$^{9}Be(^{18}C,^{17}C\gamma)$:NSCL　　2015Sm03

History

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

The authors measured the lifetimes of relatively long-lived states in ^{17}C using the TRIple PLunger for EXotic beams (TRIPLEX). A beam of 74.2 MeV/nucleon ^{18}C ions was produced by fragmenting a ^{22}Ne beam on a ^{9}Be target at the NSCL/A1900 fragment separator. The beam impinged on a 370 mg/cm^2 ^{9}Be target located at the target position of the S800 spectrometer, where the TRIPLEX plunger system was located. The TRIPLEX comprised the ^{9}Be target and a set of 1640 and 950 mg/cm^2 Ta energy degrading targets that were located at variable distances from the Be target. De-excitation γ rays from the decay of ^{17}C states, produced in $^{9}Be(^{18}C,^{17}C*)$ reactions, were observed using the GRETINA array, which covered θ=25° to 90°. Two de-excitation peaks were observed at E_γ=218 keV 1 and 332 keV 1. Analysis of the intensities of the velocity dependent Doppler shifted γ rays, after each plunger degrader, permitted a determination of the lifetime of the parent states. The center Ta degrader of the plunger device was located to give optimal lifetime sensitivity.

Finally, B(M1) values are deduced for the two observed transitions. Pure M1 decay is assumed for the observed transitions, but for the E_γ=218 keV 1 (J^π=1/2$^+$ to 3/2$^+$) transition, in the calculation of B(M1), an additional $\tau=^{+47}_{-0}$ uncertainty is added to the M1 partial lifetime to account for any E2 contributions. Discussion on the structure of ^{17}C and transition rate was included, especially on the roles played by three-body interactions and the continuum.

^{17}C Levels

E(level)	$J^{\pi\dagger}$	$T_{1/2}$	Comments
0	3/2$^+$		
218 1	1/2$^+$	366 ps +15−10	$T_{1/2}$: from τ=528 ps +21−14.
322 1	5/2$^+$	15.1 ps +24−23	$T_{1/2}$: from τ=21.8 ps +34−33.

† From (2013Ue01).

$\gamma(^{17}C)$

E_i(level)	J^π_i	$E_\gamma{}^\dagger$	I_γ	E_f	J^π_f	Comments
218	1/2$^+$	218 1	100	0	3/2$^+$	B(M1)↓=1.04×10^{-2} +3−12
322	5/2$^+$	322 1	100	0	3/2$^+$	B(M1)↓=7.12×10^{-2} +127−96

† From Doppler shift correction.

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<center><u>Level Scheme</u></center>

<center>Intensities: Relative photon branching from each level</center>

<center>${}^{17}_{6}C_{11}$</center>