

Table 16.26 from (1977AJ02): States of  $^{16}\text{O}$  from  $^{16}\text{O}(\text{p}, \text{p}')$ ,  $(\text{d}, \text{d}')$ ,  $(^3\text{He}, ^3\text{He}')$  and  $(\alpha, \alpha')$  <sup>a</sup>

$E_x^b$ (MeV $\pm$ keV)	$L^b$	$E_x^d$ (MeV)	$E_x^f$ (MeV $\pm$ keV)	$E_x^g$ (MeV $\pm$ keV)	$E_x^k$ (MeV $\pm$ keV)	$L^g$	$\Gamma^b$ (keV)	$J^\pi; T^h$	$\beta^2^k$ ( $\times 10^{-3}$ )
		6.05							
$6.13 \pm 40^c$		6.13	$6.13^{e,f}$	$6.14 \pm 50^j$	6.13	$3^{j,k}$		$3^-; 0$	<sup>1</sup>
$6.92^c$		6.92	$6.92^{c,f}$	$6.90 \pm 50^j$	6.92	$2^{j,k}$		$2^+; 0^f$	$36^1$
$7.12^c$		7.12		$6.97 \pm 50^j$	7.12	$1^{j,k}$		$1^-; 0$	
$8.75 \pm 150^c$		8.87	$8.87 \pm 30^f$	$8.876^j$		$3^j$			
$9.70 \pm 150^c$		9.85	$9.84 \pm 30$	$9.80 \pm 50^j$	9.85	$2^k$		$2^+; 0^f$	1.8
$10.35 \pm 20$	4	10.34	$10.35 \pm 30$	$10.35 \pm 30$	10.35	$4^k$		$4^+; 0$	
$10.95 \pm 30$	1	10.95						$T = 0$	
$11.10 \pm 20$	4	11.1 <sup>e</sup>	$11.09 \pm 30^e$	$11.10 \pm 30$	11.10	$4^k$		$4^+; 0$	
$11.52 \pm 20$	2	11.52	$11.52 \pm 30^f$	$11.52 \pm 30$	11.52	$2^k$	$74 \pm 4^k$	$2^+; 0$	$19^1$
$12.05 \pm 20$		12.05	$12.04 \pm 30$	$12.05 \pm 30$	12.05	$(0)^k$		$0^+; 0$	
		12.44			12.44	$1^k$		$1^-; 0$	
$12.53 \pm 20$	1	12.53		$12.51 \pm 30$					
$13.02 \pm 20$	2	13.1 <sup>e</sup>	$13.11 \pm 30$	$13.07 \pm 20$	$13.02 \pm 13.13^e$	$2^{e,k}$		$2^+; 0$	$4.4^1$
$13.26 \pm 30$	3							$3^-; 1$	
		13.66							
$13.95 \pm 50$	$(0 + 4)$		$13.97 \pm 30$	$13.95 \pm 50$	13.88	$4^{e,k}$	<sup>e</sup>	$4^+; 0$	
			$14.94 \pm 30$	$14.87 \pm 100$	14.82	$6^k$		$6^+$	
$15.26 \pm 50$	$(3)$		15.4						
$15.50 \pm 30$	3			$15.50 \pm 50^k$	15.45	$3^k$	$200 \pm 60$	$3^-; 0$	
$16.52 \pm 50$	2		$16.46 \pm 30$	$16.40 \pm 100$			$< 100$	$2^+^f$	
$16.93 \pm 50$	$(3)$								

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$E_x^b$ (MeV $\pm$ keV)	$L^b$	$E_x^d$ (MeV)	$E_x^f$ (MeV $\pm$ keV)	$E_x^g$ (MeV $\pm$ keV)	$E_x^k$ (MeV $\pm$ keV)	$L^g$	$\Gamma^b$ (keV)	$J^\pi; T^h$	$\beta^2^k$ ( $\times 10^{-3}$ )
17.25 $\pm$ 50			17.19 $\pm$ 30	17.25 $\pm$ 80		(2)	160 $\pm$ 60	$2^{+f}$	
17.88 $\pm$ 50	3			17.83 $\pm$ 100			150 $\pm$ 60		
18.15 $\pm$ 50	(2)		17.8		18.0 $\pm$ 100	$2^k$	300 $\pm$ 50	$(2^+); 0$	3.4
18.40 $\pm$ 100	2		18.52 $\pm$ 30	18.35 $\pm$ 100	18.5 $\pm$ 100	$2^k$		$2^+; 0$	7.7
18.60 $\pm$ 100				18.70 $\pm$ 100	19.0 $\pm$ 100	(3)	280 $\pm$ 80 <sup>e</sup>	$3^-; 0$	
19.10 $\pm$ 50	(4)						< 100	$4^+; 1$	
			19.09 $\pm$ 30					$2^{+f}$	
19.35 $\pm$ 80	(1)								
19.56 $\pm$ 50	3			19.50 $\pm$ 100	19.5 $\pm$ 100	(3)		$3^-; 0$	2.9
			20.0		20.15 $\pm$ 100	$2^k$	350 $\pm$ 50 <sup>k</sup>	$2^+; 0^f$	3.6
19.95 $\pm$ 50	3						< 100	$3^-; 1$	
20.56 $\pm$ 80	(1, 2)						370 $\pm$ 100		
21.05 $\pm$ 50	1			21.1 $\pm$ 100	20.9 $\pm$ 100	$2^k$	270 $\pm$ 80	$(2^+; 0)$	4.7
							350 $\pm$ 50 <sup>k</sup>		
21.80 $\pm$ 80	1						370 $\pm$ 100	$1^-; 1$	
					21.85 $\pm$ 100	$2^k$	400 $\pm$ 50 <sup>k</sup>	$2^+; 0$	5.7
22.40 $\pm$ 80	(1, 2)						420 $\pm$ 100	$1^-; 1$	
					22.5 $\pm$ 100		400 $\pm$ 50 <sup>k</sup>	$(2^+, 3^-); 0$	5.0
23.20 $\pm$ 80	1						600 $\pm$ 200	$1^-; 1$	
				23.50 $\pm$ 150 <sup>i</sup>	23.25 $\pm$ 100	2	400 $\pm$ 50 <sup>k</sup>	$2^+; 0$	5.6
					23.85 $\pm$ 100	(0) <sup>k</sup>	400 $\pm$ 50 <sup>k</sup>	$(2^+, 0^+); 0$	4.4
24.00 $\pm$ 100	(1, 2)						1200 $\pm$ 300	$1^-; 1$	

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$E_x$ <sup>b</sup> (MeV $\pm$ keV)	$L$ <sup>b</sup>	$E_x$ <sup>d</sup> (MeV)	$E_x$ <sup>f</sup> (MeV $\pm$ keV)	$E_x$ <sup>g</sup> (MeV $\pm$ keV)	$E_x$ <sup>k</sup> (MeV $\pm$ keV)	$L$ <sup>g</sup>	$\Gamma$ <sup>b</sup> (keV)	$J^\pi; T$ <sup>h</sup>	$\beta^2$ <sup>k</sup> ( $\times 10^{-3}$ )
$25.50 \pm 150$	(1)				$24.4 \pm 100$		$400 \pm 50$ <sup>k</sup> $1330 \pm 300$	$(2^+, 3^-); 0$ $1^-; 1$	4.3

<sup>a</sup> See also Tables 16.28 and 16.29 in (1971AJ02).

<sup>b</sup>  $(\text{p}, \text{p}')$ : (1975BU1F, 1976BU15),  $E_p = 45$  MeV, except for the  $\Gamma$  labeled <sup>k</sup>.

<sup>c</sup>  $(\text{p}, \text{p}')$ : (1969SU03),  $E_p = 185$  MeV.

<sup>d</sup>  $(\text{d}, \text{d}')$ : (1974DU06),  $E_d = 81.6$  MeV; energies are nominal ( $\pm 100$  to  $\pm 260$  keV); angular distributions reported to all but last state.

<sup>e</sup> Unresolved states.

<sup>f</sup>  $(^3\text{He}, ^3\text{He}')$ : (1974MO26),  $E(^3\text{He}) = 71$  MeV; angular distributions are reported to states labeled by <sup>f</sup>.

<sup>g</sup>  $(\alpha, \alpha')$ : (1975BU1F, 1976BU15),  $E_\alpha = 60$  MeV, except for states labeled by <sup>j</sup> and <sup>k</sup> where see these references for additional evidence.

<sup>h</sup> Proposed by (1975BU1F, 1976HA19, 1976HA27).

<sup>i</sup>  $\Gamma = 1.70 \pm 0.3$  MeV (1976BU15).

<sup>j</sup> (1964HA16, 1966HA19).

<sup>k</sup> Angular distribution at  $E_\alpha = 104$  MeV (1976HA19, 1976HA27). The strong excitation of  $^{16}\text{O}^*(7.12)$  is consistent with a DWBA calculation using a microscopic form factor obtained from a 1p-1h model with  $1\hbar\omega$  excitation (1976HA19).

<sup>l</sup>  $(\alpha, \alpha')$ : see also (1975KN05).