$^{9}Be(^{26}F,nX)$ 2009Ho01,2011Ho05,2015Ro16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty	NDS 186, 2 (2022)	31-Mar-2022

2009Ho01: E=85 MeV/nucleon ^{26}F beam provided by NSCL at MSU. The ^{26}F beam produced in the primary reaction ^{9}Be(^{48}Ca,X) with E(^{48}Ca)=140 MeV/nucleon. The fragments were separated by A1900 fragment separator. Measured (neutron)(^{23}O) coincidences using position-sensitive parallel-plate avalanche counters (PPAC) for charged fragments and Modular neutron array (MoNA) of plastic scintillators for neutrons.

2011Ho05: radioactive ^{26}F beam, E=85 MeV/nucleon at the Cyclotron Facility at NSCL. Target: Be of thickness 470 mg/cm^2. Used Modular Neutron Array (MoNA) to measure E(n), ^{22}O(n-n) coincidence and identified ^{22}O recoil fragments by energy loss and time of flight (tof). Deduced a two-neutron cascade from a resonant state in ^{24}O.

2015Ro16: E=76 MeV/nucleon ^{26}F secondary beam was produced from fragmentation of ^{48}Ca primary beam, E=140 MeV/nucleon, bombarding a ^{9}Be target (thickness 987 mg/cm^2). Reaction products were separated using the A1900 fragment separator at NSCL. ^{26}F beam purity was 3.3% with major contaminant of ^{29}Na fragments. ^{26}F beam particles were identified and separated from other contaminants by time-of-flight analysis and bombarded a secondary Be target (thickness 188 mg/cm^2). ^{24}O were populated either by the knockout of a p-shell proton in ^{26}F followed by neutron emission from the continuum or by direct removal of a valence proton together with a neutron. Charge fragments emerged from the secondary Be target were deflected, trajectories were determined using Cathode Readout Drift Chamber (CRCD) detectors, and fragment energy and energy loss were determined using an ion chamber and thin and thick plastic scintillators. The ^{23}O fragments from ^{24}O unbound excited state decay were separated using their trajectory and time of flight.

Reported data in 2009Ho01, 2011Ho05, and 2015Ro16 are from the same experimental facility with a few common co-authors.

^{24}O Levels

E(level)†	J$^{\pi}$‡	Γ	L	Comments
0.0	0$^+$			
4.77×10^3 *21*	(2$^+$)	0.05# MeV *+21−5*		E(level): From decay energy of 583 keV *59*: weighted average of measured decay energy, 630 keV *40* (2009Ho01) and 510 keV *50* (2015Ro16).
5.41×10^3 *21*	(1$^+$)	0.03# MeV *+12−3*		E(level): From decay energy of 1220 keV *70*: weighted average (unc − input value) of measured decay energy, 1240 keV *70* (2009Ho01) and 1200 keV *70* (2015Ro16).
≈7.6×10^3	($^+$)	0.1 MeV	(2)	E(level): From observed resonance at ≈ 0.6 (2011Ho05) deduced from the invariant mass equations in coincidence with another decay at E(n)<0.1 MeV, considered as corresponding to a previously observed decay of a 2.8 MeV, (5/2$^+$) state (45 keV *2* resonance) in ^{23}O to the ground state of ^{22}O. L,Γ: From Monte-Carlo simulations, both resonances (0.6 MeV in ^{24}O and 45 keV in ^{23}O) have L=2 (0d$_{3/2}$ neutron decay) and Γ=0.1 MeV. Decays by a two-neutron sequential cascade to the g.s. of ^{22}O.

† Using decay energy and S(n)(^{24}O)=4190 *200* (2021Wa16), except where otherwise noted. 2009Ho01 used S(n)=4090 keV *100* from 2007Ju03, thus all excitation energies quoted in 2009Ho01 have been adjusted upward by 0.1 MeV.

‡ From L values deduced from Breit-Wigner line-shape fit to the experimental decay spectrum and comparison with shell-model calculations.

For decay to 1/2$^+$ g.s. in ^{23}O; deduced from Breit-Wigner line-shape analysis of ^{23}O-neutron coincidence spectrum.