^{40}P β^- decay (150 ms) 2001Wi21

Type	Author	History Citation	Literature Cutoff Date
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Parent: ^{40}P: E=0.0; J^π=(2$^-$,3$^-$); $T_{1/2}$=150 ms *8*; Q(β^-)=14.76×10^3 *11*; %β^- decay=100.0

^{40}P-J^π,$T_{1/2}$: From Adopted Levels of ^{40}P.

^{40}P-Q(β^-): From 2012Wa38.

^{40}P-%β^- decay: %β^-n=15.8 *21*, deduced by 2001Wi21 by comparing the intensities of γ rays in the A=39 and A=40 mass chains produced in the measurement since ^{40}P is the only member of the A=40 mass chain and no members of the A=39 or lighter mass chains were present in the separated beam.

2001Wi21: ^{40}P was produced in the fragmentation of ^{48}Ca beam at E=70 MeV/nucleon on a Be target followed by analysis using using A1200 fragment separator. The decays of the implanted ions were studied by two Ge detectors and one thin plastic scintillator. Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$-coin, $\beta\gamma\gamma$-coin, decay curve. Deduced levels, J, π, parent $T_{1/2}$, γ-ray and β-decay branching ratios. Comparison with Geometrical Collective Model (GCM) calculations.

Others: 2003Gr22, 1989Le16.

^{40}S Levels

E(level)	J^π[†]	Comments
0.0	0$^+$	
903.69 *7*	2$^+$	
1916.84 *21*	(4$^+$)	
2254.79 *12*	(4$^+$)	J^π: (2$^+$) assigned by 2001Wi21 in ^{40}P β^- decay based on probable member of 2-phonon triplet.
3236.1 *3*		
3489.46 *18*	(1$^-$)	
3947.0 *3*		
4138.30 *20*	(1$^-$,2$^-$,3$^-$)[‡]	
4724.61 *23*		J^π: suggested by 2001Wi21 as possible member of 3-phonon triplet since the level decays to members of 2-phonon triplet.
5009.4 *4*	(1$^-$,2$^-$,3$^-$)[‡]	
S(n)+x		S(n)(^{40}S)=7750 *50*, x<7010.

[†] From Adopted Levels.

[‡] 2001Wi21 suggest J^π not 1$^-$, since no g.s. transition observed.

β^- radiations

E(decay)	E(level)	Iβ^-[†#]	Log *ft*[‡]	Comments
(4×10^3[@] *4*)	S(n)+x	15.8 *21*		Iβ^-: %β^-n=15.8 *21* (from ^{40}P Adopted Levels).
(9.75×10^3 *11*)	5009.4	11.3 *16*	5.3	av Eβ=4589 *89*
(1.004×10^4 *11*)	4724.61	7.5 *12*	5.6	av Eβ=4730 *89*
(1.062×10^4 *11*)	4138.30	29.8 *26*	5.1	av Eβ=5019 *89*
(1.081×10^4 *11*)	3947.0	3.4 *5*	6.1	av Eβ=5113 *89*
(1.127×10^4 *11*)	3489.46	14.1 *18*	5.5	av Eβ=5338 *89*
(1.152×10^4 *11*)	3236.1	0.7 *3*	6.9	av Eβ=5463 *89*
(1.251×10^4 *11*)	2254.79	1.6 *9*	6.7	av Eβ=5946 *89*
(1.386×10^4 *11*)	903.69	9.6 *27*	6.1	av Eβ=6611 *89*

[†] Deduced by 2001Wi21 from γ-ray intensity imbalance at each level, with all γ-ray intensities normalized to measured absolute I(903.7γ)=63% *3*. It is found that 6% *5* feeding remains unaccounted for. Since J(^{40}P g.s.)=2,3 does not allow significant feeding to ^{40}S ground state (<3% for the first forbidden unique decay of 2$^-$ to 0$^+$), this feeding may go to higher unobserved levels,

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^{40}P β^- decay (150 ms) 2001Wi21 (continued)

β^- radiations (continued)

although, no escape peaks are observed by 2001Wi21 for γ rays above 4.2 MeV. All β^- feedings should be considered as upper limits due to a large energy window available between the reported level at 5009 and Q value of 14510.

‡ These values should be considered as lower limits since some of the decay strength may be shifted to higher (unobserved) states due to a large energy gap between the Q-value and the highest observed level in 2001Wi21.

Absolute intensity per 100 decays.

@ Estimated for a range of levels.

$\gamma(^{40}S)$

Iγ normalization: From measured absolute intensity of 903.7γ based on the known decay branches for ^{40}Cl (2001Wi21).

The following γ rays are assigned to ^{39}S from β-n decay of ^{40}P: 339.88 *11* (4.6 *5*), 398.61 *14* (6.1 *9*), 465.45 *19* (4.5 *9*) (2001Wi21).

E_γ	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Comments
648.82 *15*	5.7 *5*	4138.30	$(1^-,2^-,3^-)$	3489.46	(1^-)	
x834.90 *8*	5.7 *17*					
903.68 *9*	100 *2*	903.69	2^+	0.0	0^+	
981.2 *4*	2.5 *4*	3236.1		2254.79	(4^+)	
1013.17 *20*	5.2 *12*	1916.84	(4^+)	903.69	2^+	
1351.10 *14*	12.5 *9*	2254.79	(4^+)	903.69	2^+	
1692.6 *9*	1.1 *4*	3947.0		2254.79	(4^+)	
1773.2‡ *7*	1.4 *4*	5009.4	$(1^-,2^-,3^-)$	3236.1		
2254.5‡ *9*	<0.5	2254.79	(4^+)	0.0	0^+	
2469.79 *20*	6.4 *9*	4724.61		2254.79	(4^+)	
x2550.4 *5*	1.7 *4*					in coin with 903γ.
2585.6 *4*	3.2 *6*	3489.46	(1^-)	903.69	2^+	
x2614.8 *3*	2.6 *9*					
2808.2 *9*	5.5 *15*	4724.61		1916.84	(4^+)	
3043.2 *4*	4.4 *5*	3947.0		903.69	2^+	
3234.7 *4*	41.5 *29*	4138.30	$(1^-,2^-,3^-)$	903.69	2^+	
3489.6 *4*	24.9 *24*	3489.46	(1^-)	0.0	0^+	
4105.7 *4*	16.5 *23*	5009.4	$(1^-,2^-,3^-)$	903.69	2^+	

† For absolute intensity per 100 decays, multiply by 0.63 *3*.

‡ Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays