Schrodinger Equation：$i\hbar\frac{\partial\psi}{\partial t}=-\frac{\hbar^2}{2m}\nabla^2\psi+V\psi$

Radius wave function：$R(r)^{(2)}+(\frac{2\mu}{\eta}(E+\frac{e^2}{r})-\frac{l(l+1)}{r^2})R(r)=0$

$R_{\mathrm{nl}}(r)=N_{\mathrm{nl}}e^{-\frac{\zeta}{2}}\zeta^l F(-n+l+1,2l+2,\zeta)$，其中$\zeta=\frac{2Zr}{na},N_{nl}=(\frac{2Z}{a})^{\frac{3}{2}}\frac{1}{n^2(2l+1)!}\sqrt{\frac{(n+1)!}{(n-l-1)!}}$

Spherical harmonic function：$\sin\theta\frac{\partial}{\partial\theta}(\sin\theta\frac{\partial Y}{\partial\theta})+\frac{\partial^2 Y}{\partial\varphi^2}=-l(l+1)\sin^2\theta Y$

$Y_{\mathrm{lm}}(\theta,\varphi)=(-1)^m\sqrt{\frac{(2l+1)(l-m)!}{4\pi(l+m)!}}\cdot P_l^m(\cos\theta)e^{\mathrm{im}\varphi}$,其中$\theta=\arctan(\frac{\sqrt{x^2+y^2}}{z})$

Wave function of Hydrogen：$\psi_{\mathrm{nlm}}=\sqrt{(\frac{2}{\mathrm{na}})^3\frac{(n-l-1)!}{2n((n+l)!)^3}}e^{-\frac{r}{na}}(\frac{2r}{na})^l(L_{n-l-1}^{2l+1}(\frac{2r}{na}))Y_l^m(\theta,\phi)$

Space Density Distribution Probability function：$W_{\mathrm{nlm}}(r,\theta,\varphi)=|R_{\mathrm{nl}}(r)Y_{\mathrm{lm}}(\theta,\varphi)|^2$

薛定谔方程：$i\hbar\frac{\partial\psi}{\partial t}=-\frac{\hbar^2}{2m}\nabla^2\psi+V\psi$

径向波函数的方程：$R(r)^{(2)}+(\frac{2\mu}{\eta}(E+\frac{e^2}{r})-\frac{l(l+1)}{r^2})R(r)=0$

径向波函数的解：

$R_{\mathrm{nl}}(r)=N_{\mathrm{nl}}e^{-\frac{\zeta}{2}}\zeta^l F(-n+l+1,2l+2,\zeta)$，其中$\zeta=\frac{2Zr}{na},N_{nl}=(\frac{2Z}{a})^{\frac{3}{2}}\frac{1}{n^2(2l+1)!}\sqrt{\frac{(n+1)!}{(n-l-1)!}}$

球谐函数的方程：$\sin\theta\frac{\partial}{\partial\theta}(\sin\theta\frac{\partial Y}{\partial\theta})+\frac{\partial^2 Y}{\partial\varphi^2}=-l(l+1)\sin^2\theta Y$

球谐函数的解：$Y_{\mathrm{lm}}(\theta,\varphi)=(-1)^m\sqrt{\frac{(2l+1)(l-m)!}{4\pi(l+m)!}}\cdot P_l^m(\cos\theta)e^{\mathrm{im}\varphi}$,其中$\theta=\arctan(\frac{\sqrt{x^2+y^2}}{z})$

氢原子波函数：$\psi_{\mathrm{nlm}}=\sqrt{(\frac{2}{\mathrm{na}})^3\frac{(n-l-1)!}{2n((n+l)!)^3}}e^{-\frac{r}{na}}(\frac{2r}{na})^l(L_{n-l-1}^{2l+1}(\frac{2r}{na}))Y_l^m(\theta,\phi)$

核外电子空间概率密度分布函数：$W_{\mathrm{nlm}}(r,\theta,\varphi)=|R_{\mathrm{nl}}(r)Y_{\mathrm{lm}}(\theta,\varphi)|^2$

1,0,0： $W_{100} = \frac{1}{\pi} * \frac{1}{a^3} e^{-\frac{2r}{a}}$

2,0,0： $W_{200} = \frac{1}{8\pi} * \frac{1}{a^3} (1 - \frac{r}{2a})^2 e^{-\frac{r}{a}}$

2,1,0： $W_{210} = \frac{1}{32\pi} * \frac{1}{a^5} * r^2 * e^{-\frac{r}{a}} * \cos^2\theta$

2,1,±1： $W_{211} = \frac{1}{64\pi} * \frac{1}{a^5} * r^2 e^{-\frac{r}{a}} * \sin^2\theta$

3,0,0： $W_{300} = \frac{1}{27\pi} * \frac{1}{a^3} * (1 - \frac{2}{3} * \frac{r}{a} + \frac{2}{27} (\frac{r}{a})^2)^2 e^{-\frac{2r}{3a}}$

3,1,0： $W_{310} = \frac{8}{729\pi} * \frac{1}{a^5} * r^2 (1 - \frac{1}{6} * \frac{r}{a})^2 e^{-\frac{2r}{3a}} * \cos^2\theta$

3,1,±1： $W_{311} = \frac{4}{729\pi} * \frac{1}{a^5} * r^2 (1 - \frac{1}{6} * \frac{r}{a})^2 * e^{-\frac{2r}{3a}} * \sin^2\theta$

3,2,0： $W_{320} = \frac{1}{39366\pi} * \frac{1}{a^7} * r^4 e^{-\frac{2r}{3a}} * (3\cos^2\theta - 1)^2$

3,2,±1： $W_{321} = \frac{1}{6561\pi} * \frac{1}{a^7} * r^4 e^{-\frac{2r}{3a}} * \sin^2\theta\cos^2\theta$

3,2,±2： $W_{322} = \frac{1}{26244\pi} * \frac{1}{a^7} * r^4 e^{-\frac{2r}{3a}} * \sin^4\theta$

4,0,0： $W_{400} = \frac{1}{64\pi} * \frac{1}{a^3} * (1 - \frac{3}{4} * \frac{r}{a} + \frac{1}{8} (\frac{r}{a})^2 - \frac{1}{192} (\frac{r}{a})^3)^2 e^{-\frac{r}{2a}}$

4,1,0： $W_{410} = \frac{5}{1024\pi} * \frac{1}{a^5} (1 - \frac{1}{4} * \frac{r}{a} + \frac{1}{80} (\frac{r}{a})^2)^2 e^{-\frac{r}{2a}} * \cos^2\theta$

4,1,±1： $W_{411} = \frac{5}{2048\pi} * \frac{1}{a^5} * r^2 (1 - \frac{1}{4} * \frac{r}{a} + \frac{1}{80} (\frac{r}{a})^2)^2 e^{-\frac{r}{2a}} * \sin^2\theta$

4,2,0： $W_{420} = \frac{1}{65536\pi} * \frac{1}{a^7} * r^4 (1 - \frac{1}{12} * \frac{r}{a})^2 e^{-\frac{r}{2a}} * (3\cos^2\theta - 1)^2$

4,2,±1： $W_{421} = \frac{3}{32768\pi} * \frac{1}{a^7} * r^4 (1 - \frac{1}{12} * \frac{r}{a})^2 e^{-\frac{r}{2a}} \sin^2\theta\cos^2\theta$

4,2,±2： $W_{422} = \frac{3}{131072\pi} * \frac{1}{a^7} * r^4 (1 - \frac{1}{12} * \frac{r}{a})^2 e^{-\frac{r}{2a}} * \sin^4\theta$

4,3,0： $W_{430} = \frac{1}{47185920\pi} * \frac{1}{a^9} * r^6 e^{-\frac{r}{2a}} * (5\cos^3\theta - 3\cos\theta)^2$

4,3,±1： $W_{431} = \frac{1}{62914560\pi} * \frac{1}{a^9} * r^6 e^{-\frac{r}{2a}} * \sin^2\theta (5\cos^2\theta - 1)^2$

4,3,±2： $W_{432} = \frac{1}{6291456\pi} * \frac{1}{a^9} * r^6 e^{-\frac{r}{2a}} * \sin^4\theta\cos^2\theta$

4,3,±3： $W_{433} = \frac{1}{37748736\pi} * \frac{1}{a^9} * r^6 e^{-\frac{r}{2a}} * \sin^6\theta$