^{23}O β^- decay (97 ms)   2007Su05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia[#], A. Chakraborty[##]	NDS 171, 1 (2021)	1-Jun-2020

Parent: ^{23}O: E=0.0; J^π=1/2$^+$; $T_{1/2}$=97 ms 8; Q(β^-)=11.34×10^3 13; %β^- decay=100.0

^{23}O-%β^- decay: %β^-=100. %β^-n=7 2 (2007Su05).

Other reference: 1990Mu06.

Based on XUNDL: Compiled by S. Geraedts, J. Roediger and B. Singh (McMaster), Apr 26, 2007.

^{23}O source was produced from primary ^{48}Ca beam, E=140 MeV/nucleon, fragmentation on a thick ^{9}Be target at NSCL facility. The fragments were separated by A1900 fragment separator on the basis of magnetic rigidities. The beam of ^{23}O was used in a pulsed mode with a time period of 300 ms. The β-decay of ^{23}O was monitored during the beam-off period of 300 ms. The detection system consisted of an implantation detector (plastic scintillator), an array of 16 neutron time-of-flight detectors and eight γ-ray detectors of SeGA array. Particle (^{23}O) identification was achieved by time-of-flight and energy loss information in silicon detectors. Measured Eγ, Iγ, $\gamma\gamma$, (particle)γ coin, $\gamma\beta$ coin, delayed neutrons, isotopic half-life by timing of γ rays, β rays and delayed neutrons. Comparisons with shell-model calculations.

1990Mu06: Projectile fragmentation reaction of ^{48}Ca beam at 44 MeV/nucleon on Be-target was used at GANIL. Fragment identification was carried out using LISE spectrometer. At the exit from LISE, fragments were implanted into semiconductor telescope. Measured ^{23}O half-life.

^{23}F Levels

E(level)‡	$J^{\pi\dagger}$	Comments
0.0	(5/2$^+$)	
2244 8	(1/2)$^+$	J^π: 1/2$^+$ in 2007Su05.
2926 10		
3367 13		
3837 11		
3865 9	(1/2$^+$,3/2$^+$)	
4066 16	(3/2$^+$)	
4604 14	(1/2$^+$,3/2$^+$)	
5553 13	(1/2$^+$,3/2$^+$)	
5599 14	(1/2$^+$,3/2$^+$)	
7580+x		E(level): From S(n)=7580 40 (^{23}F) and x<3.76E3 14 [from Q(β^-) (^{23}O=11.34E3 13-S(n)(^{23}F) (2017Wa10)].

† From Adopted Levels.

‡ From least-squares fit to gamma energies by the evaluators.

β^- radiations

E(decay)	E(level)	I$\beta^{-\dagger\ddagger}$	Log ft	Comments
(1.9×10^3 [@] 19)	7580+x	7 2		Iβ^-: %β^-n 7 2 (from ^{23}O Adopted Levels).
(5.74×10^3 13)	5599	5.2 10	4.31 11	av Eβ=2653 65
(5.79×10^3 13)	5553	2.1 6	4.72 14	av Eβ=2676 65
(6.74×10^3 13)	4604	3.1 9	4.86 14	av Eβ=3143 65
(7.27×10^3 13)	4066	17.1 17	4.27 7	av Eβ=3409 65
(7.48×10^3 13)	3865	15.8 19	4.36 8	av Eβ=3508 65
(7.97×10^3[#] 13)	3367	1.4 14	>5.5	av Eβ=3754 65 Iβ^-: No feeding quoted by 2007Su05. Log ft: Lower limit.
(9.10×10^3 13)	2244	45.8 16	4.30 5	av Eβ=4310 65
(1.134×10^4 13)	0.0			av Eβ=5421 65

Continued on next page (footnotes at end of table)

^{23}O β^- **decay (97 ms)**   **2007Su05 (continued)**

β^- radiations (continued)

E(decay)	E(level)	Comments
		Iβ^-: g.s. β feeding can be expected <3 considering β to the excited states and %β^-n=7 2, which yields a log $ft > 5.9$. For ΔJ=2${}^+$ and $\Delta\pi$=no expected log $ft \sim 12$.

† From γ-ray intensity balance.
‡ Absolute intensity per 100 decays.
${}^{\#}$ Existence of this branch is questionable.
${}^{@}$ Estimated for a range of levels.

$\gamma(^{23}$F$)$

E_γ	$I_\gamma{}^{\dagger}$	E_i(level)	J_i^π	E_f	J_f^π
911 4	2.7 12	3837		2926	
1237 4	3.1 9	4604	(1/2${}^+$,3/2${}^+$)	3367	
1621 6	5.7 10	3865	(1/2${}^+$,3/2${}^+$)	2244	(1/2)${}^+$
1716 6	2.1 6	5553	(1/2${}^+$,3/2${}^+$)	3837	
2243 8	51.5 12	2244	(1/2)${}^+$	0.0	(5/2${}^+$)
2673 9	5.2 10	5599	(1/2${}^+$,3/2${}^+$)	2926	
2926 10	7.2 18	2926		0.0	(5/2${}^+$)
3367 13	4.5 10	3367		0.0	(5/2${}^+$)
3868 15	10.1 16	3865	(1/2${}^+$,3/2${}^+$)	0.0	(5/2${}^+$)
4066 16	17.1 17	4066	(3/2${}^+$)	0.0	(5/2${}^+$)

† Absolute intensity per 100 decays.

$^{23}\text{O}\ \beta^-$ **decay (97 ms)**　　**2007Su05**

Decay Scheme

Intensities: I_γ per 100 parent decays

Legend

$I_\gamma < \ 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

$1/2^+$　　0.0　　97 ms 8
$Q_{\beta^-}=11.34\times10^3\ 13$　$\%\beta^-=100.0$

$^{23}_{8}\text{O}_{15}$

$I\beta^-$	Log ft			
7				7580+x
5.2	4.31	$(1/2^+,3/2^+)$		5599
2.1	4.72	$(1/2^+,3/2^+)$		5553
3.1	4.86	$(1/2^+,3/2^+)$		4604
17.1	4.27	$(3/2^+)$		4066
15.8	4.36	$(1/2^+,3/2^+)$		3865
				3837
1.4	>5.5			3367
				2926
45.8	4.30	$(1/2)^+$		2244
		$(5/2^+)$		0.0

2673 5.2
1716 2.1
1237 3.1
4066 17.1
3868 10.1
1621 5.7
911 2.7
3367 4.5
2926 7.2
2243 51.5

$^{23}_{9}\text{F}_{14}$