^{9}Be(^{9}C,^{7}B) 2011Ch32

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Kelley, C. G. Sheu	ENSDF	01-June-2014

The authors impinged a 70 MeV/A ^{9}C beam on a thick ^{9}Be target and detected ejected reaction products with a large area position sensitive ΔE-E array. Reconstruction of the complete kinematics permitted an analysis of excitation energies, decay pathways and associated branching ratios for several nuclei.

A beam of 150 MeV/nucleon ^{16}O ions was fragmented in a thick ^{9}Be target to produce a 70 MeV/nucleon ^{9}C beam in the NSCL A1900 fragment separator. The ^{9}C beam impinged on a 1mm thick ^{9}Be target and reaction products were detected in 14 position sensitive ΔE-E elements of the HiRA array. The coincident reaction products were analyzed via kinematic energy reconstruction to evaluate excitation energies and decay paths.

The $^{7}B_{g.s.}$ is observed in the 3p+α decay spectrum, which is significantly contaminated by ^{8}C events (4p+α) where one proton is not detected. The ^{7}B excitation energy spectrum is "corrected" for ^{8}C events and a broad background is also considered.

^{7}B Levels

E(level)	J^{π}	Γ	Comments
0	$(3/2^{-})$	801 keV *20*	T=(3/2) J^{π}: From Adopted Levels. A kinematic reconstruction of α+3p events indicates a state at mass excess=27677 keV *25*, which is ≈ 250 keV lower than the accepted value for $^{7}B_{g.s.}$ (27.94 MeV *10*). A width of Γ=800 keV *20* was deduced, which compares with 1.4 MeV *2* from 1967Mc14. The decay path was evaluated to determine the fraction of $^{7}B_{g.s.}$ –> p+$^{6}Be_{g.s.}$ decay events. Initial analysis indicated a (54 ± *6*)% probability for p+$^{6}Be_{g.s.}$ events in the data, though after correction for a broad background component a final ratio of $^{7}Be_{g.s.}$ –> (81 ± *10*)% p+$^{6}Be_{g.s.}$ is deduced. This appears consistent with a shell model spectroscopic factor prediction S=0.688. Discussion on the p+^{6}Be*(1.67 MeV; $J^{\pi}=2^{+}$) decay branch is given. The p+^{6}Be(2^{+}) configuration is expected to be 3 times larger than the p+$^{6}Be_{g.s.}(0^{+})$ configuration in $^{7}B_{g.s.}$; however the p+^{6}Be(2^{+}) channel is suppressed due to a smaller barrier penetration factor.