Table 13.1 The spherical harmonics for $l = 0$ through $l = 3$.

$$Y_0^0(\theta,\phi) = \frac{1}{\sqrt{4\pi}}$$

$$Y_1^0(\theta,\phi) = \sqrt{\frac{3}{4\pi}}\cos\theta$$

$$Y_1^{\pm 1}(\theta,\phi) = \mp\sqrt{\frac{3}{8\pi}}\sin\theta e^{\pm i\phi}$$

$$Y_2^0(\theta,\phi) = \sqrt{\frac{5}{16\pi}}\left(3\cos^2\theta - 1\right)$$

$$Y_2^{\pm 1}(\theta,\phi) = \mp\sqrt{\frac{15}{8\pi}}\sin\theta\cos\theta e^{\pm i\phi}$$

$$Y_2^{\pm 2}(\theta,\phi) = \sqrt{\frac{15}{32\pi}}\sin^2\theta e^{\pm i2\phi}$$

$$Y_3^0(\theta,\phi) = \sqrt{\frac{7}{16\pi}}\left(5\cos^3\theta - 3\cos\theta\right)$$

$$Y_3^{\pm 1}(\theta,\phi) = \mp\sqrt{\frac{21}{64\pi}}\sin\theta\left(5\cos^2\theta - 1\right)e^{\pm i\phi}$$

$$Y_3^{\pm 2}(\theta,\phi) = \sqrt{\frac{105}{32\pi}}\sin^2\theta\cos\theta e^{\pm i2\phi}$$

$$Y_3^{\pm 3}(\theta,\phi) = \mp\sqrt{\frac{35}{64\pi}}\sin^3\theta e^{\pm i3\phi}$$

Table 13.2 The radial wave functions for $n = 1$ through $n = 3$.

$$R_{10}(r) = 2\sqrt{\frac{1}{a_0^3}}e^{-r/a_0}$$

$$R_{20}(r) = \frac{1}{2}\sqrt{\frac{1}{2a_0^3}}\left(-\frac{r}{a_0} + 2\right)e^{-r/2a_0}$$

$$R_{21}(r) = \frac{1}{2}\sqrt{\frac{1}{6a_0^3}}\left(\frac{r}{a_0}\right)e^{-r/2a_0}$$

$$R_{30}(r) = \frac{2}{9}\sqrt{\frac{1}{3a_0^3}}\left[\frac{2}{9}\left(\frac{r}{a_0}\right)^2 - 2\frac{r}{a_0} + 3\right]e^{-r/3a_0}$$

$$R_{31}(r) = \frac{4}{27}\sqrt{\frac{1}{24a_0^3}}\left[-\frac{2}{3}\frac{r}{a_0} + 4\right]\left(\frac{r}{a_0}\right)e^{-r/3a_0}$$

$$R_{32}(r) = \frac{8}{81}\sqrt{\frac{1}{120a_0^3}}\left(\frac{r}{a_0}\right)^2 e^{-r/3a_0}$$

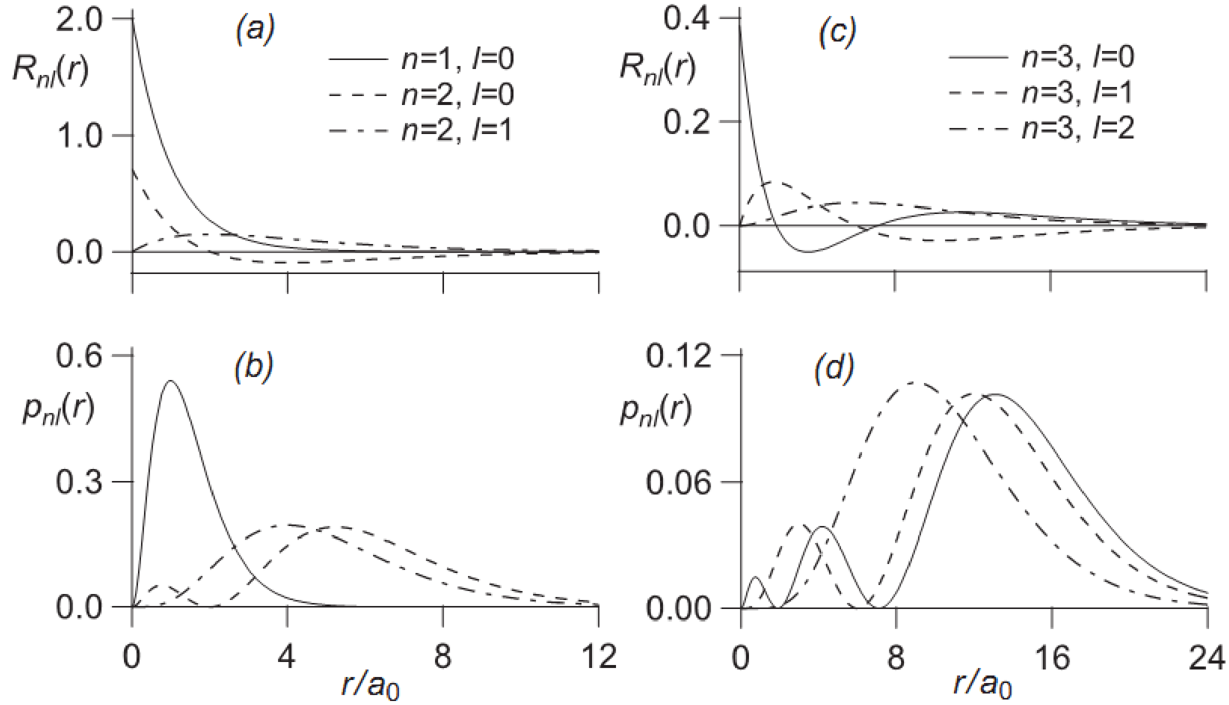

Fig 13.4 (a) Plots of the radial wave functions $R_{nl}(r)$ for $n=1$ and $n=2$, and (b) the corresponding radial probability densities $p_{nl}(r)$; the legend in (a) is also applicable to (b). (c) Plots of the radial wave functions $R_{nl}(r)$ for $n=3$, and (d) the corresponding radial probability densities $p_{nl}(r)$; the legend in (c) is also applicable to (d).