

```

R[n_, l_, r_] := r^l Exp[-r / (n a)] Sum[b[j, n, l] r^j, {j, 0, n-1-l}]

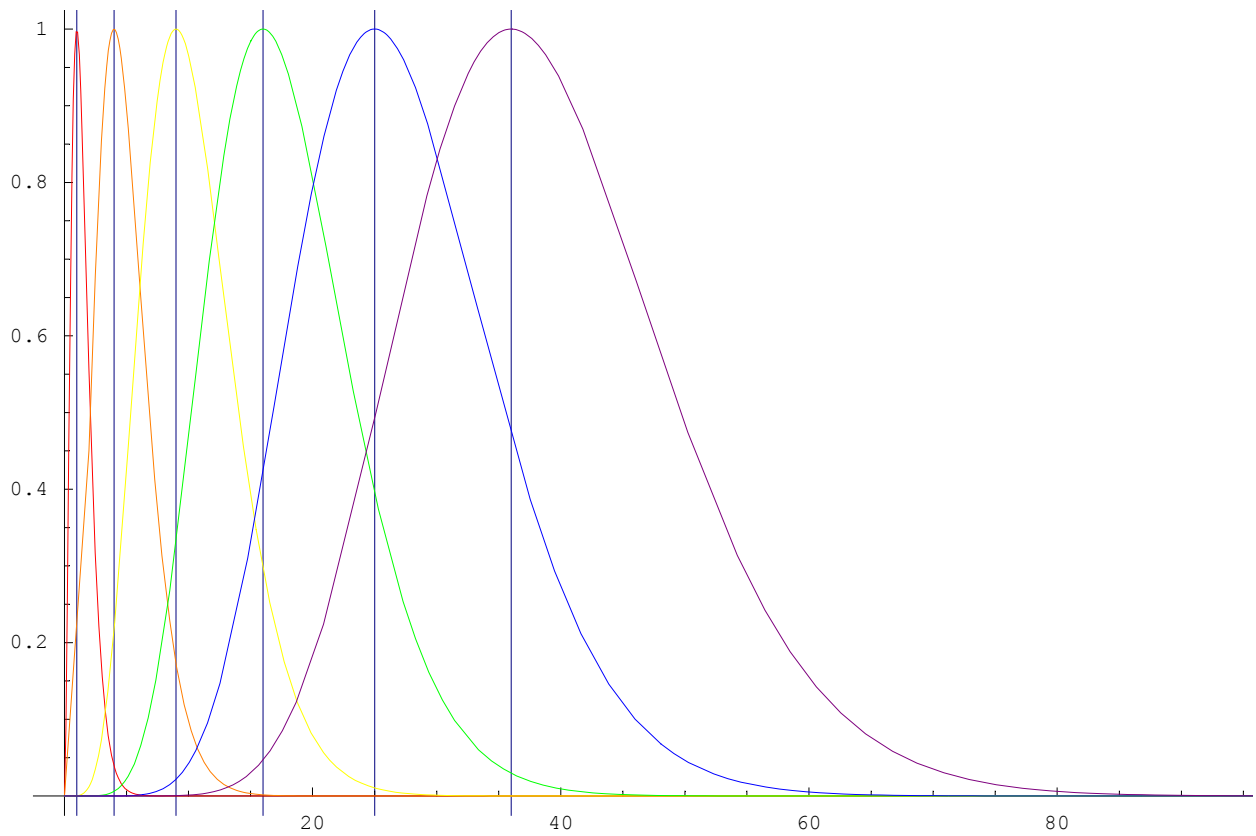
b[j_, n_, l_] := If[j == 0, 2 (n a)^(-3/2), 2 / (n a) * (j+1-n) / (j+2 l+1) b[j-1, n, l]]

flm[l_, m_, zoverr_] := Sqrt[1 - zoverr^2]^Abs[m] / 2^l (l!) D[(zoverr^2 - 1)^l, {zoverr, 1 + Abs[m]}]

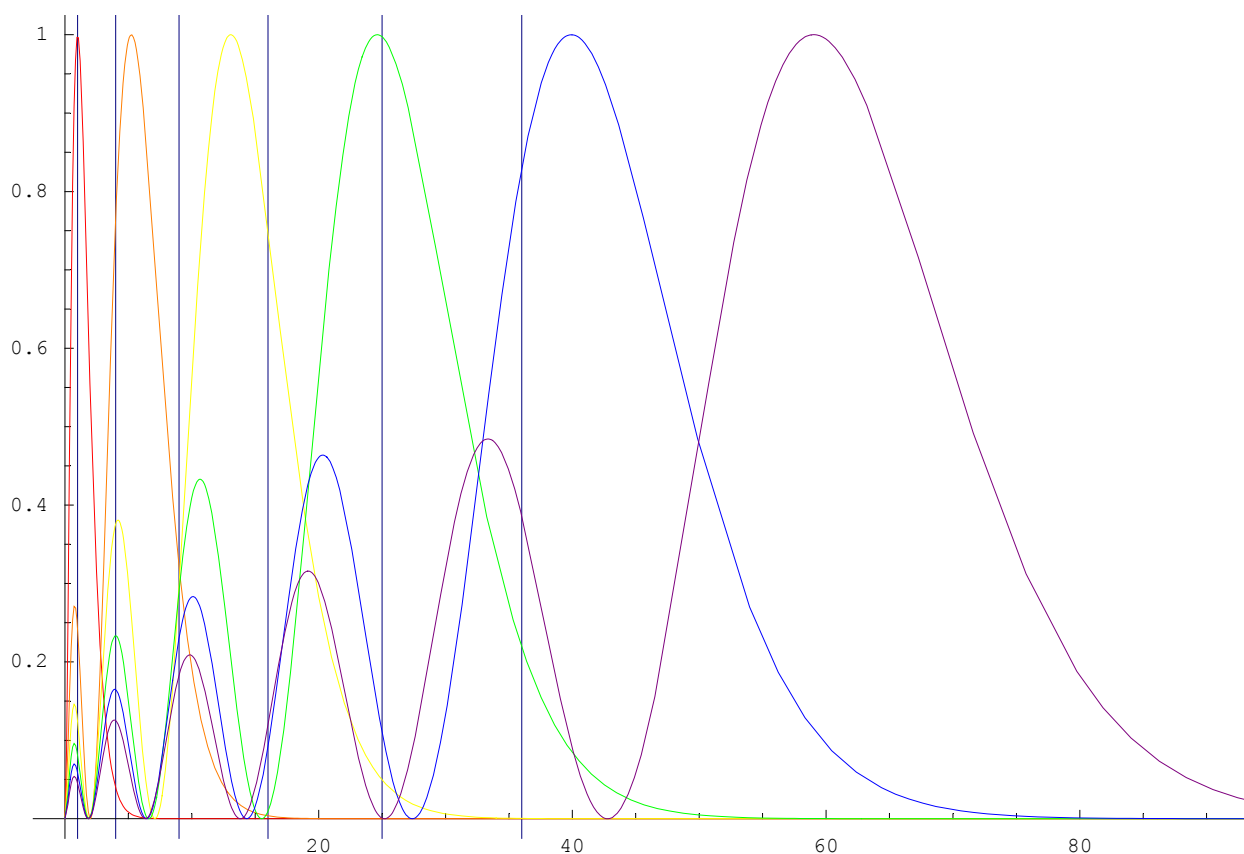
psi[n_, l_, m_, x_, y_, z_] :=
  R[n, l, Sqrt[x^2 + y^2 + z^2]] flm[l, m, zoverr] /. zoverr -> z / Sqrt[x^2 + y^2 + z^2]

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;
```

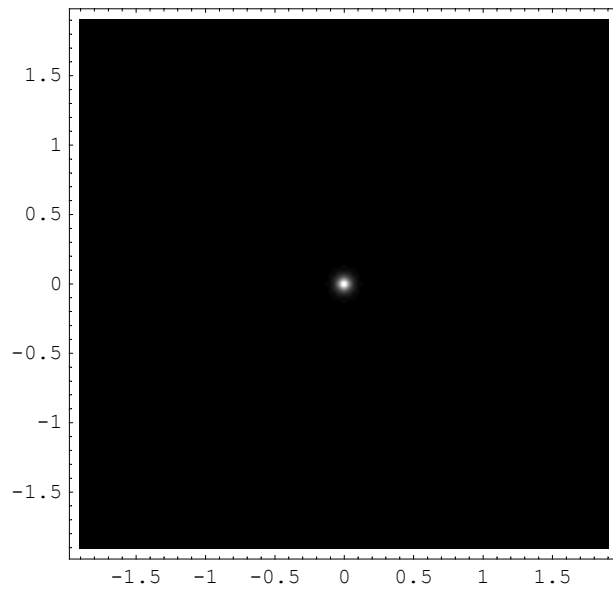
```
m = 5.68;
```

```
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]]];
```

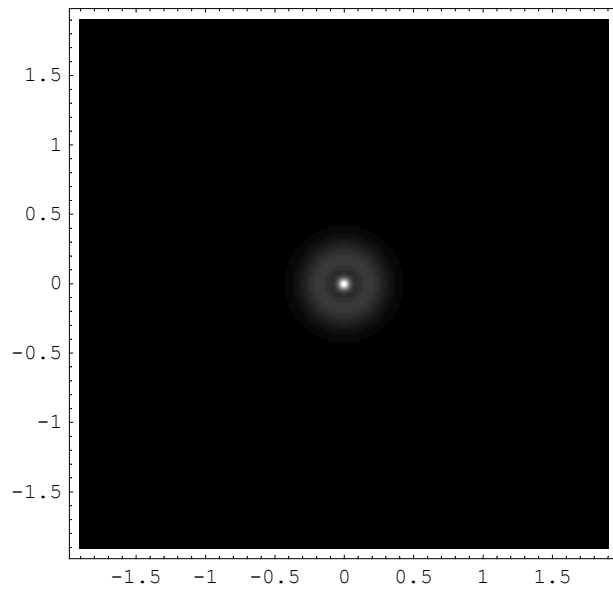
```
PlotDensity[1, 0, 0];
```

n=1, l=0, m=0

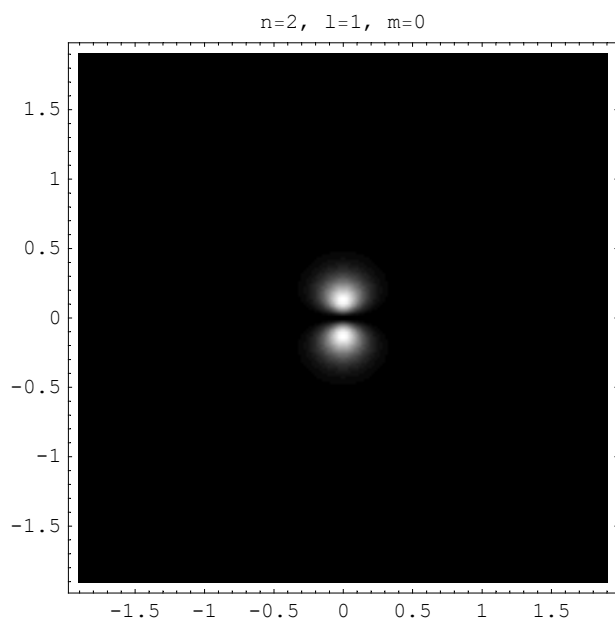


```
PlotDensity[2, 0, 0];
```

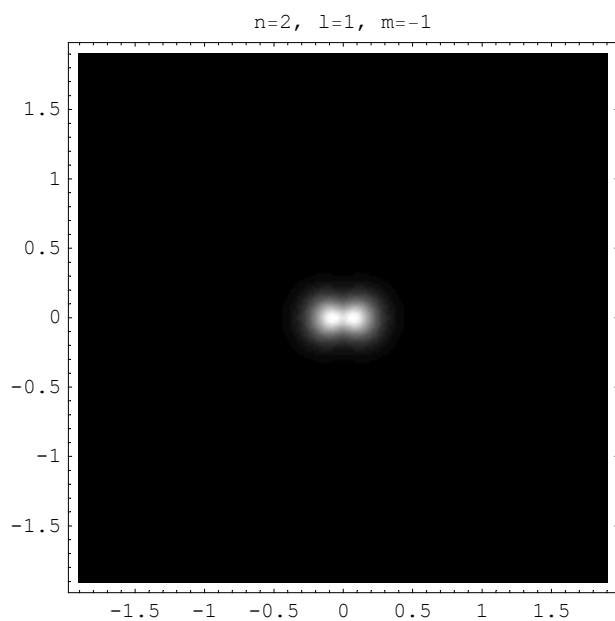
n=2, l=0, m=0



```
PlotDensity[2, 1, 0];
```

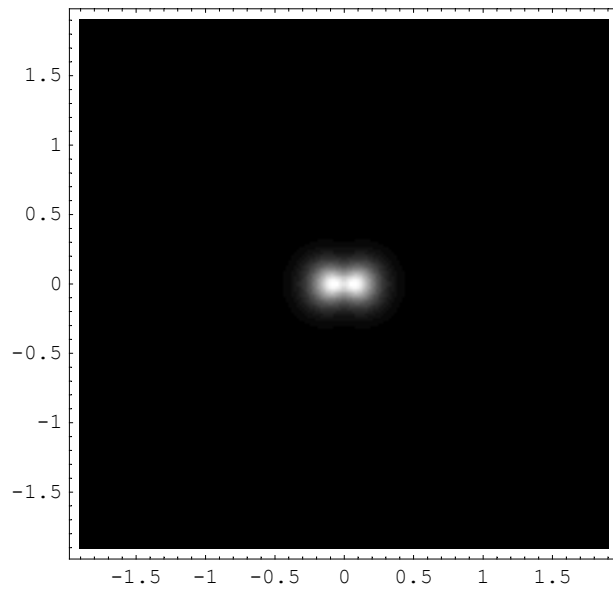


```
PlotDensity[2, 1, -1];
```



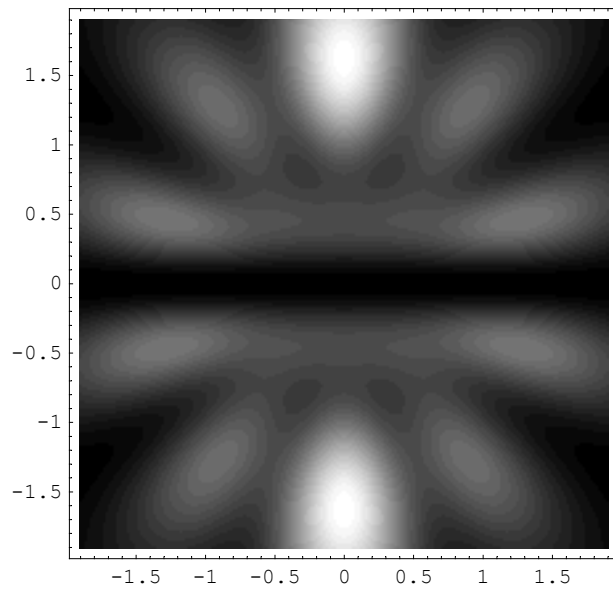
```
PlotDensity[2, 1, 1];
```

n=2, l=1, m=1

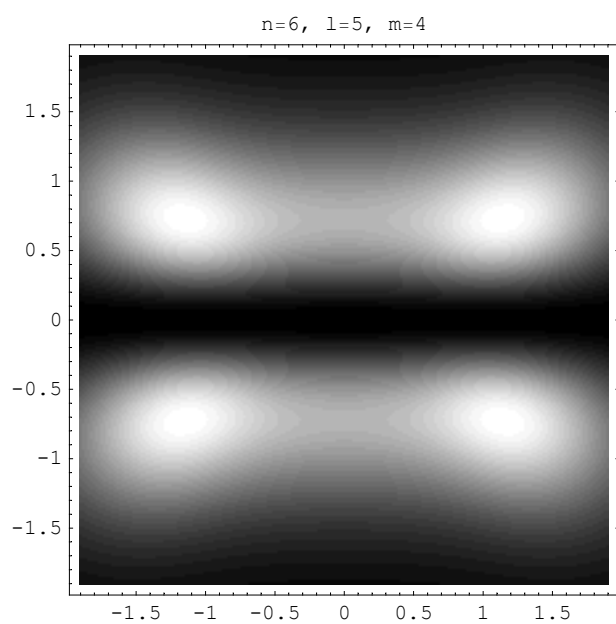


```
PlotDensity[6, 5, 0];
```

n=6, l=5, m=0



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



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

