

Preparation for final exam

This is a compilation of those most important expressions in the course, which you should know actively and on the basis of which you should be able to calculate.

This compilation does not imply that the rest of the course is not examinable!

1. Special relativity

- Lorentz trafo (1.23) and consequences
- relat. E and p: (1.38), (1.39)
- E-p-conservation, fission

2. Blackbody Radiation

- Stefan-Boltzmann law (2.21)
- Wien's displacement law (2.24)
- Planck's blackbody law (2.47)
- Photoelectric effect (2.56)

3. Structure of atoms

- Bohr's model of the atom: (3.18), (3.16), $E_n = 13.6 \cdot V$
- de Broglie hypothesis (3.25)

4. Quantum Mechanics

- know the postulates
- operators: Laplace, momentum, kin. + pot. energy, ...
- solve 1-dim QM-problems ...
- commutators of $\hat{x}, \hat{p}, \hat{L}, \dots$

5. Hydrogen atom

- origin of quantum numbers n, l, m_l
(5.41), (5.43), (5.44)
- spectroscopic notation (5.69), ~~(5.93)~~ (5.106)
- normal Zeeman effect (5.82)
- spin-orbit coupling: (5.89), (5.90), (5.91), (5.92), (5.93)
- periodic table, electronic structure

6. Molecular structure

- moment of inertia (6.3)
- rotation energy (6.6)
- reduced mass (6.8)
- transitions of rotation-vibration spectrum (6.17)

7. Statistics

- Fermi-Dirac (7.9), Maxwell-Boltzmann (7.1), Bose-Einstein (7.16)
- rms speed (7.8)
- Fermi Energy (7.15) and its interpretation