

# PEP4 Zusammenfassung

## Atom- und Kernphysik

Sommersemester 2017  
Heidelberg

Konstanten:

- $m_e c^2 = 511 \text{ keV}$
- $hc = 1240 \text{ eV nm} = 1240 \text{ MeV fm}$
- $\hbar c = 197 \text{ eV nm} = 197 \text{ MeV fm}$
- $E_0 = 13.6 \text{ eV}$  (*Rydbergenergie*)
- $R_{y(\infty)} = \frac{E_0}{hc} = 1.027 \cdot 10^7 \frac{1}{m}$  (*Rydbergkonstante*)
- $1u = 931.5 \text{ MeV}/c^2$
- $M_H = 1.0078 \text{ u}$
- $M_N = 1.0087 \text{ u}$

## 1 Vielelektronensysteme

### 1.1 Wasserstoffatom

- Energieniveaus:  $E_n = -\frac{1}{n^2} \underbrace{\frac{m_e c^2}{2} \left( \frac{e^2}{\hbar c} \right)^2}_{E_0 = 13.6 \text{ eV}} Z^2 \stackrel{Z=1}{=} -\frac{1}{n^2} E_0$
- Bohrradius:  $a_0 = \frac{(\hbar c)^2}{m_e c^2 e^2} = 0.0529 \text{ nm}$
- Spektrum:  $\frac{1}{\lambda} = \underbrace{\frac{E_0}{hc}}_{R_y} \left( \frac{1}{m^2} - \frac{1}{n^2} \right)$