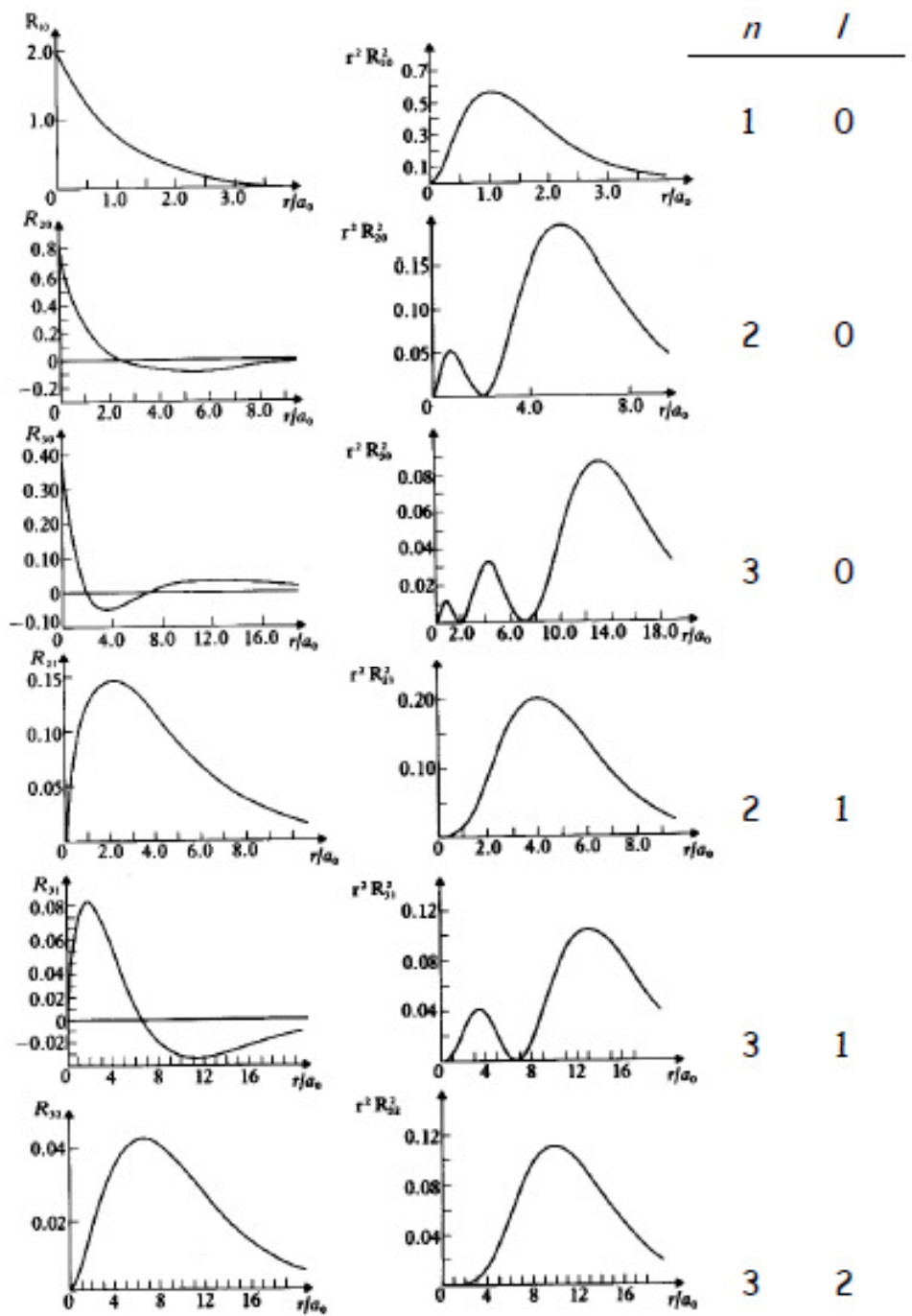
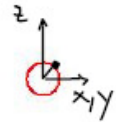


| Shell | Quantum numbers $n \quad l \quad m$ | Spectroscopic notation | Wave function $\psi_{nlm}(r, \theta, \phi)$ |
|-------|--|----------------------------------|--|
| K | 1 0 0 | 1s | $\frac{1}{\sqrt{\pi}} (Z/a_0)^{3/2} \exp(-Zr/a_0)$ |
| L | 2 0 0 | 2s | $\frac{1}{2\sqrt{2\pi}} (Z/a_0)^{3/2} (1 - Zr/2a_0) \exp(-Zr/2a_0)$ |
| | 2 1 0 | 2p ₀ | $\frac{1}{4\sqrt{2\pi}} (Z/a_0)^{3/2} (Zr/a_0) \exp(-Zr/2a_0) \cos \theta$ |
| | 2 1 ± 1 | 2p _{± 1} | $\mp \frac{1}{8\sqrt{\pi}} (Z/a_0)^{3/2} (Zr/a_0) \exp(-Zr/2a_0) \sin \theta \exp(\pm i\phi)$ |
| M | 3 0 0 | 3s | $\frac{1}{3\sqrt{3\pi}} (Z/a_0)^{3/2} (1 - 2Zr/3a_0 + 2Z^2r^2/27a_0^2) \exp(-Zr/3a_0)$ |
| | 3 1 0 | 3p ₀ | $\frac{2\sqrt{2}}{27\sqrt{\pi}} (Z/a_0)^{3/2} (1 - Zr/6a_0)(Zr/a_0) \exp(-Zr/3a_0) \cos \theta$ |
| | 3 1 ± 1 | 3p _{± 1} | $\mp \frac{2}{27\sqrt{\pi}} (Z/a_0)^{3/2} (1 - Zr/6a_0)(Zr/a_0) \exp(-Zr/3a_0) \sin \theta \exp(\pm i\phi)$ |
| | 3 2 0 | 3d ₀ | $\frac{1}{81\sqrt{6\pi}} (Z/a_0)^{3/2} (Z^2r^2/a_0^2) \exp(-Zr/3a_0) (3 \cos^2 \theta - 1)$ |
| | 3 2 ± 1 | 3d _{± 1} | $\mp \frac{1}{81\sqrt{\pi}} (Z/a_0)^{3/2} (Z^2r^2/a_0^2) \exp(-Zr/3a_0) \sin \theta \cos \theta \exp(\pm i\phi)$ |
| | 3 2 ± 2 | 3d _{± 2} | $\frac{1}{162\sqrt{\pi}} (Z/a_0)^{3/2} (Z^2r^2/a_0^2) \exp(-Zr/3a_0) \sin^2 \theta \exp(\pm 2i\phi)$ |



Polardiagramm

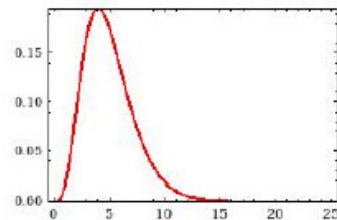
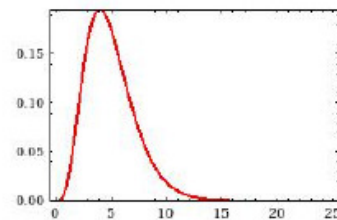
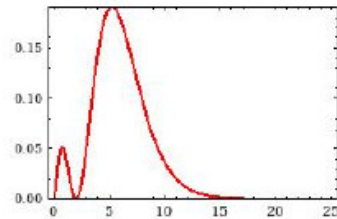
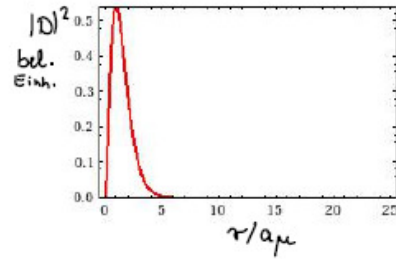
Radialabstand = $|Y_{\ell m}(r, \varphi)|^2$



Radiale Verteilungs-

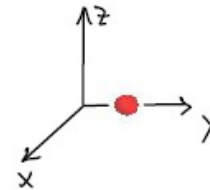
funktion

$|D_{n,\ell}(r)|^2$



Flächen

mit $|Y|^2 = \text{const.}$



Farbe = $\text{Arg}(\varphi)$

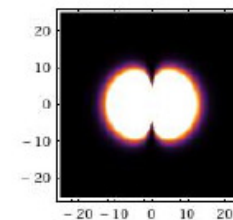
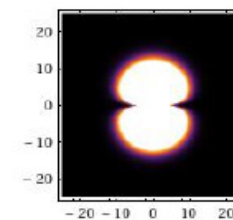
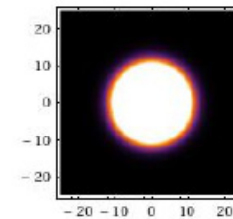
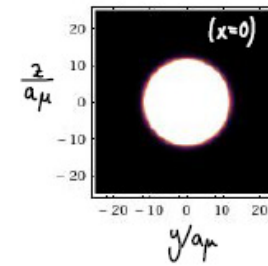


d.h. die komplexe Phase

x=0 Ebene:

Helligkeit prop.

$|Y_{\ell m}(x,y,z)|^2$



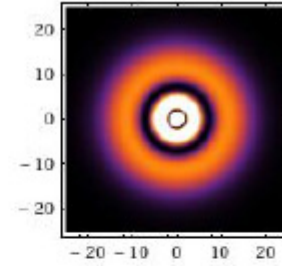
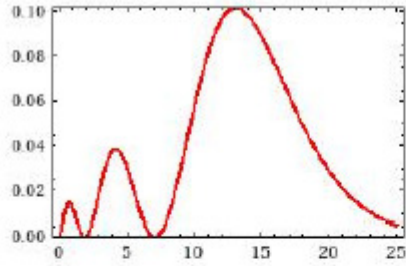
(n, l, m)

(1, 0, 0)

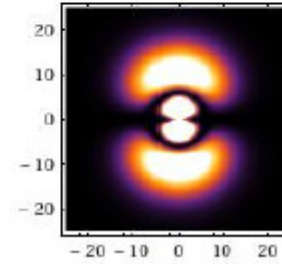
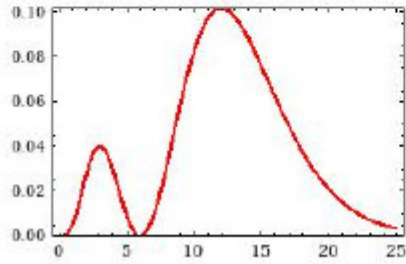
(2, 0, 0)

(2, 1, 0)

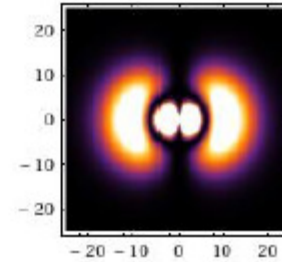
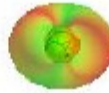
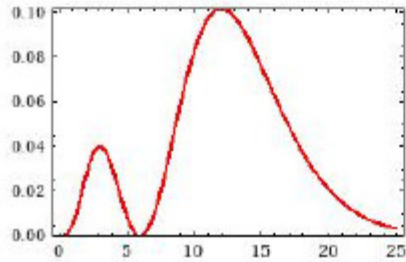
(2, 1, ±1)



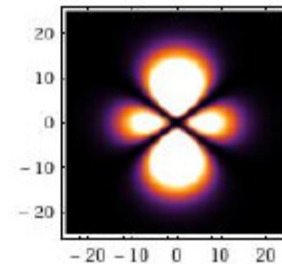
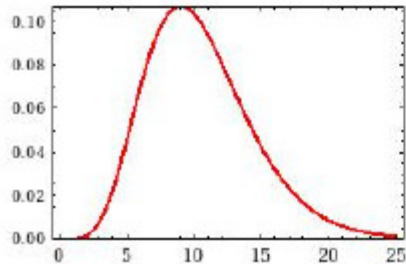
$(3,0,0)$



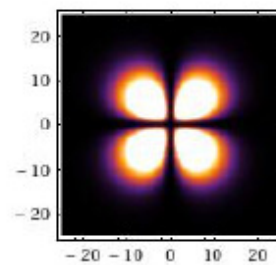
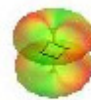
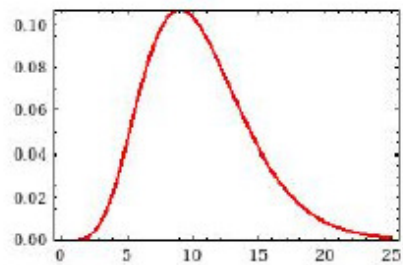
$(3,1,0)$



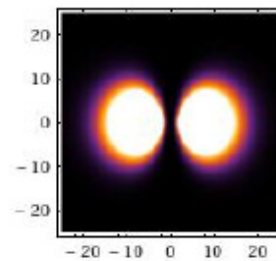
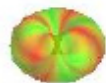
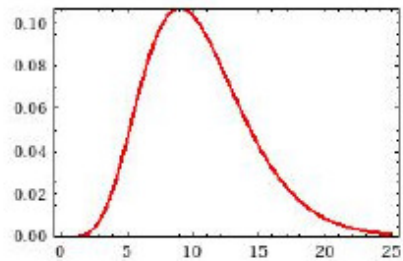
$(3,1,\pm 1)$



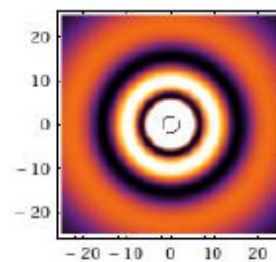
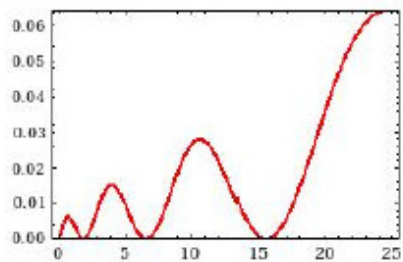
$(3,2,0)$



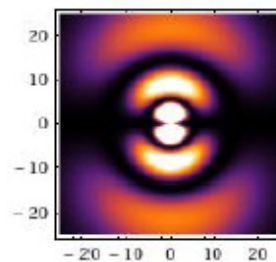
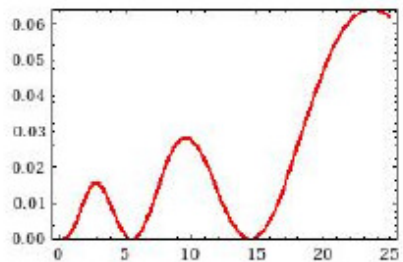
$(3, 2, \pm 1)$



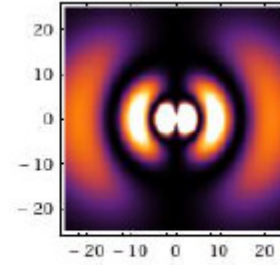
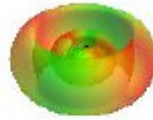
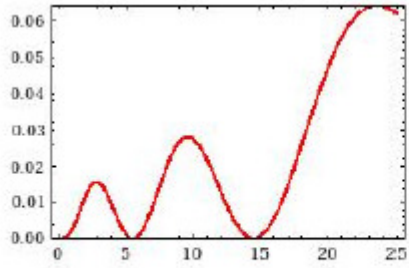
$(3, 2, \pm 2)$



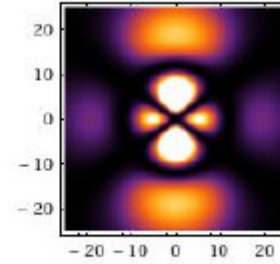
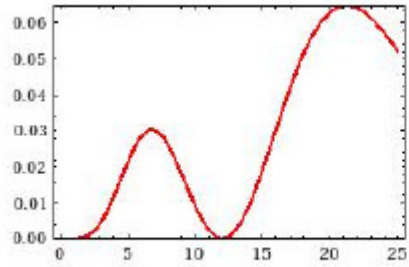
$(4, 0, 0)$



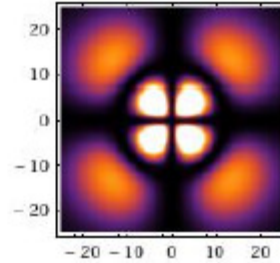
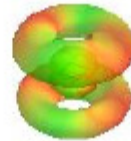
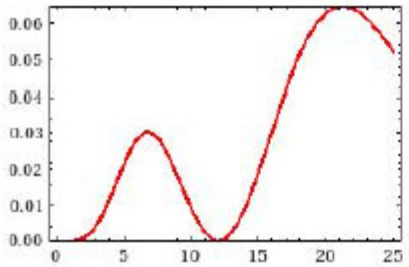
$(4, 1, 0)$



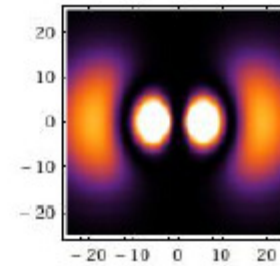
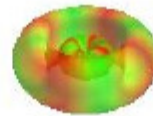
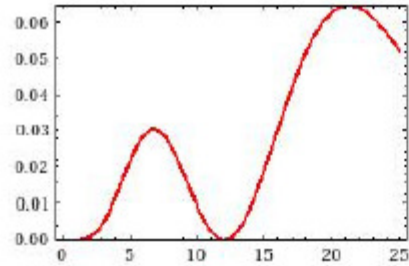
$(4, 1, \pm 1)$



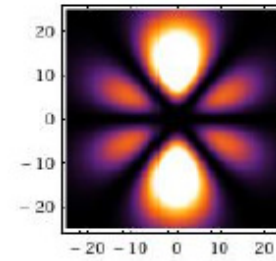
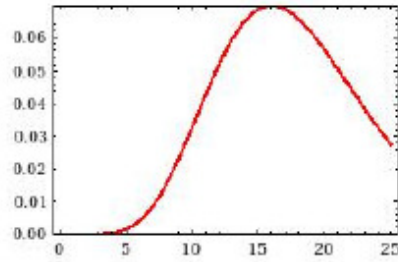
$(4, 2, 0)$



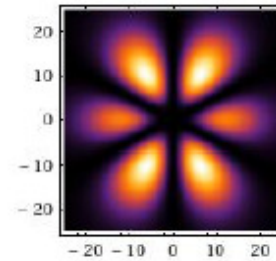
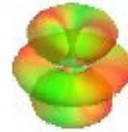
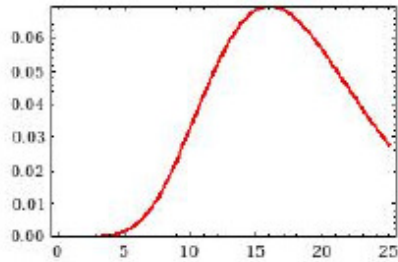
$(4, 2, \pm 1)$



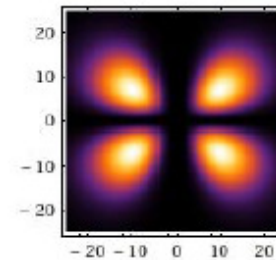
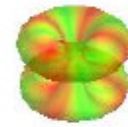
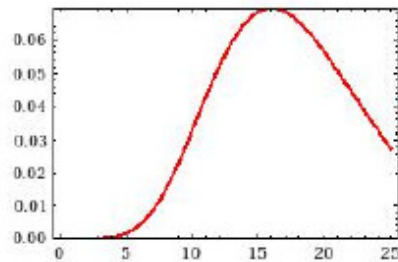
$(4, 2, \pm 2)$



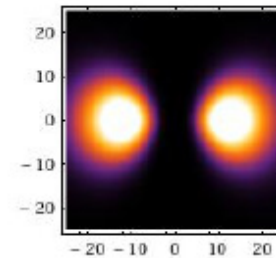
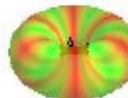
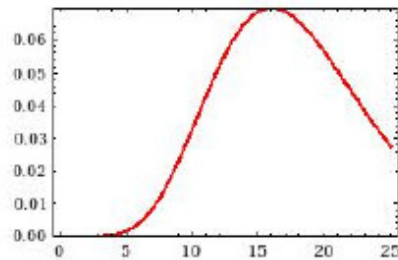
$(4,3,0)$



$(4,3,\pm 1)$



$(4,3,\pm 2)$



$(4,3,\pm 3)$