Pb(^{17}Ne,^{17}Ne) 2016Ma42

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, G. C. Sheu	ENSDF	16-Jan-2018

2016Ma42: XUNDL file compiled by TUNL 2017. See earlier analysis in (2012Ma39,2016Mazy,2016PaZX).

Nuclear and Coulomb excitation of 500 MeV/nucleon ^{17}Ne projectiles on either 199 mg/cm^2 lead, 370 mg/cm^2 carbon or a 213 mg/cm^2 polyethylene targets was measured at the GSI/R^{3}B-LAND target position. After the target, particles were momentum analyzed using position, ΔE, Time-of-Flight and/or magnetic rigidity analysis techniques. In addition, the γ rays from reactions in the target were detected using the 4π Crystal Ball array.

Events with ^{15}O+p+p particles in coincidence were analyzed to obtain the ^{17}Ne excitation spectra. Five peaks, corresponding to unbound ^{17}Ne states are observed in the polyethylene and carbon target data, while only three states are observed in the lead target data. The lowest peak apparently corresponds to an unresolved doublet, first reported by (1998Gu10). The second peak agrees well in excitation energy with the $J^\pi=5/2^+$ 2651 keV *12* state, also reported by (1998Gu10); however because this region is populated in both Coulomb and nuclear mechanisms, it is suggested that a $5/2^+$ and $3/2^-$ doublet is present in this region.

The 3-body kinematics are also analyzed to estimate the branching ratios for sequential decay via ^{16}F states (assuming only the ^{15}O ground state is populated.

Lastly, the Coulomb excitation results are analyzed to obtain the transition strengths.

See (2018Pa43) for theoretical analysis and discussion of astrophysical reactions.

^{17}Ne Levels

E(level)	J^π	Comments
0		
1764† *12*	$5/2^-$	B(E2)↑=0.0090 *18* σ(CH$_2$)=4.04 mb *20*, σ(C)=2.44 mb *18*, σ(Pb)=11.6 mb *15*, σ(H)≈0.80 mb *14*. Analysis of 3-body kinematics suggests decay via ^{16}F*(1468:$J^\pi=0^-$).
1908† *15*	$1/2^+$	B(E1)↑<0.00007 σ(CH$_2$)=0.85 mb *15*, σ(C)=0.81 mb *15*, σ(Pb)=2.5 mb *12*, σ(H)≈<0.1 mb. Analysis of 3-body kinematics suggests decay via ^{16}F*(1468:$J^\pi=0^-$).
2614‡ *20*	$5/2^+$	σ(CH$_2$)=0.97 mb *51*, σ(C)=1.14 mb *10*, σ(Pb)=7.68 mb *74*, σ(H)≈<0.2 mb. Analysis of 3-body kinematics suggests decay via ^{16}F*(1892:$J^\pi=2^-$).
2692‡ *21*	$(3/2^-)$	B(E2)↑=0.0069 *10* σ(CH$_2$)=1.40 mb *53*, σ(C)<0.3 mb, σ(Pb)=0 mb, σ(H)≈0.70 mb *26*. Analysis of 3-body kinematics suggests decay via ^{16}F*(1892:$J^\pi=2^-$).
3415 *38*	$(5/2^-)$	σ(CH$_2$)=1.37 mb *12*, σ(C)=0.62 mb *10*, σ(Pb)=0 mb, σ(H)≈0.38 mb *8*. Analysis of 3-body kinematics suggests 50% decay via ^{16}F*(1892:$J^\pi=2^-$) and 50% decay via ^{16}F*(2180:$J^\pi=3^-$).
5210 *79*	$(3/2^+)$	B(E1)↑=0.00071 *9* σ(CH$_2$)=1.13 mb *22*, σ(C)=0.46 mb *19*, σ(Pb)=14.4 mb *17*, σ(H)≈0.33 mb *15*. Table 4 lists E_x=5141, which is the value reported in (1998Gu10). σ(CH$_2$)=2.10 mb *35*, σ(C)=0.91 mb *46*, σ(Pb)=0 mb.

† Unresolved doublet with ^{17}Ne*(1764) and ^{17}Ne*(1908); E, J^π from (1998Gu10).

‡ Suggested unresolved doublet with ^{17}Ne*(2614 keV *20*:$5/2^+$) and ^{17}Ne*(2692 keV *21*:$3/2^-$).