## $^{12}C(^{17}Ne,^{16}Ne)$ 2014Wa09,2015Ma09

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
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2014Wa09,2015Ma09: XUNDL dataset compiled/updated by TUNL, 2014/2015.

A beam of 500 MeV/nucleon $^{17}$Ne ions was produced by fragmenting $^{20}$Ne nuclei on a Be target. The $^{17}$Ne ions impinged on either carbon or polyethylene targets that were positioned at the ALADIN large-gap dipole magnet target position. The protons and oxygen isotope reaction products were detected in separate arrays, which determined their momenta following $^{17}$Ne breakup.

The relative energy spectra of 2p+$^{13,14,15}$O products were analyzed to determine the $^{15,16,17}$Ne states populated in the reactions. Analysis of $^{15}$O+2p events, which involved $^{17}$Ne*(1764 keV) with E($^{15}$O+2p)=831 keV *12* (observed at E($^{15}$O+2p)=881 keV *5*), was used as a calibration reaction. A systematic correction of the relative energy spectrum based on the analysis (detailed in F. Warmers, private communication, May 28, 2014, and 2015Ma09) was applied to all relative energy spectra. Analysis of the $^{14}$O+2p products, which populated $^{16}$Ne resonances at E($^{14}$O+2p)=1.4, 3.2 MeV, provided a verification of the method.

The $^{14}$O+2p relative energy spectrum revealed three well resolved structures that correspond to previously observed states.

Analysis of the 3-body correlations indicate $J^\pi$ of $^{16}$Ne*(6170) is unambiguously $2^+$ (2015Ma09).

### $^{16}$Ne Levels

| E(level)[†] | $J^\pi$[‡] | $\Gamma$[‡] | E($^{14}$O+2p) (MeV)[‡] | Comments |
|---|---|---|---|---|
| 0 | $0^+$ | 82 keV *15* | | E($^{14}$O+2p) (MeV): We used 1401 keV *20* from (2017Wa10: AME-2016). See also 1.388 MeV *15* (2014Wa09,2015Ma09). |
| $1.82\times10^3$ *5* | $(0^+,2^+)$ | ≤50 keV | 3.22 *5* | E(level): decays predominantly to $^{15}F_{g.s.}(1/2^+)$ by p emission (2015Ma09).<br>Assuming $J^\pi=2^+$, comparison with $^{16}$C implies a Thomas-Ehrman shift $\Delta$=+70 keV *46*. |
| $6.17\times10^3$ *6* | $2^+$ | ≤100 keV | 7.57 *6* | $J^\pi=(2^+)$ in (2014Wa09). Analysis of 3-body correlations in (2015Ma09) confirms $J^\pi=2^+$.<br>E(level): decays primarily by p emission to $^{15}$F*(2.8 MeV:$5/2^+$) (2015Ma09). |

[†] Level energies are deduced using $^{14}$O, $^{16}$Ne and p mass excesses from (2017Wa10: AME-2016). The literature reports a sizeable spread in measured values for the g.s. E($^{14}$O+2p) resonance energy, and use of any different g.s. energy would change the excitation energy scale.

[‡] From (2014Wa09,2015Ma09).