4.0 *15*	0.00004 *3*	εK=0.902 *4*; εL=0.087 *3*; εM+=0.0112 *4*
(1.4×10^3 *3*)	10250	1.×10^{-5} *3*	5.×10^{-5} *6*	4.6 *6*	0.00006 *3*	av Eβ=1.4×10^2 *11*; εK=0.7 *4*; εL=0.07 *4*; εM+=0.009 *5*
(1.67×10^3 *5*)	9950	6.×10^{-5} *2*	2.×10^{-5} *1*	5.14 *20*	0.00008 *3*	av Eβ=265 *22*; εK=0.25 *6*; εL=0.024 *5*; εM+=0.0031 *7*
(1.77×10^3 *5*)	9850	8.1×10^{-5} *25*	1.9×10^{-5} *7*	5.25 *17*	0.00010 *3*	av Eβ=305 *24*; εK=0.17 *4*; εL=0.017 *4*; εM+=0.0021 *5*
(1.87×10^3 *5*)	9750	0.00010 *3*	1.6×10^{-5} *5*	5.36 *15*	0.00012 *3*	av Eβ=350 *22*; εK=0.124 *23*; εL=0.0119 *22*; εM+=0.0015 *3*
(1.97×10^3 *5*)	9650				0	
(2036 *6*)	9583	0.00061 *15*	5.4×10^{-5} *13*	4.92 *11*	0.00066 *16*	av Eβ=423.2 *27*; εK=0.0740 *13*; εL=0.00708 *13*; εM+=0.000912 *16*
(2.07×10^3 *5*)	9550	0.00030 *4*	2.4×10^{-5} *5*	5.29 *10*	0.00032 *4*	av Eβ=438 *22*; εK=0.067 *11*; εL=0.0064 *10*; εM+=0.00083 *13*
(2.17×10^3 *5*)	9450	7.×10^{-5} *3*	4.×10^{-6} *2*	6.11 *21*	0.00007 *3*	av Eβ=482 *23*; εK=0.051 *8*; εL=0.0049 *7*; εM+=0.00063 *9*

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^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †‡	Iε‡	Log *ft*	I($\varepsilon+\beta^+$)‡	Comments
(2.27×10^3 *5*)	9350	0.00022 *9*	1.0×10^{-5} *4*	5.74 *19*	0.00023 *9*	av Eβ=526 *23*; εK=0.040 *6*; εL=0.0038 *5*; εM+=0.00049 *7*
(2426 *9*)	9193	0.00098 *12*	3.1×10^{-5} *4*	5.31 *6*	0.00101 *12*	av Eβ=596.2 *41*; εK=0.0281 *6*; εL=0.00268 *6*; εM+=0.000345 *7*
(2465 *6*)	9154	0.0057 *6*	0.000168 *19*	4.60 *5*	0.00586 *66*	av Eβ=613.9 *28*; εK=0.0258 *4*; εL=0.00247 *4*; εM+=0.000318 *4* Iβ^+: deduced from: Iβ(p0)=0.00049 *10*, Iβ(p1)= 0.00467 *62* and Iβ(p2)=0.0007 *2*.
(2502 *5*)	9117	0.0053 *6*	0.00014 *2*	4.68 *5*	0.0054 *6*	av Eβ=630.7 *23*; εK=0.02394 *25*; εL=0.002288 *24*; εM+=0.000295 *3* Iβ^+: deduced from two contributions: Iβ(p0)=0.00173 *23* and Iβ(p1)= 0.00367 *55*.
(2655 *8*)	8964	0.018 *4*	0.00036 *9*	4.33 *11*	0.0181 *45*	av Eβ=701.2 *37*; εK=0.0178 *3*; εL=0.00170 *3*; εM+=0.000219 *4* Iβ^+: deduced from two contributions: Iβ(p0)=0.0133 *30* and Iβ(p1)= 0.0048 *33*. Others: 0.003 *2* (p0) (1971Ha05).
(2755 *10*)	8864	0.00027 *8*	4.5×10^{-6} *13*	6.27 *13*	0.00027 *8*	av Eβ=747.1 *46*; εK=0.0149 *3*; εL=0.00142 *3*; εM+=0.000183 *4*
(2770 *5*)	8849	0.012 *5*	0.00019 *9*	4.65 *20*	0.0118 *54*	av Eβ=754.0 *24*; εK=0.01451 *13*; εL=0.001386 *13*; εM+=0.0001785 *1*
(2806 *8*)	8813	0.00052 *9*	8.0×10^{-6} *14*	6.03 *8*	0.00053 *9*	av Eβ=770.5 *37*; εK=0.01364 *19*; εL=0.001303 *18*; εM+=0.0001679 *2*
(3061 *5*)	8558	0.028 *6*	0.00029 *6*	4.55 *9*	0.0284 *57*	av Eβ=888.8 *24*; εK=0.00912 *7*; εL=0.000872 *7*; εM+=0.0001123 *9* Iβ^+: deduced from two contributions: Iβ(p0)=0.0147 *14* and Iβ(p1)= 0.0137 *55*.
(3129 *6*)	8490	0.0022 *3*	2.0×10^{-5} *3*	5.73 *6*	0.0022 *3*	av Eβ=920.5 *29*; εK=0.00827 *8*; εL=0.000790 *7*; εM+=0.0001017 *9* Iβ^+: deduced from two contributions: Iβ(p0)=0.00100 *15* and Iβ(p2)= 0.0012 *3*.
(3303 *6*)	8316	0.021 *6*	0.00015 *4*	4.90 *13*	0.021 *6*	av Eβ=1002.0 *29*; εK=0.00652 *6*; εL=0.000622 *5*; εM+=8.02×10^{-5} *7* Iβ^+: deduced from two contributions: Iβ(p0)=0.0075 *46* and Iβ(p1)= 0.013 *4*. Other: 0.017 *4* (p0) (1971Ha05).
(3436 *3*)	8183	0.12 *3*	0.00072 *20*	4.25 *13*	0.118 *33*	av Eβ=1064.3 *15*; εK=0.005496 *21*; εL=0.0005250 *2*; εM+=6.76×10^{-5} *3* Iβ^+: deduced from two contributions: Iβ(p0)=0.109 *33* and Iβ(p1)= 0.0085 *10*.
(3489 *3*)	8130	0.011 *4*	6.3×10^{-5} *23*	5.33 *16*	0.011 *4*	av Eβ=1089.4 *15*; εK=0.005150 *20*; εL=0.0004919 *1*; εM+=6.335×10^{-5} *24* Iβ^+: Others: 0.14 *10* (p0+p1) (1971Ha05), 0.037 *11* (p1) and <0.005 (p0) (1996Ho24). Additional information 4.
(3542 *3*)	8077	0.21 *3*	0.00111 *18*	4.09 *8*	0.208 *34*	av Eβ=1114.4 *15*; εK=0.004833 *18*; εL=0.0004616 *1*; εM+=5.945×10^{-5} *22* Iβ^+: deduced from two contributions: Iβ(p0)=0.155 *34* and Iβ(p1)= 0.0531 *40*. Others: 0.23 *10* (p0) (1971Ha05), 0.122 *11* (p0) and 0.036 *11* (p1) (1996Ho24). Additional information 5.
(3854 *3*)	7765	0.021 *3*	7.9×10^{-5} *11*	5.31 *7*	0.021 *3*	av Eβ=1262.5 *15*; εK=0.003409 *11*; εL=0.0003255 *1*; εM+=4.193×10^{-5} *14* Iβ^+: deduced from two contributions:

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^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03 (continued)

ε,$β^+$ radiations (continued)

E(decay)	E(level)	I$β^+$ †‡	Iε‡	Log *ft*	I(ε+$β^+$)‡	Comments
						Iβ(p0)=0.0133 *29* and Iβ(p2)= 0.0073 *11*. Others: 0.010 *3* (E_p(c.m.)=5486) (1971Ha05).
(3952 *4*)	7667	0.041 *10*	0.00014 *3*	5.09 *11*	0.041 *10*	av Eβ=1309.2 *20*; εK=0.003080 *13*; εL=0.0002941 *1*; εM+=3.788×10^{-5} *16* I$β^+$: deduced from two contributions: Iβ(p0)=0.036 *10* and Iβ(p1)= 0.0044 *6*. Other: 0.57 *6* (E_p(c.m.)=3165) (1971Ha05).
(4068.1 *21*)	7551	0.040 *3*	0.000121 *9*	5.18 *4*	0.0398 *31*	av Eβ=1364.7 *10*; εK=0.002743 *6*; εL=0.0002619 *6*; εM+=3.373×10^{-5} *7* I$β^+$: Other: 0.037 *15* (p1) (1996Ho24).
(4079 *4*)	7540	0.072 *20*	0.00022 *6*	4.92 *12*	0.072 *20*	av Eβ=1369.9 *20*; εK=0.002714 *11*; εL=0.0002591 *1*; εM+=3.337×10^{-5} *14* I$β^+$: Other: 0.079 *9* (p0) (1996Ho24). Additional information 6.
(4137.1 *21*)	7482	0.30 *4*	0.00086 *11*	4.34 *6*	0.304 *39*	av Eβ=1397.7 *10*; εK=0.002566 *6*; εL=0.0002450 *5*; εM+=3.155×10^{-5} *7* I$β^+$: deduced from two contributions: Iβ(p0)=0.258 *38* and Iβ(p1)= 0.046 *10*. Others: 0.037 *3* (p1) and 0.223 *15* (p0) (1996Ho24). Additional information 7.
(4215 *10*)	7404	0.00141 *14*	3.7×10^{-6} *4*	6.72 *5*	0.00141 *14*	av Eβ=1435.1 *48*; εK=0.002383 *23*; εL=0.0002276 *2*; εM+=2.93×10^{-5} *3*
(4330 *4*)	7289	0.023 *4*	5.5×10^{-5} *10*	5.57 *8*	0.023 *4*	av Eβ=1490.3 *20*; εK=0.002145 *8*; εL=0.0002048 *8*; εM+=2.638×10^{-5} *10* I$β^+$: deduced from two contributions: Iβ(p0)=0.016 *4* and Iβ(p1)= 0.0069 *12*.
(4477 *5*)	7142	0.00079 *10*	1.6×10^{-6} *2*	7.12 *6*	0.00079 *10*	av Eβ=1561.0 *25*; εK=0.001885 *9*; εL=0.0001799 *8*; εM+=2.317×10^{-5} *10*
(4670.1 *21*)	6949	0.0158 *12*	2.81×10^{-5} *21*	5.93 *4*	0.0158 *12*	av Eβ=1654.1 *10*; εK=0.001603 *3*; εL=0.0001531 *3*; εM+=1.971×10^{-5} *4*
(5026 *5*)	6593	0.0043 *7*	5.8×10^{-6} *9*	6.68 *7*	0.0043 *7*	av Eβ=1826.4 *25*; εK=0.001216 *5*; εL=0.0001161 *5*; εM+=1.495×10^{-5} *6*
(5305.1 *21*)	6314	0.015 *7*	1.7×10^{-5} *8*	6.27 *21*	0.015 *7*	av Eβ=1961.9 *11*; εK=0.0009952 *1*; εL=9.501×10^{-5} *14*; εM+=1.2236×10^{-5} *1*
(5364.1 *21*)	6255	0.79 *3*	0.00083 *3*	4.578 *17*	0.786 *28*	av Eβ=1990.6 *11*; εK=0.0009556 *1*; εL=9.122×10^{-5} *13*; εM+=1.1749×10^{-5} *1* I$β^+$: deduced from two contributions: Iβ(p0)=0.753 *28* and Iβ(p1)= 0.0329 *16*. Other: 0.58 *6* (1971Ha05).
(5750 *3*)	5869	0.18 *3*		5.39 *8*	0.18 *3*	av Eβ=2178.7 *15* I$β^+$: Others: 0.23 *10* (p0+p1) (1971Ha05), 0.192 *14* (p1) and <0.015 (p0) (1996Ho24). Additional information 8.
(5887 *3*)	5732	0.061 *31*		5.92 *22*	0.061 *31*	av Eβ=2245.8 *15* I$β^+$: Others: 0.37 *4* (1971Ha05).
(6071.1 *12*)	5548	31.0 *14*	0.0210 *10*	3.284 *21*	31.0 *14*	av Eβ=2335.76 *57*; εK=0.0006109 *5*; εL=5.831×10^{-5} *4*; εM+=7.509×10^{-6} *6* I$β^+$: from 2010Ad03. Other: 30.7 *1*, calculated from *ft* value 1981.4 (1987Bo21); 26.7 *27* (1971Ha05)6.
(6319.1 *21*)	5300	0.109 *16*		5.83 *7*	0.109 *16*	av Eβ=2457.2 *11* I$β^+$: deduced from two contributions: Iβ(p0)=0.089 *16* and Iβ(p1)= 0.0202 *17*. Others: Iβ(p1)/Iβ(p0)=39(9)/93(19)

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^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03 (continued)

ε,β$^+$ radiations (continued)

E(decay)	E(level)	Iβ$^+$ †‡	Iε‡	Log *ft*	I(ε+β$^+$)‡	Comments
						(1996Ho24).
(6513.1 *21*)	5106	0.0435 *31*		6.31 *4*	0.0435 *31*	av Eβ=2552.3 *11* Iβ$^+$: Others: 0.081 *13* (1971Ha05).
(6784.1 *21*)	4835	0.349 *6*		5.499 *9*	0.349 *6*	av Eβ=2685.4 *11* Iβ$^+$: Others: 0.31 *4* (1971Ha05).
(7153.1 *21*)	4466	0.347 *6*		5.628 *9*	0.347 *6*	av Eβ=2866.4 *11*
(7178.1 *21*)	4441	2.375 *20*		4.800 *7*	2.375 *20*	av Eβ=2878.7 *11* Iβ$^+$: Others: 2.50 *26* (1971Ha05).
(7506.1 *21*)	4113	0.453 *6*		5.626 *8*	0.453 *6*	av Eβ=3040.3 *11* Iβ$^+$: Others: 0.43 *5* (1971Ha05).
(7648.1 *12*)	3971	0.382 *20*		5.744 *24*	0.382 *20*	av Eβ=3110.24 *58* Iβ$^+$: Others: 0.40 *4* (1971Ha05).
(9266.8 *7*)	2352.3	1.7 *3*		5.54 *8*	1.7 *3*	av Eβ=3910.23 Iβ$^+$: from 1987Bo21. 2.0 *3* in 2010Ad03.
(10808.5 *6*)	810.63	41.0 *8*	0.00390 *9*	4.516 *10*	41.0 *8*	av Eβ=4674.80; εK=8.584×10^{-5} *2*; εL=8.191×10^{-6} *2*; εM+=1.0548×10^{-6} *2* Iβ$^+$: weighted average from 1987Bo21 (41.1 *8*) and 2010Ad03 (40.5 *16*). Other: 48.1 *36* (1971Ha05).
(11619.1 *6*)	0	18.7 *4*	0.00140 *3*	5.022 *11*	18.7 *4*	av Eβ=5077.51; εK=6.778×10^{-5} *2*; εL=6.467×10^{-6} *1*; εM+=8.329×10^{-7} *2* %ε+%β$^+$: estimate based on log *ft*=5.03 *1*, as in mirror 1/2$^+$ to 3/2$^+$ (^{33}P) decay (2010Ad03).

† From the table of comparison of proton intensities above. Absolute intensities deduced from the relative intensities assuming the 31.0% intensity for the strongest protons (2010Ad03).
‡ Absolute intensity per 100 decays.

γ(^{33}Cl)

E_γ	I_γ†	E_i(level)	J^π_i	E_f	J^π_f	Comments
810.6 *2*	41.9 *8*	810.63	1/2$^+$	0	3/2$^+$	E_γ: weighted average from 1987Bo21 and 2010Ad03. I_γ: weighted average from 1987Bo21 (42.1 *8*) and 2010Ad03 (41.1 *16*).
1541.5 *5*	1.0 *3*	2352.3	3/2$^+$	810.63	1/2$^+$	E_γ: weighted average from 1987Bo21 and 2010Ad03. I_γ: from 1987Bo21.
2352.4 *6*	0.7 *2*	2352.3	3/2$^+$	0	3/2$^+$	E_γ: weighted average from 1987Bo21 and 2010Ad03. I_γ: from 1987Bo21.

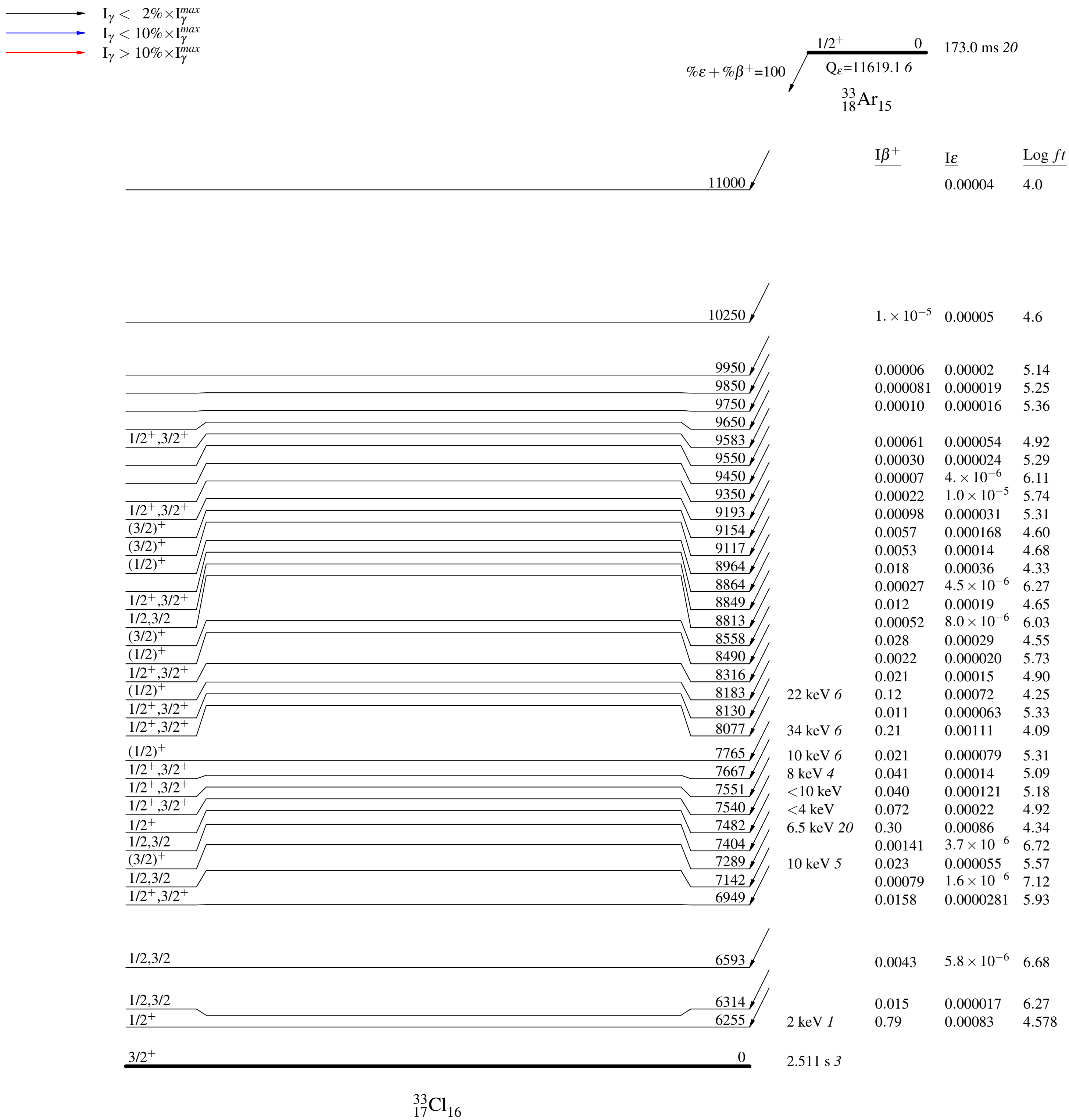
† Absolute intensity per 100 decays.

^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03

Decay Scheme

Legend

Intensities: I_γ per 100 parent decays



^{33}Ar ε decay (173.0 ms) 1993Sc16,1987Bo21,2010Ad03

Decay Scheme (continued)