^{9}Be(^{19}N,^{18}Cγ) 2012Vo05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Kelley, C. G. Sheu	ENSDF	01-May-2017

The authors measured the lifetime of the first two excited states of ^{18}C.

Neutron rich ^{18}C ions were produced at the NSCL in a multistep process, first by fragmenting a 120 MeV/nucleon ^{22}Ne beam in a 1763 mg/cm^2 ^{9}Be target to produce a $\Delta p/p$=0.7% momentum analyzed 72 MeV/nucleon ^{19}N beam. The ^{19}N beam then impinged on a 196 mg/cm^2 ^{9}Be target where ^{18}C ions were produced in ground and excited states via 1-proton knockout reactions. Transitions from the $J^{\pi}=2^{+}_{1,2}$ states are observed with a relative production ratio of 4: 1, respectively.

The lifetimes were determined using the recoil distance method (see for example 2008De30). A 2.01 g/cm^2 ^{181}Ta degrader foil was placed downstream of the 196 mg/cm^2 ^{9}Be reaction foil; γ-rays emitted before/after the degrader foil experience different Doppler shifts and the state lifetime can be deduced from the ratio (v/c_i=0.3565 and $v/c_f\approx$0.2920). Reactions in the Ta degrader foil introduce a systematic error.

Finally, discussion indicates strong evidence that the inclusion of three-body forces is needed to describe the low-lying excited-state properties of this A=18 system.

^{18}C Levels

E(level)	J^{π}	$T_{1/2}$	Comments
0	0^+		
1585 *19*	2^+	15.5 ps *25*	The mean lifetime τ=22.4 ps *9*(stat) *+33−22*(syst) is deduced corresponding to $T_{1/2}$=15.5 ps *6*(stat) *+23−15*(syst).
2517 *22*	(2^+)	<3.2 ps	The mean lifetime τ<4.6 ps is deduced corresponding to $T_{1/2}$<3.2 ps.

γ(^{18}C)

E_i(level)	J^{π}_i	E_γ	I_γ	E_f	J^{π}_f	Mult.	Comments
1585	2^+	1585 *19*		0	0^+	E2	B(E2)=0.000364 *+15−14*(stat) *+40−47*(syst).
2517	(2^+)	932 *11*	86 *12*	1585	2^+		
		2517 *30*	14 *12*	0	0^+		

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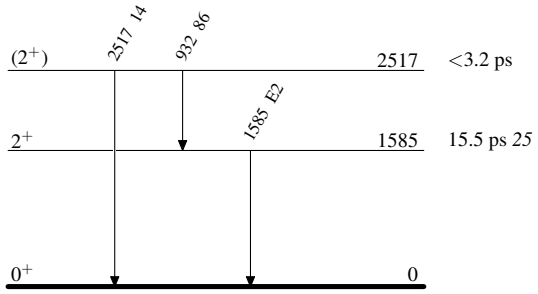
Level Scheme

Intensities: % photon branching from each level



$^{18}_{6}C_{12}$