

Advanced Solid State Physics

- Master in Physics, (compulsory) elective subject
- other students are welcome, if space permits, please, let us know!

- weekly lectures and problem sets
- written exam at the end of term (10.7.2013)

- credit points: 10 (4 SWS + 2 SWS)
- „Scheine“ etc. are possible for non-Ma students

Lectures & Tutorium

- Prof. Dr. Stephanie Reich
room 1.2.42, reich@physik.fu-berlin.de
office hours: Fri 2-3pm (after lecture)
- Wed noon-2pm, Fri noon-2pm

- Benjamin Hatting
benjamin.hatting@fu-berlin.de
- Wed 10am-noon, Wed 2-4pm, starts 23.4.2013

- everybody registered?

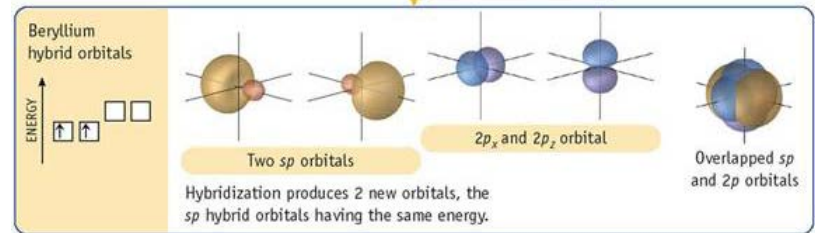
Nr	Datum	Thema
1	17.04.2013	Introduction, reminders
		Crystal structure
2	19.04.2013	Crystals, periodicity, and symmetry
3	24.04.2013	Symmetry & physical properties
4	26.04.2013	Quasicrystals & amorphous solids
		Electronic structure
5	03.05.2013	Empty lattice, photonic crystals
6	08.05.2013	Tight binding, graphene
7	10.05.2013	Photoelectron spectroscopy, examples of band structure in real solids
8	15.05.2013	Low-dimensional systems & density of states
		Vibrational properties
9	17.05.2013	Linear chain & phonon dispersion
10	22.05.2013	Electron-phonon interaction
11	24.05.2013	Raman, X-ray & neutron scattering
12	29.05.2013	Thermal properties of solids
		Electrical Transport
13	31.05.2013	Quasi-free electrons, relaxation dynamics
14	05.06.2013	Doping & carrier mobility
15	07.06.2013	Field & temperature dependence
16	12.06.2013	FET & fundamentals of electrical transport
17	14.06.2013	Coulomb blockade, Luttinger liquid
18	19.06.2013	Quantum Hall effect: Integer & fractional
		Optical properties
19	21.06.2013	Dielectric function
20	26.06.2013	Joint density of states, van Hove singularities & absorption edges
21	28.06.2013	Free carrier absorption, plasmons
22	03.07.2013	Exzitons in bulk crystals and low dimensional solids
23	05.07.2013	Absorption, emission, luminescence
24	10.07.2013	Klausur
25	12.07.2013	Example challenges in solid state systems

Books

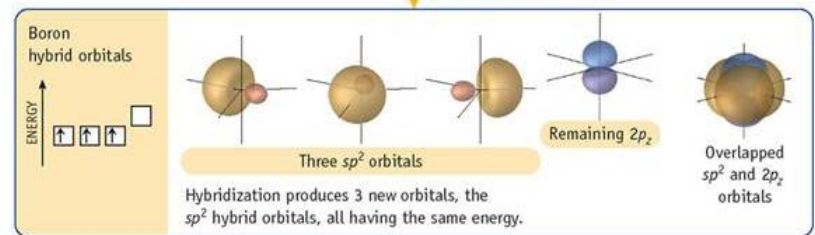
- Ashcroft & Mermin
Solid State Physics (Cengage Learning)
- Ibach & Lüth
Solid State Physics, Festkörperphysik (Springer)
- Hunklinger
Festkörperphysik (Oldenbourg, German only)
- Yu & Cardona
Fundamentals of Semiconductors (Springer)

Hybridization

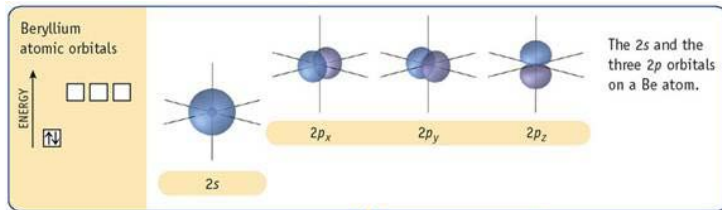
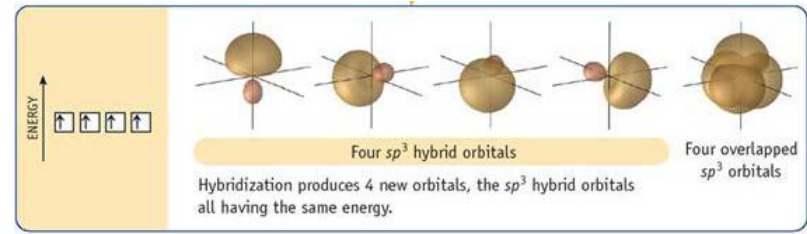
sp



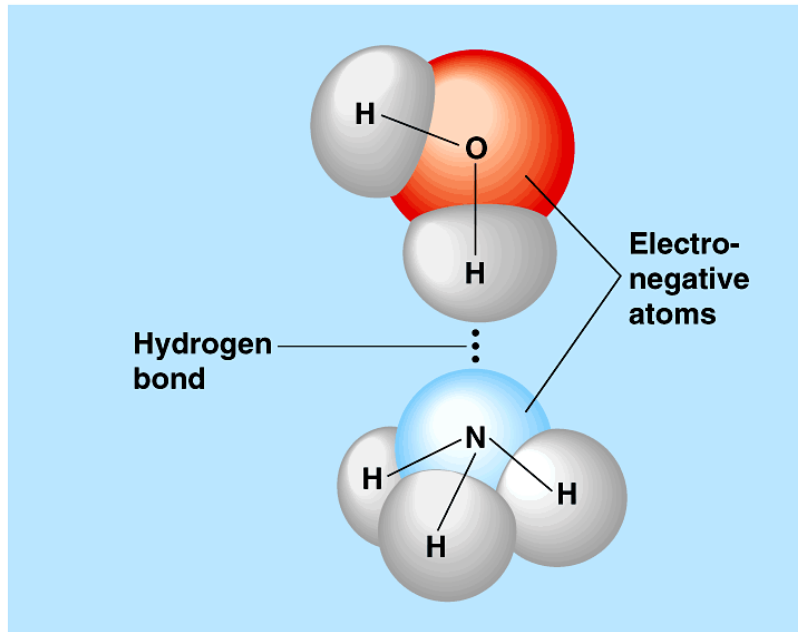
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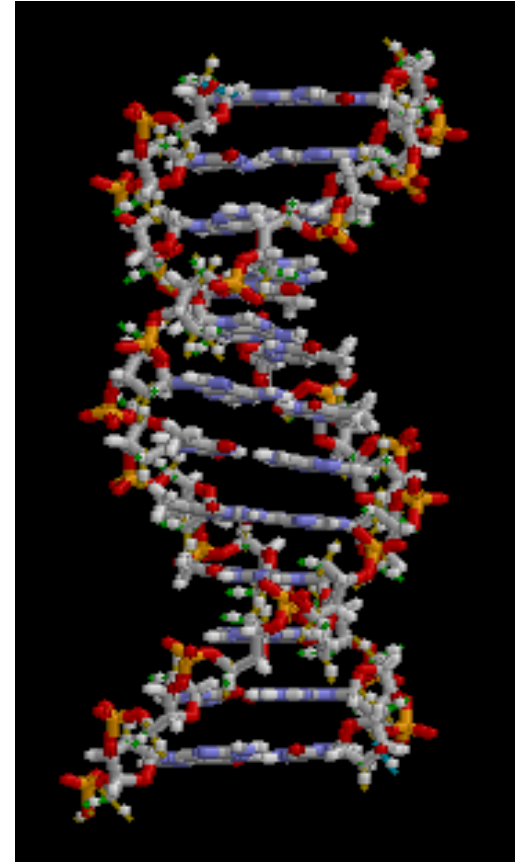
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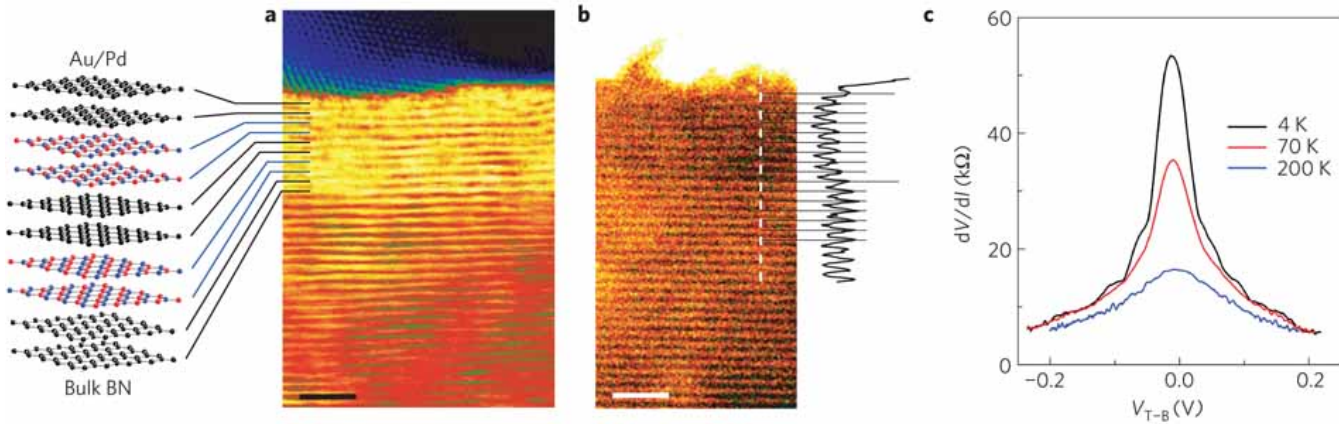
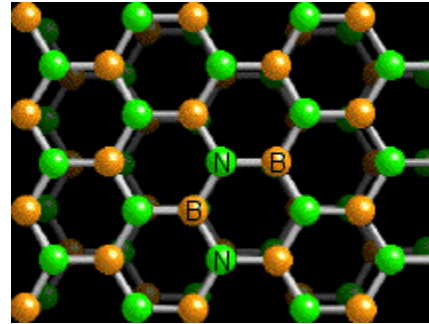
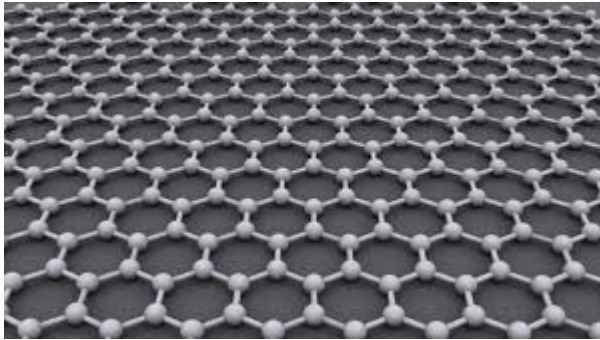
Hydrogen bond



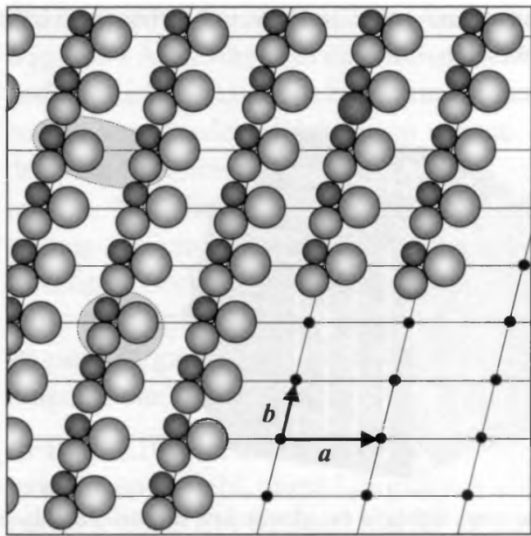
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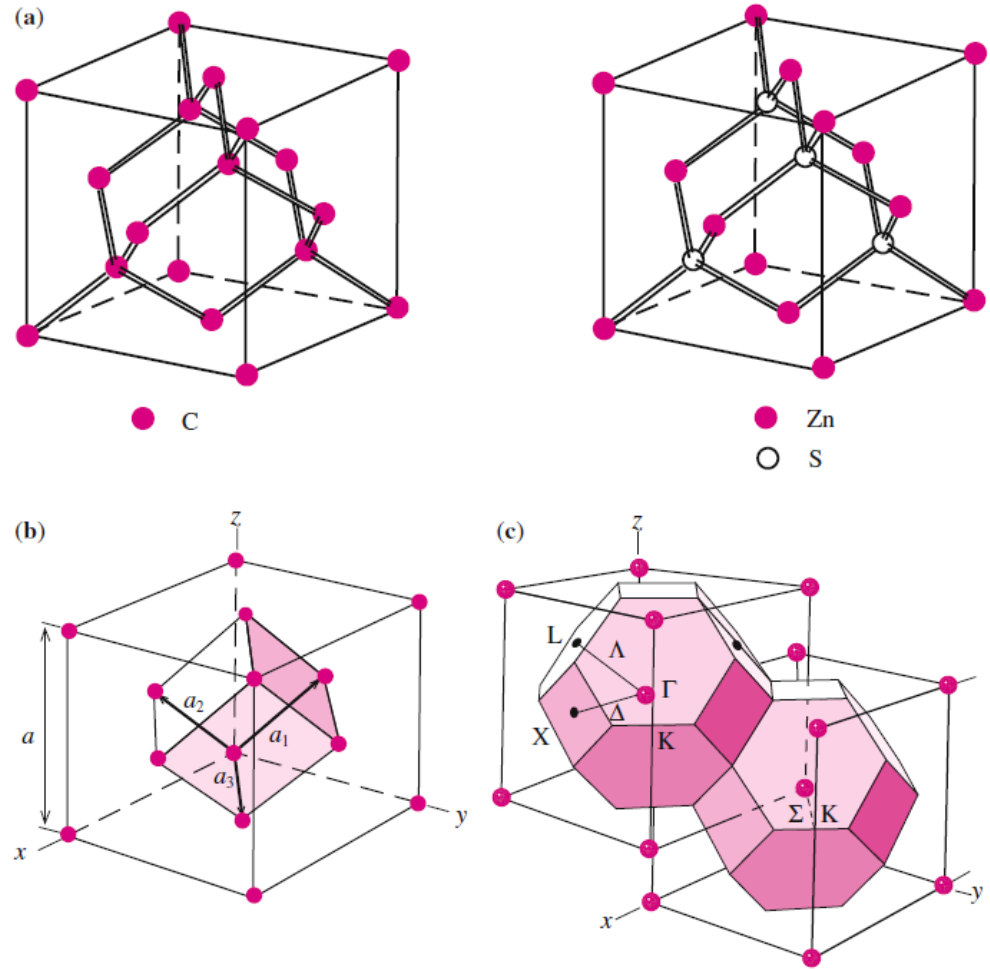
Van der Waals Solids



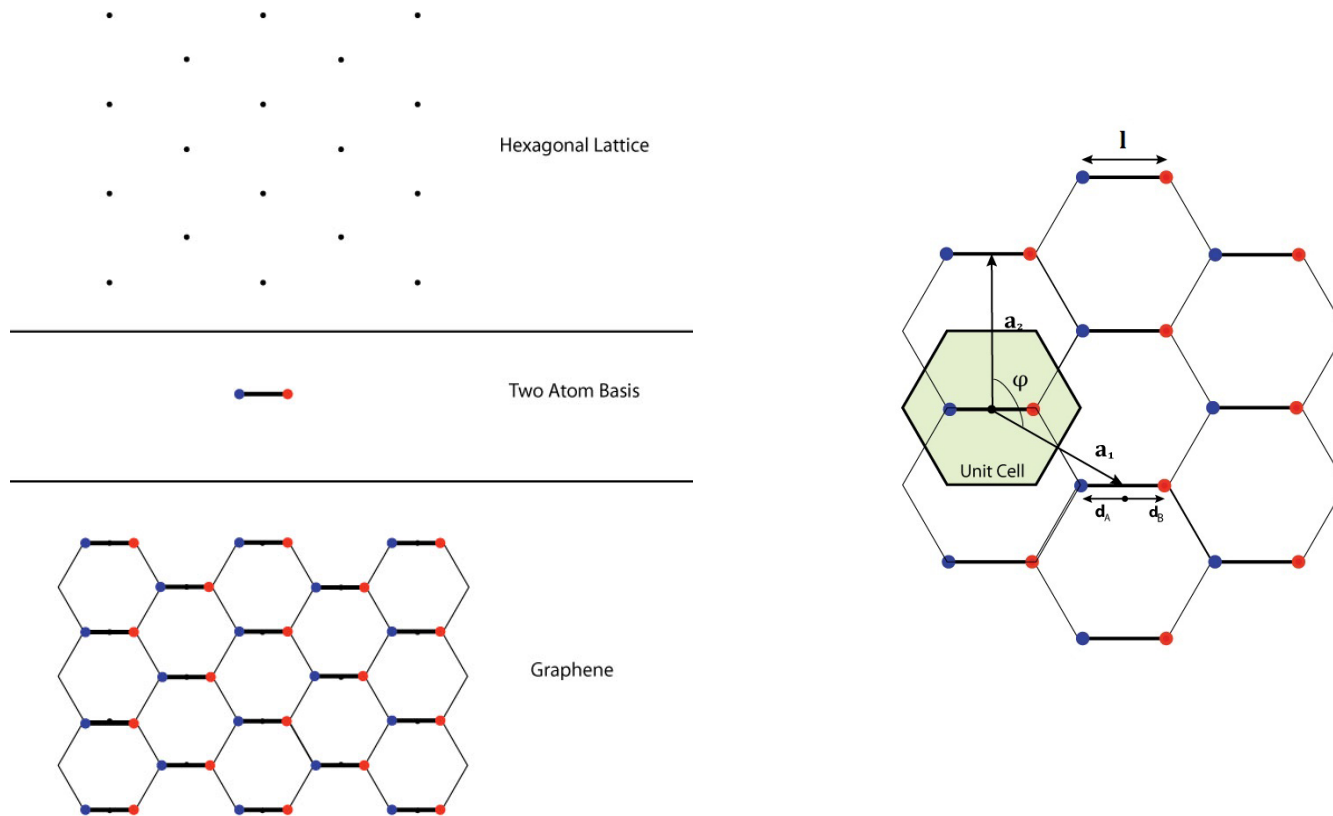
Crystal structure



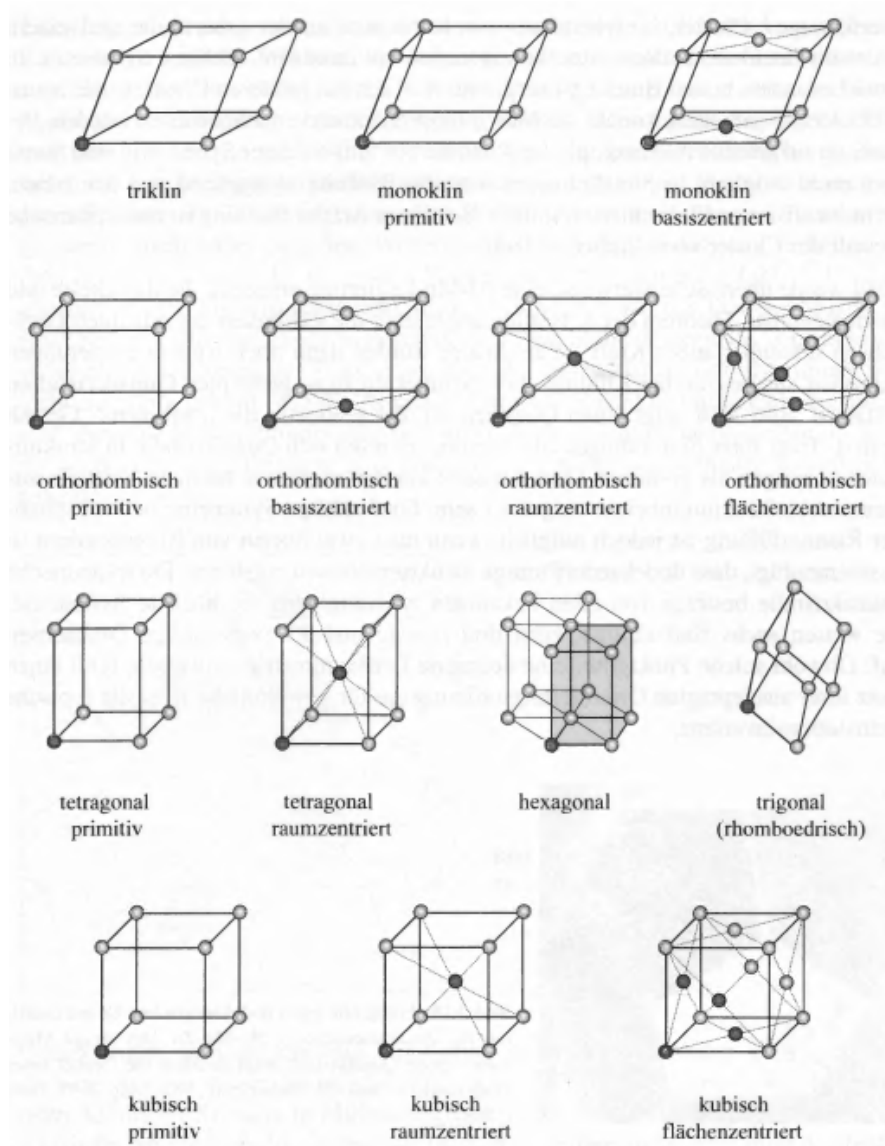
diamond & zincblende



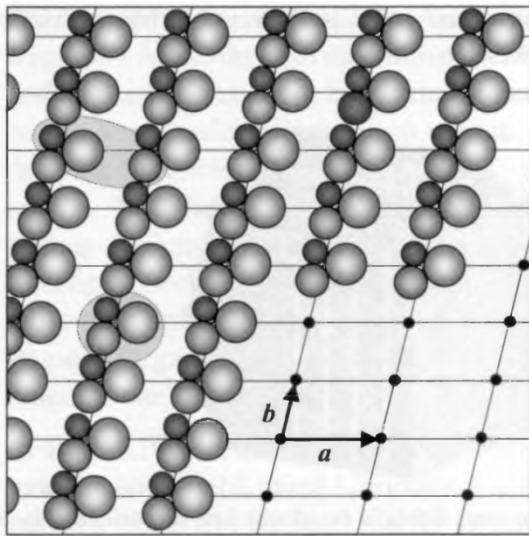
Hexagonal + 2 atoms



Bravais lattices



Crystal structure



diamond & zincblende

