

## BACHELOR Arbeitsthemen

### Description of project nr. 5

#### *Introduction to semiconductors. Microscopic treatment*

#### **Quantum mechanics, Statistical Physics** Fundamentals

- 1) Fundamentals: General properties of semiconductors
- 2) Classification
  - Homogeneous
  - Inhomogeneous
  - Extrinsic
  - Intrinsic
- 3) **Concept of bandstructure: almost free-electron approach**
  - Fundamentals
  - calculations with simple examples
- 4) **Semiconductor Statistics**
- 5) **Transport in semiconductors:**
  - analytical and numerical solutions of the differential equations.
- 6) **Spintronics**
  - Comparison of results with experiment.
- 7) Example: carbon nanotubes

#### **Literature**

N. W. Ashcroft, N. D. Mermin, *Solid State physics*. HRW International Editions (1976)  
K. Seeger, *Semiconductor Physics*, Springer (2004)

#### **Original Articles** (spintronics)

S. DasSarma *American Scientist*, Volume 89 , 516 (2001)