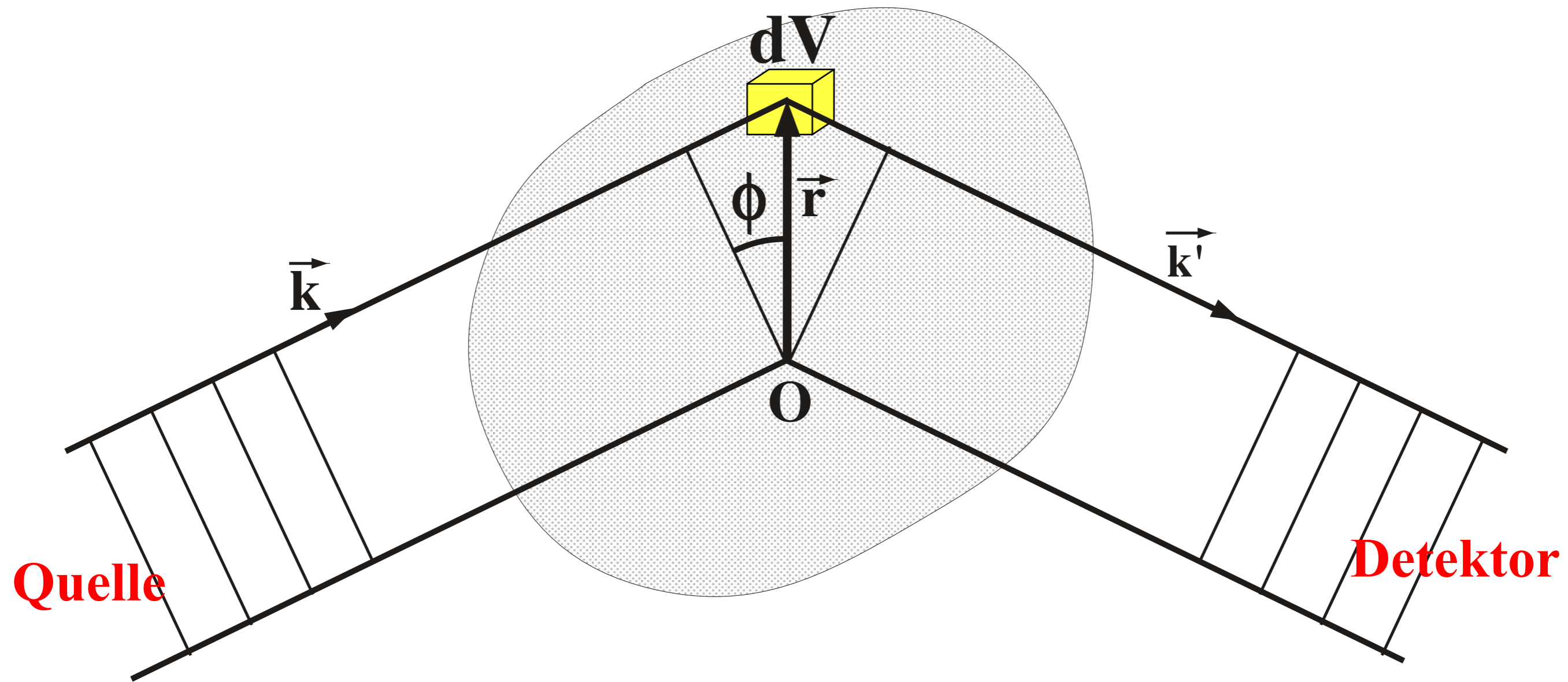


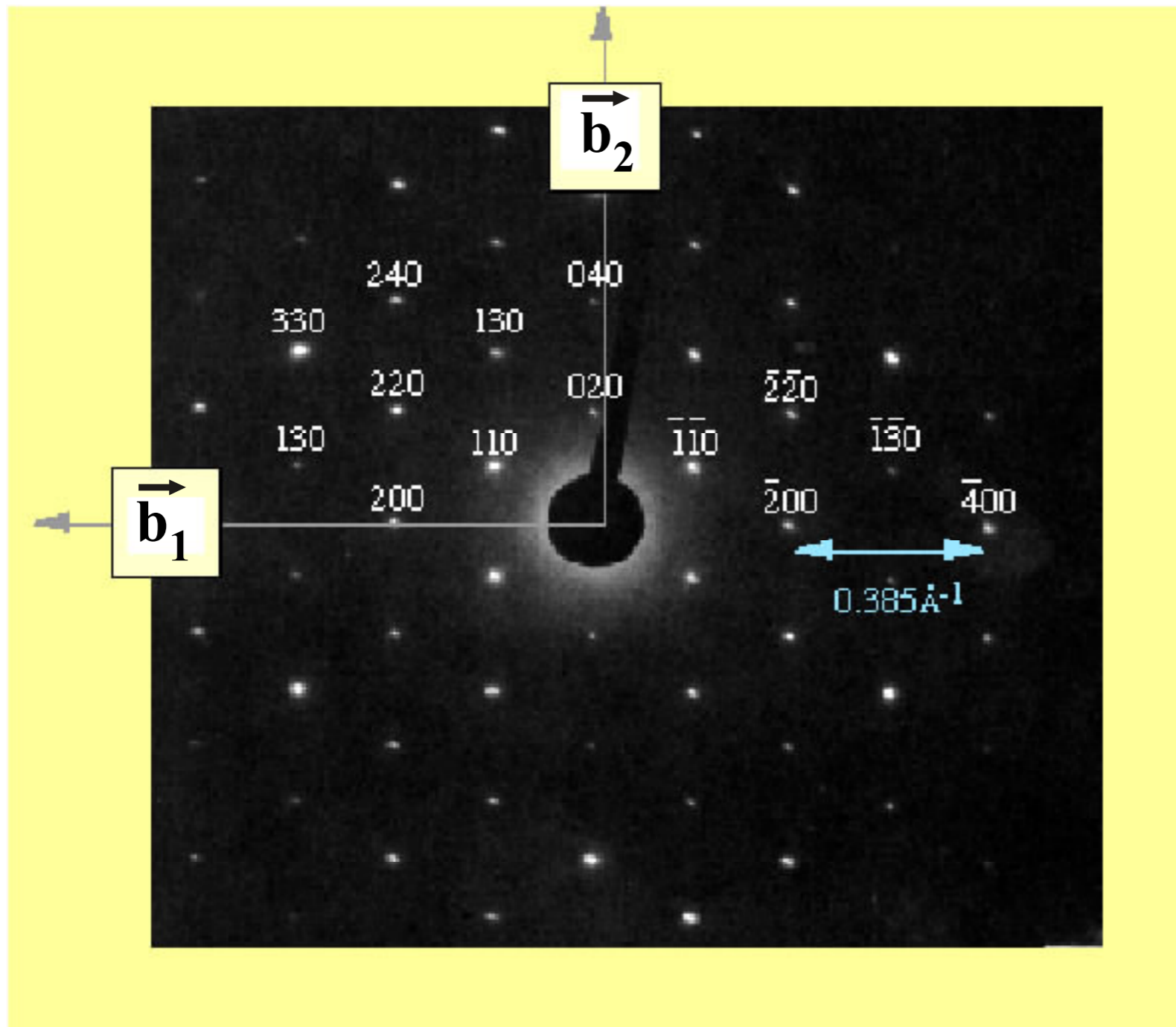
# Beugung in kontinuierlichen Medien



$$\text{Phase: } \phi(\vec{r}) = (\vec{k} - \vec{k}') \vec{r}$$

# Beugungsreflexe als Gittervektoren

$$\text{Braggbedingung: } \vec{k}' - \vec{k} = \vec{G}$$



**Orientierung des Einkristalls:**  
senkrecht zu  $\vec{a}_1, \vec{a}_2$

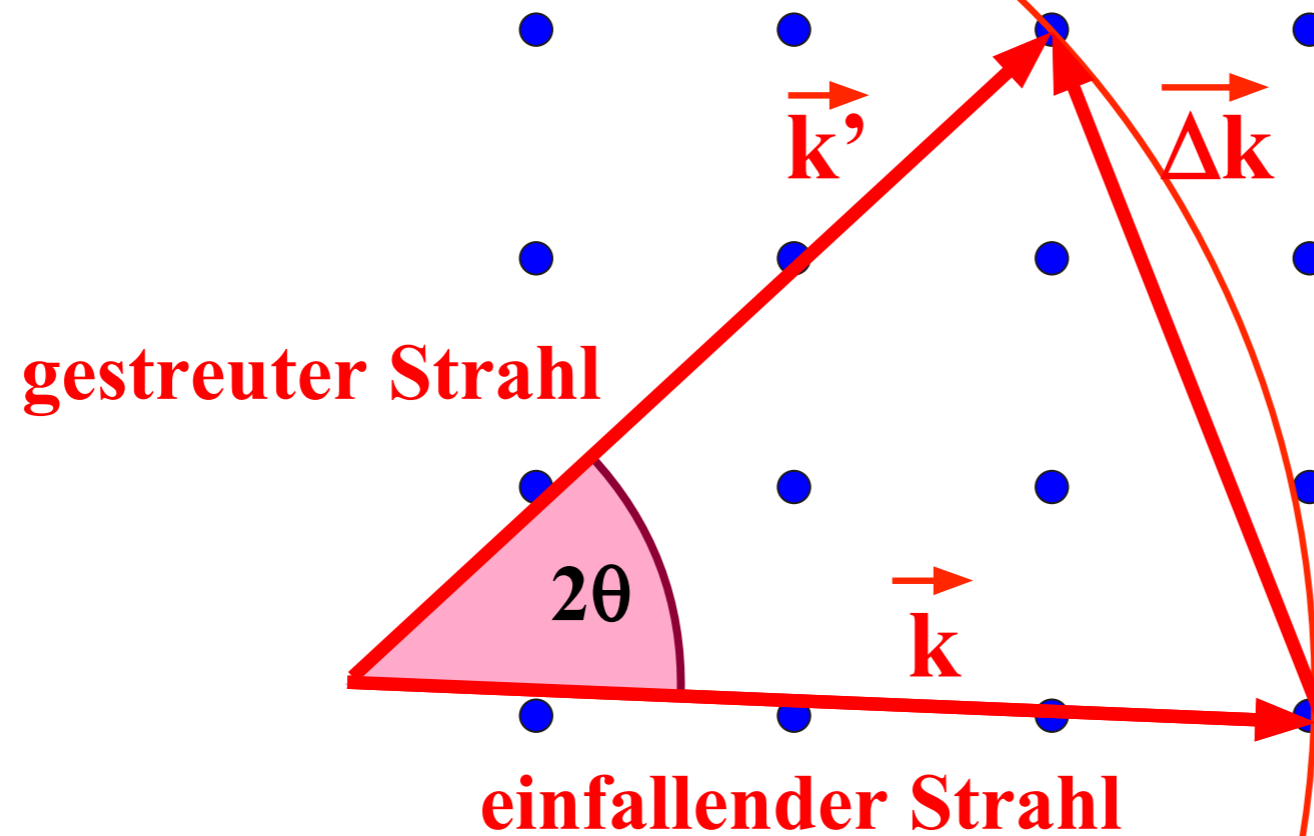
**Beugungsreflexe von Muskovit ( $\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{F,OH})_2$ )**

# Ewald Konstruktion

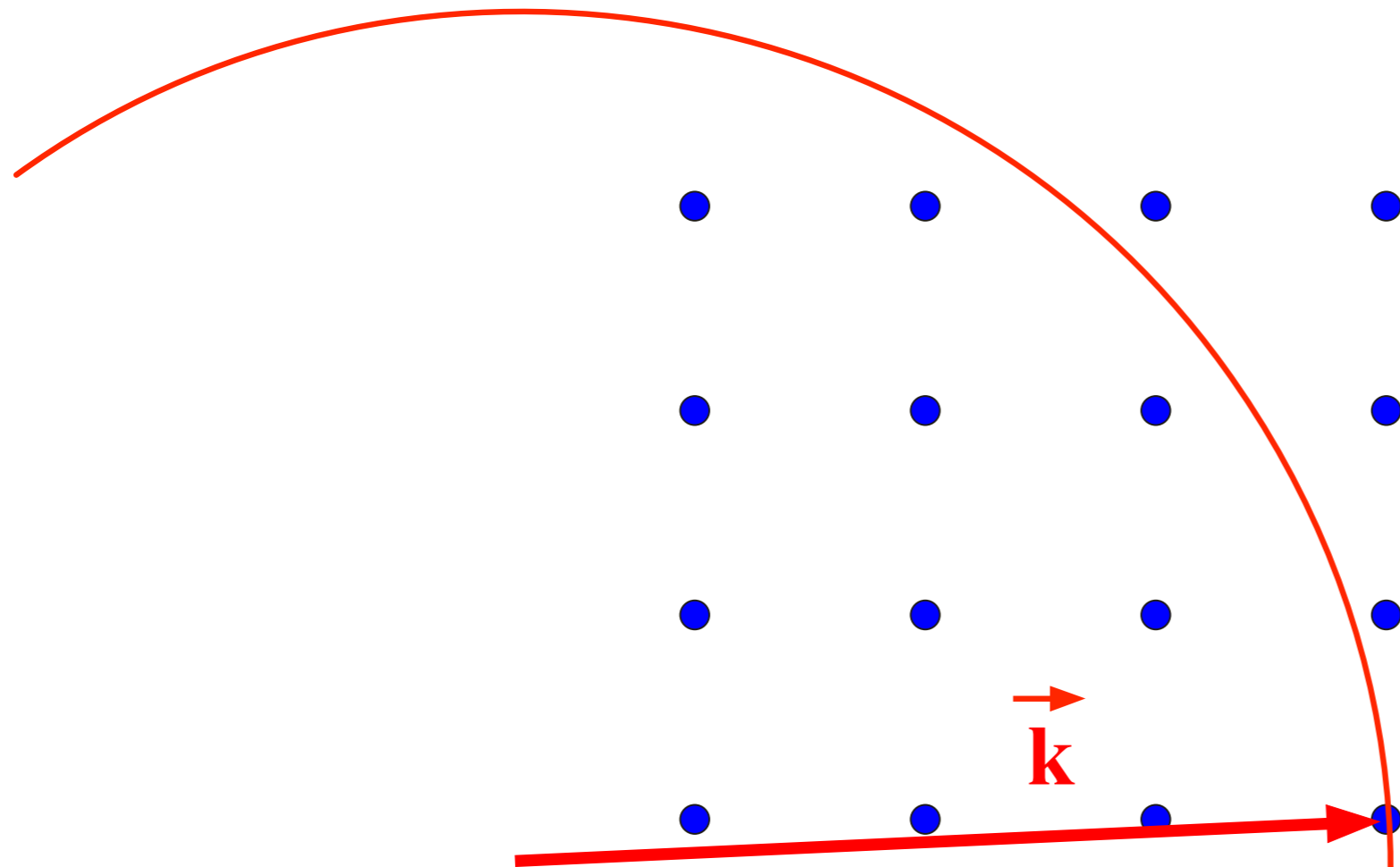
elastische Streuung:

$$|\mathbf{k}| = |\mathbf{k}'|$$

reziprokes Gitter



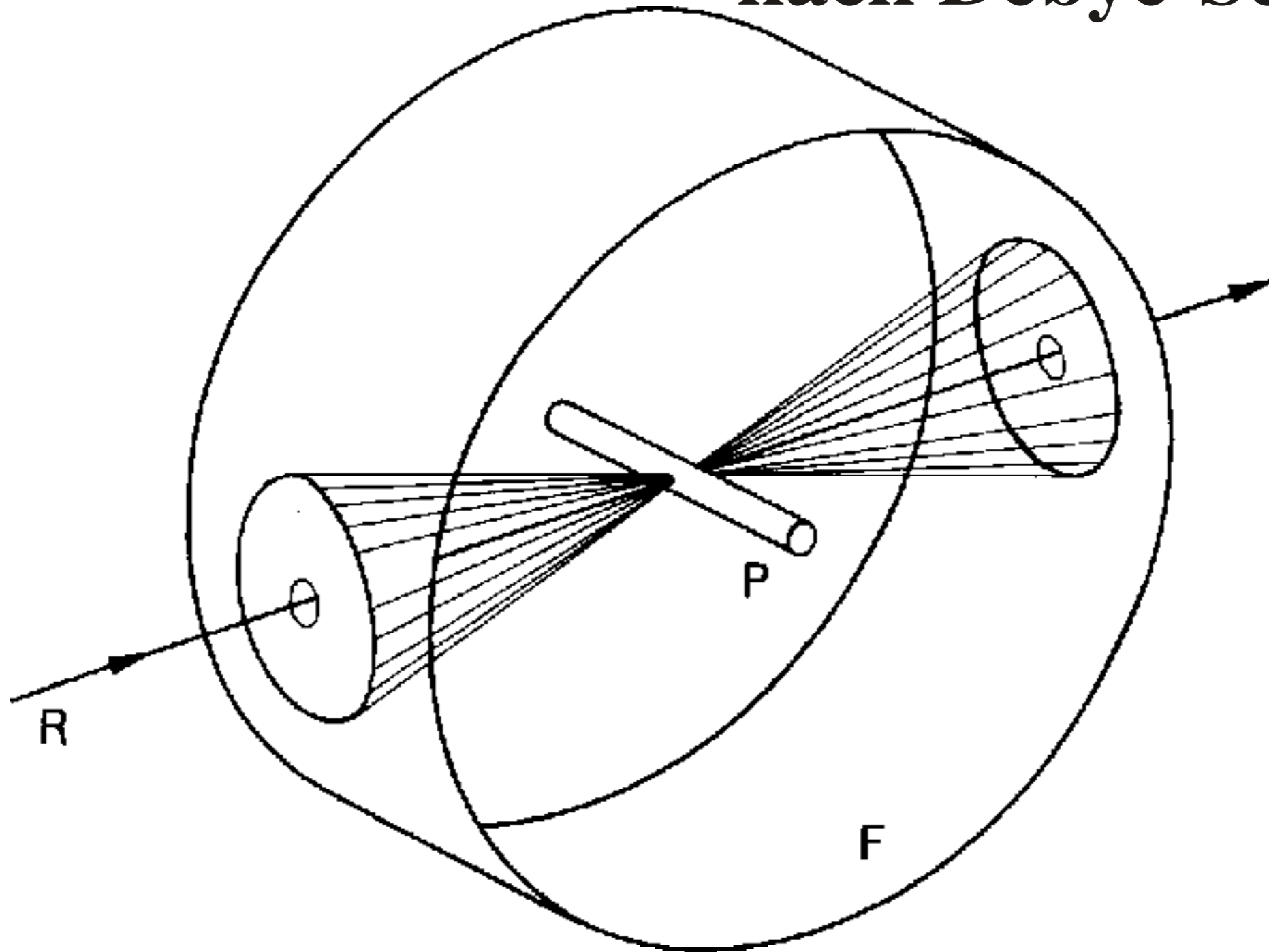
# Ewald Konstruktion



**kein Reflex !**

# Röntgenbeugung an Pulvern

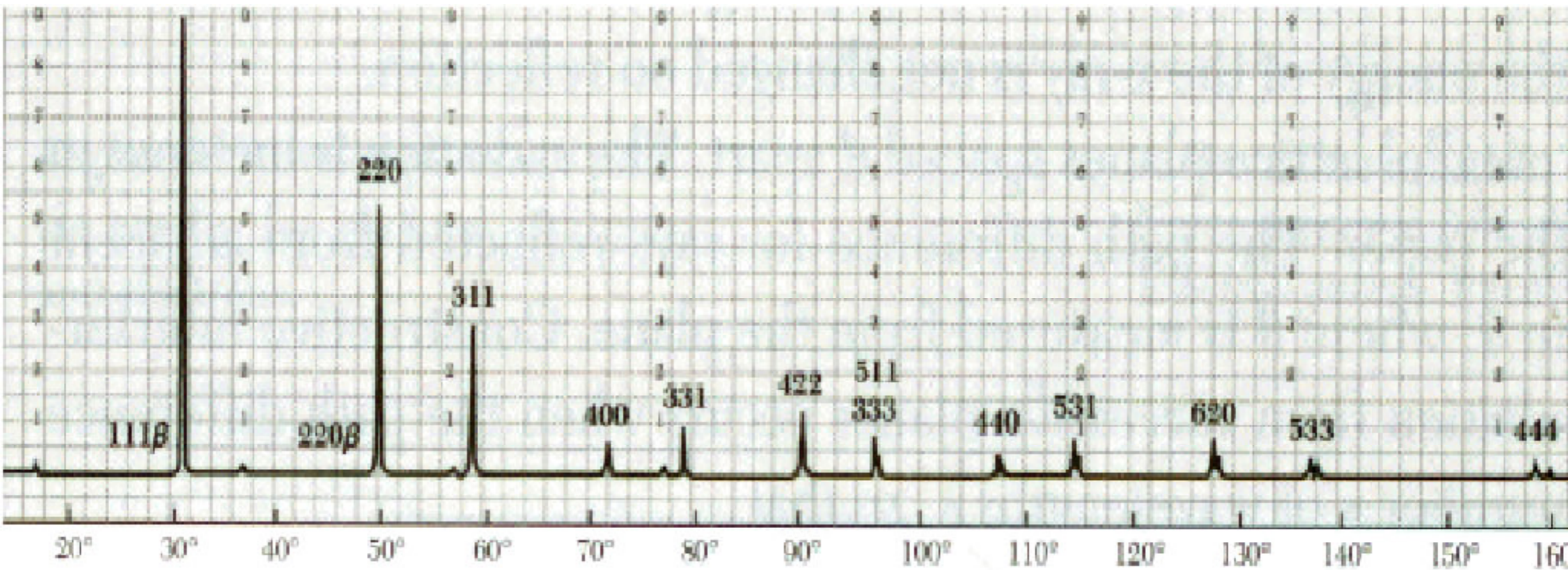
nach Debye-Scherrer



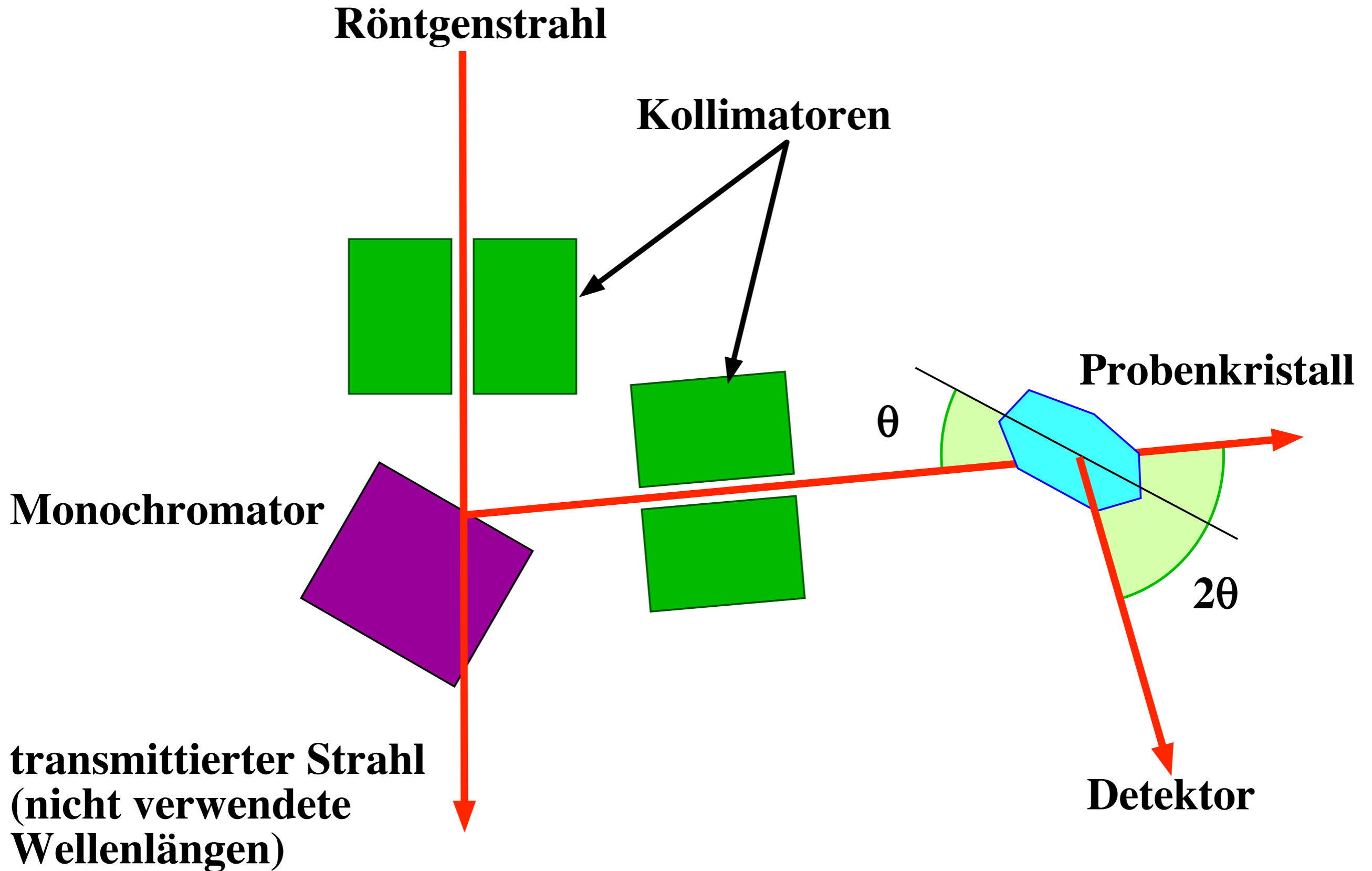


# Röntgenbeugung an Pulvern

## Röntgenreflexe von Si Pulver



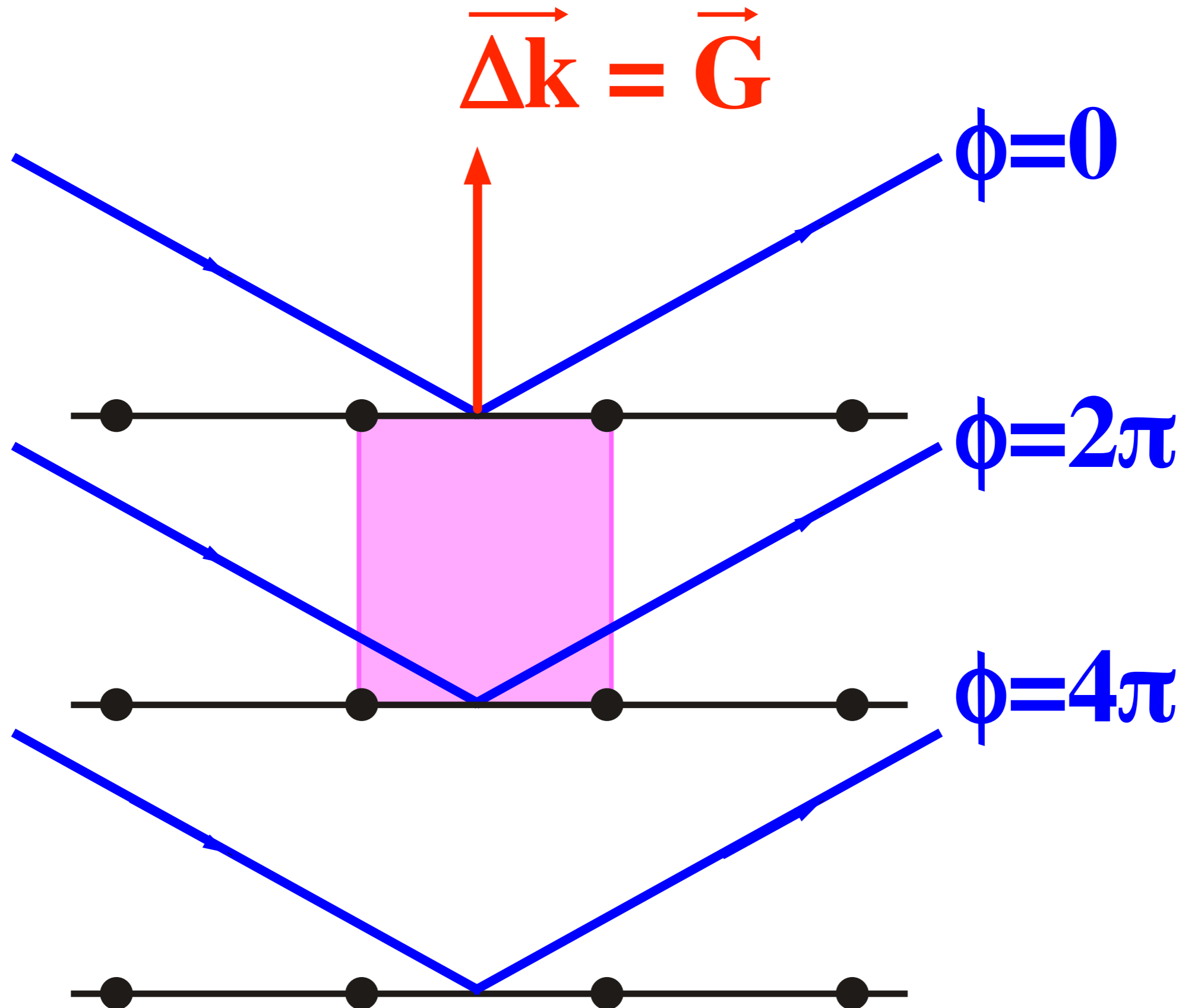
# Drehkristall Methode



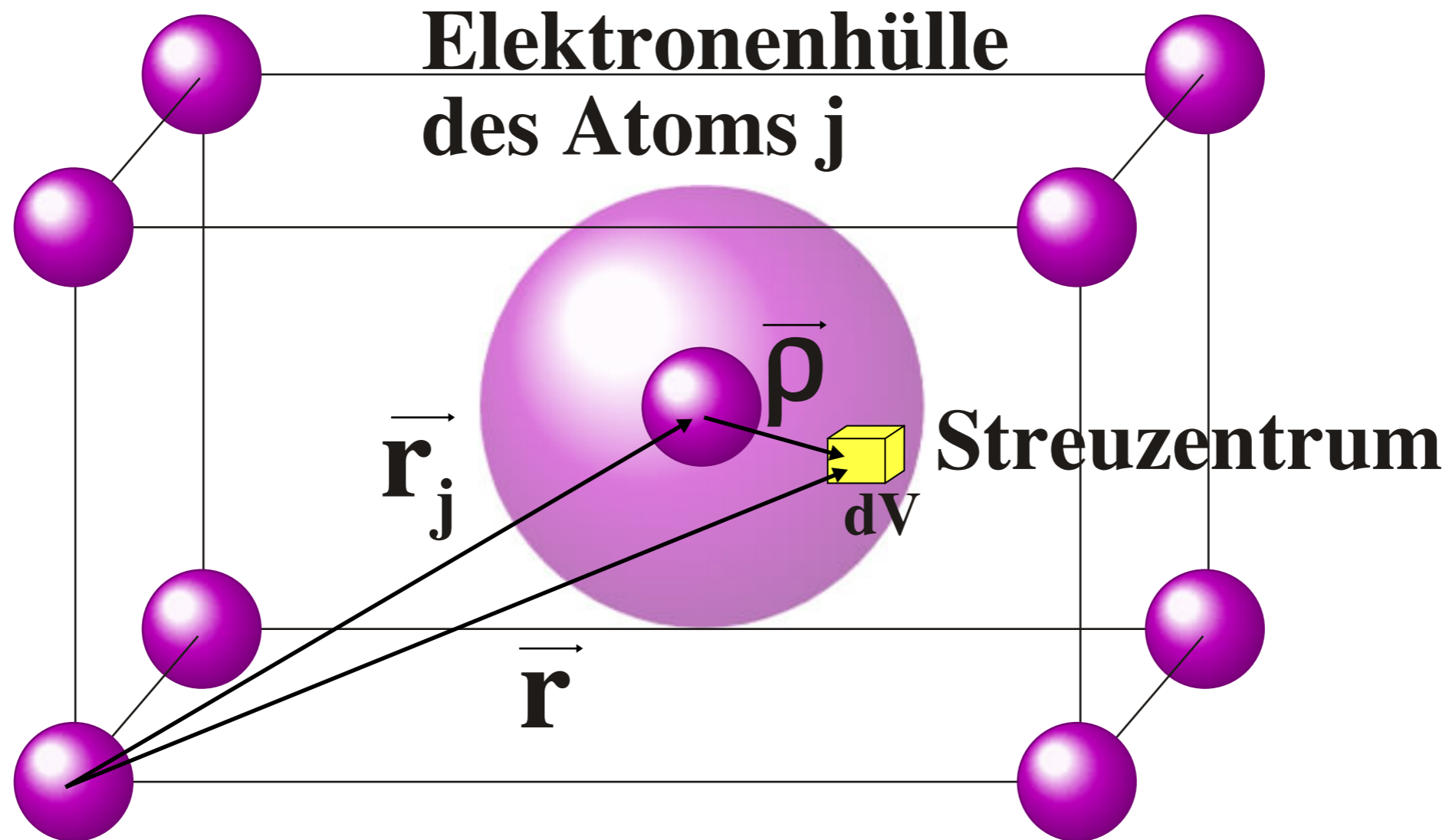




# Reflexion an (100)



# Streuamplitude



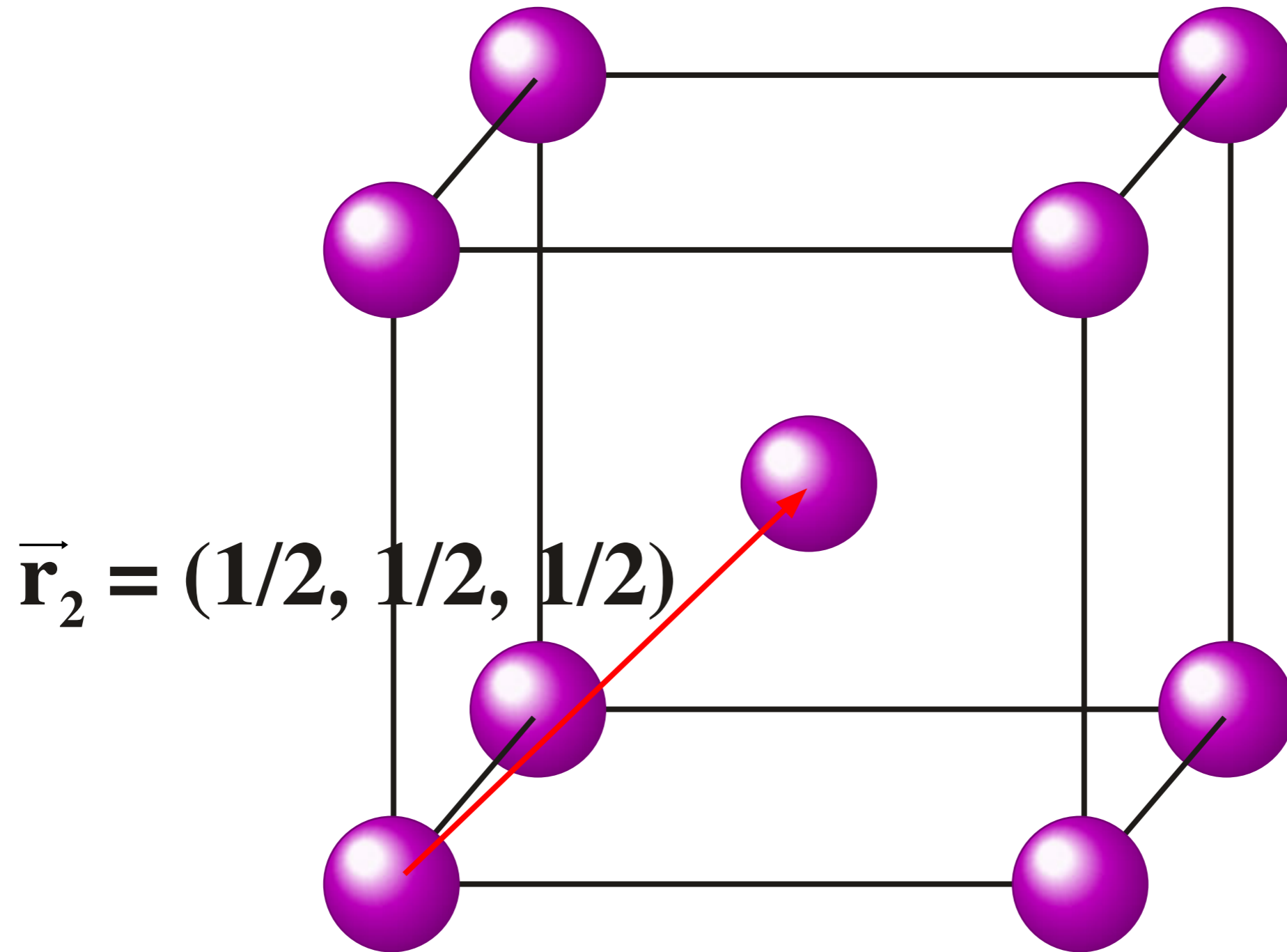
Strukturfaktor

$$S_{\vec{G}} = \sum_{j=1}^s f_j \exp(-i\vec{G} \cdot \vec{r}_j)$$

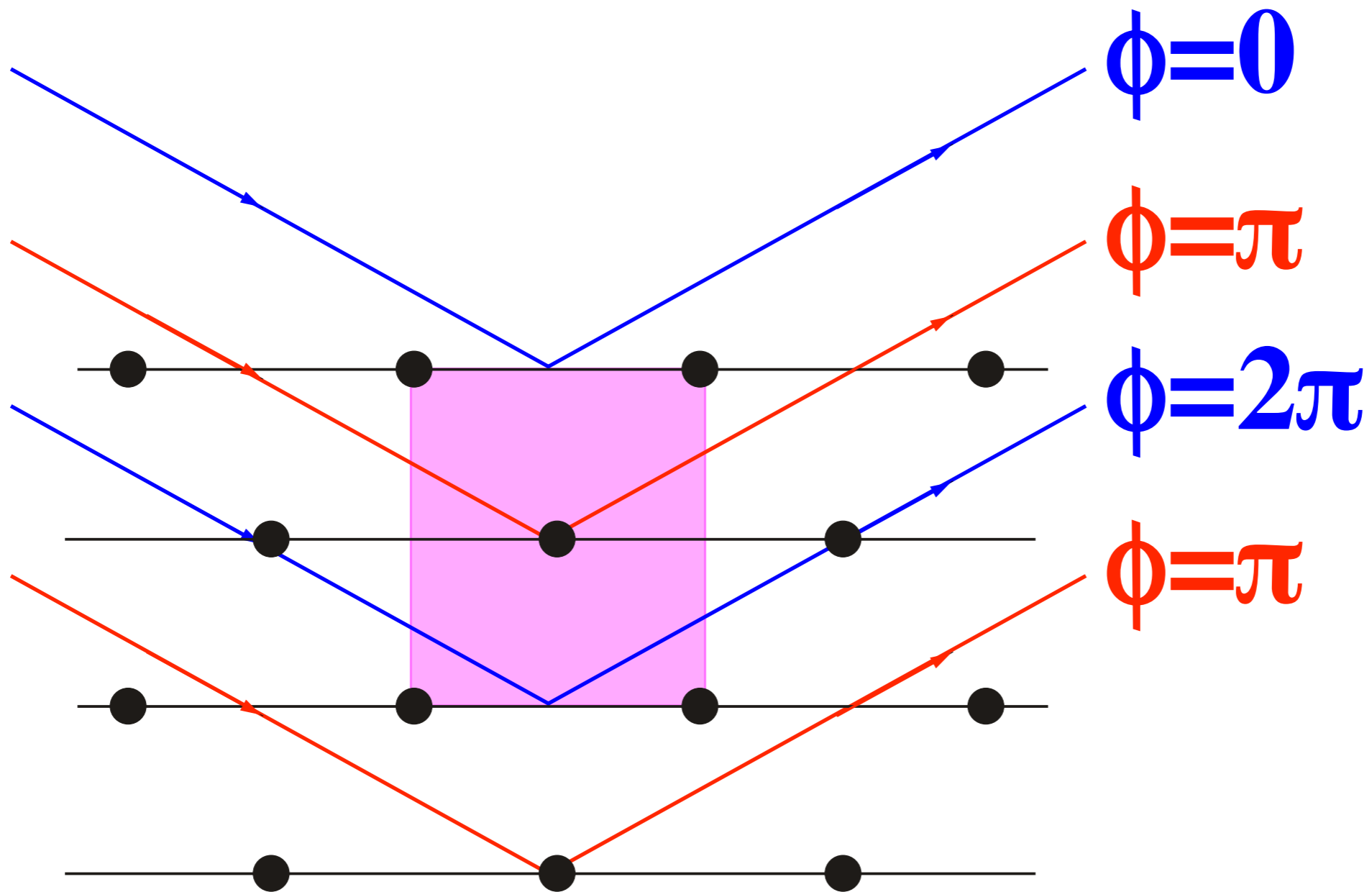
Atomformfaktor

$$f_j = \int dV n_j(\vec{\rho}) \exp(-i\vec{G} \cdot \vec{\rho})$$

# Kubisch innenzentrierte Einheitszelle

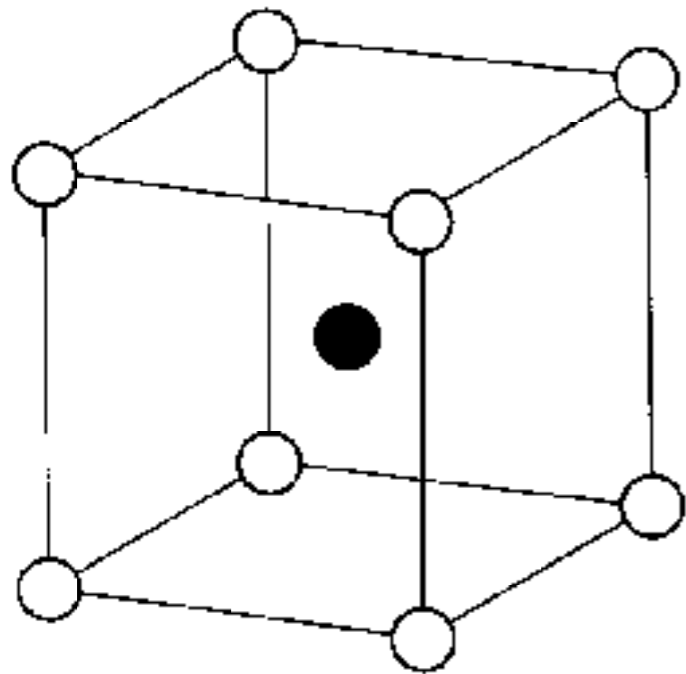
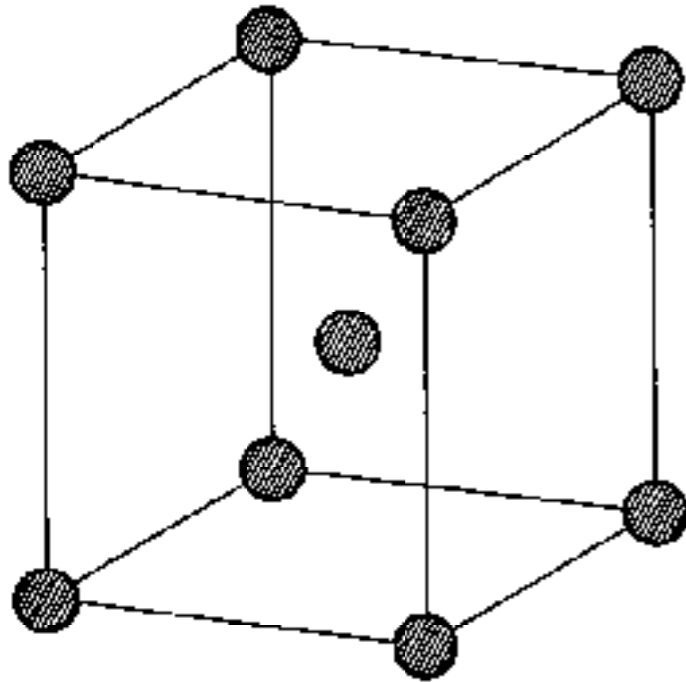


# Destruktive Interferenz

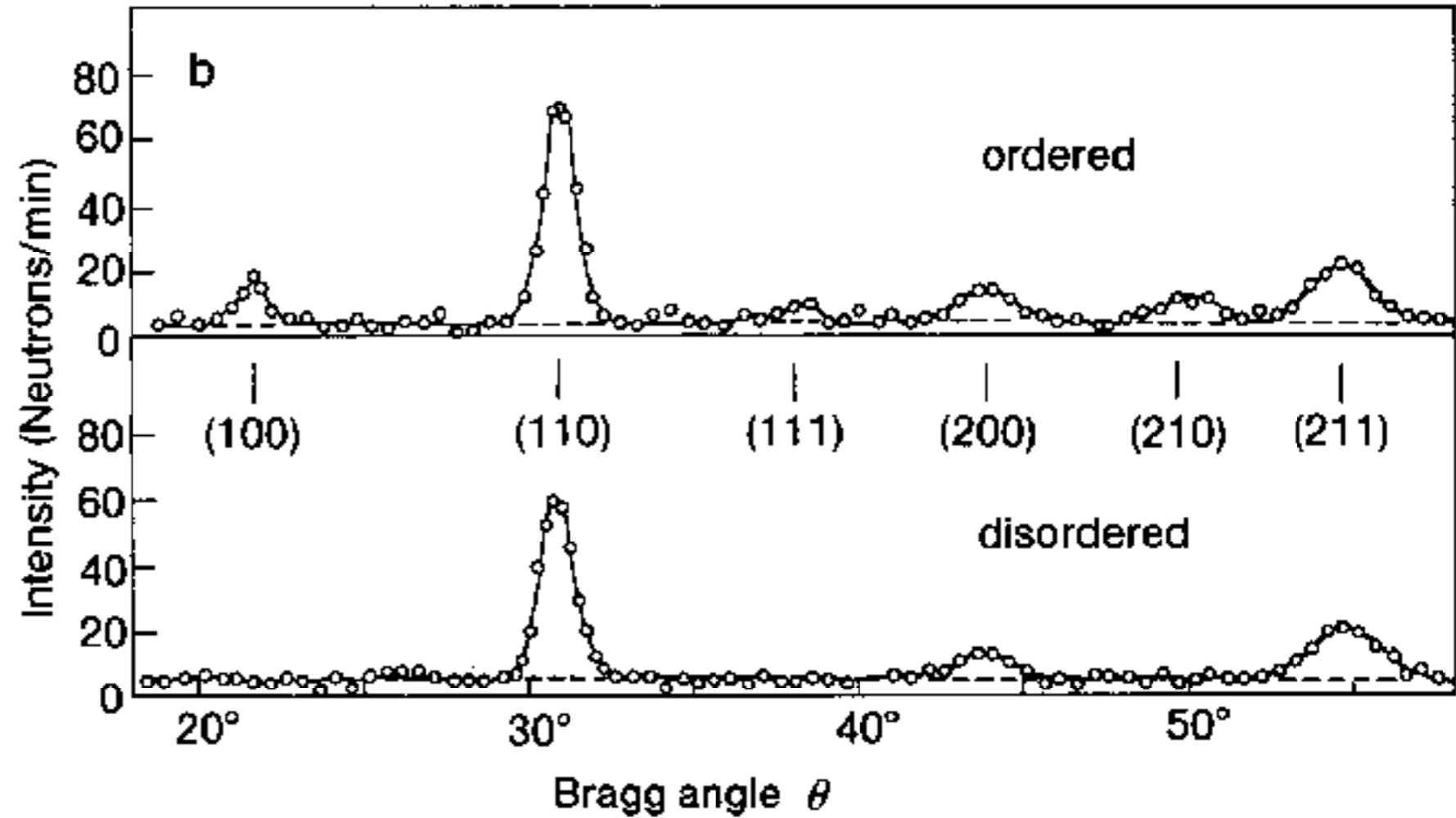


# Verbotene Reflexe

FeCo

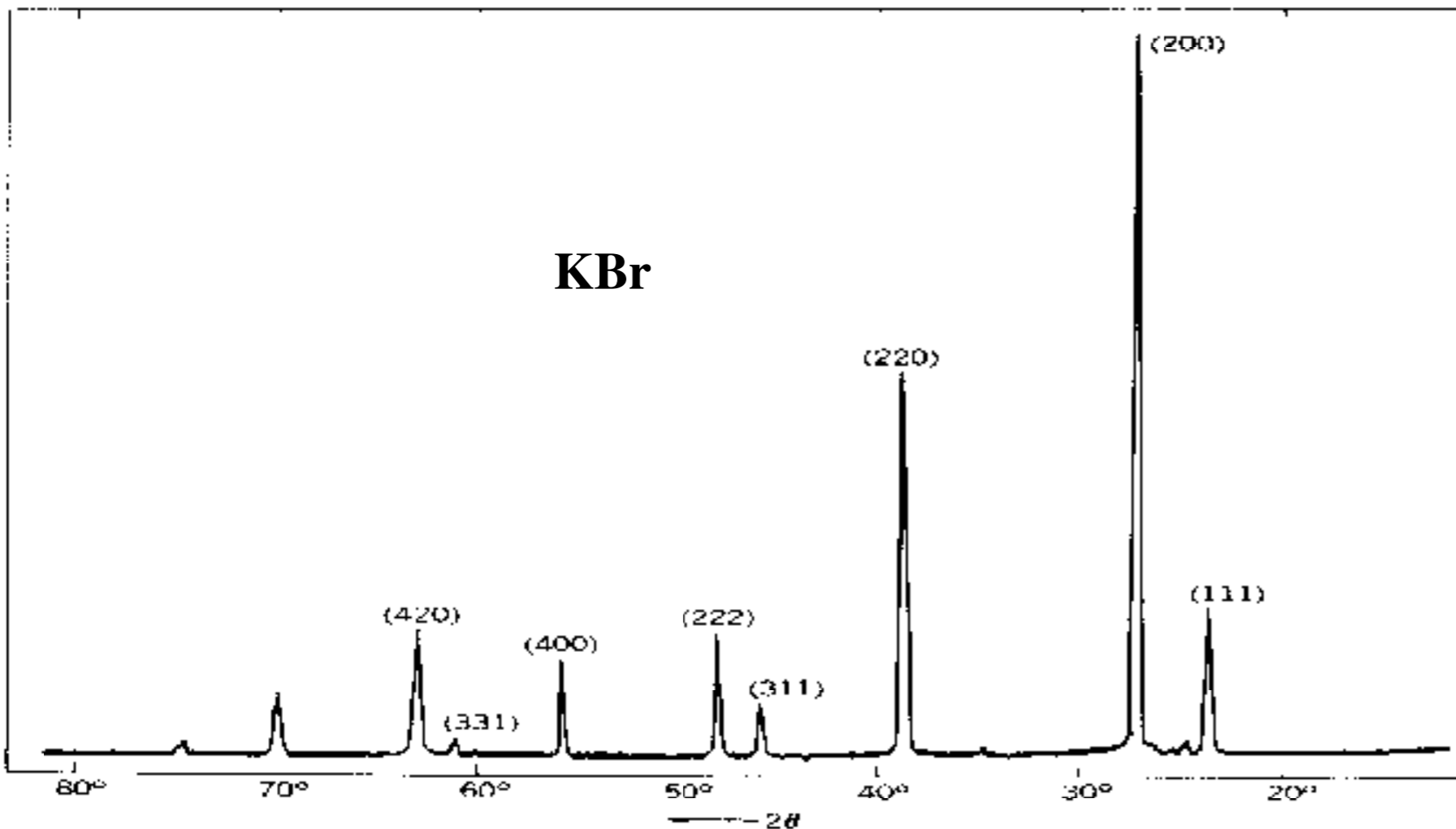
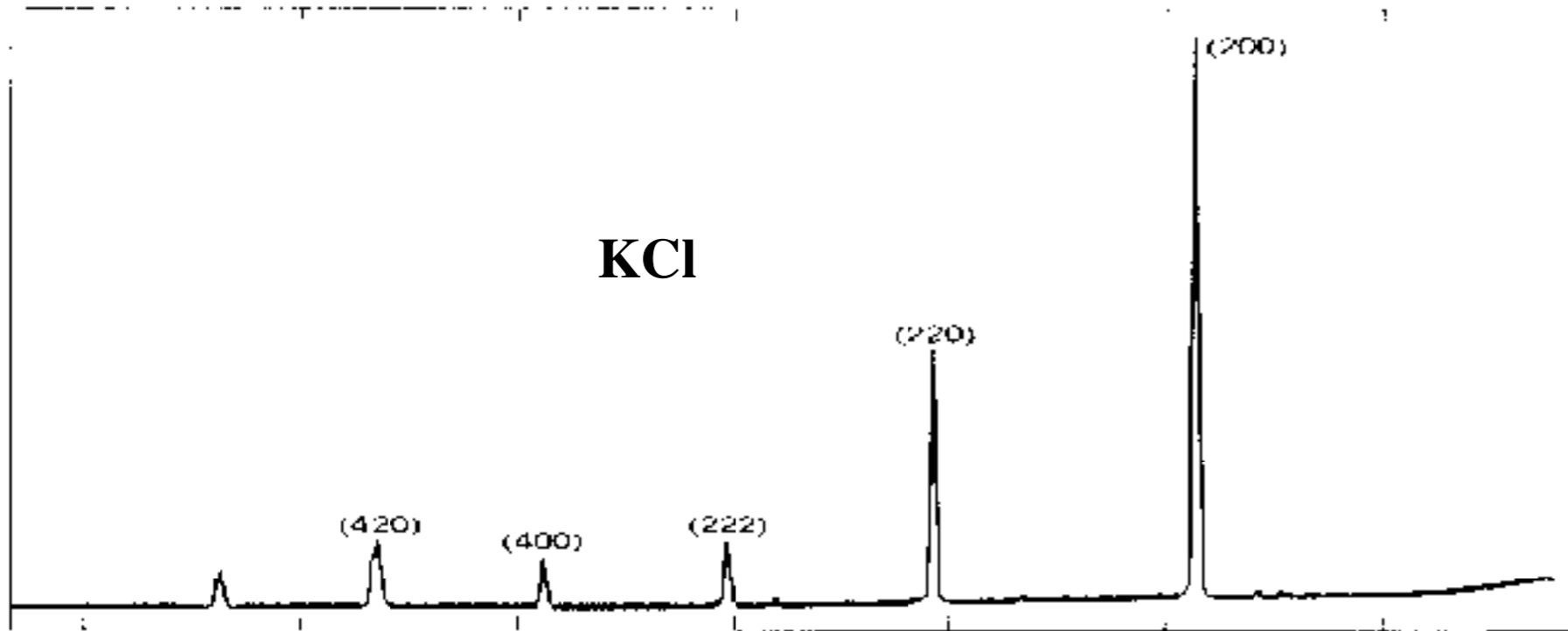


- Atom A
- Atom B
- Atom A or B

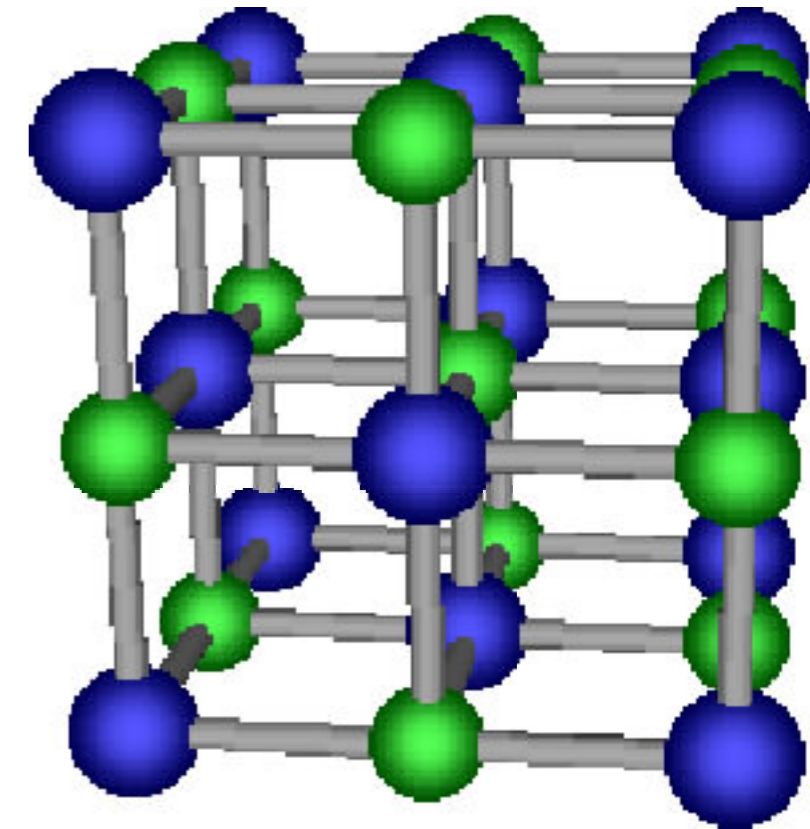




# Verbotene Reflexe



## Kochsalzstruktur



# Elektronen:

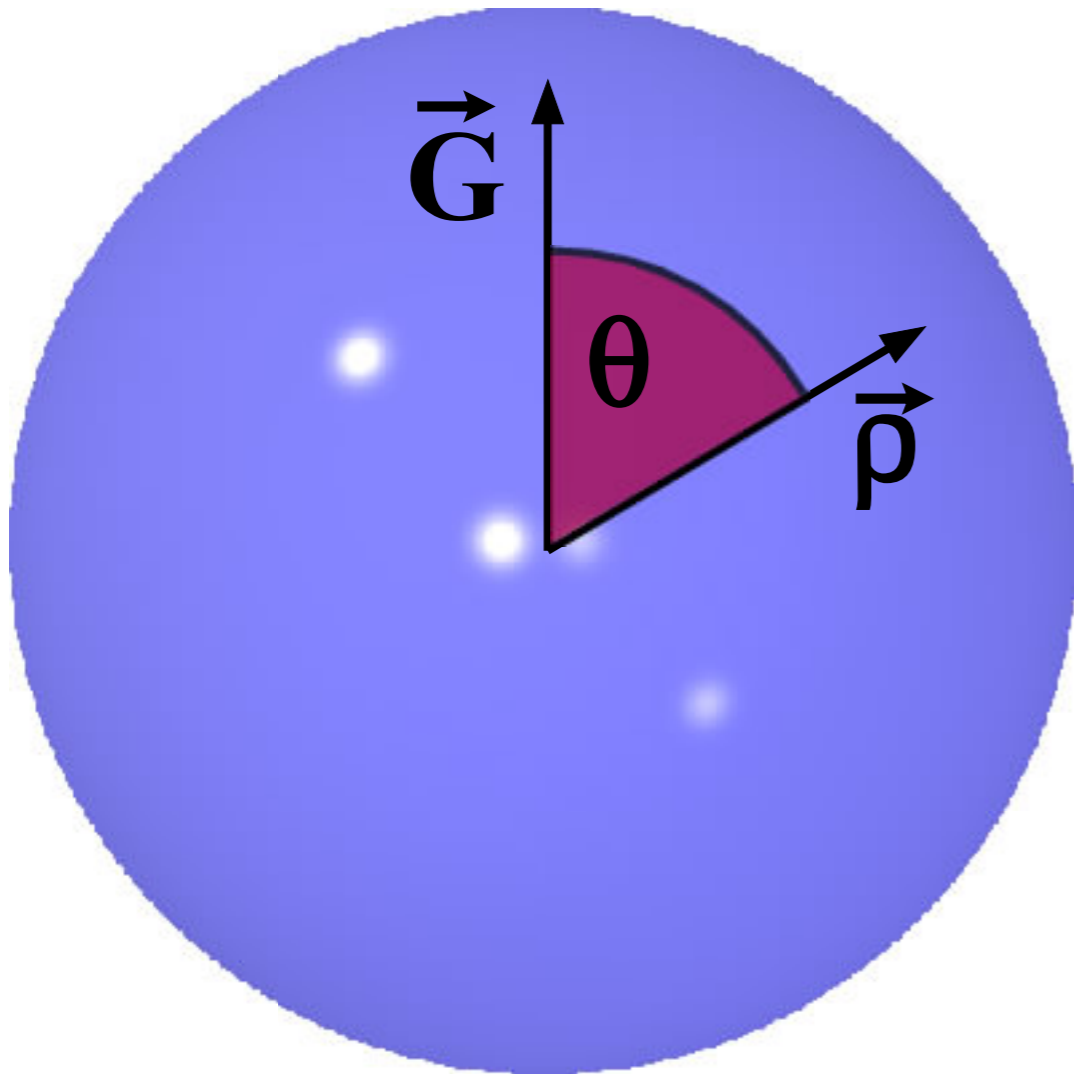
**K<sup>+</sup>: 18**

**Cl<sup>-</sup>: 18**

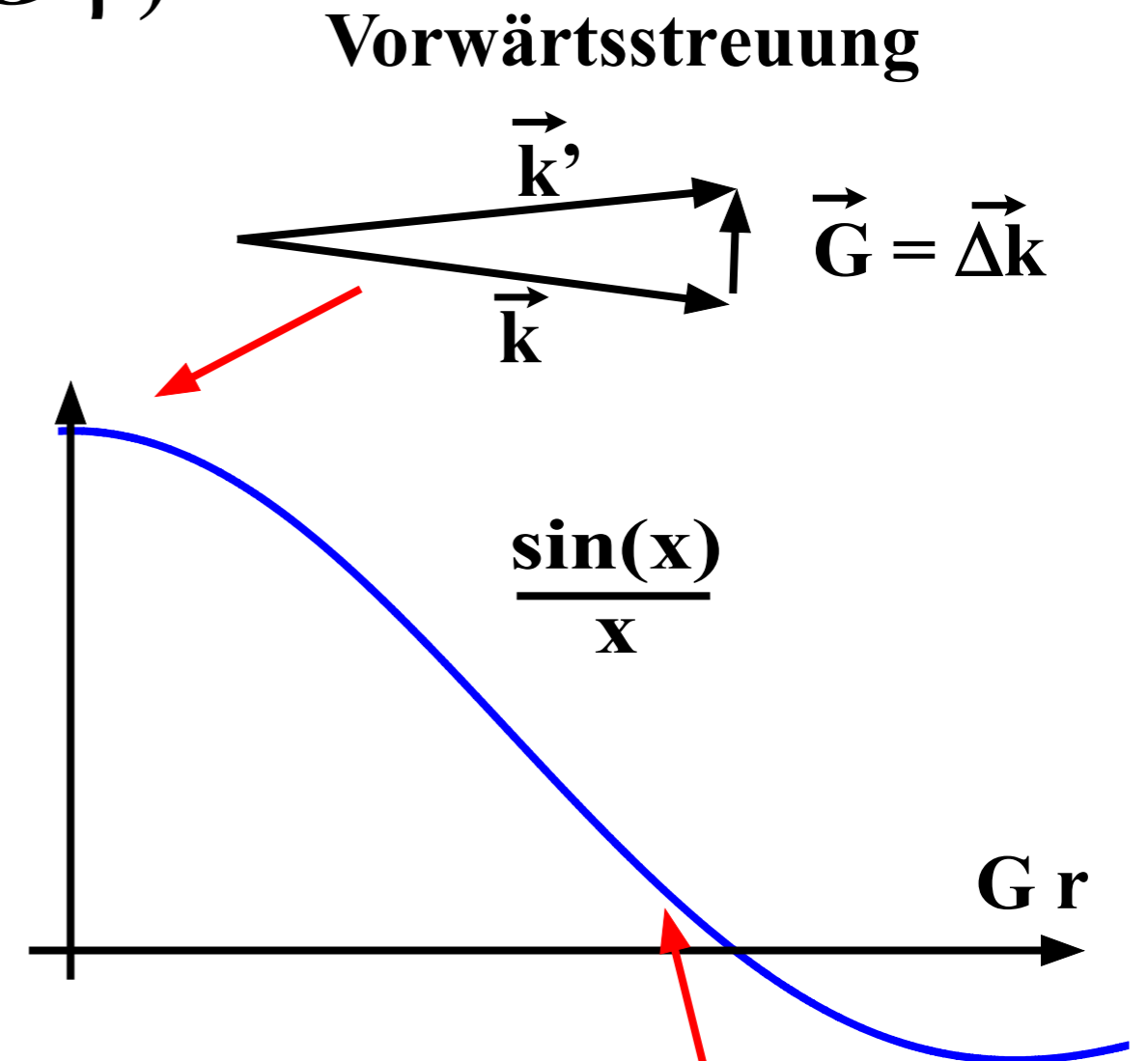
**Br<sup>-</sup>: 36**

# Atomformfaktor

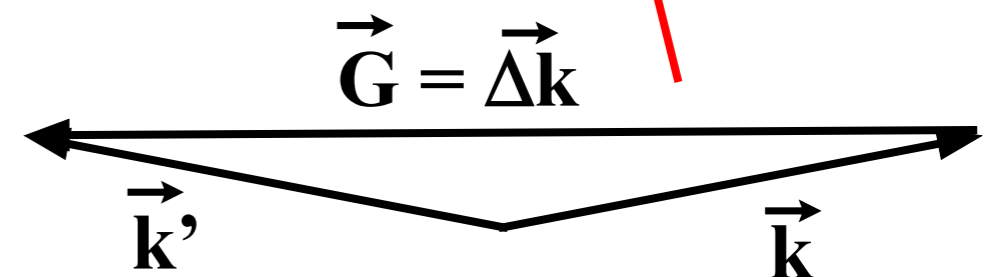
$$f_j = \int dV n_j(\vec{\rho}) \exp(-i \vec{G} \cdot \vec{\rho})$$



$$= 4\pi \int dr n_j(r) r^2 \frac{\sin(Gr)}{Gr}$$

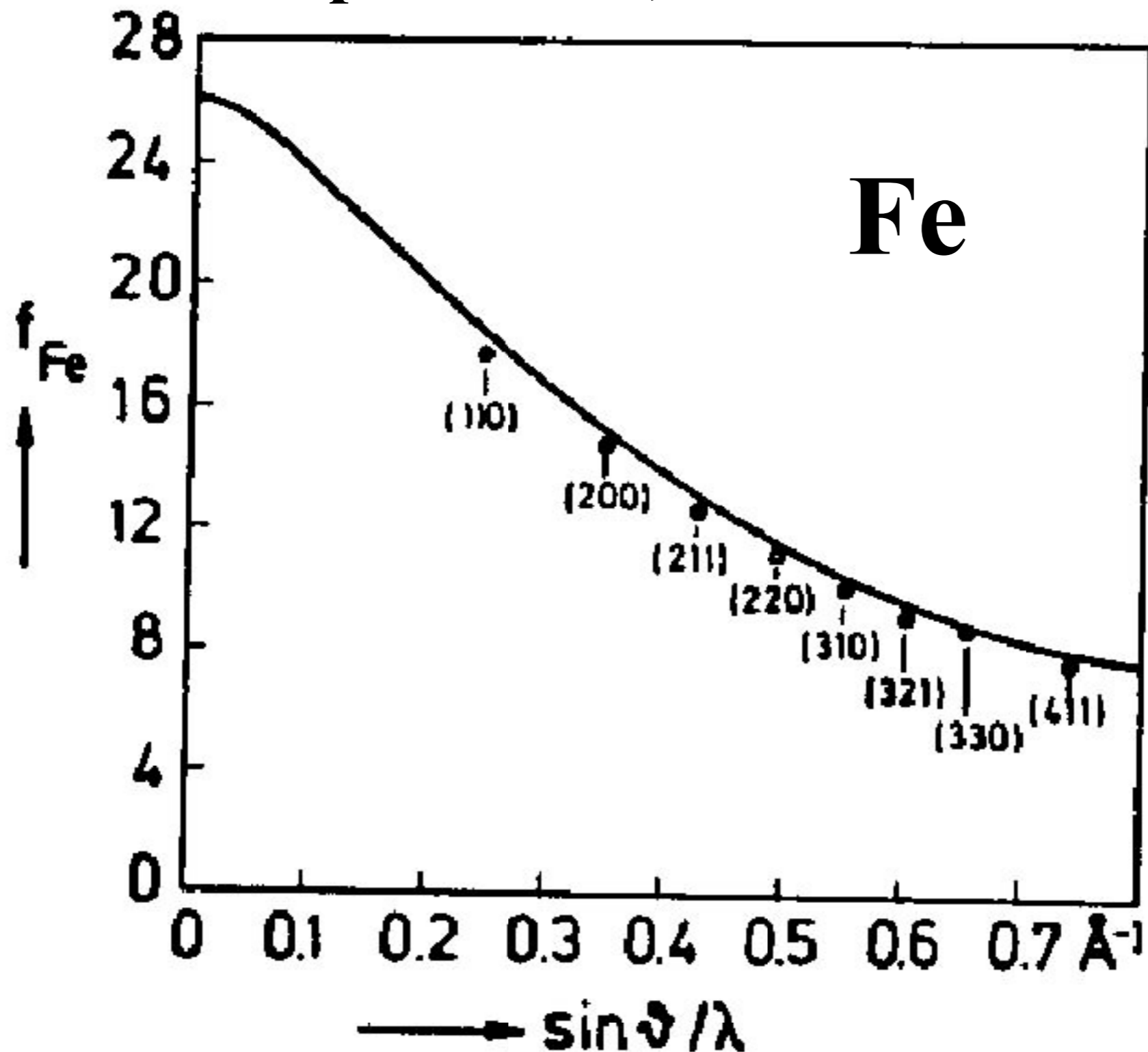


Rückwärtsstreuung



# Atomformfaktor

Beispiel: Eisen,  $\lambda = 0.709$  nm

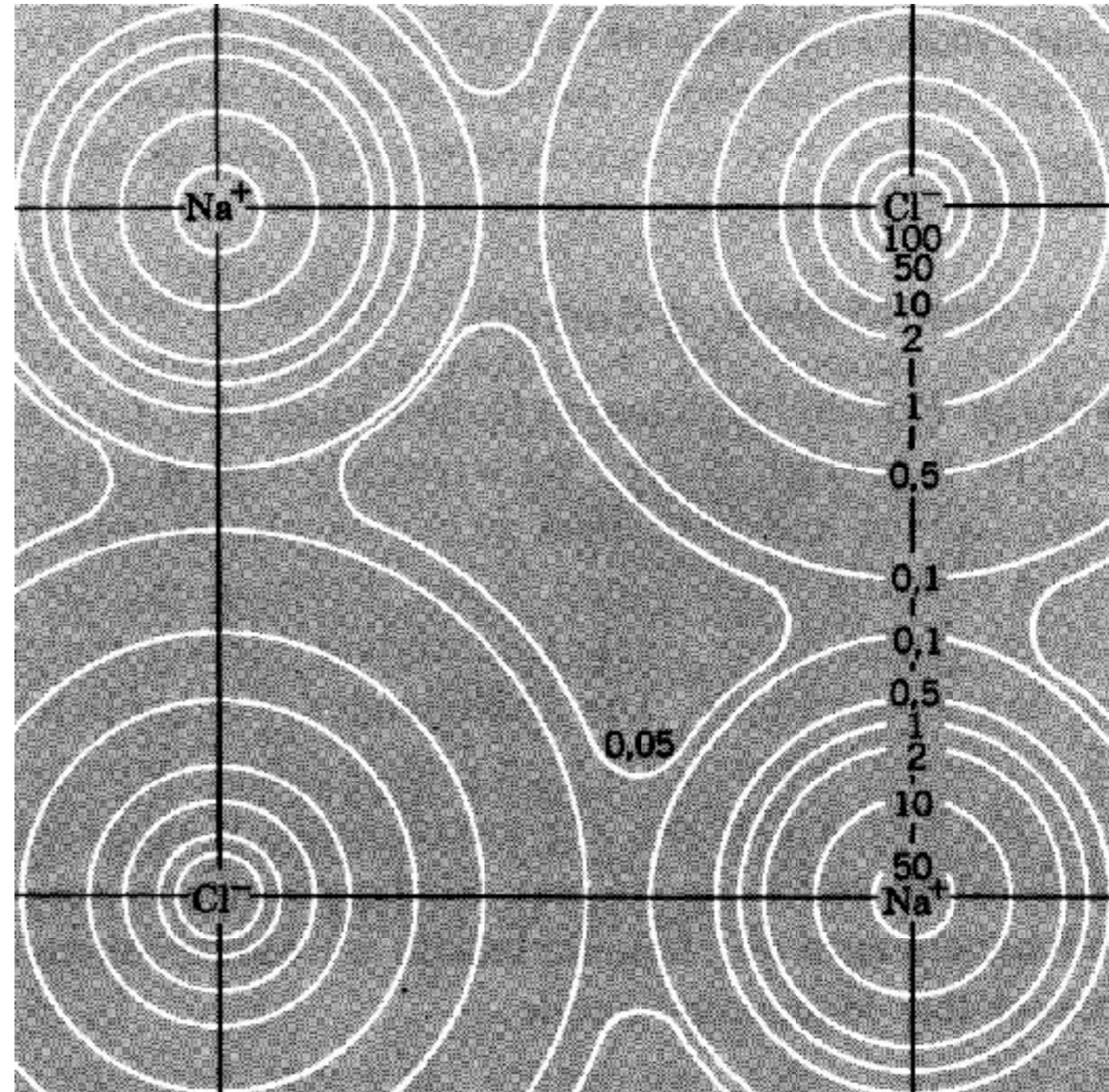
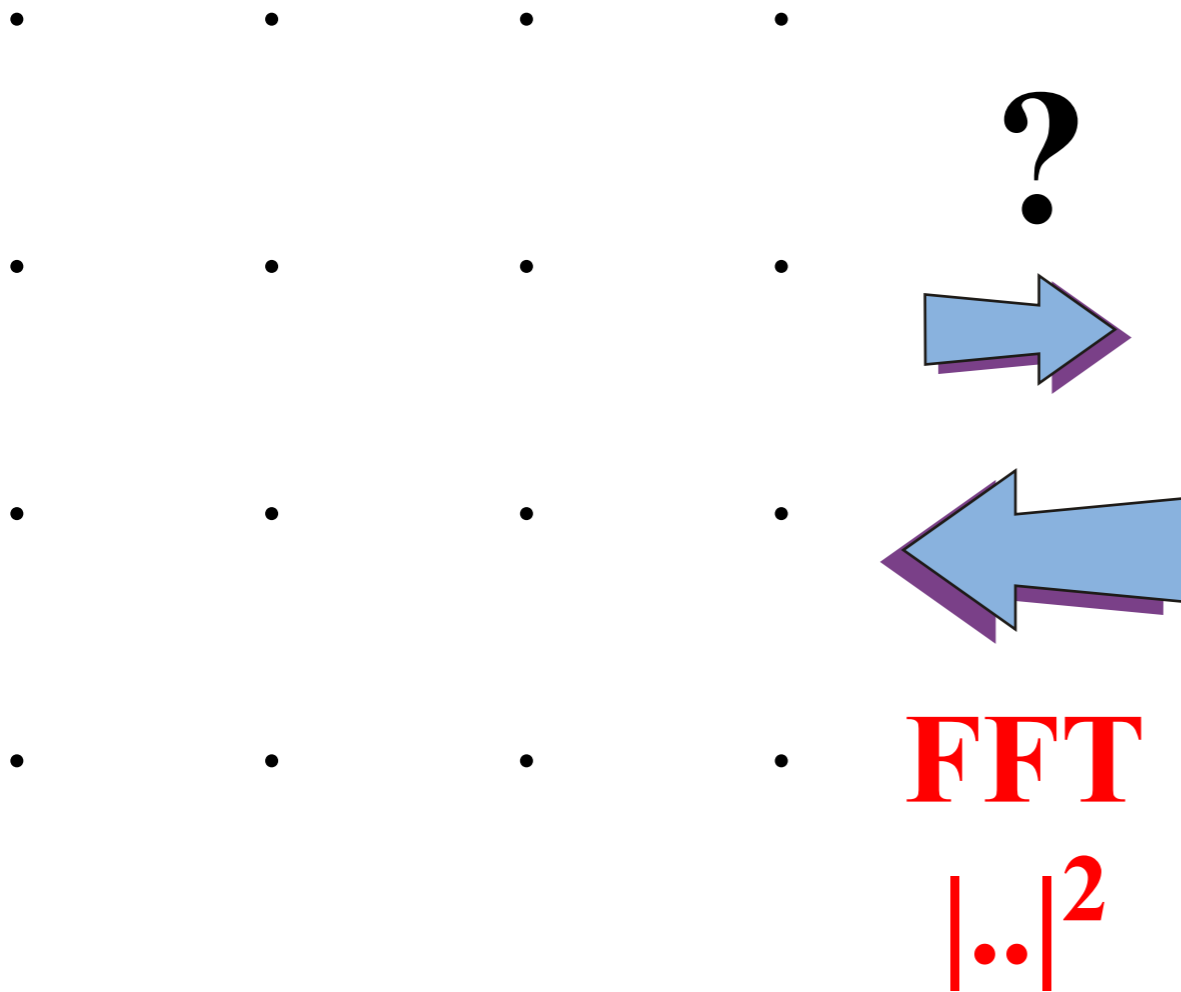




# Strukturbestimmung

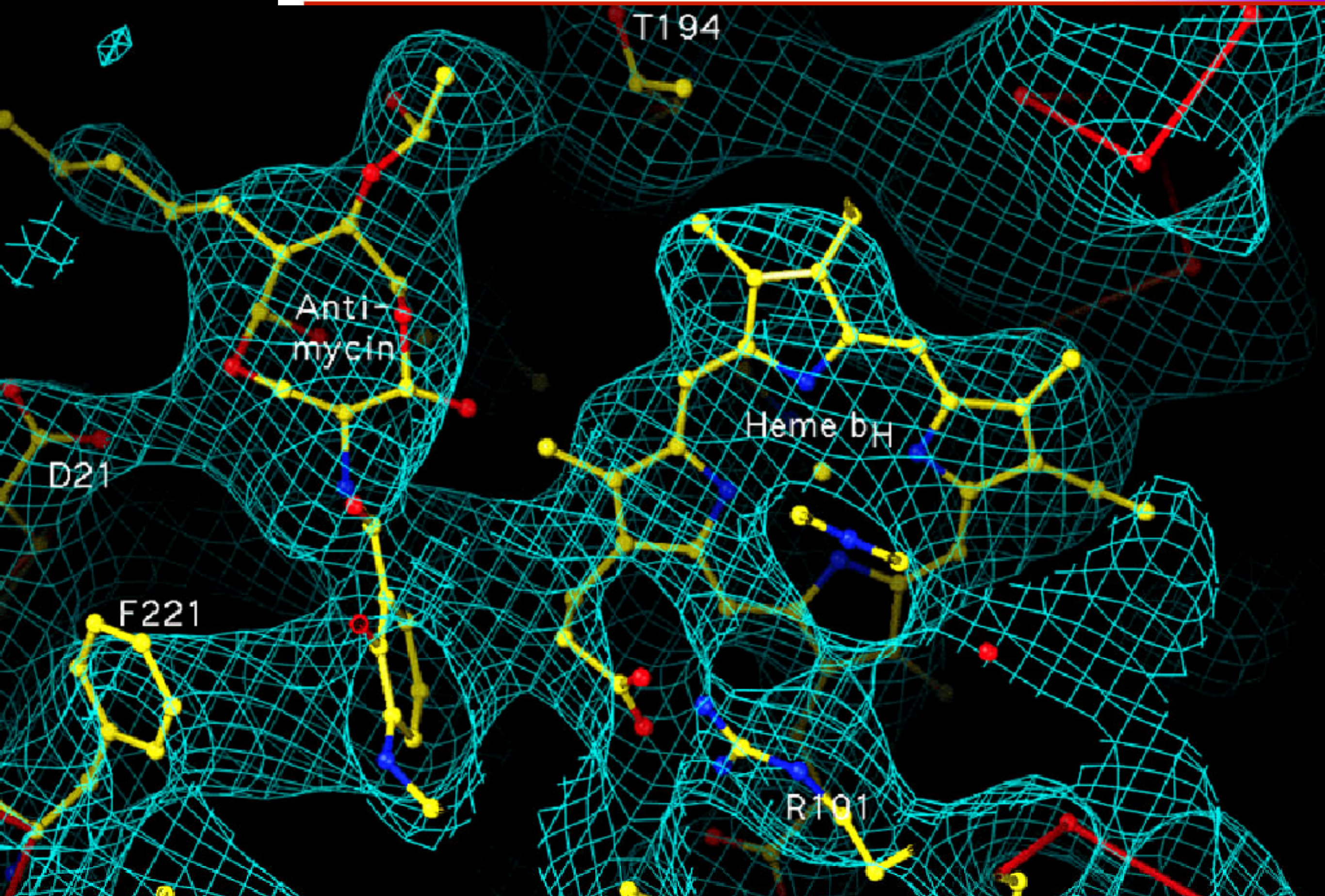
## Elektronendichte in NaCl

### Beugungsmuster





# Elektronendichte in Protein





# Debye-Waller Faktor

