

Table 15.25 from (1976AJ04): Resonances in  $^{14}\text{N} + \text{p}$ 

$E_p$ (keV)	$\Gamma_{\text{lab}}$ (keV)	$\omega\Gamma_\gamma$ (eV)	Particles out	$J^\pi$	$E_x$ (MeV)	Refs.
$278.1 \pm 0.4$	$1.7 \pm 0.5$	0.014	$\gamma$	$\frac{1}{2}^+$	7.5568	A
$1058.0 \pm 0.5$	$3.9 \pm 0.7$	0.95	$\gamma$	$\frac{3}{2}^+$	8.2843	A, (1972NE05)
$1550 \pm 6$	34	0.16	$\gamma$	$\frac{1}{2}^+$	8.743	A
$1742 \pm 2$	$\approx 4$	0.16	$\gamma, p_0$	$(\frac{5}{2}^+)$	8.922	(1971LA23, 1972KR14)
$1747 \pm 2$	$\approx 4$	0.06	$\gamma, p_0$	$(\frac{1}{2}^-)$	8.927	(1971LA23, 1972KR14)
$1806.4 \pm 1.5$	$4.2 \pm 0.4$	0.52	$\gamma$	$(\frac{1}{2}, \frac{3}{2})^-$	8.9824	A, (1966EV01, 1972KR14)
$2348 \pm 3$	$10.8 \pm 0.5$	2.4	$\gamma$	$\frac{5}{2}^-$	9.488	A, (1970KU09)
$2368 \pm 32$	$300 \pm 26$		$\gamma$	$(\frac{1}{2}^+)$	9.506	A, (1970KU09)
$2479 \pm 1.7$	$9.4 \pm 0.5$	3.3	$\gamma$	$\frac{3}{2}^-$	9.610	A, (1970KU09)
$2537 \pm 4$	$2 \pm 1$		$p_0$	$(\frac{7}{2}, \frac{9}{2})^-$	9.664	(1967LA05, 1967LA10)
$2600 \pm 50$	$1270 \pm 50$	46	$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	9.72	(1951DU08)
3209 <sup>a</sup>	$3 \pm 1$		$p_0$	$(\frac{5}{2}^-)$	10.291	(1970DI1D, 1972CH28)
3215 <sup>a</sup>	$12 \pm 2^b$		$p_0$	$\frac{5}{2}^+$	10.296	(1970DI1D, 1972CH28)
3410 <sup>c</sup>	$27 \pm 5$		$\gamma, p_0$	$(\frac{3}{2})^-$	10.478	(1970DI1D, 1972CH28)
3440 <sup>c</sup>	$150 \pm 45$		$\gamma, p_0$	$(\frac{3}{2})^+$	10.506	(1970DI1D, 1972CH28)
$3880 \pm 15$	97		$p_0$	$\frac{7}{2}^+$	10.916	A
		$\Gamma_{\gamma_0}$ (eV)				A, (1970KU09, 1972PH02)
$3903 \pm 3$	$106 \pm 5$	$14 \pm 3$	$\gamma, p_0, p_1$	$\frac{1}{2}^+$	10.938	A, (1972PH02)
$3996 \pm 3$	$27 \pm 2$	$1.4 \pm 0.4$	$\gamma, p_0, p_1$	$\frac{1}{2}^-$	11.025	(1969WE02)
$4130 \pm 15$	$< 10$		$p_0$		11.150	(1969WE02, 1970KU09, 1972PH02)
$4203 \pm 3$	$43 \pm 4$	$5.2 \pm 0.4$	$\gamma, p_0$	$\frac{3}{2}^+$	11.218	(1969WE02)
$4575 \pm 15$	$< 10$		$p_0$		11.565	(1969WE02, 1972PH02)
$4580 \pm 15$	$21 \pm 15$	$0.7 \pm 0.2$	$\gamma, p_0$	$\frac{5}{2}^-$	11.569	(1970KU09)

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$E_p$ (keV)	$\Gamma_{\text{lab}}$ (keV)	$\omega\Gamma_\gamma$ (eV)	Particles out	$J^\pi$	$E_x$ (MeV)	Refs.
4580	150		$\gamma$		11.57	(1969WE02, 1972PH02)
4630 $\pm$ 15	86 $\pm$ 50		$\gamma, \text{p}_0$	$(\frac{3}{2}, \frac{1}{2})^-$	11.616	(1969WE02)
4740 $\pm$ 15	< 10		$\text{p}_0$		11.718	A, (1972PH02)
4772 $\pm$ 3	106 $\pm$ 5		$\gamma, \text{p}_0, \text{p}_1$	$\frac{5}{2}^+$	11.748	A, (1972PH02)
4877 $\pm$ 3	70 $\pm$ 3		$\gamma, \text{p}_0, \text{p}_1$	$\frac{5}{2}^-$	11.846	(1969WE02, 1972PH02)
5025 $\pm$ 15	21 $\pm$ 5		$\text{p}_0, \text{p}_1$	$\frac{5}{2}^-$	11.984	(1969WE02, 1972PH02)
5180 $\pm$ 15	214 $\pm$ 50		$\text{p}_0, \text{p}_1$	$\frac{5}{2}^+$	12.129	(1972PH02)
5280 $\pm$ 20	106 $\pm$ 50		$\text{p}_1^{\text{d}}$		12.222	(1969WE02, 1972PH02)
5547 $\pm$ 3	82 $\pm$ 4		$\text{p}_1, \text{p}_2$	$\frac{5}{2}^- (\frac{3}{2}^-)$	12.471	(1970KU09)
5900	$\approx$ 250		$\gamma$		12.80	(1972PH02)
5937 $\pm$ 3	17 $\pm$ 1		$\text{p}_2^{\text{e}}$		12.835	(1968SH11)
(6100)	30		$\text{p}_0 \rightarrow \text{p}_2, \alpha_0$	$\frac{5}{2}^+$	(12.99)	(1972PH02)
6123 $\pm$ 3	230 $\pm$ 30		$\text{p}_2^{\text{e}}$		13.008	(1972PH02)
6141 $\pm$ 3	43 $\pm$ 30		$\text{p}_2^{\text{e}}$		13.025	(1968SH11, 1970KU09)
6600	$\approx$ 1000		$\gamma, (\text{p}_2, \alpha_0)$	$(\frac{1}{2}, \frac{3}{2})^+$	13.45	(1968SH11)
6640			$(\text{p}_0), (\text{p}_2)$	$(\frac{3}{2}^+)$	13.49	(1968SH11)
6760			$\alpha_0$	$\frac{5}{2}^+$	13.60	(1968SH11)
6870			$\text{p}_2$	$\frac{3}{2}^-$	13.70	(1968SH11)
6960			$\text{p}_1, \text{p}_2, \text{p}_4, \alpha_0$	$\frac{3}{2}^-$	13.79	(1970KU09)
7050	$\approx$ 150		$\gamma$		13.87	(1968SH11)
7370			$\alpha_0$	$\frac{5}{2}^-$	14.17	(1964KU06, 1968SH11, 1970ME30)
7500	$\approx$ 500		$\text{n}, \text{p}_0 \rightarrow \text{p}_2, {}^3\text{He}, \alpha$		14.29	(1968SH11)
7550			$\alpha_0$	$\frac{5}{2}^+$	14.34	(1964KU06, 1970ME30)

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$E_p$ (keV)	$\Gamma_{\text{lab}}$ (keV)	$\omega\Gamma_\gamma$ (eV)	Particles out	$J^\pi$	$E_x$ (MeV)	Refs.
7700			n, p <sub>0</sub> , $\alpha_0$		14.48	(1964KU06)
7950	$170 \pm 50$		n		14.71	(1964KU06, 1970ME30)
8200			n, p <sub>2</sub> $\rightarrow$ p <sub>6</sub> , $^3\text{He}$ , $\alpha_0$ , $\alpha_1$		14.94	(1970KU09)
8400 <sup>f</sup>	$\approx 1000$		$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	15.1	(1964KU06)
9050 <sup>f</sup>			n		15.74	(1964KU06)
g						
$9370 \pm 20$	$\approx 200$		n, p <sub>2</sub> , p <sub>8</sub> , $\alpha_1$		16.04	(1964KU06, 1970ME30)
$9580 \pm 20$	$\approx 150$		p <sub>0</sub> , p <sub>1</sub> , p <sub>3</sub> $\rightarrow$ p <sub>7</sub> , p <sub>9</sub> , $^3\text{He}$ , $\alpha_1$		16.23	(1970ME30)
$9850 \pm 50$	$600 \pm 100$		n, $^3\text{He}$		16.48	(1964KU06, 1970ME30)
10300 <sup>f</sup>	$\approx 1000$		$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	16.9	(1970KU09)
10600			p <sub>4</sub> $\rightarrow$ p <sub>9</sub> , $\alpha_0$ , $\alpha_1$		17.2	(1970ME30)
11900	$\approx 1000$		$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	18.4	(1970KU09)
14200	$\approx 2000$		$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	20.5	(1970KU09)
15800	$\approx 2000$		$\gamma$	$(\frac{1}{2}, \frac{3}{2})^+$	22.0	(1970KU09)

A: See earlier references for this resonance in [\(1970AJ04\)](#).

<sup>a</sup> Previously [see [\(1970AJ04\)](#)] a single resonance at  $E_p = 3200 \pm 8$  keV was reported [ $\Gamma_{\text{lab}} = 17 \pm 4$  keV].

<sup>b</sup> [\(1971SH1D, 1972KU1J\)](#); abstracts) report  $\Gamma_{\text{lab}} = 9 \pm 2$  keV,  $\Gamma_p/\Gamma \approx 1.0$ .

<sup>c</sup> Previously [see [\(1970AJ04\)](#)] a single resonance at  $E_p = 3390 \pm 10$  keV was reported [ $\Gamma_{\text{lab}} = 50$  keV]. See also [\(1970KU09\)](#). [\(1971SH1D, 1972KU1J\)](#); abstracts) report that one of these states has  $\Gamma \leq 2$  keV and the other [ $J^\pi = (\frac{3}{2}, \frac{5}{2})^-$ ] has  $\Gamma = 30 \pm 5$  keV.

<sup>d</sup> Weak.

<sup>e</sup> Strong.

<sup>f</sup> See also [\(1970ME30\)](#).

<sup>g</sup> [\(1974HU02\)](#) report three large structures in the  $\alpha_0$  yield [ $E_p = 9$  to 12 MeV] corresponding to excitations of 16.2, 17.2 and 17.8 MeV in  $^{15}\text{O}$ : these appear to be composed of substructures. For instance  $^{15}\text{O}^*(16.2)$  appears to have components at  $E_x = 15.9, 16.1$  and 16.25 MeV;  $^{15}\text{O}^*(17.2)$  appears to involve  $E_x = 17.0$  and a sharper peak at 17.25 MeV;  $^{15}\text{O}^*(17.8)$  involves  $E_x = 17.7$  and 17.9 MeV. It appears that this region is better studied via the  $^{12}\text{C} + ^3\text{He}$  reaction: see [Table 15.20](#).