Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, B. Grees	ENSDF	31-July-2020

S(n)=14225 *18*; S(p)=1299.6 *24*; Q(α)=−10650 *syst* 2017Wa10

Previous evaluations of ^{9}C are found in (1955Aj61, 1959Aj76, 1966La04, 1974Aj01, 1979Aj01, 1984Aj01, 1988Aj01, 2004Ti02).

Larger theoretical review articles: (2001Ka66, 2001Ar22).

Shell model analyses of the properties of light nuclei: (1970Co28, 1974Ir04, 1993Po11, 1998Na17, 1999Ki28, 2001Co21, 2014Vo09, 2015Ti03).

Cluster model analyses of light nuclei: (1995Va18, 1995Va31, 1996Ka14, 1997Ho04, 1997Ka25, 1997Va05, 2001Ka66, 2001Ar22, 2009Fu09, 2014Ko03).

Hartree Fock analyses of light nuclei: (1987Sa15, 1997Ba54, 1998Sh16, 2003Ch79, 2004Sa58, 2010Ha18, 2011Ha38).

Other theoretical approaches: (1996Re19, 1996Su24, 1997Po12, 1998Su18, 2012No09, 2013Ma60, 2019Fo17).

Studies in the ^{9}C-^{9}Li mirror states, and α=9 analog states. (1995Va18, 1995Va31, 1997Po12, 2012Br07, 2019Fo17).

Discussions on p-p pairing interactions and ^{9}C as a proton halo nucleus: (2002Gu10, 2009Fu09, 2010Ha18, 2014Ko03).

Notable:

2014Vo09: Continuum shell model calculations of levels up to E_x≈10 MeV.

2019Fo17: Potential model analysis of mirror states in ^{9}C and ^{9}Li. Predictions are made for the first *s* and $(sd)^2$ states in ^{9}Li based on ^{9}C observations.

The ^{9}C β$^+$, β$^+$p and β$^+$α decay studies are reported in: (1965Ha09, 1972Es05, 1971Ha05, 1971Mo01, 1988Mi03, 1995Ma48, 1996Ma38, 1998Hu08, 2000Ge09, 2001Be51, 2001Bu05, 2002Be53, 2002Bo29, 2004Bo22, 2004Bo43, 2005Mi30).

Compilations of decay properties for a global collection of nuclei are found in (1973Ha77, 1977Ce05, 1993Ch06).

Discussions on searches for evidence of second-class currents in β decay are found in (1970Wi02, 2003Sm02).

Other experimental studies:

1997We03: Analyzed ^{197}Au(^{12}C,X) isotope production at E(^{12}C)≈47 MeV/nucleon to estimate the reaction temperature.

^{9}C Levels

Cross Reference (XREF) Flags

A	^{1}H(^{8}B,P)	H	^{9}Be(^{9}C,^{9}C)	O	^{12}C(P,^{9}C)
B	^{1}H(^{9}C,P)	I	^{9}Be(^{10}C,^{9}C)	P	^{12}C(^{3}He,^{6}He)
C	^{1}H(^{10}C,^{9}C)	J	^{9}Be(^{13}O,X):^{11}O 2p decay	Q	^{12}C(^{9}C,X)
D	^{2}H(^{8}B,^{9}C)	K	^{10}B(p,2n),^{11}B(p,3n),^{12}C(P,D2N)	R	^{12}C(^{12}C,^{9}C)
E	^{6}Li(^{3}He,π$^-$)	L	^{10}B(^{7}Li,^{8}He)	S	^{12}C(^{14}N,^{9}C)
F	^{7}Be(^{3}He,n)	M	^{10}B(^{14}N,^{15}C)	T	^{93}Nb(^{20}Ne,^{9}C)
G	^{9}Be(π$^+$,π$^-$)	N	^{12}C(μ$^-$,^{9}C),^{14}N(μ$^-$,^{9}C)		

E(level)	J^π	T$_{1/2}$	XREF	Comments
0.0	3/2$^-$‡	126.5 ms *10*	BCDEFG IJKLMNOPQRST	%ε+%β$^+$=100; %β$^+$p=62.0 *19*; %β$^+$α=37.9 *58* T=3/2; μ=−1.3914 *5* The β decay of ^{9}C always results in p+2α either by ^{9}C(β$^+$p)^{8}Be→2α or ^{9}C(β$^+$α)^{5}Li→p+α. The decay rates here are from the respective ^{8}Be: ^{9}C β$^+$p and ^{5}Li: ^{9}C β$^+$α data sets in ENSDF. There are essentially two precision measurements given in (2000Ge09, 2001Be51). As in (2004Ti02) we take the ^{9}C branch feeding the ^{9}B g.s. to be 54.1 from (2001Be51), where extra care was taken to avoid low-energy threshold concerns; the branches feeding other levels were taken from (2000Ge09) and renormalized to give a 100% feeding (×46.9/54.1≈0.86). (2000Ge09) also found a large *background* branch (approx 4%), which was attributed to tails from higher states; this intensity is included but not attributed to any states.

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Adopted Levels (continued)

^{9}C Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
				μ from (1996Ma38); see further details in (1994MaZU, 1995MaZW, 1995Ma48, 2002Ma43). See μ=−1.396 μ_N *3* in 1998Hu08. See theoretical discussion in (1997KiZV, 1999Ki28, 2003Su04, 2003Su09, 2003Su28, 2003Sa50, 2004Ut02, 2005Ut02, 2011Za04, 2013Pa10, 2016Me17, 1996Ka14). $T_{1/2}$: From weighted average of 126.5 ms *10* (1971Ha05,1972Es05), 126.5 ms *20* (1971Mo01) and 127 ms *3* (1965Ha09).
2218 *11*	1/2−‡	52 keV *11*	A E H P	%p≈100 (2017Br07) T=3/2 E(level): From (1974Be66: ^{12}C(^{3}He,^{6}He)). Γ: From (2017Br07: ^{9}Be(^{9}C,^{9}C)); see also Γ=100 keV *20* in (1974Be66).
3542 *20*	5/2−	673 keV *50*	A H P	%p≈100 (2017Br07) T=3/2 E(level): From (2017Br07). See also 3.6 MeV *2* (2007Ro01, 2019Ho14: ^{1}H(^{8}B,p)) and 3.30 MeV *5* (1991Go13: ^{12}C(^{3}He,^{6}He)). Efforts to observe a lower-energy state corresponding to the precise energy given in (1991Go13) have found no supporting evidence suggesting only one state is in this region. Γ: From (2017Br07); see also Γ=1.1 MeV *7* in (2019Ho14) and an earlier value Γ=1.4 MeV *5* (2007Ro01). In (2019Ho14) discussion on Γ suggests a large background subtraction in (2017Br07) may distort the deduced value when compaired with their larger value, but (2019Ho14) also suggests the narrower value may be in better agreement when comparing with the ^{9}Li analog. J^{π}: From R-matrix analysis in (2007Ro01).
4400 *40*	5/2+	2.75 MeV *11*	A H P	%p≈100 T=3/2 E(level),Γ: from (2017Br07), see also E_x=4.3 MeV *3* and Γ=4.0 MeV *+20−14* in (2019Ho14). J^{π}: From R-matrix analysis in (2019Ho14). Decays via p+^{8}B*(770 keV: $J^{\pi}=1^{+}$)→2p+^{7}Be.
5750 *40*		601 keV *50*	H	%p≈100 T=3/2 E(level),Γ: From (2017Br07). Decays via p+^{8}B*(2320 keV: $J^{\pi}=3^{+}$)→2p+^{7}Be.
9×10^{3}†			E	E(level): From (1984Br22: ^{6}Li(^{3}He,π^{-})); the state is suggested as the analog to ^{9}Be*(23 MeV: GDR). Γ: broad.
15×10^{3}†			E	E(level): From (1984Br22: ^{6}Li(^{3}He,π^{-}). Γ: broad.

† Decay mode not specified.
‡ From comparison with the mirror ^{9}Li.