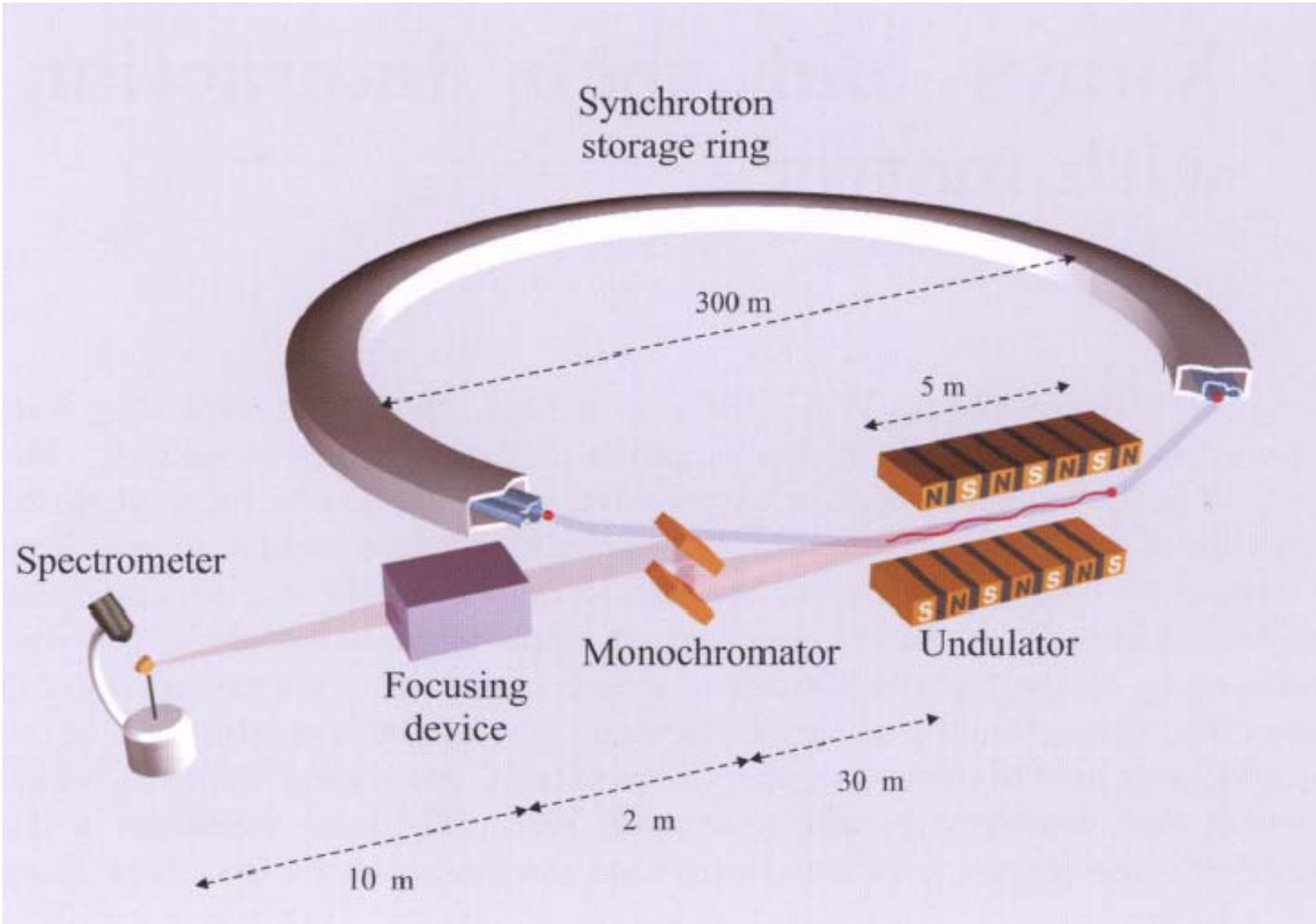
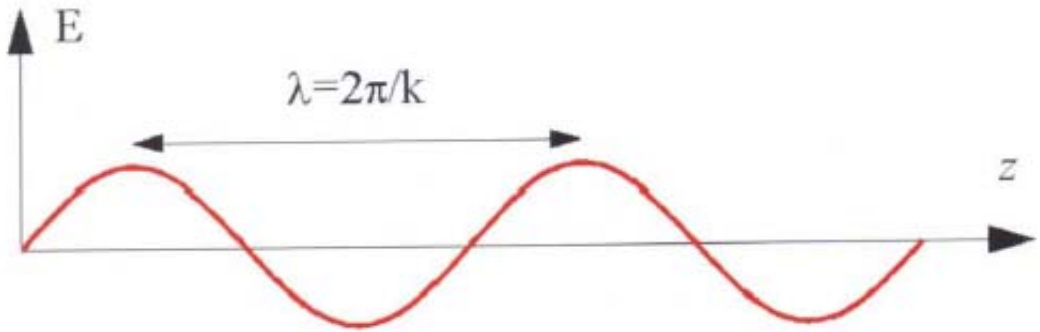
Schematischer Aufbau einer Synchrotronstrahlungsquelle der 3. Generation

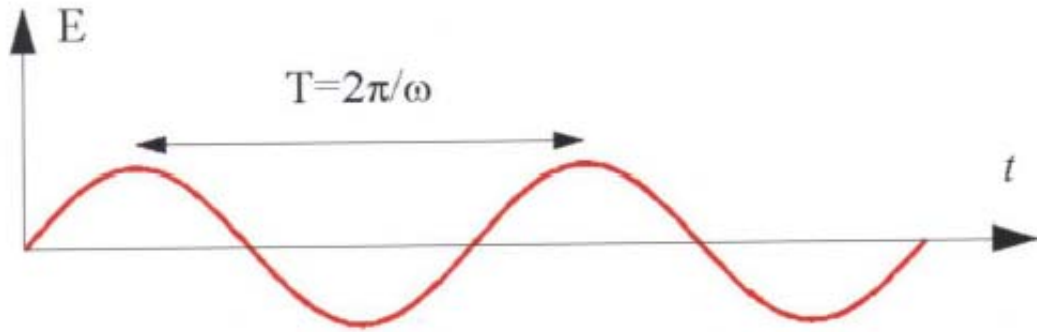


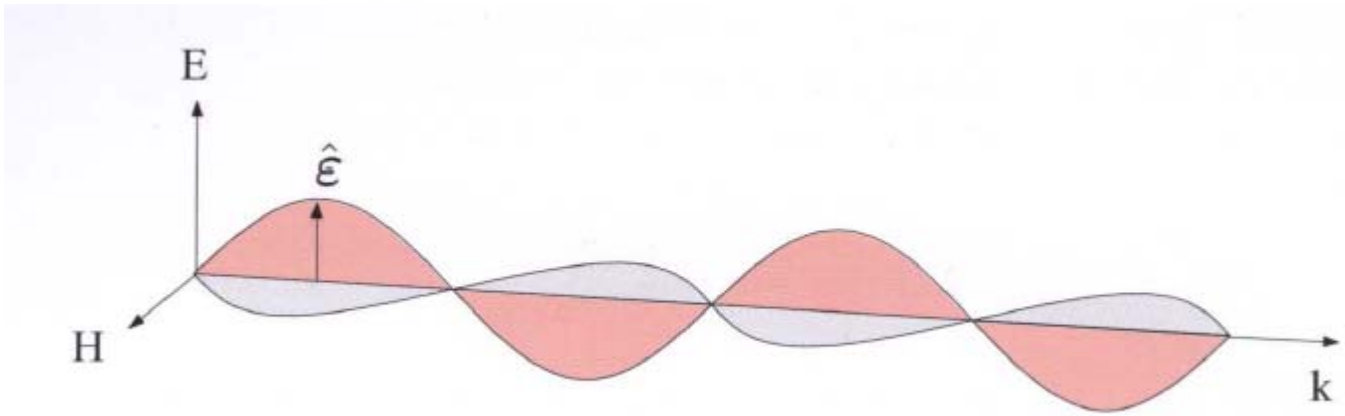
Als-Nielsen 2001, Abb. 1.2

European Synchrotron Radiation Facility
Grenoble (France): E = 6 GeV, U = 844 m

Röntgenstrahlung
als elektromagnetische Transversalwelle

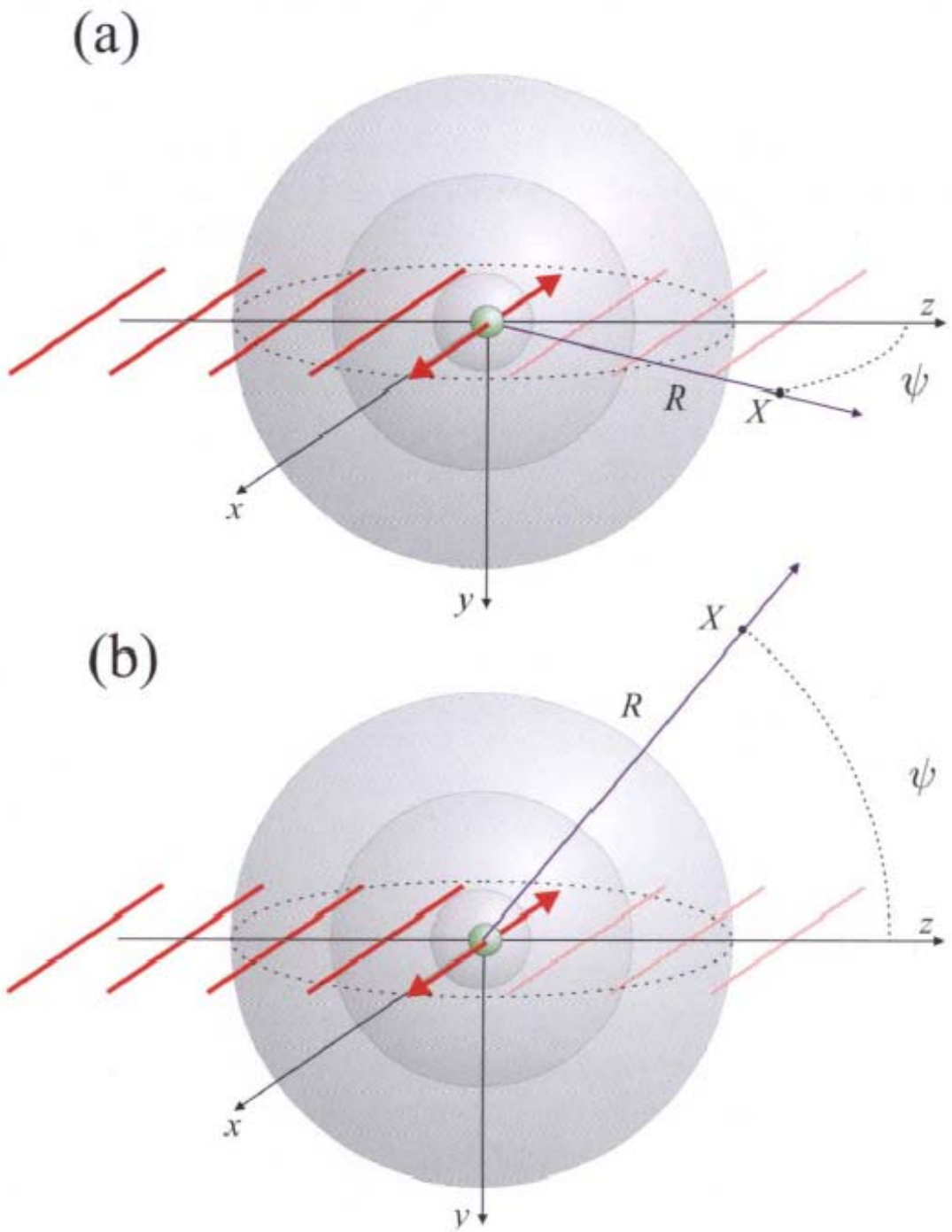






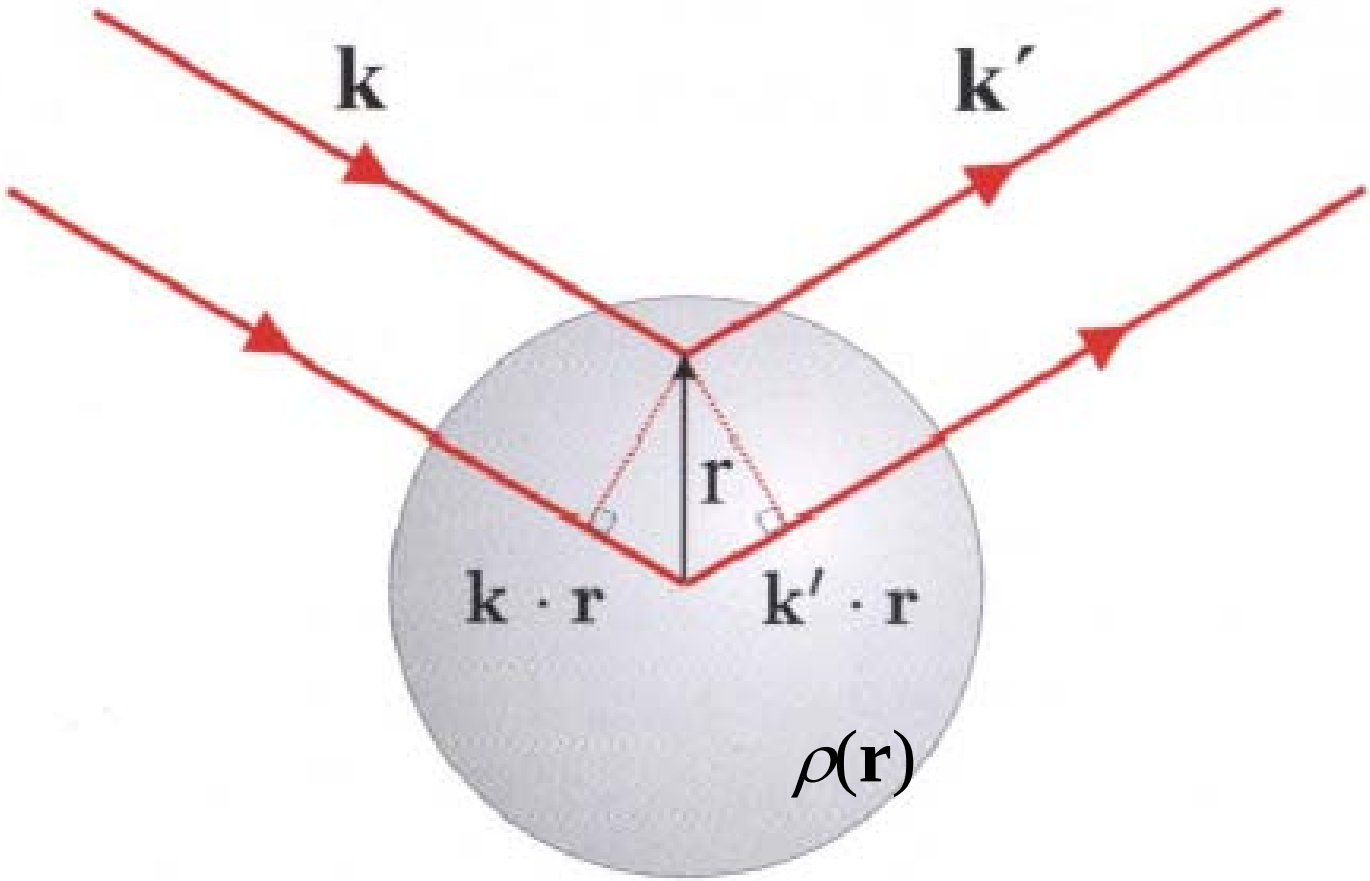
Als-Nielsen 2001, Abb. 1.4, 1.5

Streuung von Röntgenstrahlung an einem Elektron (klassisch)



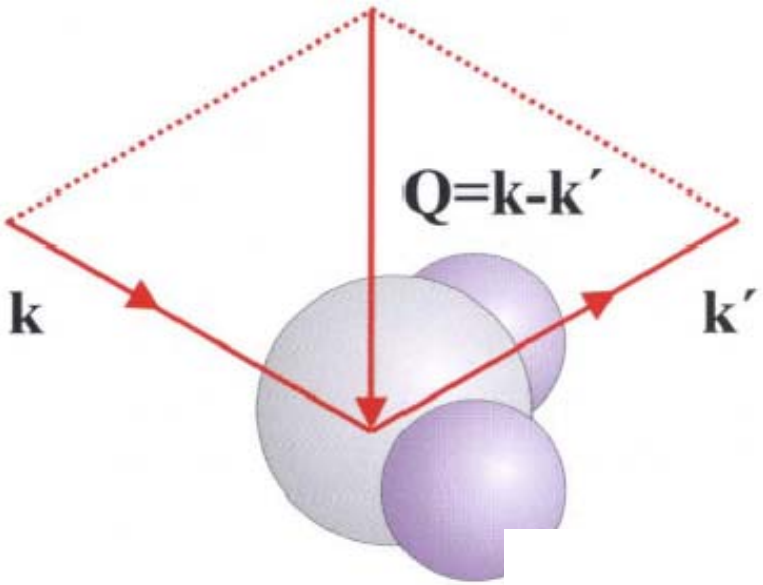
Als-Nielsen 2001, Abb. 1.5

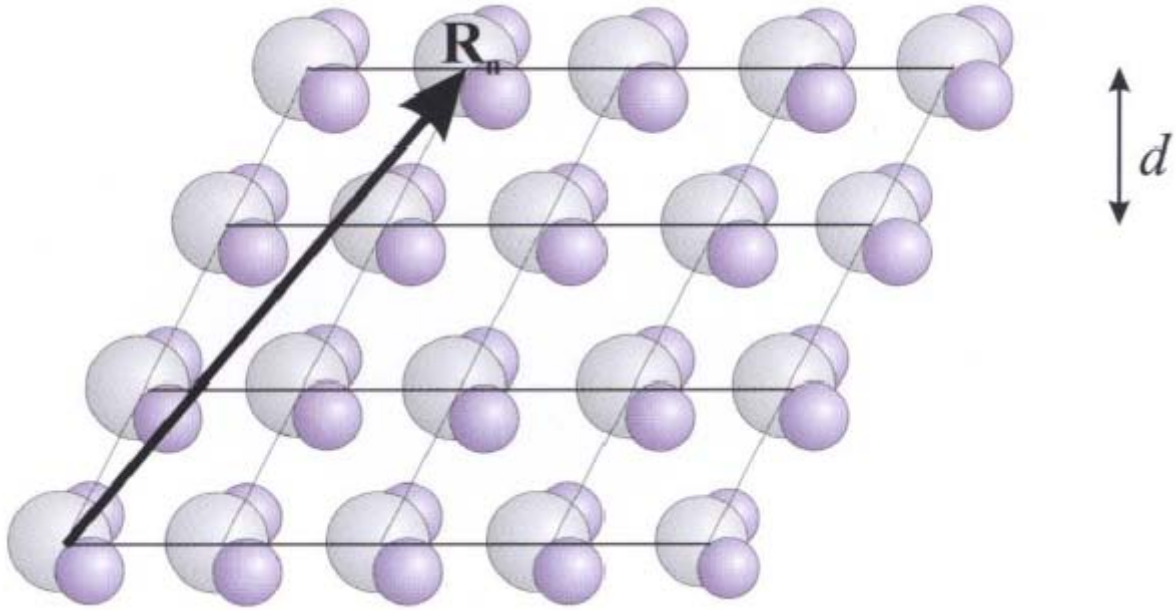
Röntgenstreuung an einem Atom



Als-Nielsen 2001, Abb. 1.6

Röntgenstreuung an Molekül und Kristall





Als-Nielsen 2001, Abb. 1.6

Reziprokes Gitter: Fouriertransformation

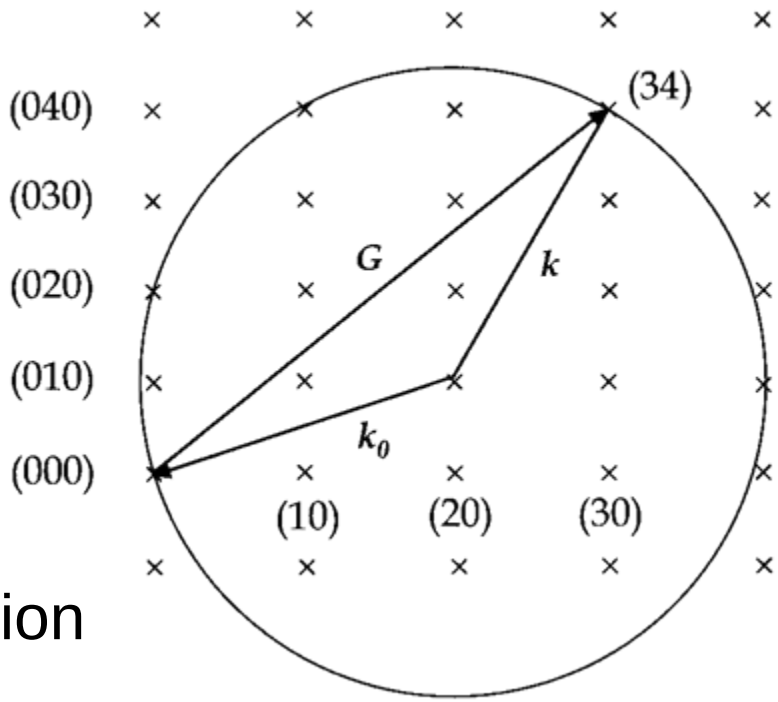
reziproker Gittervektor $\vec{G} = h\vec{a}^* + k\vec{b}^* + l\vec{c}^*$

mit $\vec{a}^* = 2\pi \dfrac{\vec{b} \times \vec{c}}{\vec{a} \cdot \left(\vec{b} \times \vec{c}\right)}$ etc.

steht senkrecht auf Ebene (hkl)

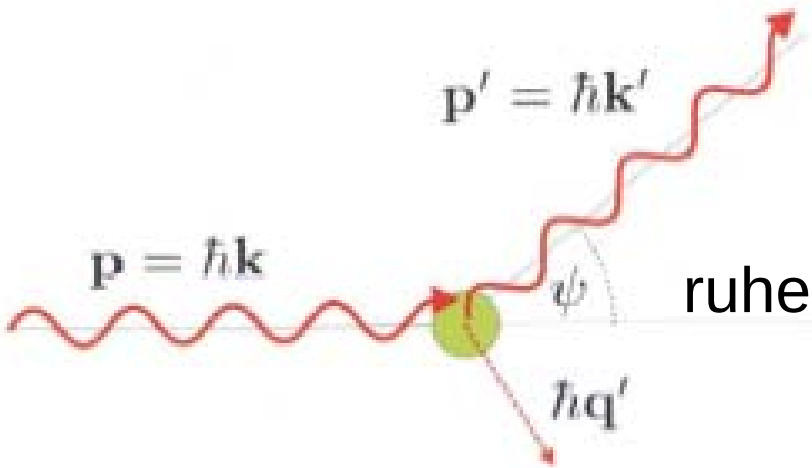
Beugungsbedingung

$$\vec{Q} = \vec{G}$$

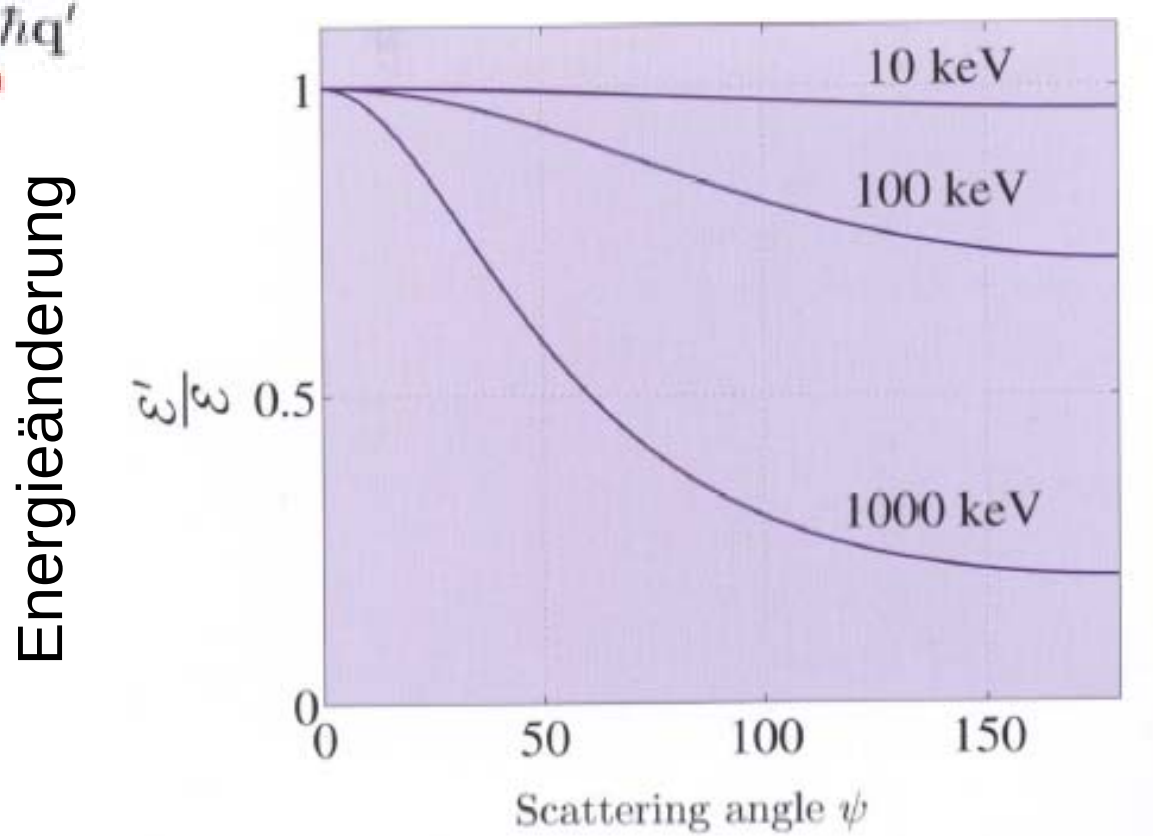


Ewaldkonstruktion

Compton-Streuung



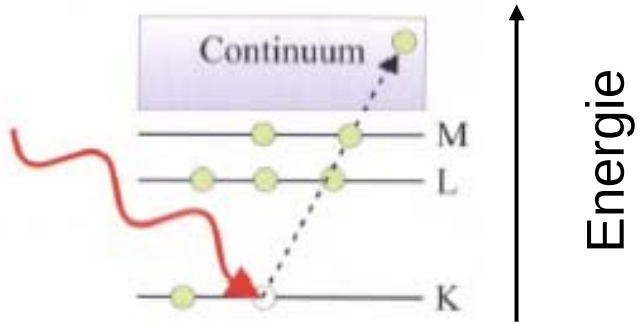
ruhendes Elektron

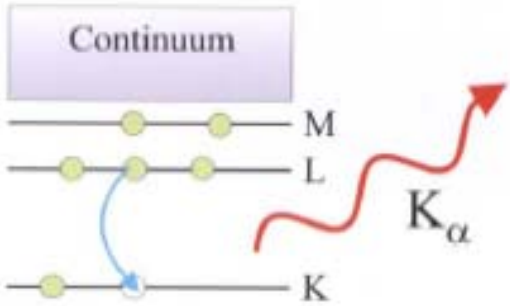


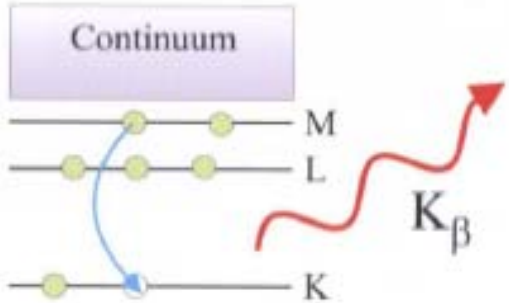
Als-Nielsen 2001, Abb. 1.7, 1.8

Absorption von Röntgenstrahlung

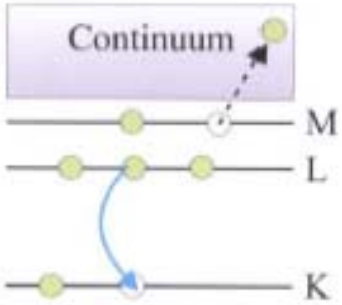
photoelektrische Absorption







Fluoreszenz-Emission



Emission eines Auger-Elektrons

Als-Nielsen 2001, Abb. 1.9