

# Gegeben: Quantummechanik 1

Wasserstoffatom

$$R_{10} = 2 a^{-3/2} \exp\left(-\frac{r}{a}\right)$$

$$R_{20} = 2^{-1/2} a^{-3/2} \left(1 - \frac{r}{2a}\right) \exp\left(-\frac{r}{2a}\right)$$

$$R_{21} = 24^{-1/2} a^{-3/2} \frac{r}{a} \exp\left(-\frac{r}{2a}\right)$$

$$Y_0^0 = \left(\frac{1}{4\pi}\right)^{1/2}$$

$$Y_1^0 = \left(\frac{3}{4\pi}\right)^{1/2} \cos \theta$$

$$Y_1^{\pm 1} = \mp \left(\frac{3}{8\pi}\right)^{1/2} \sin \theta e^{\pm i\varphi}$$

Ein-dimensionale harmonische oscillator

$$\hat{a}_{\pm} \equiv \frac{1}{\sqrt{2m\hbar\omega}} \left(\mp i\hat{p}_x + m\omega\hat{x}\right)$$

$$\hat{a}_+ |n\rangle = \sqrt{n+1} |n+1\rangle$$

$$\hat{a}_- |n\rangle = \sqrt{n} |n-1\rangle$$

$$E_n = \left(n + \frac{1}{2}\right) \hbar\omega \quad n=0, 1, 2, \dots$$