Adopted Levels

S(p)=−131 *25*; Q(α)=−10350 *30* 2017Wa10
S(2p)=−1401 *20*; ΔM=23987 keV *20* (2017Wa10).

^{16}Ne was first reported in $^{16}O(\pi^+,\pi^-)$ by (1977Ho13: see 2012Th01). It is bound with respect to decay into ^{15}F+p by 131 keV and unbound with respect to ^{14}O+2p by 1.40 MeV. An earlier search for 2p decay radiation from ^{16}Ne (1964Ka28) failed to find evidence of any states.

Theory:
Predictions, calculations and analyses for ground-state and excited-state parameters of ^{16}Ne: 1972Wa07, 1975Be31, 1983Ma35, 1984An18, 1996Gr21, 1997Pa38, 1999Og11, 2002Fo11, 2004Ge02, 2006Fo16, 2006Sa29, 2009Ok01, 2009Ok03, 2010Fo06, 2010Ti02, 2011Ok01, 2011Ro50, 2012Ok03, 2013Xu15, 2015Wu07, 2016Fo09, 2016Fo11, 2016Pr01, 2018Fo04, 2019Sr02.
Few-body interactions and decays: 1962Go28, 1990Ko45, 2001Gr29, 2002Gr03, 2002Gr25, 2006Xu15, 2012Ok03, 2014Fo15, 2015Gr04, 2016Fo09, 2017Fo23, 2017Go17, 2019Ka50.

^{16}Ne Levels

Cross Reference (XREF) Flags

- **A** $^9Be(^{17}Ne,^{16}Ne)$
- **B** $^{12}C(^{17}Ne,^{16}Ne)$
- **C** $^{16}O(\pi^+,\pi^-)$
- **D** $^{20}Ne(\alpha,^8He)$

E(level)†	J^π	Γ	E(^{14}O+2p) (MeV)	XREF	Comments
0	0^{+}#&	<80 keV	1.401 *20*	ABCD	%2p=100 Decays 100% by 2p decay mode to ^{14}O (2008Mu13). E(^{14}O+2p) (MeV): We used S_{2p}=−1401 keV *20* from (2017Wa10: AME-2016).The weighted average of all measured S_{2p} values is −1413 keV *17* (external errors) based on −1350 keV *80* (2008Mu13, 2009Mu09, 2009Mu17, 2010Mu12), −1466 keV *20* (2014Br19, 2015Br11), −1388 keV *15* (2014Wa09,2015Ma09), −1463 keV *45* (1980Bu15), −1399 keV *24* (1983Wo01) and −1330 keV *80* (1978Ke06). See also S_{2p}=−1476 keV (2016ChZV). Direct measurements of reaction Q-values to obtain the ΔM are given in (1983Wo01: ΔM=23.984 MeV *24*), (1980Bu15: 24.051 MeV *45*) and (1978Ke06: 23.92 MeV *8*). In this evaluation we accept ΔM=23987 keV *20* from (2017Wa10: AME-2016). See also (1977Ho13,1978Bu09: 24.4 MeV *5*) and (1966Ke16, 1978Gu10, 1988Co15, 2013Xu15, 2018Fo04: theory). Γ: The expected width is ≈0.8-3.1 keV (2002Gr03, 2015Br11), but the experimental resolution limits observations. In (2014Br19) Γ<80 keV was determined from the best fit to the ^{14}O+p+p excitation function using a Breit-Wigner line shape. Similarly, in (2014Wa09) a resolution folded Breit-Wigner line shape is fit to the ^{14}O+p+p excitation function resulting in Γ=82 keV *15*. Early measurements of $^{20}Ne(\alpha,^8He)$ reported Γ=110 keV 40 (1983Wo01) and Γ_{exp}=200 keV *100* (1978Ke06). In (1978Ke06) a detailed discussion on the total decay width is given where proton and diproton penetrabilities are taken into account; the authors suggested a total decay width of 20 keV (ranging between 5-100 keV) and a diproton branching ratio of 10-90%.

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Adopted Levels (continued)

^{16}Ne Levels (continued)

E(level)[†]	J^π	Γ	E(^{14}O+2p) (MeV)	XREF	Comments
1.77×10^3[‡] *3*	2$^+$[#]	≤50 keV	3.17 *2*	ABCD	J^π: See also 0$^+$ (1997Fo09). E(^{14}O+2p) (MeV): from the weighted average of 3.16 MeV *2* (2014Br19, 2015Br11) and 3.22 MeV *5* (2014Wa09, 2015Ma09). See also 3.56 MeV *21* (1980Bu15) and 3.02 MeV *11* (1978Ke06). Γ: from (2014Wa09,2015Ma09). See also 200 keV *200* (2010Mu12) and 150 keV *50* (2015Br11), which may be influenced by other nearby states. Unusual correlations amongst the ^{14}O+2p ejectiles indicate a complex interplay between direct 2p decay and sequential decay via ^{15}F*+p (2015Br11). See also (2010Mu12).
6.19×10^3 *4*	2$^+$[@&]	≤100 keV	7.59 *3*	AB	%p=100 E(^{14}O+2p) (MeV): from the weighted average of 7.60 MeV *4* (2014Br19,2015Br11) and 7.57 MeV *6* (2014Wa09,2015Ma09). Γ: from (2014Wa09,2015Ma09). See also ≤0.5 MeV (2015Br11) and 0.8 MeV *+8−4* (2009Mu09,2010Mu12).
8.44×10^3[‡] *10*		0.32[a] MeV *10*	9.84 *10*	A	E(^{14}O+2p) (MeV): deduced from E(^{13}N+3p)=5.21 MeV *10* (2015Br11).
10.83×10^3[‡] *20*		0.51[a] MeV *23*	12.23 *20*	A	E(^{14}O+2p) (MeV): deduced from E(^{13}N+3p)=7.60 MeV *20* (2015Br11).

[†] 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.

[‡] Decay mode not specified.

[#] From (2010Mu12,2014Br19,2015Br11).

[@] From (2009Mu09,2010Mu12).

[&] See also (2014Wa09,2015Ma09).

[a] From (2015Br11).

$^{9}Be(^{17}Ne,^{16}Ne)$ 2010Mu12,2015Br11

2008Mu13: XUNDL dataset compiled by McMaster University, 2008.

Two-proton radioactive decay of ^{16}Ne to ^{14}O was observed in the reactions of a 410 MeV/nucleon ^{17}Ne secondary beam on a ^{9}Be target. the ^{17}Ne beam was produced by fragmenting a ^{24}Mg beam at the GSI SIS facility. The $^{17}Ne+^{9}Be$ reaction products were detected with four large area silicon strip detectors. The momenta of ^{14}O fragments and correlated two protons from ^{16}Ne were analyzed along with the p+^{14}O angular correlations.

The two-proton decay process comprises simultaneous emission of 2 protons from $^{16}Ne_{g.s.}$ to ^{14}O and sequential decay from excited states of ^{16}Ne via $^{15}F_{g.s.}$ which decay 100% by proton emission.

2009Mu09: XUNDL dataset compiled by TUNL, 2009.

The authors fragmented a E=450A MeV beam of ^{17}Ne ions in a ^{9}Be target to produce ^{16}Ne nuclei. Residual ^{15}F+p and ^{14}O+2p products were detected in the FRS spectrometer (heavy ions) and a Si Strip Array (protons). Kinematic reconstruction of the reaction product trajectories yielded information on ^{16}Ne levels.

2010Mu12: XUNDL dataset compiled by TUNL, 2011.

A 591 MeV/nucleon beam of ^{24}Mg, from the SIS facility at GSI, was used to produce a beam of 410 MeV/nucleon ^{17}Ne in the FRS. The ^{16}Ne nuclei were produced by (^{17}Ne,^{16}Ne) reactions on a ^{9}Be target. The (p_1-^{14}O)(p_2-^{14}O) angular correlations were analyzed to determine: the decay mode (2p or sequential proton decay), and the excitation energies of states involved in the reactions. Angular correlations were measured; momenta were not measured; hence properties of excited states are deduced based on GEANT simulations of the p-HI (Heavy Ion) and (p_1-HI)(p_2-HI) angular correlations.

2014Br19: XUNDL dataset compiled by NSCL, 2014.

A ^{17}Ne beam with an average E=57.6 MeV/nucleon was produced using the MSU/NSCL A1900 fragment separator. The ^{17}Ne beam impinged on a 1 mm thick ^{9}Be target yielding ^{16}Ne reaction products that decayed into ^{14}O+p+p. These decay products were detected in the High Resolution Array (HiRA), which was configured as 14 ΔE-E Si-CsI(Tl) telescopes subtending zenith angles from 2° to 13.9°. The 2p+^{14}O relative energy distribution was obtained from kinematic analysis of the momenta of the decay particles and ^{16}Ne resonance energies and decay modes were deduced. A limit for the intrinsic decay width of the ground state was deduced.

For the first time a 2p emitter was studied where correlations between the momenta of the three decay products with sufficient resolution and statistics allowed for an unambiguous demonstration of dependence on the long-range nature of the Coulomb interaction.

2015Br11: XUNDL dataset compiled by TUNL, 2015.

The data of 2014Br19 were further analyzed in 2015Br11. The analysis of ^{14}O+2p and ^{13}N+3p relative energy spectra and few-body correlations was extended to gain additional information on ^{16}Ne level spectroscopy.

The ground state and E_x=1.69 MeV first excited state were observed in ^{14}O+2p events. Significant attention was focused on the core-p-p correlations and the comparison of 3-body breakup vs sequential decay via ^{15}F states. In addition to this, kinematic analysis of the ^{13}N+3p events indicated states at E_x=8.37 and 10.76 MeV.

See also (2016ChZV).

^{16}Ne Levels

E(level)[†]	J^{π}[‡]	Γ[&]	E(^{14}O+2p) (MeV)	Comments
0	0^{+}[#]	<80 keV		%2p=100 Decays 100% by 2p decay mode to ^{14}O (2008Mu13). E(^{14}O+2p) (MeV): We used 1401 keV *20* from (2017Wa10: AME-2016). See also 1350 keV *80* (2008Mu13,2009Mu09,2009Mu17,2010Mu12), 1466 keV *20* (2014Br19,2015Br11) and 1476 keV (2016ChZV: $\tau \approx 4\times10^{-19}$ s). Γ: The expected width is ≈0.8-3.1 keV (2002Gr03, 2015Br11), but the experimental resolution limits the result. This Γ<80 keV was determined from the best fit to the excitation function using a Breit-Wigner line shape (2014Br19).
1.76×10^{3} *3*	2^{+}[#]	153 keV *49*	3.16 *2*	E(^{14}O+2p) (MeV): From (2014Br19,2015Br11); See also E(^{14}O+2p)=3.2 MeV *2* (2010Mu12) and 3160 keV (2016ChZV). Γ: weighted value of 150 keV *50* (2015Br11) and 0.2 MeV *2*

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^{9}Be(^{17}Ne,^{16}Ne) 2010Mu12,2015Br11 (continued)

^{16}Ne Levels (continued)

E(level)[†]	Jπ[‡]	Γ[&]	E(^{14}O+2p) (MeV)	Comments
				(2010Mu12). The width of the state cannot be reproduced in simple models, suggesting that unaccounted for nearby states may influence the observations (2015Br11). Unusual correlations amongst the ^{14}O+2p ejectiles indicate a complex interplay between direct 2p decay and sequential decay via ^{15}F*+p (2015Br11). See also (2010Mu12).
6.20×10^3 *4*	2$^+$[@]	<0.5 MeV	7.60 *4*	E(^{14}O+2p) (MeV): From (2014Br19,2015Br11). See also E(^{14}O+2p)=7.6 MeV *2* (2009Mu09,2010Mu12). The decay is 24% *8* to ^{15}F(0, 1/2$^+$) and 76% *8* to ^{15}F*(1.3 MeV, 5/2$^+$)) (2009Mu09,2010Mu12). Γ: from ≤0.5 MeV (2015Br11). See also Γ=0.8 MeV $^{+8}_{-4}$ (2009Mu09,2010Mu12).
8.44×10^3 *10*		0.32 MeV *10*	9.84 *10*	E(^{14}O+2p) (MeV): deduced from E(^{13}N+3p)=5.21 MeV *10* (2015Br11).
10.83×10^3 *20*		0.51 MeV *23*	12.23 *20*	E(^{14}O+2p) (MeV): deduced from E(^{13}N+3p)=7.60 MeV *20* (2015Br11).
x				%p=100 Presumably decays 100% by sequential 2p decay mode to ^{14}O through the 0, 1/2$^+$; 1290, 5/2$^+$; 3340 and 4840 levels of ^{15}F (2008Mu13).

† 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.
‡ Jπ assigned in (2014Br19,2015Br11) are based on a comparison with theoretical predictions.
\# From (2010Mu12,2014Br19,2015Br11).
@ From (2009Mu09,2010Mu12). See also (2014Br19,2015Br11: (2$^+$)).
& From (2015Br11) except where noted.

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

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$^{\pi}$‡	Γ‡	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).
1.82×10^{3} *5*	(0^{+},2^{+})	≤50 keV	3.22 *5*	E(level): decays predominantly to $^{15}F_{g.s.}$(1/2^{+}) by p emission (2015Ma09). Assuming J$^{\pi}$=2^{+}, comparison with ^{16}C implies a Thomas-Ehrman shift Δ=+70 keV *46*.
6.17×10^{3} *6*	2^{+}	≤100 keV	7.57 *6*	J$^{\pi}$=(2^{+}) in (2014Wa09). Analysis of 3-body correlations in (2015Ma09) confirms J$^{\pi}$=2^{+}. 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).

$^{16}O(\pi^+,\pi^-)$ 1997Fo09

1977Ho13: The differential cross sections for $E_{mean}(\pi^+)$=145 MeV bombardment of a 3.18 g/cm^2 thick gelatin disk, 99.76% enriched in ^{16}O, were measured at 0° at the Los Alamos Meson Physics Facility. The momentum acceptance was Δp/p=±5% and the solid angle was ΔΩ=7.2 msr. An array of plastic scintillator and Cerenkov counters were used to identify particles based on E-ΔE. Time-of-flight, measured relative to the accelerator RF, provided another means of particle identification. The width of peak was 5 MeV (FWHM). The differential cross section for the $^{16}O(\pi^+,\pi^-)^{16}Ne$ reaction at 0° was 0.87 μb/sr *21* with measurement efficiency of 43%. The measured mass excess of ^{16}Ne is 24.4 MeV *5*, in agreement with theoretical predictions.

1978Bu09: $^{16}O(\pi^+,\pi^-)$, E=145 MeV; measured σ. ^{16}Ne deduced mass excess. The differential cross section at 0° for this reaction is 0.87 μb/sr *21*. The ratio of the ground-state transitions near 140 MeV is $\sigma(^{18}O)/\sigma(^{16}O)$=2.3 *7*.

1980Bu15: $^{16}O(\pi^+,\pi^-)$, E=180 MeV; measured σ(θ), Q. ^{16}Ne deduced masses. Isobaric multiplet mass equation analysis.

1980Mi05: $^{16}O(\pi^+,\pi^-)$, E=240 MeV; measured $\sigma(E(\pi^-),\theta(\pi^-))$; deduced reaction mechanism. Cross sections were measured at θ_{lab}=50°, 85° and 130° with an uncertainty ±5°. The integrated cross section is 5.8 mb *9*.

1981GrZS: $^{16}O(\pi^+,\pi^-)$, E=100-290 MeV; measured σ(θ,E); deduced reaction mechanism, structure effects.

1982Bl20: $^{16}O(\pi^+,\pi^-)$, E=100-292 MeV; measured σ(E). ^{16}Ne deduced non-analog transition, isobar component width. Breit-Wigner analysis, two amplitude model. Data for the reaction $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$ at θ_{lab}=5° as a function of E_π are well fitted with a Breit-Wigner resonance at 169 MeV *4* with a width of 66 MeV *6*.

1982Gr02: $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$, E=80-292 MeV; measured σ(θ) vs E; deduced direct double analog, two-step non-analog amplitude interference.

1982Mo12: $^{16}O(\pi^+,\pi^-)$, E=164 MeV; measured $\sigma(E(\pi^-))$ at θ=5°; deduced mass dependence, $A^{-4/3}$ of σ, isobar components in wave function.

1983Gr07: $^{16}O(\pi^+,\pi^-)$, E=164 MeV; measured σ(θ). Diffractive scattering. ^{16}Ne deduced non-analog transition characteristics. Eikonal fit.

1984Gi05: $^{16}O(\pi^+,\pi^-)$, E=164 MeV; measured σ(θ). Diffractive scattering. Deduced non-analog double charge exchange reaction mechanism characteristics. Damped Bessel function fit. $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$ at θ_{lab}=5° as a function of E_π are well fitted (except the 292 MeV point) with a Breit-Wigner resonance at 171 MeV with a width of 75 MeV.

1989Gr06: $^{16}O(\pi^+,\pi^-)$, E=180,240 MeV; measured total reaction σ. Phenomenological model.

1990Se11: $^{16}O(\pi^+,\pi^-)$, E=100-300 MeV; measured σ(θ) vs E. Cross sections of $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$ at θ=5° were measured.

1993Be18: $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$, E=100-300 MeV; measured σ(θ) vs E.

1993Be34: $^{16}O(\pi^+,\pi^-)^{16}Ne_{g.s.}$, E=300-500 MeV; measured σ(θ) vs E; deduced reaction mechanism.

1997Fo09: A beam of E_π=45-90 MeV pions impinged on a 4-15 mm thick, target purified water, which was contained in an aluminium frame between thin polyethylene foils, at the Paul Scherrer Institute. Measurements were performed at θ_{lab}=17°, 30°, 45° and 65° using the Low Energy Pion Spectrometer (LEPS) setup at the πE3 channel. The cross sections of the ground state transitions were measured. The transition to the state ^{16}Ne*(2.1 MeV:$J^\pi=0^+$) was also observed, which is interpreted as the quadruple isobaric analog state of ^{16}C*(3.03 MeV:$J^\pi=0^+_2$).

2000Dr19: $^{16}O(\pi^+,\pi^-)$, E=30-90 MeV; measured σ(E,θ); deduced energy and mass dependence features. Comparisons with theoretical calculations, dibaryon hypothesis.

See also (1982BlZZ, 1982GrZV, 1982GrZZ, 1984GiZY) and (1977Le16, 1979Hu02, 1981Ma23, 1985Gi01, 1985Gi06, 1986Ch39, 1986Fo03, 1986Gi13, 1987Ka39, 1988Ma27, 1989Vi01, 1989Wi20, 1993Gi03, 1995Ka49, 1998Bi01, 2002Wu07, 2003Wu09: theory).

^{16}Ne Levels

T: From (1997Fo09).

E(level)[†]	J^π[†]	Comments
0[‡]	0^+	T=2 T_z=−2, see (1980Bu15). Q_0=−28.785 MeV *45* (1980Bu15), which implies ΔM=24.051 MeV *45*; analysis of the IMME indicates *d*=2.5 keV *37* (1980Bu15; see also (1981SeZR)). See also ΔM=24.4 MeV *5* (1977Ho13,1978Bu09).
2.1×10^3[‡] *2*	0^+	T=2 See also (2000Dr19).

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$^{16}O(\pi^{+},\pi^{-})$ 1997Fo09 (continued)

^{16}Ne Levels (continued)

† From (1997Fo09).
‡ See also (1980Mi05, 1982Bl20, 1982Gr02, 1983Gr07, 1984Gi05, 1993Be18, 1993Be34, 1997Fo09, 2000Dr19).

^{20}Ne(α,^{8}He) 1978Ke06,1983Wo01

1977KeZX: ^{20}Ne(α,^{8}He), E=118 MeV; measured σ. ^{16}Ne deduced levels, mass excess.

1978Ke06: A beam of $E_{\alpha}\approx$177 MeV ions, from the Lawrence Berkeley Laboratory 88-inch cyclotron, impinged on a ^{20}Ne gas target that was enriched to >99.5% and had a thickness of 1.2 mg/cm^2 *4* at a pressure of 310 Torr. Reaction products were collomated and magnetically analyzed in a quadrupole-sextupole-dipole (QSD) spectrometer; the time-of-flight through the spectrometer was also measured to aid in particle identification. The ^{16}Ne*(0,1.69 MeV *7*) states were populated. The $\Gamma_{c.m.}$ and the Q value of the $^{16}Ne_{g.s.}$ state, the ^{16}Ne mass excess, the total decay width and the di-proton branching ratio were deduced. The differential cross section for the gound state at θ_{lab}=8° was also measured.

1982WoZX: ^{20}Ne(α,^{8}He), E=129 MeV; measured σ(reaction). ^{16}Ne deduced mass. Enriched gas target, split-pole spectrograph.

1983Wo01: An alpha beam of 129 Mev, supplied by the Texas A&M University 224 cm cyclotron, impinged on a 99.5% enriched ^{20}Ne gas target. Reaction products were detected in the focal plane of the spectrograph with a gas proportional counter backed by a Si detector. Particle identification was determined from ΔE, E and time-of-flight parameters. The mass measurement was performed at θ_{lab}=7.5°. Coefficients of the isobaric multiplet mass equation (IMME) for the A=16 quintet were deduced.

^{16}Ne Levels

T: See (1978Ke06).

E(level)†	J$^{\pi}$†	Γ	Comments
0	0$^+$	122 keV *37*	%p=100 T=2 E(^{14}O+2p) (MeV): We used 1401 keV *20* from (2017Wa10: AME-2016). See also 1.33 MeV *8* (1978Ke06) and ≈1.4 MeV (1983Wo01). Γ: The weighted value of (1983Wo01: 110 keV *40*) and (1978Ke06: 200 keV *100*). Applying penetrability corrections leads to a total decay width for ^{16}Ne of 20 keV and a diproton branching ratio of 20%. Consideration of the uncertainties in the mass and width leads to the total decay width of 5-100 keV and the di-proton branching ratio is 10-90% (1978Ke06). Q_0=−60.15 MeV *8* (1978Ke06), which corresponds to ΔM=23.92 MeV *8*; see also Q_0=−60.197 MeV *23* and ΔM=23.984 MeV *24* (1983Wo01). Analysis of the IMME suggests *d*=8 keV *5* (1978Ke06); see also *d*=*e*=4 keV *3* (1983Wo01).
1690 *70*	2$^+$		T=2 Analysis of the IMME suggests d=15 keV *6* (1978Ke06).

† See (1978Ke06).

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