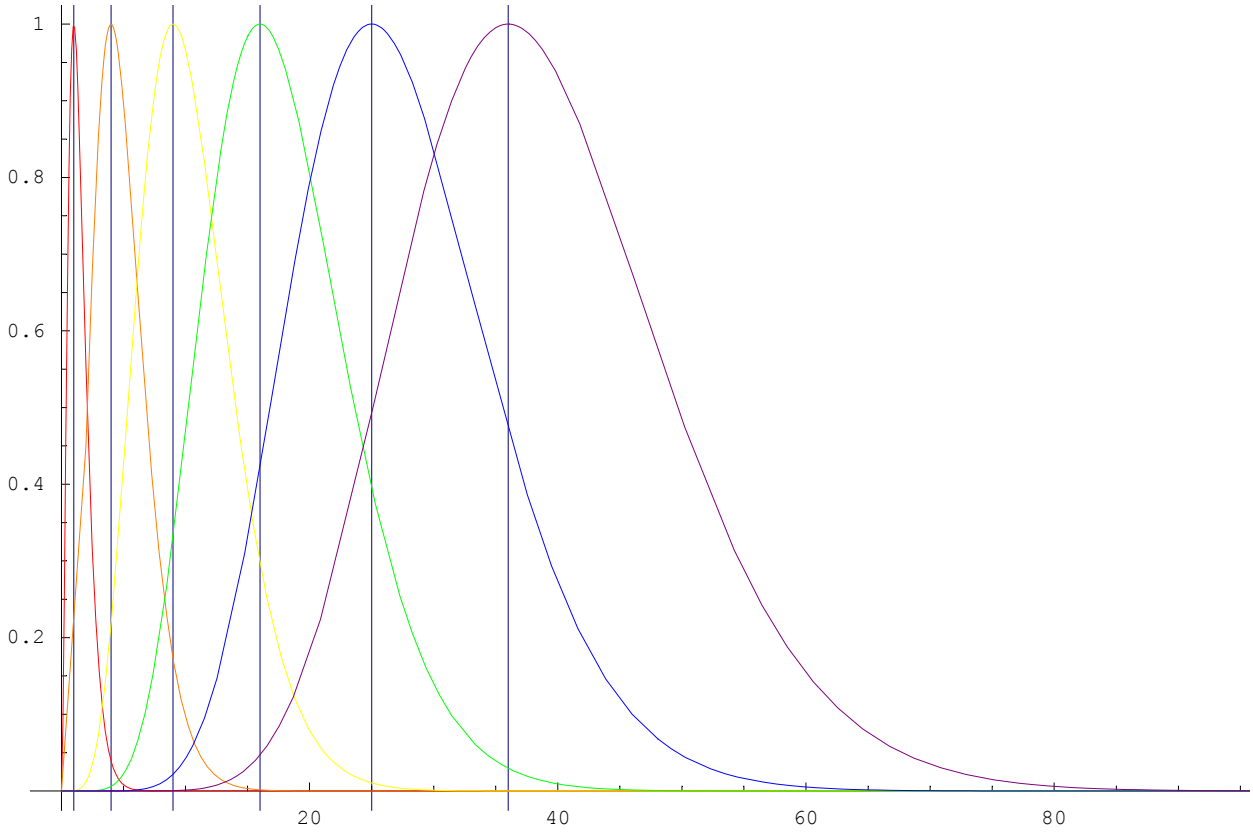
$$R[n\_, l\_, r\_] := r^{l}\, \text{Exp}[-r/(n\,a)] \sum_{j=0}^{n-l-1} b[j, n, l]\, r^{j}$$

$$b[j\_, n\_, l\_] := \text{If}\left[j == 0,\ 2\,(n\,a)^{-3/2},\ \frac{2}{n\,a}\,\frac{j+l-n}{j\,(j+2\,l+1)}\,b[j-1, n, l]\right]$$

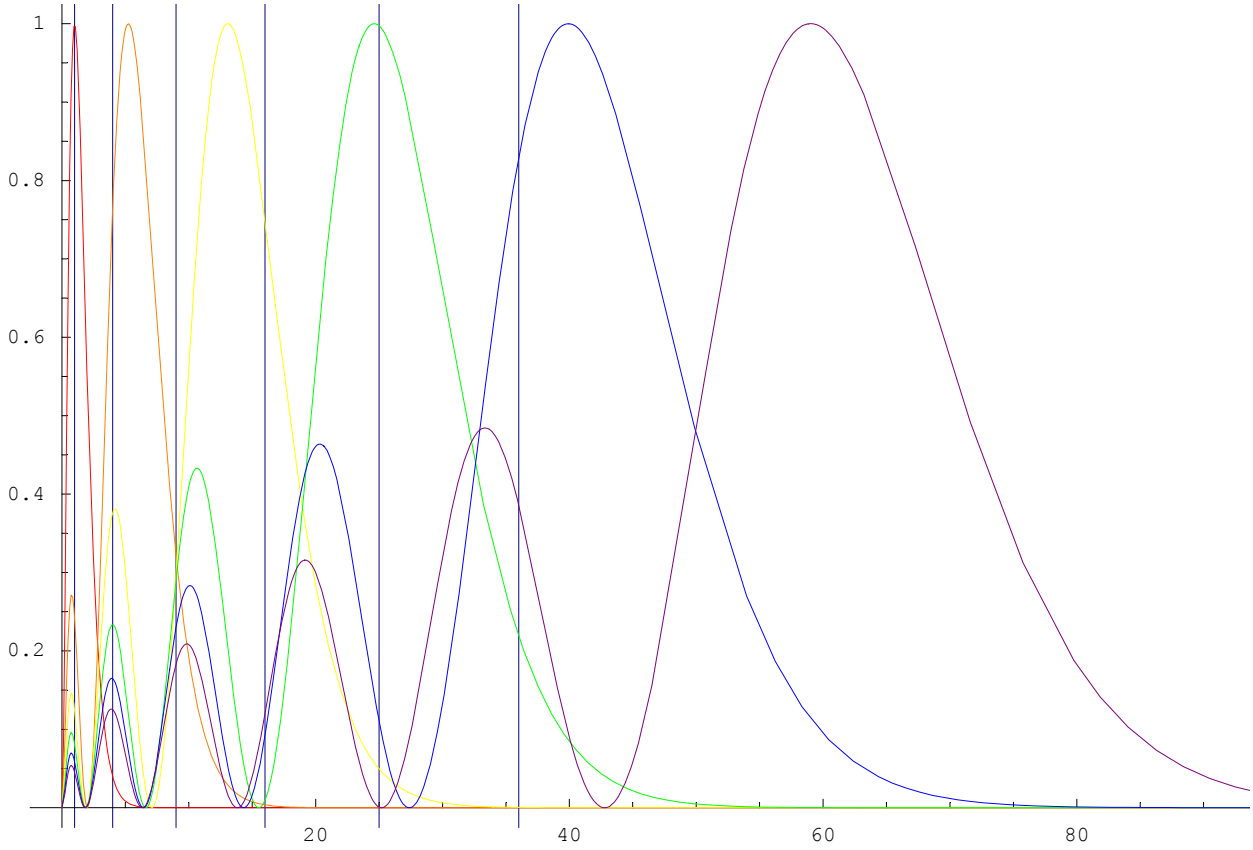
$$\text{flm}[l\_, m\_, \text{zoverr}\_] := \frac{\text{Sqrt}[1-\text{zoverr}^2]^{\text{Abs}[m]}}{2^{l}\,(l!)}\,D\left[(\text{zoverr}^2-1)^{l}, \{\text{zoverr}, l+\text{Abs}[m]\}\right]$$

$$\text{psi}[n\_, l\_, m\_, x\_, y\_, z\_] := R\left[n, l, \sqrt{x^2+y^2+z^2}\right]\text{flm}[l, m, \text{zoverr}] /. \text{zoverr} \to z\Big/\sqrt{x^2+y^2+z^2}$$

```
a = 1; Plot[Evaluate[
  Table[(r R[n, n - 1, r])^2 / FindMaximum[(r R[n, n - 1, r])^2, {r, n^2}][[1]], {n, 6}]],
 {r, 0, 100}, PlotStyle → {Red, Orange, Yellow, Green, Blue, Purple},
 PlotRange → All, GridLines → {{1, 4, 9, 16, 25, 36}, None}];
```



```
Plot[Evaluate[
   Table[(r R[n, 0, r])^2 / FindMaximum[(r R[n, 0, r])^2, {r, 1.5 n^2}][[1]], {n, 6}]],
  {r, 0, 100}, PlotStyle → {Red, Orange, Yellow, Green, Blue, Purple},
  PlotRange → All, GridLines → {{1, 4, 9, 16, 25, 36}, None}];
```



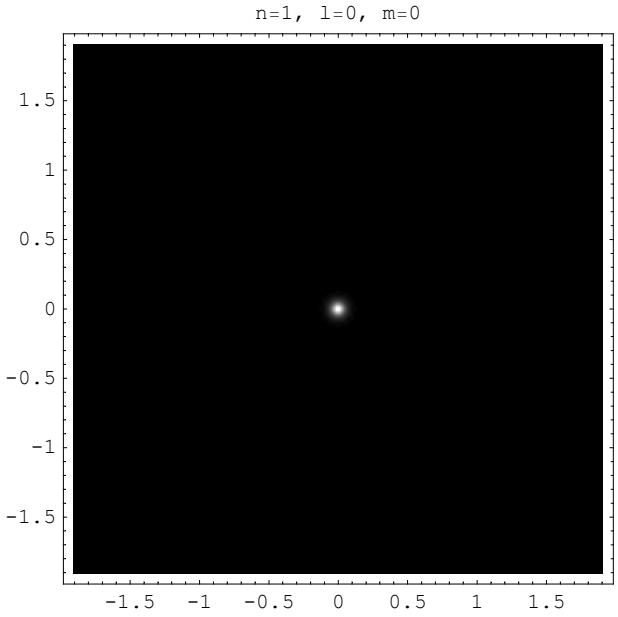

```
FindMaximum[(r R[6, 0, r])^2, {r, 60}]
```

```
{0.0336471, {r → 59.024}}
```

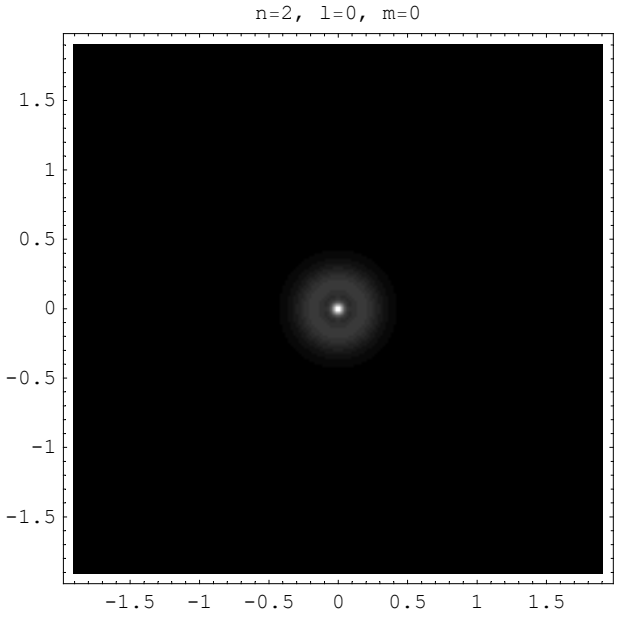
```
hbar = 0.658;
ke2 = 1.44;
m = 5.68;
a = hbar^2 / (m ke2); E1 = -m ke2^2 / (2 hbar^2);
```

```
range = 36 a; PlotDensity[n_, l_, m_] := DensityPlot[
  NIntegrate[Evaluate[psi[n, l, m, x, y, z]^2], {y, -∞, ∞}], {x, -range, +range},
  {z, -range, +range}, PlotPoints → 200, Mesh → False, PlotRange → All, PlotLabel →
   StringJoin["n=", ToString[n], ", l=", ToString[l], ", m=", ToString[m]]];
```

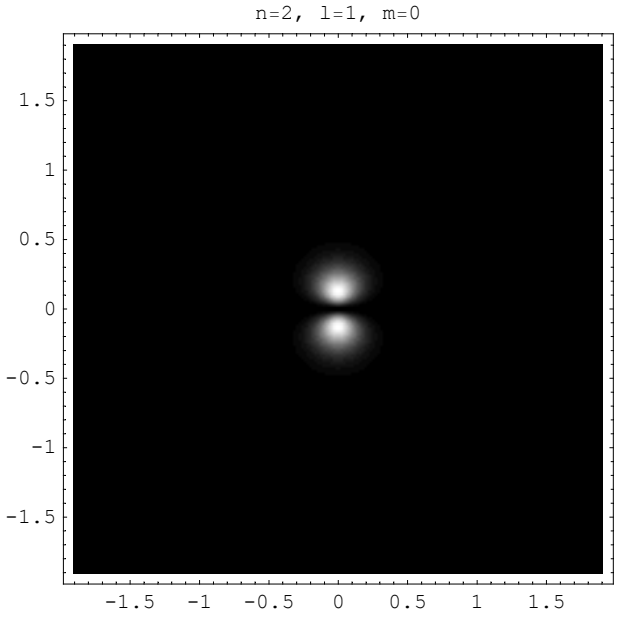
PlotDensity[1, 0, 0];



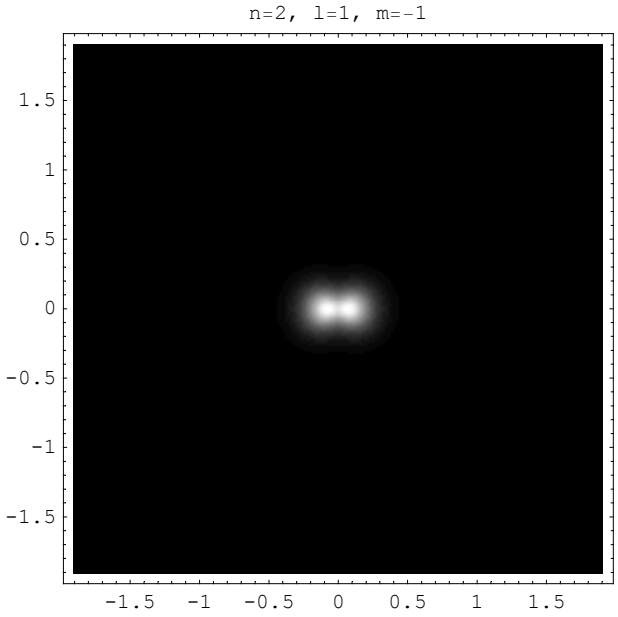
PlotDensity[2, 0, 0];



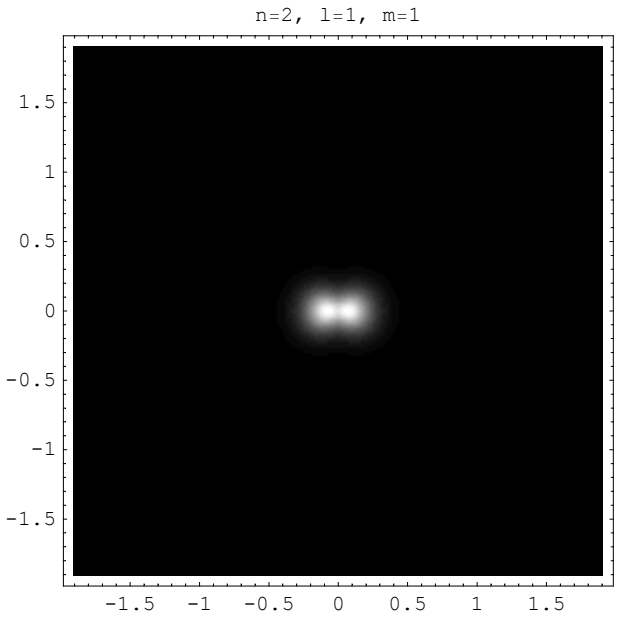
PlotDensity[2, 1, 0];



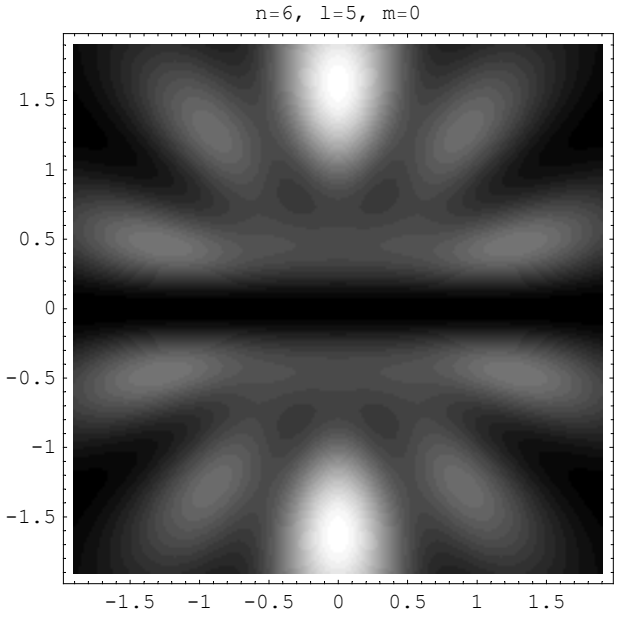
PlotDensity[2, 1, -1];



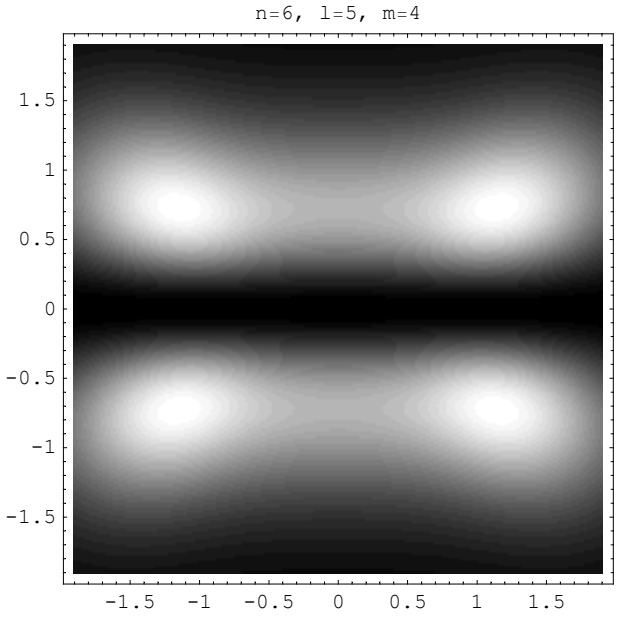
```
PlotDensity[2, 1, 1];
```




```
PlotDensity[6, 5, 0];
```



```
PlotDensity[6, 5, 4];
```




```
PlotDensity[6, 0, 0];
```