$^{1}H(^{19}C,P'\gamma)$ 2005El07

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, G. C. Sheu	ENSDF	23-March-2017

Beam=^{19}C, target=liquid H_2.

2005El07: A beam of 49.4 MeV/nucleon ^{19}C ions, produced in fragmentation of a 110 MeV/nucleon ^{22}Ne beam on a ^{9}Be target at the RIKEN/RIPS facility, was momentum and mass analyzed before impinging in a 3 cm diameter cryogenic hydrogen target that had an areal density of 190 mg/cm^2.

The scattered ^{19}C particles were detected in a ΔE-ΔE-ΔE-E telescope that covered θ<1.7°, while γ-rays were detected using the DALI2 array of 158 NaI(Tl) scintillators. Eγ, Iγ, $\gamma\gamma$, particle-γ coin were measured.

2005Ka26: The authors searched for evidence of an isomeric state with E_x<300 keV and $T_{1/2}$<500 ns, as predicted by shell model calculations.

A coctail beam, including ^{19}C and ^{17}B, was produced by fragmenting a ^{22}Ne beam on a ^{9}Be target at RIKEN. Beam particles were identified from analysis of ΔE, time-of-flight and beam rigidity. The beam impinged on a liquid hydrogen target that was surrounded by NaI γ-ray detectors; results for prompt transitions are reported in (2005El07). After the target, the beam was stopped in a ΔE-ΔE-ΔE-E telescope that was surrounded by thin plastic scintillators (for identification of β decay events) and an array of segmented HPGe clover detectors that were intended to observed delayed de-excitations from isomeric states populated in the reaction. Several transitions related to β-decay of daughters and granddaughters were identified. No definitive evidence in support of an isomeric state was found.

The authors commented on the level of confidence for non-observation over various transition energy ranges, and over various lifetime ranges. Finally, various combinations of J^π values were considered for the ground state and a supposed isomeric state.

See also analysis in (2008Ka39).

^{19}C Levels

E(level)‡	J$^\pi$†	Comments
0.0	1/2$^+$	Configuration=$d^4_{5/2}\otimes s_{1/2}$ (2001Ma08).
197? *6*	(3/2$^+$)	Configuration of state suggested as mixture of $d^5_{5/2}$, $d^5_{5/2}\otimes s^2_{1/2}$ and $d^4_{5/2}\otimes s_{1/2}$ configurations (2001Ma08).
269? *8*	(5/2$^+$)	β_2=0.29 *3*; deduced from integrated experimental cross section for this state from 0°−1.7° and distorted wave analysis (2005El07). Cross section: 4.2 mb *5* in (p,p′).

† Tentative assignments to excited states based upon systematics of transition strengths combined with considerations of g.s. configuration and half-lives of the excited states.

‡ From 2005El07.

$\gamma(^{19}C)$

Neither of the observed transitions in ^{19}C from 2005El07 corresponds to a 5/2→1/2 γ ray as it would imply a long lifetime for each level and would make the observation of the transitions impossible with the setup described above.

Eγ†‡	Iγ‡	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
72 *4*	100 *13*	269?	(5/2$^+$)	197?	(3/2$^+$)	
197 *6*	89 *12*	197?	(3/2$^+$)	0.0	1/2$^+$	Eγ: Assignment to (1/2$^+$) state based upon retarded feature of the 3/2→1/2 transition and the prompt nature of the observed γ rays. (2005El07).

† Quoted uncertainties are from statistical error and Doppler correction.

‡ From 2005El07.

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Level Scheme

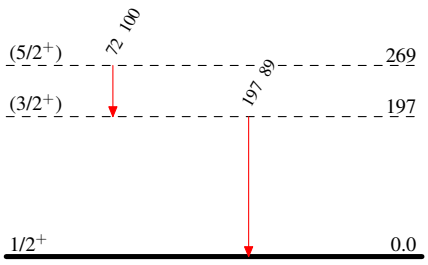
Intensities: Relative I_γ

Legend

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

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

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



$^{19}_{6}C_{13}$