Adopted Levels 2019We03

S(p)=−1.56×10^3 2017Wa10,2019We03

From S_{2p}=−4160 keV (2019We03), ΔM(^{9}C)=28.91 MeV and ΔM(^{11}O)=47.65 MeV.

Evidence supporting observation of the unbound ground state of ^{11}O has been reported in (2019We03). A multiplet of unresolved broad states peaked at E(2p+^{9}C)≈4.5 MeV is observed; the analysis supports association with a group of four resonances having J^π=3/2$^-$ and 5/2$^+$.

Theoretical Mass Estimates:

2012Ch40: The mass of ^{11}C was predicted using the Isobaric Multiplet Mass Equation. In the article, the authors used the ^{12}Be(p,2n) reaction to identify the ^{11}Li$_{g.s.}$ double isobaric analog state in ^{11}B at E_x=33.57 MeV *8*. With this information, and using the appropriate analog state masses of ^{11}Li, ^{11}Be and ^{11}B, using the *a*, *b* and *c* terms of the IMME they predicted the mass excess of the ^{11}O ground state as ΔM=46.70 MeV *84*. In this case, ^{11}O is predicted to be unbound to 2p decay by 3.21 MeV *84*.

2013Fo20:

A parametrization of mirror energy differences is developed and used to predict the ^{11}O$_{g.s.}$ mass. The formula is presented as MED=S_{2n}−S_{2p}=[a+bS_{2n}−cP(s^2)]$Z_<$/A$^{1/3}$, where P(s^2) is the fractional parentage in the 2s$_{1/2}$ orbital. Using a=0.0228(7) (dimensionless), b=0.724(6) MeV and c=2.373(9) MeV (2013Fo01), S_{2p}=−5.41 MeV *11* is predicted.

2013Fo26, 2017Fo14:

In (2013Fo26) a potential model is developed to estimate the energies of the s^2- and p-shell energies in ^{11}O, and the relationship between the two proton separation energy, S_{2p}, and the fractional occupancy, P(s^2), is explored. The sequential decay (via ^{10}N unbound states) and simultaneous 2p decay modes of ^{11}O are estimated in (2017Fo14) using their predicted S_{2p}=−4.49 MeV value. Their conclusion suggests, “Simultaneous decay is predicted to be comparable to or larger than sequential decay.”.

Others:

See also (1974Ir04, 1987Sa15, 2000Po32).

^{11}O Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{13}O,2p+^{9}C)

E(level)†‡	J^π†	Γ (MeV)†	$E_{rel.}$(2p+^{9}C) (MeV)	XREF	Comments
0	(3/2$^-$)	1.30 MeV	4.16	A	%2p≈100 E(level): (2019We03) observe a peak near E_{res}(2p+^{9}C)≈4.5 MeV that is reasonably explained assuming a four resonance multiplet.
0.49×10^3	(5/2$^+$)	1.06 MeV	4.65	A	%2p≈100
0.69×10^3	(3/2$^-$)	1.33 MeV	4.85	A	%2p≈100
2.12×10^3	(5/2$^+$)	1.96 MeV	6.28	A	%2p≈100

† From analysis of a 2p+^{9}C relative energy spectrum, including comparison with the mirror ^{11}Li nuclear structure.

‡ $E_{g.s.}$ from E_{res}(2p+^{9}C)=4.16 MeV.

^{9}Be(^{13}O,2p+^{9}C) 2019We03

The authors analysed the relative energy spectrum of 2p+^{9}C products following 2-neutron knockout reactions from ^{13}O ions. First evidence of any ^{11}O resonances is reported.

A beam of 69.5 MeV/nucleon ^{13}O ions, from the NSCL/A1900 fragment separator, was purified in the Radio Frequency Fragment Separator before impinging on a 1 mm thick ^{9}Be target. The reaction products were detected using the HiRA High-Resolution position sensitive ΔE-E telescope array, which covered the polar angles θ_{lab}=2.1° to 12.1°. A broad peak near E_{res}(2p+^{9}C)≈4.5 MeV was observed in the total energy spectrum. The peak included contributions from 2p+^{9}C, 2p+^{10}C and 2p+^{11}C; however the 2p+^{10}C(^{12}O) and 2p+^{11}C(^{13}O) components were estimated and subtracted.

A rigorous theoretical analysis of the resulting spectrum was carried out that included a comparison with the mirror ^{11}Li system. The authors found a reasonable fit to their spectrum by assuming the broad peak they observed could be associated with a collection of four unresolved J^{π}=3/2^{-} and 5/2^{+} states.

^{11}O Levels

E(level)[†‡]	J^{π}[†]	Γ (MeV)[†]	$E_{rel.}$(2p+^{9}C) (MeV)	Comments
0	(3/2^{-})	1.30 MeV	4.16	%2p≈100 E(level): (2019We03) observe a peak near E_{res}(2p+^{9}C)≈4.5 MeV that is reasonably explained using a four resonance fit. The fit, which is guided by theory, is found to be favorable but not uniquely constrained.
0.49×10^{3}	(5/2^{+})	1.06 MeV	4.65	%2p≈100
0.69×10^{3}	(3/2^{-})	1.33 MeV	4.85	%2p≈100
2.12×10^{3}	(5/2^{+})	1.96 MeV	6.28	%2p≈100

[†] From analysis and comparison with ^{11}Li.

[‡] $E_{g.s.}$ from E_{res}(2p+^{9}C)=4.16 MeV.

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