

$^{16}\text{O}(^{16}\text{O},\text{X})$:resonance **1986Ga24,1985Ga05**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 201,1 (2025)	31-Oct-2024

1986Ga24: ($^{16}\text{O},\alpha$), ($^{16}\text{O},^8\text{Be}$) $E_{\text{cm}}=12\text{-}20$ MeV ^{16}O in 50-keV steps from the Florida State University S-FN Tandem Van de Graaff. Targets were SiO_2 on carbon backings. Measured excitation function, $\sigma(\theta)$. Deduced resonances, L values. See also **1985Li04** for the measurement of ($^{16}\text{O},\alpha$) from the same lab.

1985Ga05,1981Ga33: ($^{16}\text{O},\alpha$), ($^{16}\text{O},^{16}\text{O}$), ($^{16}\text{O},\gamma$) $E_{\text{cm}}=15.5\text{-}17.0$ MeV ^{16}O beams were from the Yale MP1 accelerator. Targets were $30\text{ }\mu\text{g}/\text{cm}^2$ WO_3 (for α and γ yields) and $15\text{ }\mu\text{g}/\text{cm}^2$ SiO_2 (for scattered ^{16}O). Charged particles were detected with a position-sensitive detector and γ rays were detected with a Ge(Li) detector. Measured excitation functions, $\sigma(\theta)$. Deduced resonance parameters, L values.

1984Po15,1981Po16: ($^{16}\text{O},\alpha$) $E_{\text{lab}}=20\text{-}44.25$ MeV ^{16}O beams were from the Stanford University tandem Van de Graaff accelerator in steps of 250 keV. Targets were 35, 37 and $43\text{ }\mu\text{g}/\text{cm}^2$ SiO_2 on gold backings. α particles were detected with an array of four large area solid-state detectors. Measured excitation functions, $\sigma(\theta)$. Deduced resonance energy, L values.

1986Ga10: ($^{16}\text{O},\alpha$) $E_{\text{cm}}=8.5\text{-}12.5$ MeV ^{16}O from the 4-MV dynamitron accelerator at Bochum. Measured excitation function. Deduced compound structures.

1985Ti05,1983Ti01: ($^{16}\text{O},^{16}\text{O}$) $E_{\text{cm}}=15.5\text{-}18.0$ MeV ^{16}O from the Erlangen EN tandem accelerator in steps of 50 keV. Measured excitation functions, $\sigma(\theta)$. Deduced resonances, L values. **1985Ti05** reanalyze data in **1983Ti01**. See also **1987Ti01** at $E_{\text{cm}}\approx 17$ MeV.

1992Ba53,1985Ba60: ($^{16}\text{O},^{16}\text{O}$) $E_{\text{cm}}=25.5\text{-}35.5$ MeV (**1992Ba53**) and $17\text{-}41$ MeV (**1985Ba60**) ^{16}O beams were from the Tandem accelerator at the University of Pennsylvania. Targets were $25\text{ }\mu\text{g}/\text{cm}^2$ BeO foils. Measured excitation functions. Deduced resonances. The L values for $E_{\text{cm}}=25.5$ and 29.3 MeV from **1992Ba53** are discrepant from those in **1985Ba60**, which can be attributed to limitations of the zeros analysis used in **1985Ba60**. Note that the first and all other authors of the two references are different, but the measurements were performed at the same lab.

1996Fr09: ($^{16}\text{O},^{12}\text{C}$) $E_{\text{lab}}=51\text{-}66$ MeV ^{16}O beams from the Australian National University 14-UD tandem. Measured excitation functions, $\sigma(\theta)$. Deduced resonances, L values.

1972Si17: ($^{16}\text{O},^{12}\text{C}$) $E_{\text{lab}}=17.5\text{-}30.0$ MeV from the Argonne National Laboratory tandem Van de Graaff accelerator. Measured excitation function, $\sigma(\theta)$. Deduced levels, L values.

Others: **1969Sh17**, **1972Le34**, **1980Fr10**.

 ^{32}S Levels

E(level) [†]	J^π [‡]	Γ [#]	L [‡]	Comments
30.89×10^3	10^+		10	E(level): from $E_{\text{cm}}=14.35$ MeV (1986Ga24).
$30.93\times 10^3?$	(6^+)		(6)	E(level): from $E_{\text{cm}}=14.39$ MeV (1986Ga24).
31.11×10^3	10^+		10	E(level): from $E_{\text{cm}}=14.57$ MeV (1986Ga24).
31.33×10^3	10^+		10	E(level): from $E_{\text{cm}}=14.79$ MeV (1986Ga24).
31.64×10^3	10^+		10	E(level): from $E_{\text{cm}}=15.10$ MeV (1986Ga24). Others: $E_{\text{cm}}=15.20$ in 1985Li04 and 1984Po15 .
				J^π, L : also from 1985Li04 and 1984Po15 .
32.14×10^3	$12^+{}^a$		12^a	E(level): from $E_{\text{cm}}=15.60$ MeV (1985Ti05). $\Gamma_{\alpha 0}=2.9$ keV (1985Ti05).
32.37×10^3	$10^+{}^{\&}$	40 keV	$10^{\&}$	E(level): from $E_{\text{cm}}=15.83$ MeV (1985Ga05). $\Gamma_0\Gamma_\alpha/\Gamma^2=0.0001$ (1985Ga05).
32.49×10^3	$12^+{}^a$	80 keV	12^a	E(level): from $E_{\text{cm}}=15.95$ MeV (1985Ti05). Other: $E_{\text{cm}}=15.93$ MeV (1985Ga05). J^π : other: (8) from 1985Ga05 is discrepant. $\Gamma_0\Gamma_\alpha/\Gamma^2=0.000225$ (1985Ga05).
32.64×10^3	$8^+{}^{\&}$	60 keV	$8^{\&}$	E(level): from $E_{\text{cm}}=16.10$ MeV (1985Ga05). Other: $E_{\text{cm}}=16.05$ MeV (1985Ti05). J^π, L : also from 1985Ti05 . $\Gamma_0\Gamma_\alpha/\Gamma^2=0.0001$ (1985Ga05).
32.84×10^3	$8^+{}^a$		8^a	E(level): from $E_{\text{cm}}=16.30$ MeV (1985Ti05). $\Gamma=153$ keV for $E_{\text{cm}}=16.32$ MeV in 1983Ti01 , probably a doublet of $16.30+16.35$ resonances as stated in 1985Ti05 .

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$^{16}\text{O}(^{16}\text{O},\text{X})$:resonance **1986Ga24,1985Ga05** (continued) ^{32}S Levels (continued)

E(level) [†]	J ^π [‡]	Γ [#]	L [‡]	Comments
32.89×10 ³	10 ⁺ ^a		10 ^a	E(level): from E _{cm} =16.35 MeV (1985Ti05).
33.64×10 ³	10 ⁺ ^a		10 ^a	E(level): from E _{cm} =17.10 MeV (1985Ti05).
33.84×10 ³	12 ⁺	156 keV	12	E(level): from E _{cm} =17.30 MeV (1986Ga24). Other: E _{cm} =17.40 MeV (1985Ti05). J ^π ,L: also from 1985Ti05. Γ: from 1983Ti01 for E _{cm} =17.31 MeV. Γ _{α0} =4.9 keV (1985Ti05), 3 keV (1983Ti01).
34.24×10 ³ ?	(12 ⁺) ^a	156 keV	(12) ^a	E(level): from E _{cm} =17.7 MeV (1985Ti05). Γ: from 1983Ti01. Γ _{α0} =3 keV (1983Ti01).
39.5×10 ³	16 ⁺ [@]		16 [@]	E(level): from E _{cm} =23.0 MeV (1972Si17).
42.0×10 ³	18 ⁺ ^b		18 ^b	E(level): from E _{cm} =25.5 MeV (1992Ba53). L: other: 16 (1985Ba60).
43.0×10 ³	18 ⁺ [@]		18 [@]	E(level): from E _{cm} =26.5 MeV (1972Si17).
44.0×10 ³	18 ⁺ ^c		18 ^c	E(level): from E _{cm} =27.5 MeV (1996Fr09).
45.8×10 ³	20 ⁺ ,22 ⁺ ^b		20,22 ^b	E(level): from E _{cm} =29.3 MeV (1992Ba53). L: other: 18 (1985Ba60).
48.5×10 ³	20 ⁺ ^c		20 ^c	E(level): from E _{cm} =32.0 MeV (1996Fr09).
50.1×10 ³	22 ⁺ ,26 ⁺ ^b		22,26 ^b	E(level): from E _{cm} =33.6 MeV (1992Ba53). L: other: 22 from 1985Ba60.
54.7×10 ³	24 ⁺		24	E(level): from E _{cm} =38.2 MeV (1985Ba60). L: from 1985Ba60.

[†] From E_{cm}(¹⁶O)+Q, with E_{cm}=E_{lab}/2 and Q=2*M(¹⁶O)-M(³²S)=16542.5 using masses from 2021Wa16.

[‡] From γ(θ) in 1986Ga24, unless otherwise noted.

[#] From 1985Ga05, unless otherwise noted.

[@] From 1972Si17.

[&] From 1985Ga05.

^a From 1985Ti05.

^b From 1992Ba53.

^c From 1996Fr09.