

$^{30}\text{Si}(^{18}\text{O},\text{p}3\text{n}\gamma)$ 2005La19

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 190,1 (2023)	20-Jun-2023

2005La19: E=68 MeV ^{18}O beam was produced from the VIVITRON accelerator at IReS in Strasbourg. Target was a metallic 800 $\mu\text{g}/\text{cm}^2$ thick ^{30}Si . γ rays were detected by the high-efficiency EUROBALL IV Ge-detector array in coincidence with the Recoil Filter Detector (RFD). Measured $E\gamma$, $I\gamma$, γ -recoil coin, $\gamma\gamma(\text{DCO})$, $\gamma\gamma(\text{lin pol})$. Lifetimes estimated with application of the Recoil Filter Detector.

 ^{44}Sc Levels

E(level) [†]	J π [‡]	T _{1/2} [@]	Comments
0.0	2 ⁺		
67.90 ^b 30	1 ⁻		
234.62 ^a 23	2 ⁻		
271.05 ^{&} 29	6 ⁺	58.61 h 10	T _{1/2} : from the Adopted Levels.
349.60 30	4 ⁺		
424.78 ^b 23	3 ⁻		
531.42 ^d 30	3 ⁻		
630.94 ^a 26	4 ⁻		
968.30 ^{&} 30	7 ⁺		
1006.52 ^c 27	4 ⁻		
1197.50 ^b 28	5 ⁻		
1683.24 ^d 31	5		
1755.08 ^a 29	6 ⁻		
2210.53 ^c 30	6 ⁻		
2606.72 ^b 28	7 ⁻		
2671.67 ^{&} 32	9 ⁺		
2789.44 ^d 29	7		
2989.14 ^a 30	8 ⁻		
3364.07 ^c 29	8 ⁻		
3567.18 ^{&} 32	11 ⁺		
3829.05 ^b 29	9 ⁻		
4107.29 ^d 32	9		
4114.06 ^{&} 34	10 ⁺		
4422.16 34	9		
4540.53 ^a 32	10 ⁻		
4949.84 ^c 31	10		
5358.05 ^b 31	11 ⁻		
6376.66 ^a 34	12 ⁻	0.31 ps 10	
6440.6 4	12 ⁻	80 fs 24	
7092.04 ^b 34	13 ⁻	195 fs 69	
8095.5 ^a 4	14 ^{-#}	177 fs 56	
9141.0 ^b 4	15 ^{-#}	118 fs 21	

[†] From a least-squares fit to γ -ray energies. For $E\gamma$ values without uncertainties except for those from level-energy differences (not used in the fitting), a $\Delta E\gamma=0.3$ keV is assumed for the fitting purpose.

[‡] From 2005La19, with spin assignments primarily from R_{DCO} information for transitions and parities up to 13⁻ level at 7092 fixed by linear polarization measurements of several intense transitions, unless otherwise noted. But no polarization are given in 2005La19. When considered in Adopted Levels, assignments are treated as tentative by the evaluators where supporting data are

$^{30}\text{Si}(^{18}\text{O}, \text{p}3\text{n}\gamma)$ **2005La19 (continued)** ^{44}Sc Levels (continued)

lacking.

Firm negative parity assignment suggested by **2005La19** on basis that the level then completes the unnatural-parity band. Parity change for this level would be hard to understand (authors' note).

@ From Doppler-Shift-Attenuation-Method (DSAM) (**2005La19**).

& Seq.(C): $\pi f_{7/2} \nu f_{7/2}^3$.

^a Band(A): Band based on 67.9, $\alpha=0$. Configuration= $\pi(d_{3/2}^{-1} f_{7/2}^2) \nu f_{7/2}^3$.

^b Band(a): Band based on 234.6, $\alpha=1$. Configuration= $\pi(d_{3/2}^{-1} f_{7/2}^2) \nu f_{7/2}^3$.

^c Band(B): Band based on 531.4, $\alpha=0$.

^d Band(b): Band based on 1006.5, $\alpha=1$.

 $\gamma(^{44}\text{Sc})$

R_{DCO} values given under comments are extracted from coin spectra gated on known E2 transitions, unless stated otherwise.

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	I_γ	E_f	J_f^π	Mult. [#]	Comments
234.62	2 ⁻	166.7		67.90	1 ⁻		
		234.6		0.0	2 ⁺		
349.60	4 ⁺	349.6		0.0	2 ⁺		
424.78	3 ⁻	190.1		234.62	2 ⁻		
		356.9		67.90	1 ⁻		
		424.8		0.0	2 ⁺		
531.42	3 ⁻	296.8		234.62	2 ⁻		
630.94	4 ⁻	206.2		424.78	3 ⁻		
		396.3		234.62	2 ⁻		
968.30	7 ⁺	697.2		271.05	6 ⁺		
1006.52	4 ⁻	375.6		630.94	4 ⁻		
		475.1		531.42	3 ⁻		
		581.7		424.78	3 ⁻		
		771.9		234.62	2 ⁻		
1197.50	5 ⁻	566.6		630.94	4 ⁻		
		772.7		424.78	3 ⁻		
		926.4		271.05	6 ⁺		
1683.24	5	1052.3		630.94	4 ⁻		
		1151.8		531.42	3 ⁻		
1755.08	6 ⁻	786.8 [‡]	3 1	968.30	7 ⁺	(D)	DCO=1.08 20
		1124.1 2	31 4	630.94	4 ⁻	Q	DCO from gate on $\Delta J=1$ transition.
		1484.0 1	100 3	271.05	6 ⁺		DCO=1.06 26
							DCO=1.04 9
							DCO consistent with $\Delta J=0$.
2210.53	6 ⁻	1013.0		1197.50	5 ⁻		
		1204.0		1006.52	4 ⁻		
2606.72	7 ⁻	396.2 [‡]	7 2	2210.53	6 ⁻	(D)	DCO=1.58 23
		1409.2 1	100 3	1197.50	5 ⁻	Q	DCO=1.01 8
		2335.6 3	11 2	271.05	6 ⁺	D	DCO=1.04 18
							DCO from gate on $\Delta J=1$ transition.
2671.67	9 ⁺	1703.2		968.30	7 ⁺		
2789.44	7	578.9		2210.53	6 ⁻		
		1034.4		1755.08	6 ⁻		
		1106.2		1683.24	5		
		2518.4		271.05	6 ⁺		
							E_γ : from γ spectra gating on 408.2 γ in Fig.2 of 2005La19 ; not placed by the authors. It is placed here by the evaluators based on $\gamma\gamma$ -coin and exact match to the level-energy difference.
2989.14	8 ⁻	199.7 2	5 1	2789.44	7		

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$^{30}\text{Si}(^{18}\text{O},\text{p}3\text{n}\gamma)$ **2005La19** (continued) $\gamma(^{44}\text{Sc})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	I_γ	E_f	J_f^π	Mult. [#]	Comments
2989.14	8 ⁻	382.4 [‡]	13 3	2606.72	7 ⁻		
		1234.0 2	100 3	1755.08	6 ⁻	Q	DCO=0.97 17
		2020.8 1	86 7	968.30	7 ⁺	D	DCO=1.07 10
							DCO from gate on $\Delta J=1$ transition.
3364.07	8 ⁻	574.6		2789.44	7		
		757.4		2606.72	7 ⁻		
		1153.5		2210.53	6 ⁻		
3567.18	11 ⁺	895.4		2671.67	9 ⁺		
3829.05	9 ⁻	465.0 1	45 6	3364.07	8 ⁻	D	DCO=1.88 20
		839.9 3	80 8	2989.14	8 ⁻		
		1039.7 2	14 4	2789.44	7		
		1157.5 3	40 8	2671.67	9 ⁺		DCO=1.07 11
							DCO consistent with $\Delta J=0$.
							DCO=1.03 7
4107.29	9	1222.3 1	100 9	2606.72	7 ⁻	Q	
		743.2		3364.07	8 ⁻		
		1118.1		2989.14	8 ⁻		
		1317.8		2789.44	7		
4114.06	10 ⁺	547.0		3567.18	11 ⁺		
		1442.3		2671.67	9 ⁺		
4422.16	9	1058.0		3364.07	8 ⁻		
		1433.0		2989.14	8 ⁻		
4540.53	10 ⁻	433.2 [‡]	12 3	4107.29	9		
		711.9 2	100 8	3829.05	9 ⁻	D	DCO=1.69 26
							Additional information 1.
		973.1 3	12 3	3567.18	11 ⁺	D	DCO=1.70 25
		1551.4 [‡]	14 4	2989.14	8 ⁻		
		1868.6 3	16 3	2671.67	9 ⁺		
4949.84	10	527.6		4422.16	9		
		842.5		4107.29	9		
		1382.7		3567.18	11 ⁺		
		1585.6		3364.07	8 ⁻		
		2278.2		2671.67	9 ⁺		
5358.05	11 ⁻	408.2 1	100 3	4949.84	10	D	DCO=1.85 12
		817.8 3	10 2	4540.53	10 ⁻		
		1244.0 2	80 5	4114.06	10 ⁺	D	DCO=1.64 15
		1250.7 3	16 2	4107.29	9	Q	DCO=1.11 17
		1528.8 2	73 5	3829.05	9 ⁻	Q	DCO=1.04 15
		1790.8 2	27 3	3567.18	11 ⁺		DCO=1.08 11
							DCO consistent with $\Delta J=0$.
6376.66	12 ⁻	1018.5 3	28 5	5358.05	11 ⁻		
		1836.3 3	38 5	4540.53	10 ⁻		
		2809.3 4	100 6	3567.18	11 ⁺	D	DCO=1.83 18
6440.6	12 ⁻	(1900.2)		4540.53	10 ⁻		E_γ, I_γ : unobserved transition; branching estimated as less than 10% of γ -intensity depopulating the level (2005La19). E_γ from level-energy difference.
		2873.4 4	100 5	3567.18	11 ⁺	D	DCO=1.56 19
7092.04	13 ⁻	651.5 2	4 1	6440.6	12 ⁻	D	DCO=1.94 22
		715.4 2	7 1	6376.66	12 ⁻	D	DCO=2.04 32
		1733.9 2	100 6	5358.05	11 ⁻	Q	DCO=0.99 7
8095.5	14 ⁻	1003.5 3	100 8	7092.04	13 ⁻	D	DCO=1.74 24
		1654.9 2	87 10	6440.6	12 ⁻	Q	DCO=1.07 15
9141.0	15 ⁻	1045.5 3	27 6	8095.5	14 ⁻	D	DCO=1.86 32
		2048.9 3	100 9	7092.04	13 ⁻	Q	DCO=1.01 15

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$^{30}\text{Si}(^{18}\text{O},\text{p}3\text{n}\gamma)$ **2005La19** (continued)

$\gamma(^{44}\text{Sc})$ (continued)

[†] From **2005La19**. Values with uncertainties are from Table 1 and those without uncertainties are read from the level scheme in Figure 1 or the γ spectra in Figure 2, unless otherwise noted.

[‡] Weak transition or doublet; $E\gamma$ from level-energy difference.

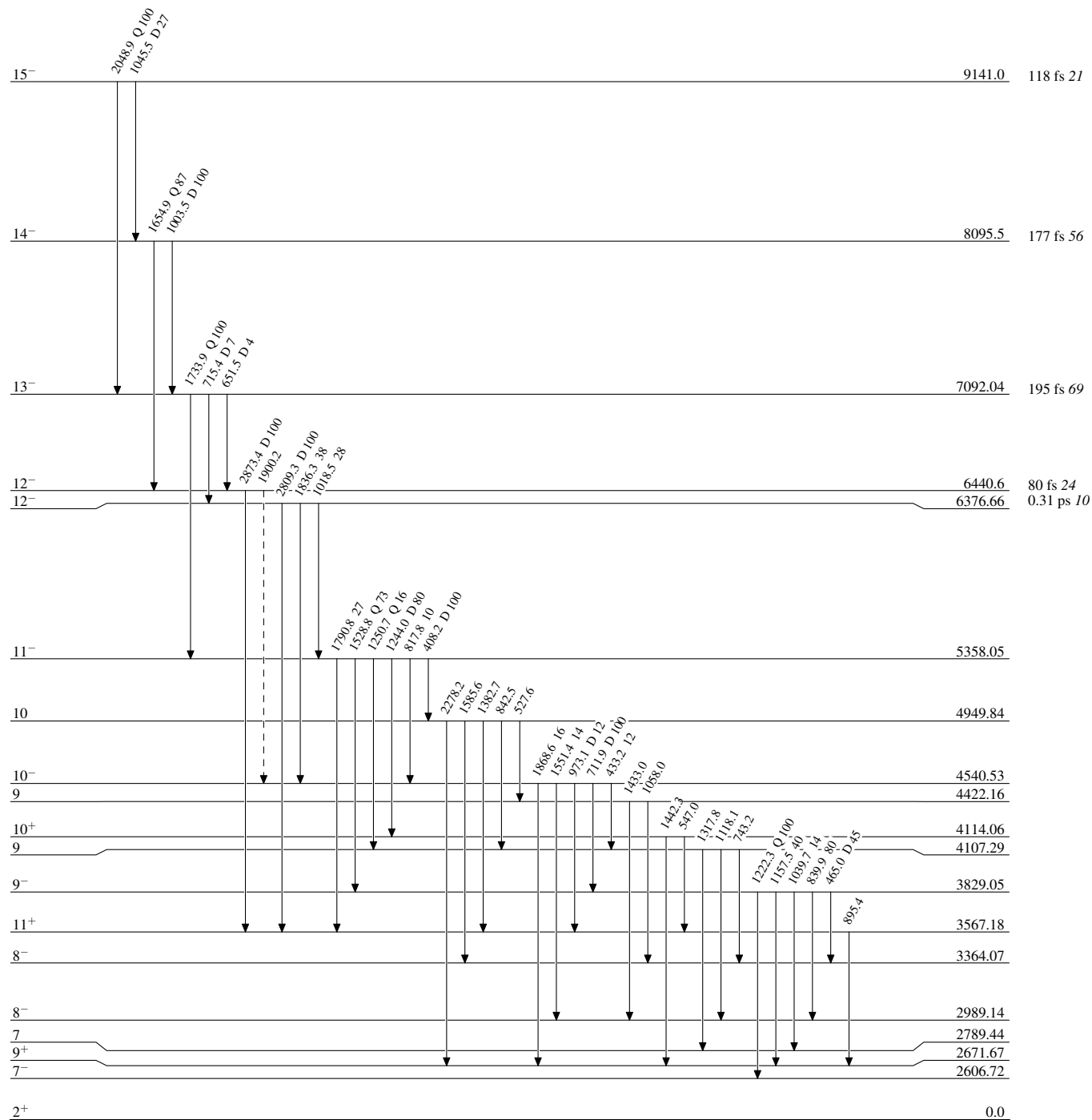
[#] Not listed in **2005La19**; D ($\Delta J=1$) and Q ($\Delta J=2$) deduced by the evaluators based on DCO ratios where available and authors' J^π assignments as claimed to be from DCO ratios.

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Legend

Level Scheme

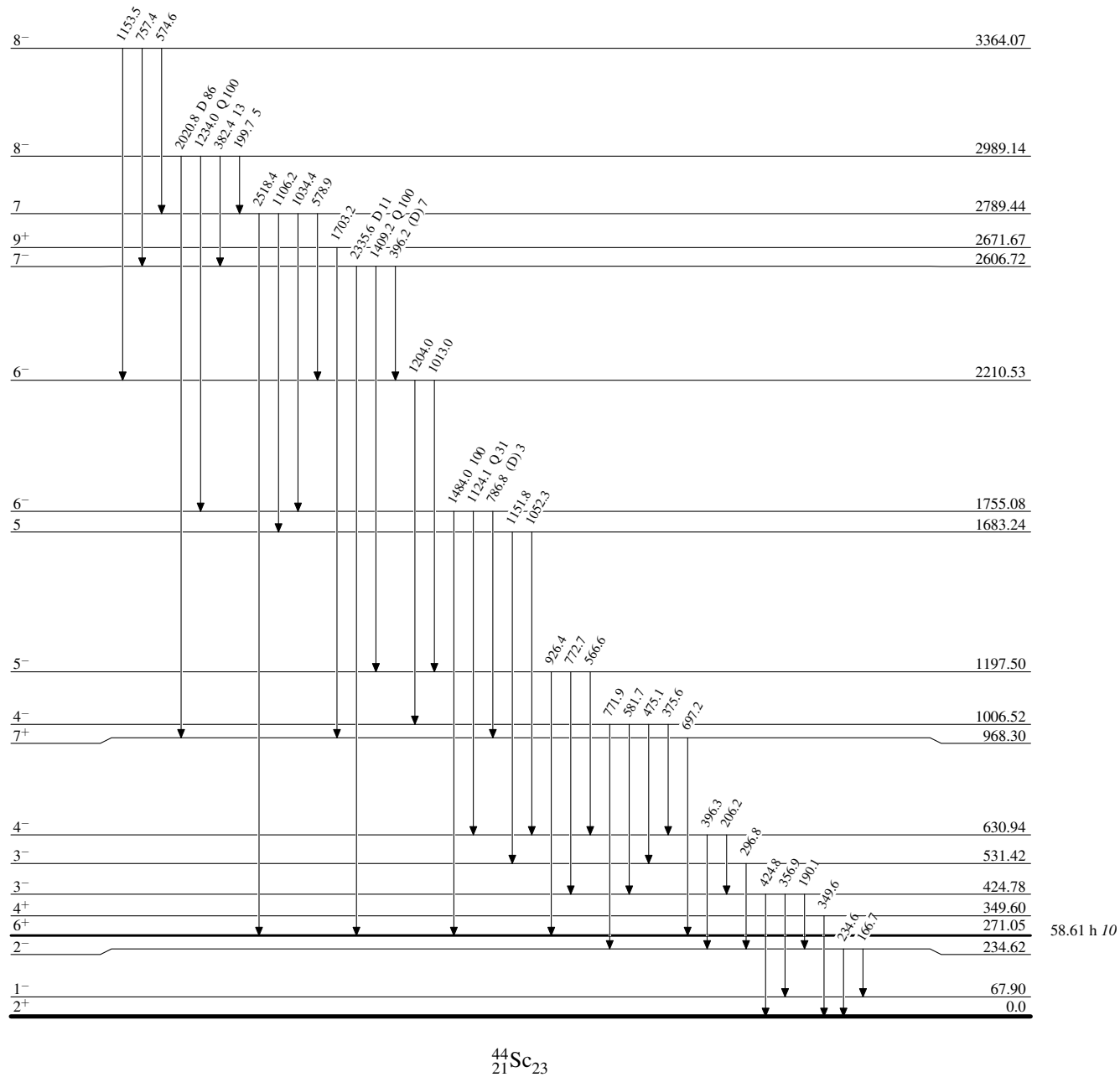
Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)


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Level Scheme (continued)

Intensities: Relative photon branching from each level



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