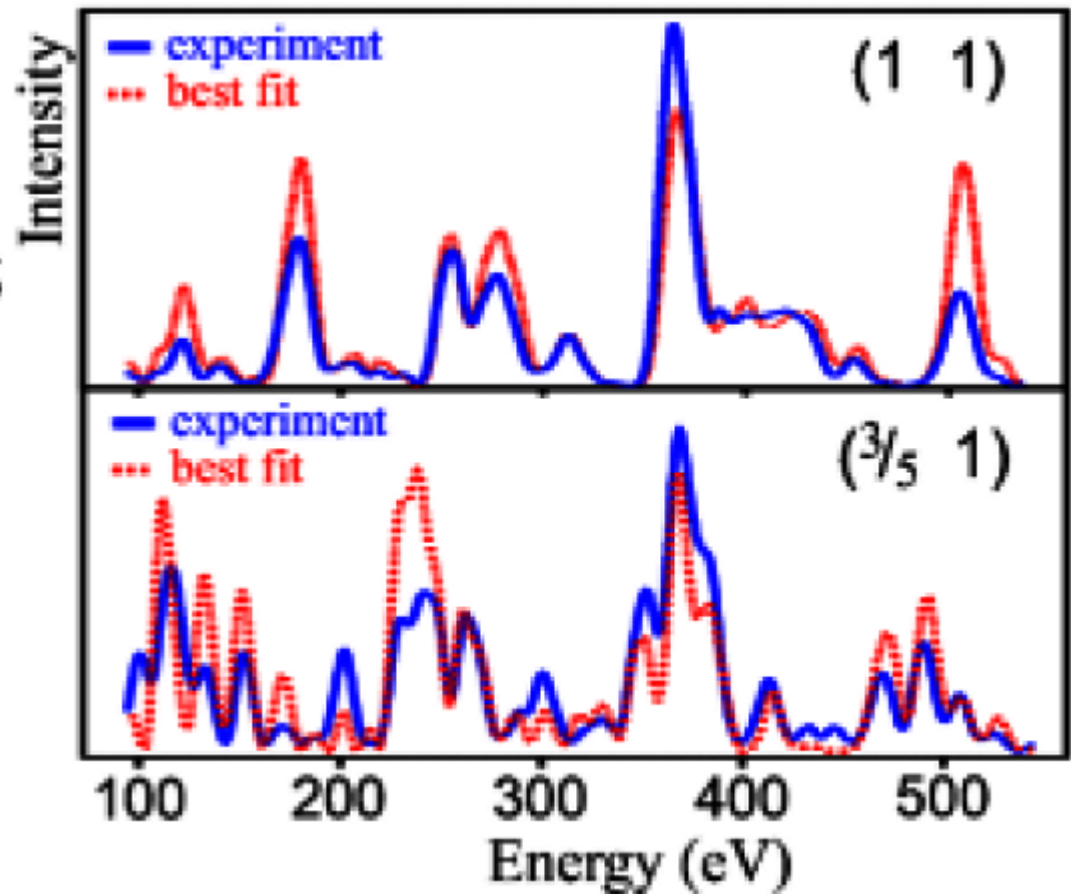
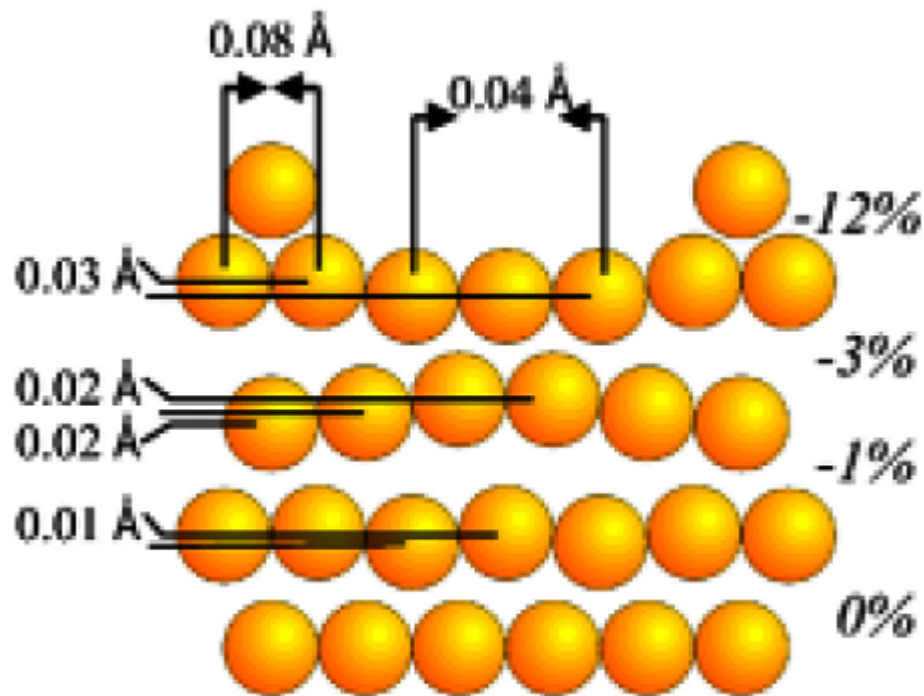


Dynamical LEED data evaluation



$$R_p = 0.27$$

Abb. 3.7.7

Der R -Faktor für Al(110) bei Variation der einzelnen Schichtabstände d_{12} (Kurve A), d_{23} (Kurve B) und d_{34} (Kurve C)

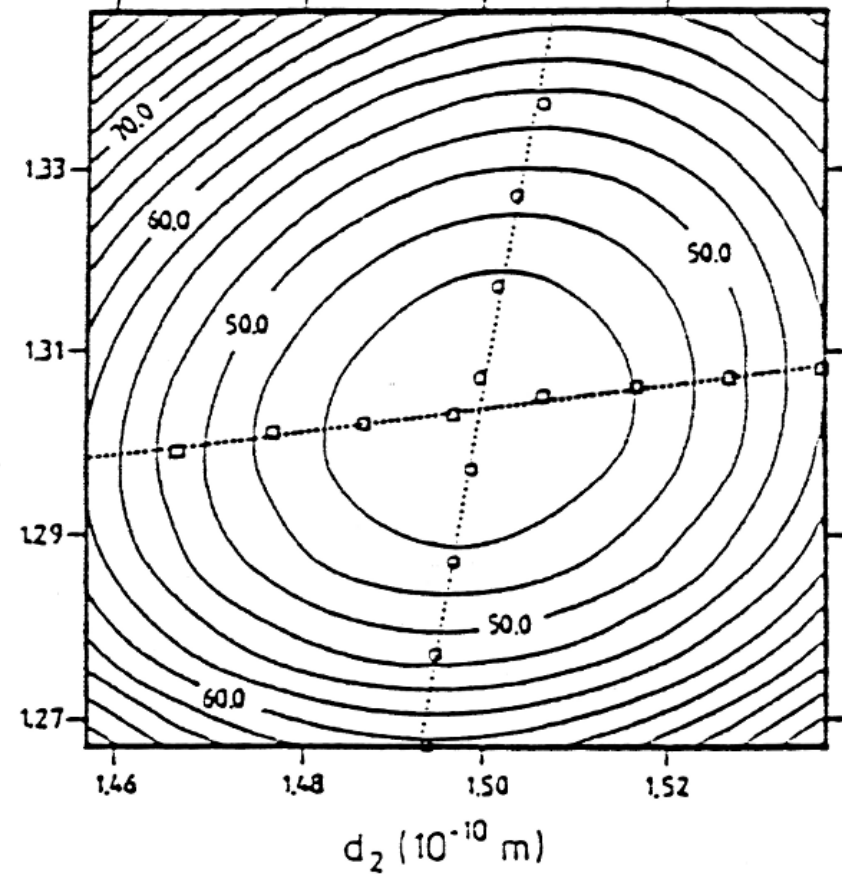
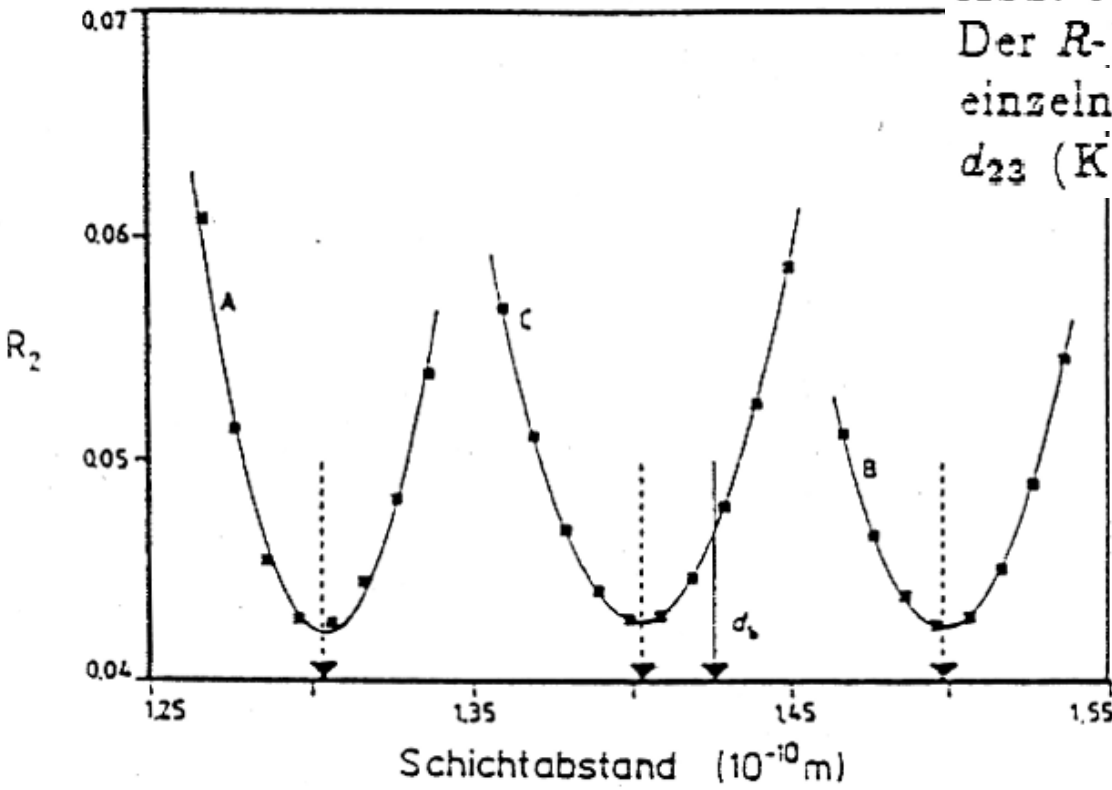


Abb. 3.7.8

Der R -Faktor für Al(110) bei gleichzeitiger Variation der Abstände d_{12} und d_{23} [And 84]

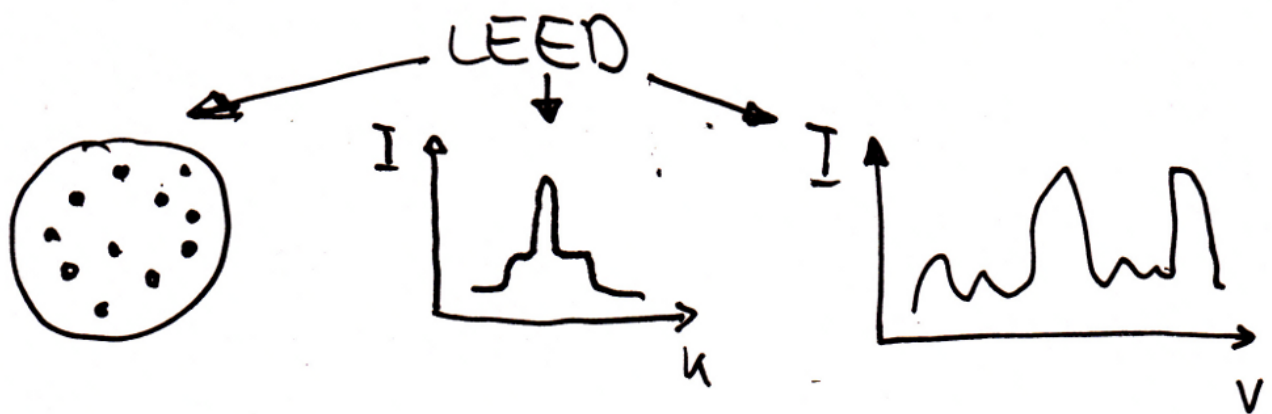
Table 1.2. Relaxation of the distance between the surface layer and the second layer Δd_{12} and the second and the third layer Δd_{23} for several {110} surfaces.

Material	Δd_{12}	Δd_{23}	(lbach)
Cu{110}	-9%	+3%	
Ag{110}	-8%	0%	
Ni{110}	-9%	+3.5%	
Pd{110}	-5%	+1%	
Rh{110}	-7%	+2%	

Summary

- Kinematic theory
 - single scattering
 - Laue equation
 - size and shape of unit cell
 - steps, domains, ...
- Dynamic theory
 - multiple scattering
 - atomic positions
 - Quantitative data

Welche Information steckt in LEED?



Spots

Spot profile

I-V-Kurven

+ kinemat. Näherung

+ Vielfach-Streuung

Taschenrechner

PC

"3090"

Abmessungen der Einheitszelle (Gitter)

Anordnung der Einheitszellen (Domänen, Steps)

Atompositionen (Basis)

ohne PC:
 Splitting → Steps
 breit → kleine Domänen in der "breiten" Richtung

Standard LEED

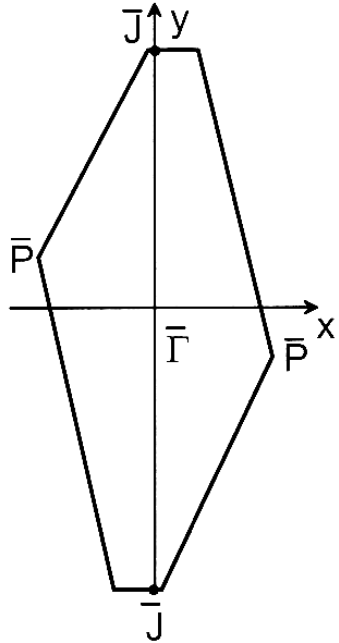
SPALEED

LEED I-V

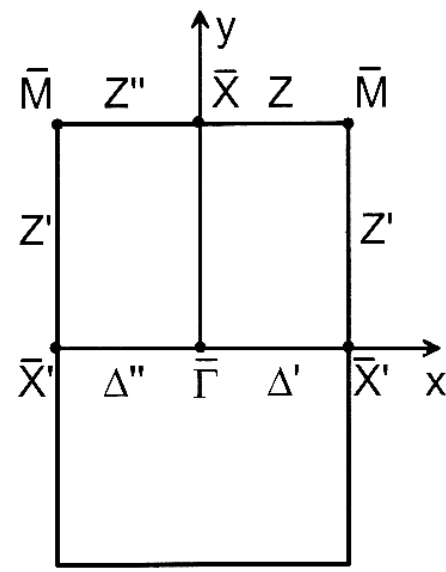
REL

Brillouinzonen der 5 Bravaisnetze

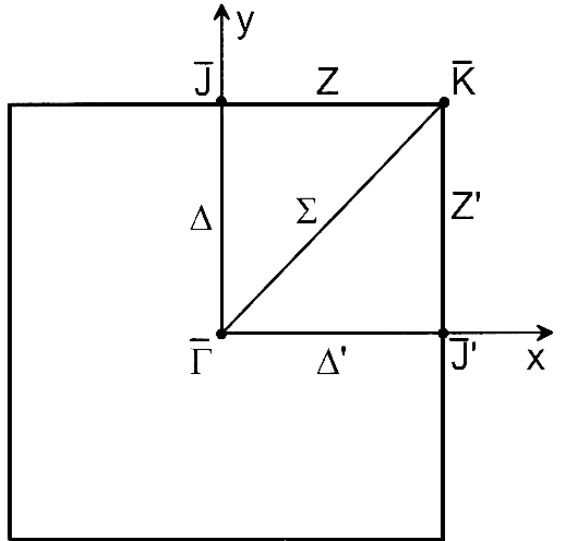
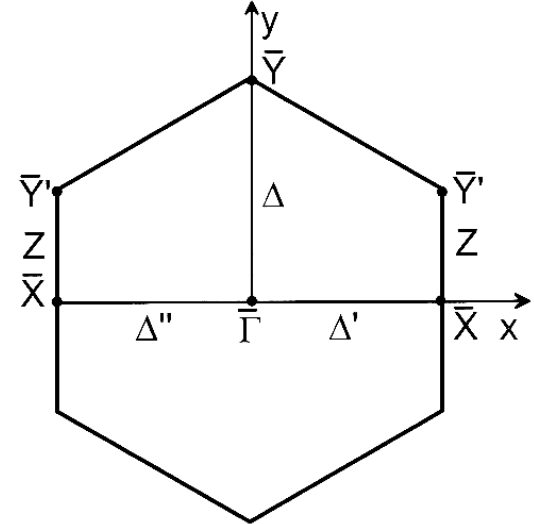
Oblique



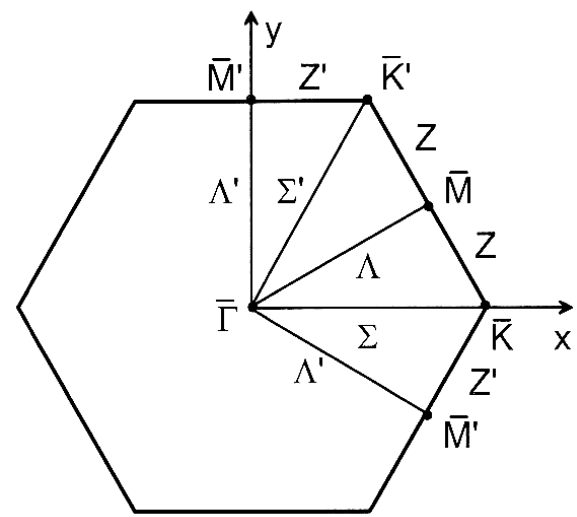
primitiv rechteckig



zentriert rechteckig

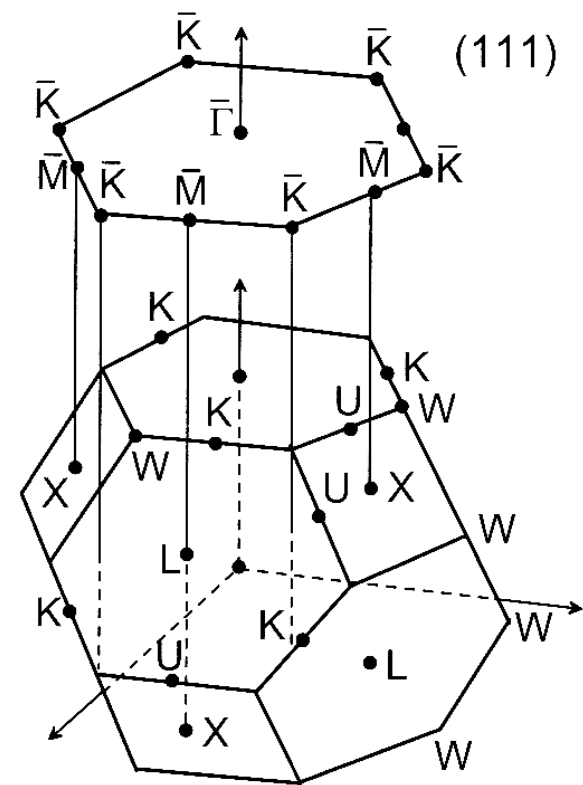
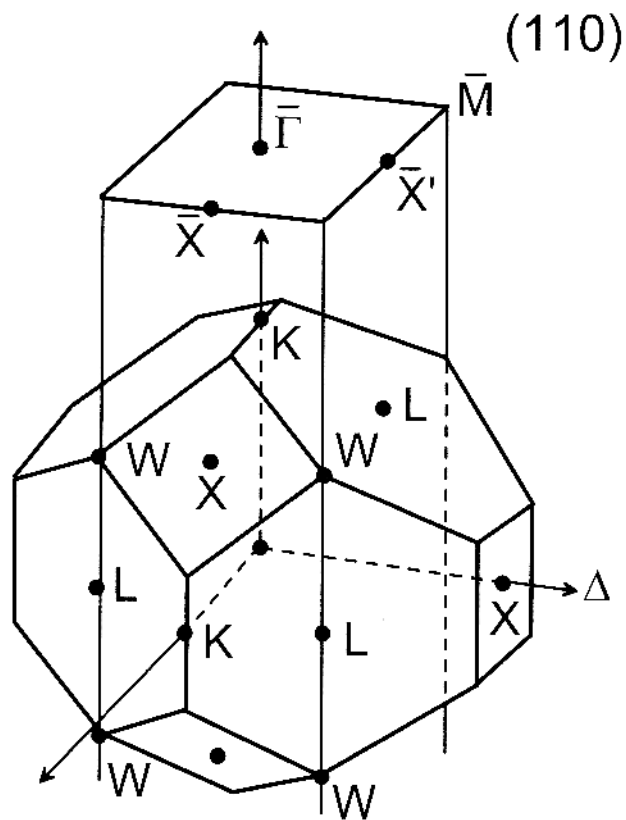
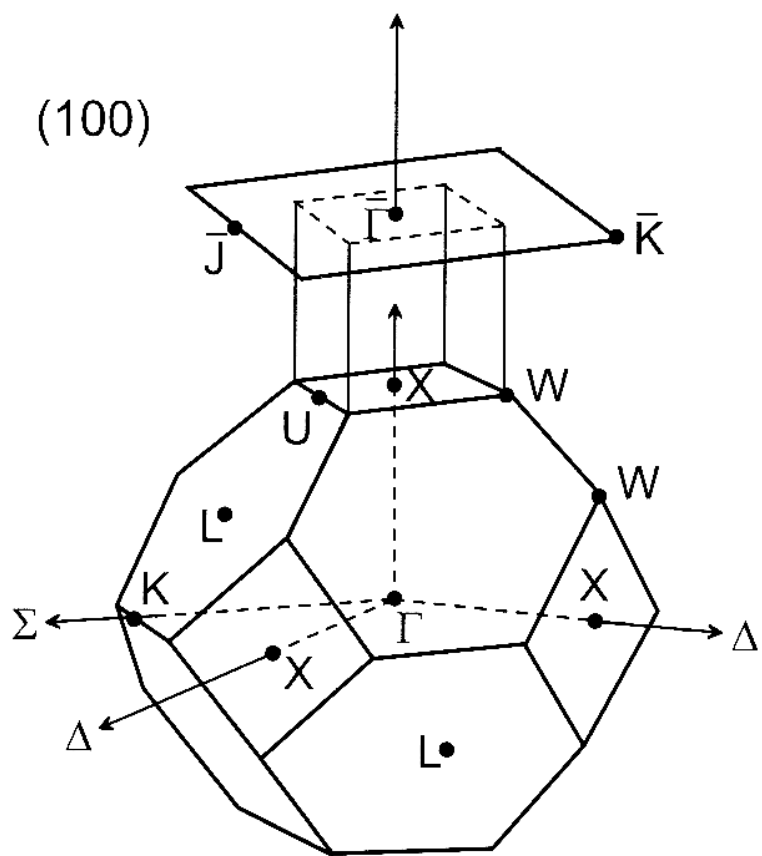


quadratisch



hexagonal

Projekt 3D nach 2D am Beispiel kfz (fcc)



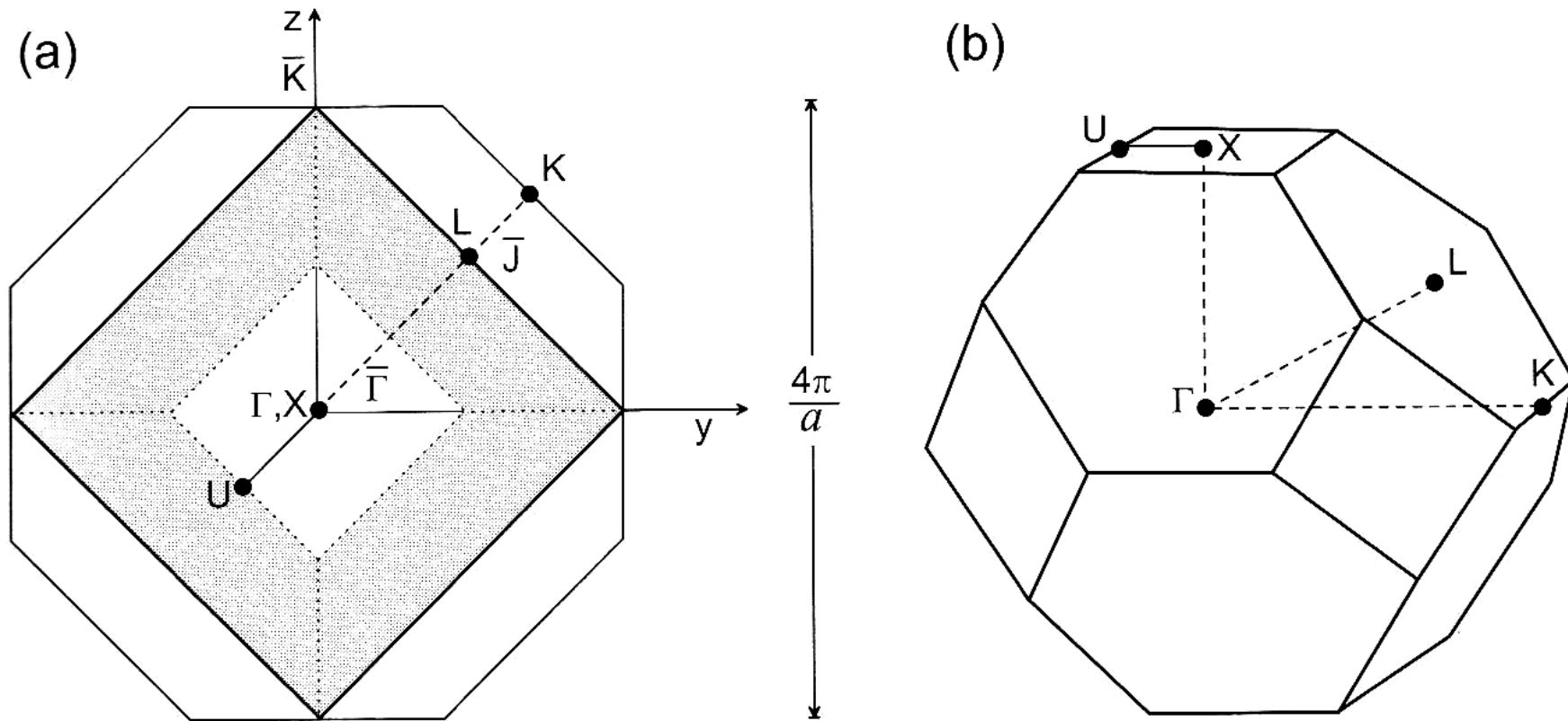
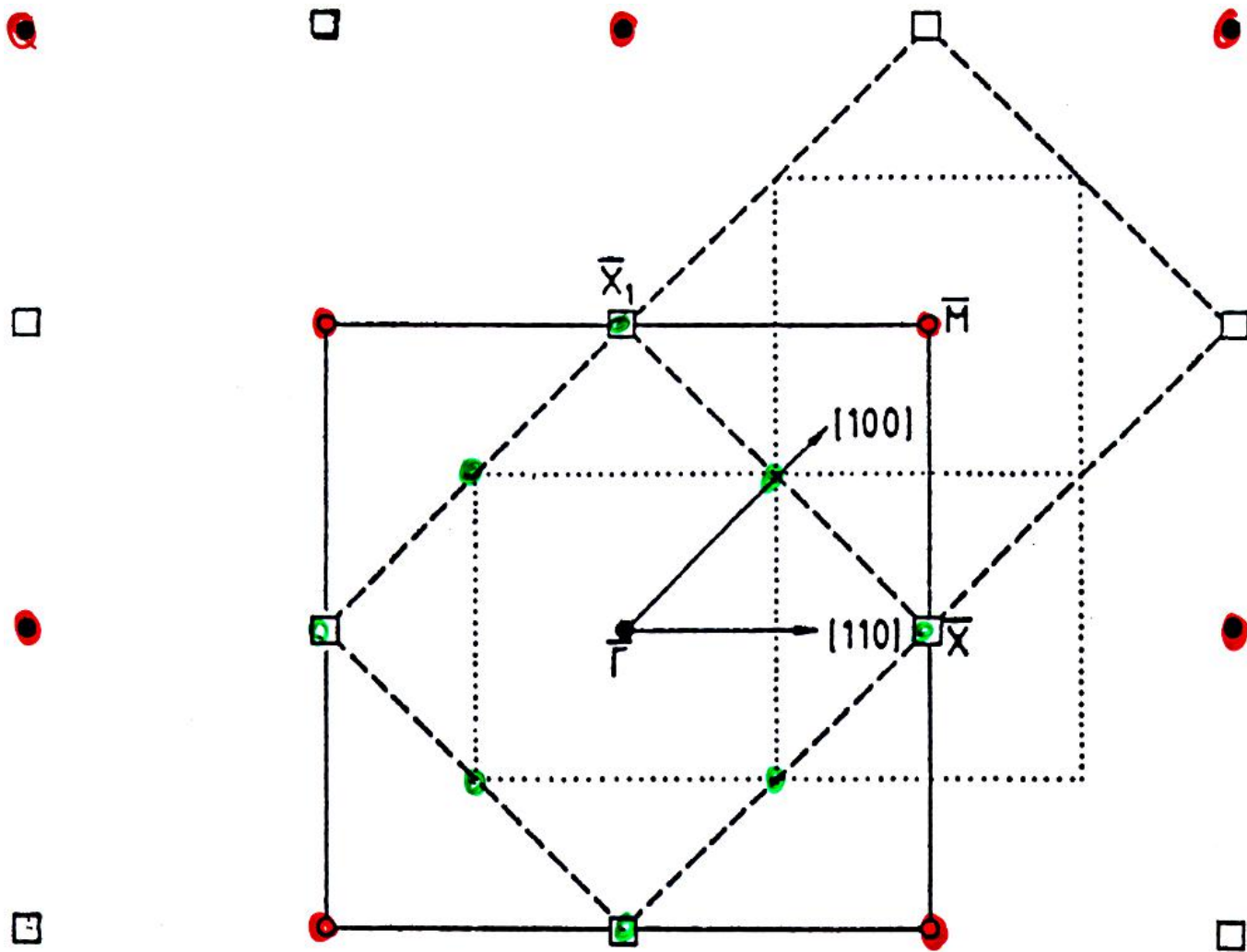


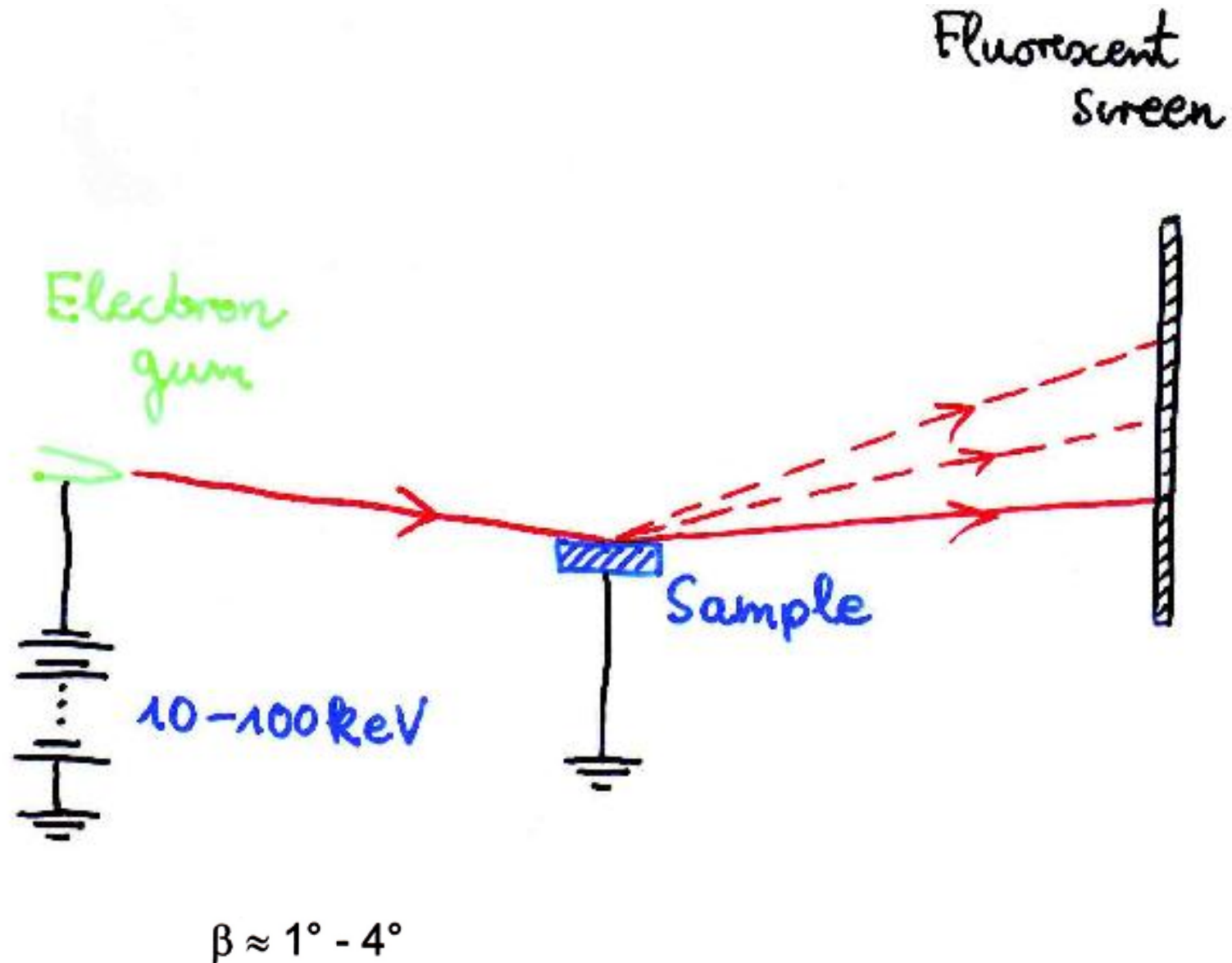
Fig. 1.26. (a) Brillouin zone of a (100) surface (shaded area) together with the projected bulk BZ of an fcc crystal. Projected critical points of the 3D BZ are indicated along a $[011]$ direction. (b) Bulk BZ for comparison.



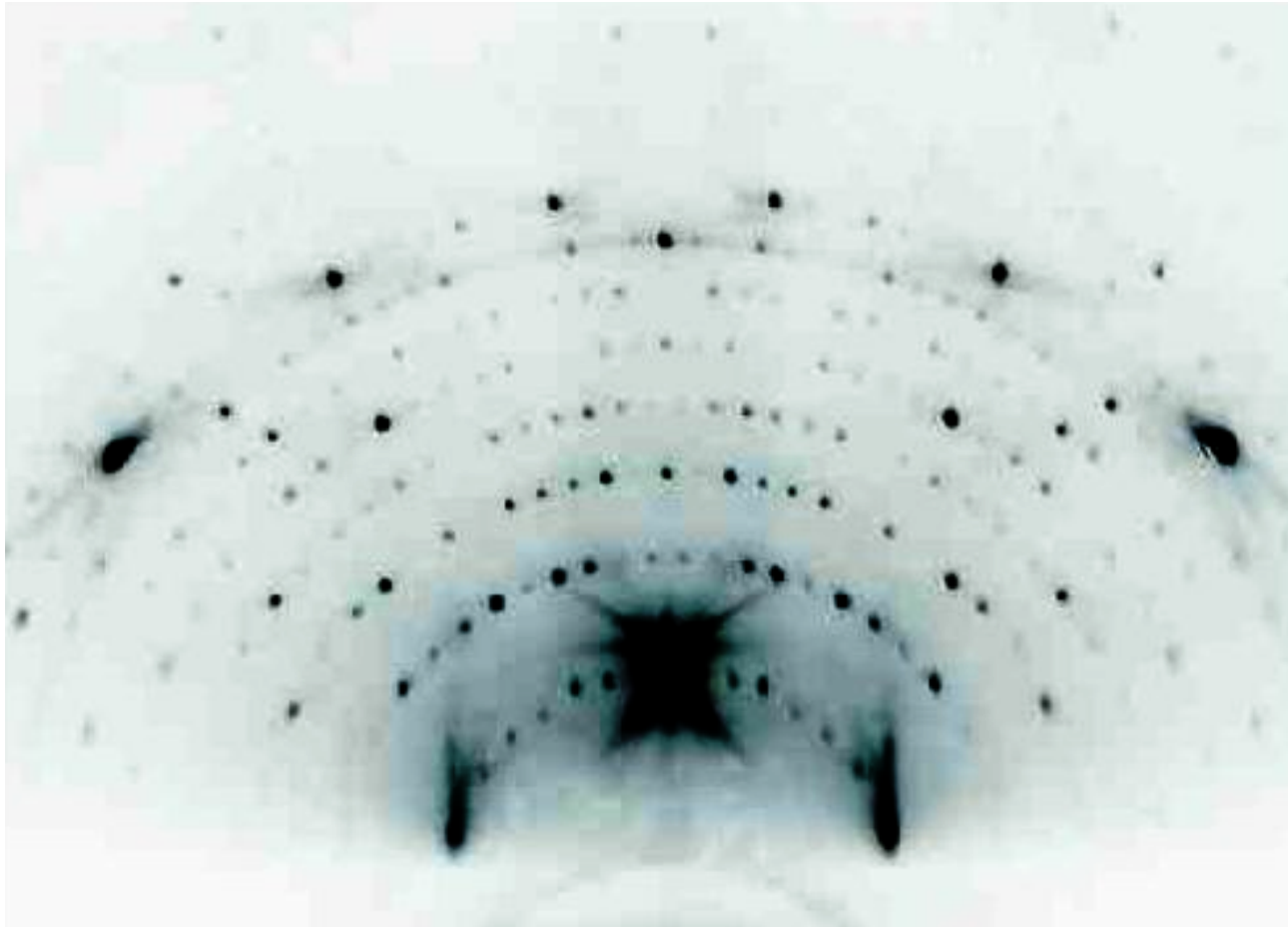
Brillouinzone einer (100)-Oberfläche eines kubisch flächenzentrierten Kristalles mit (2x2)-Überstruktur. Die Punkte des reziproken Gitters ohne Überstruktur sind mit gefüllten Kreisen markiert. Die entsprechende Brillouinzone wird von durchgezogenen Linien begrenzt. Das reziproke Gitter der c(2x2)-Überstruktur enthält zusätzlich die mit offenen Kreisen gekennzeichneten Punkte. Die zugehörige Brillouinzone ist gestrichelt eingezeichnet. In der p(2x2)-Struktur gehören auch die Punkte, die mit Quadraten versehen sind, zum reziproken Gitter. Die Brillouinzone ist von punktierten Linien umgeben.

RHEED

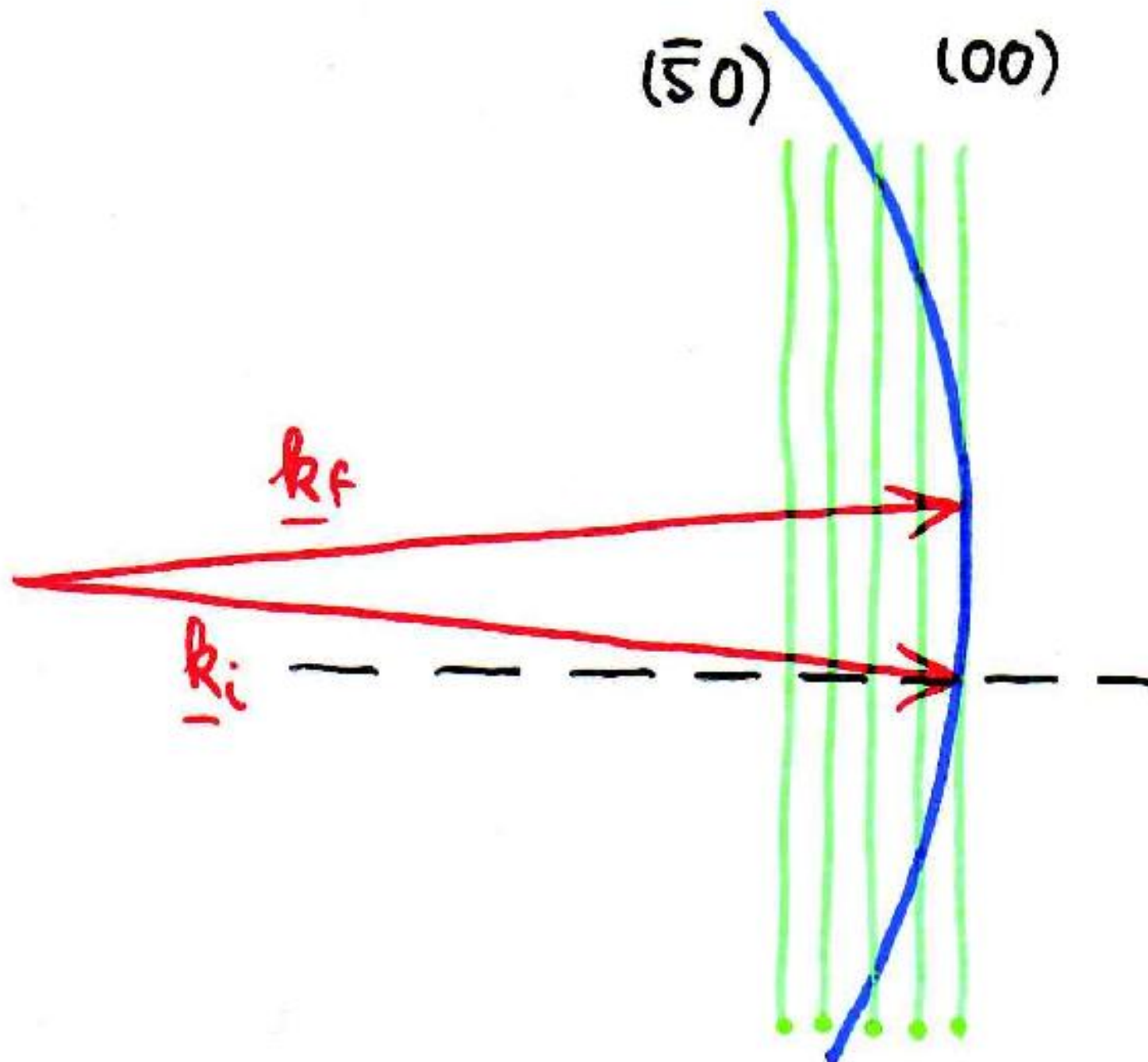
Reflection high-energy electron diffraction RHEED

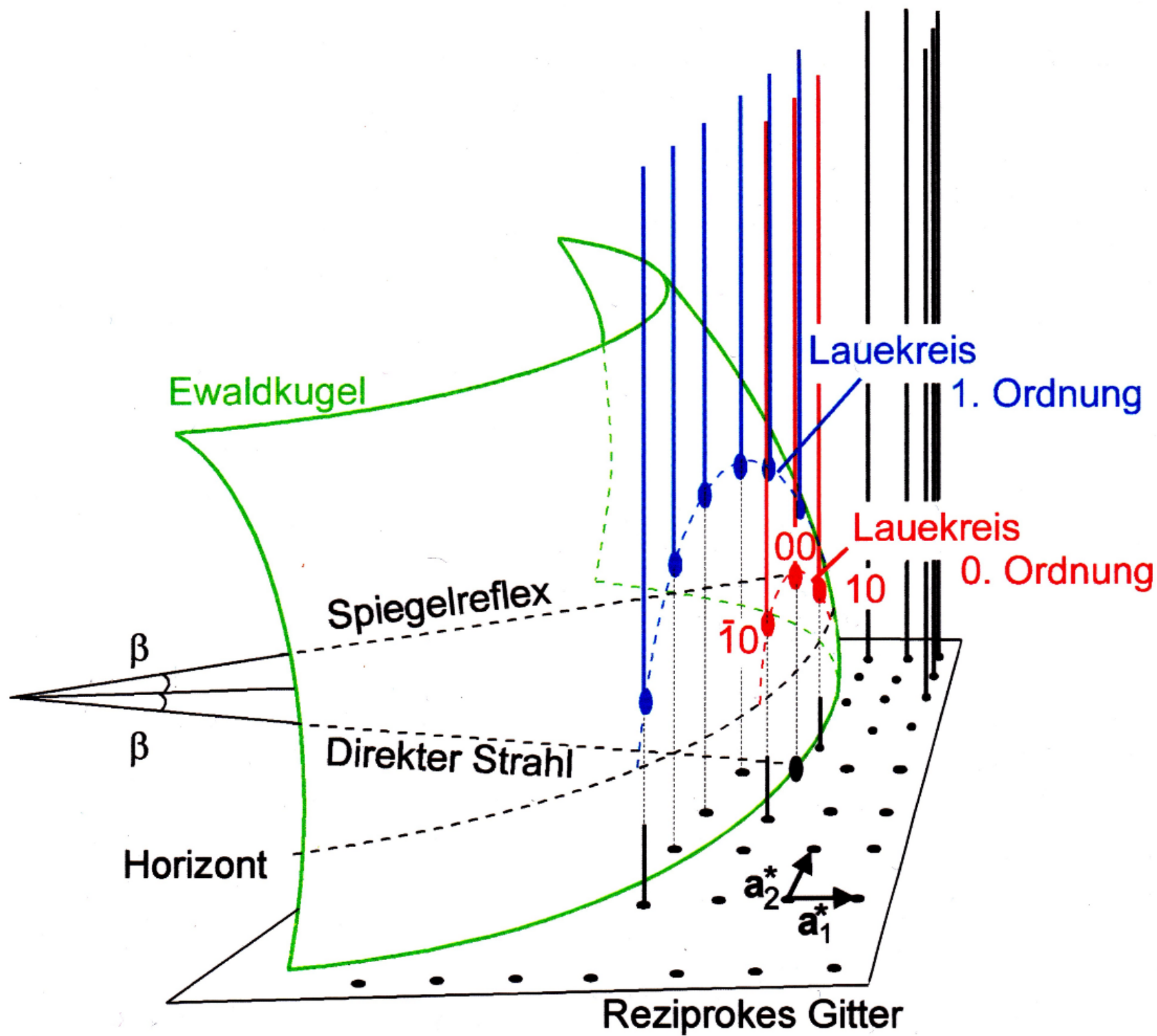


Si(111) - (7×7)

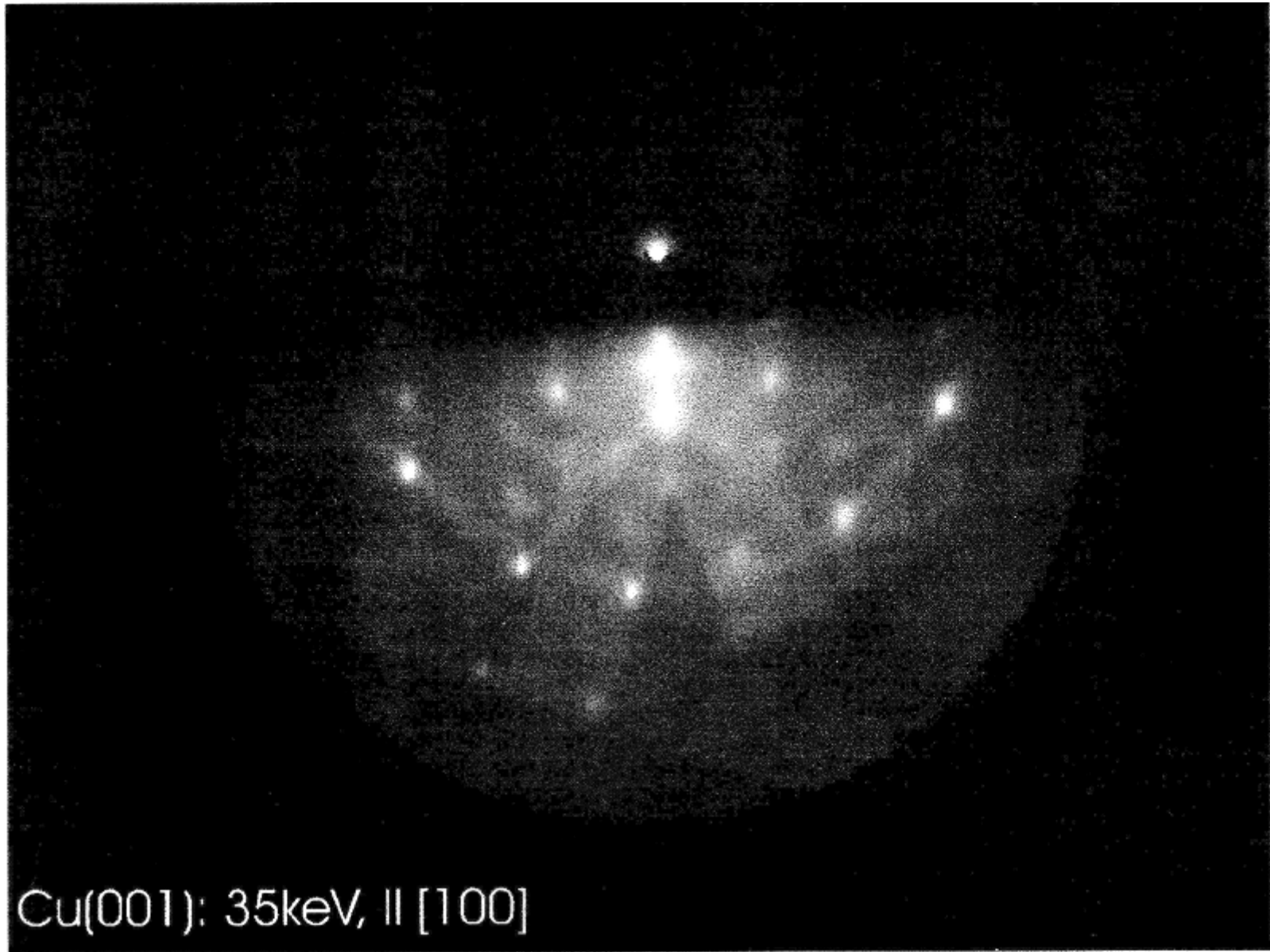


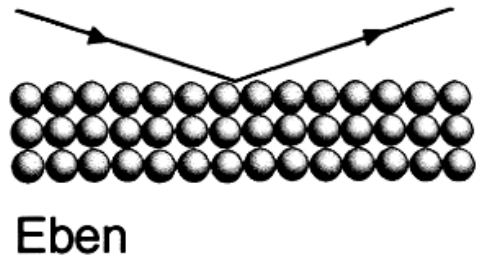
Ewald construction: RHEED



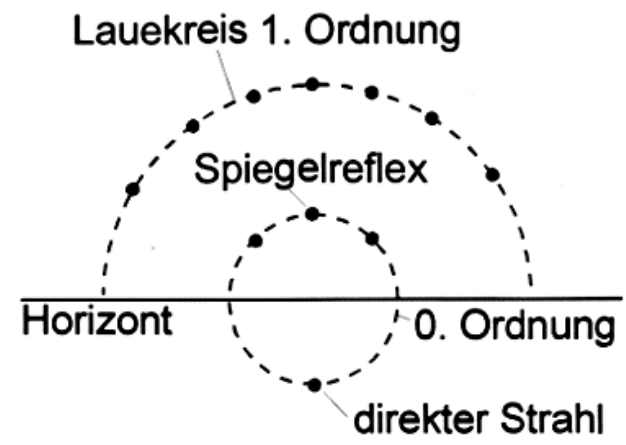


Reale Oberflächen: Bewertung des
RHEED-Bildes

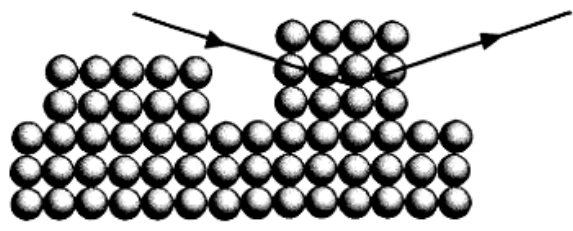
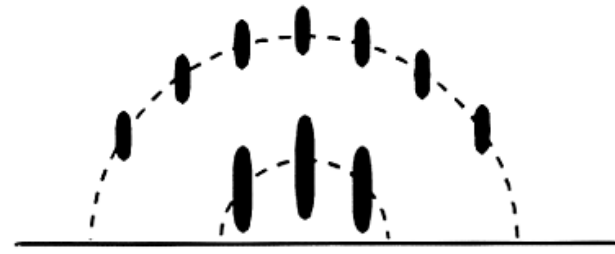




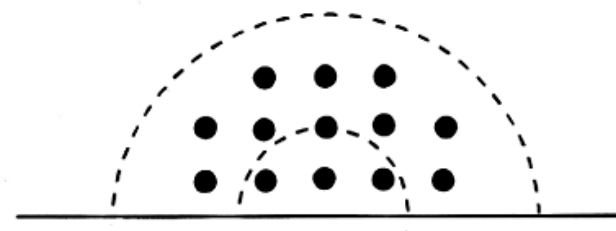
Eben



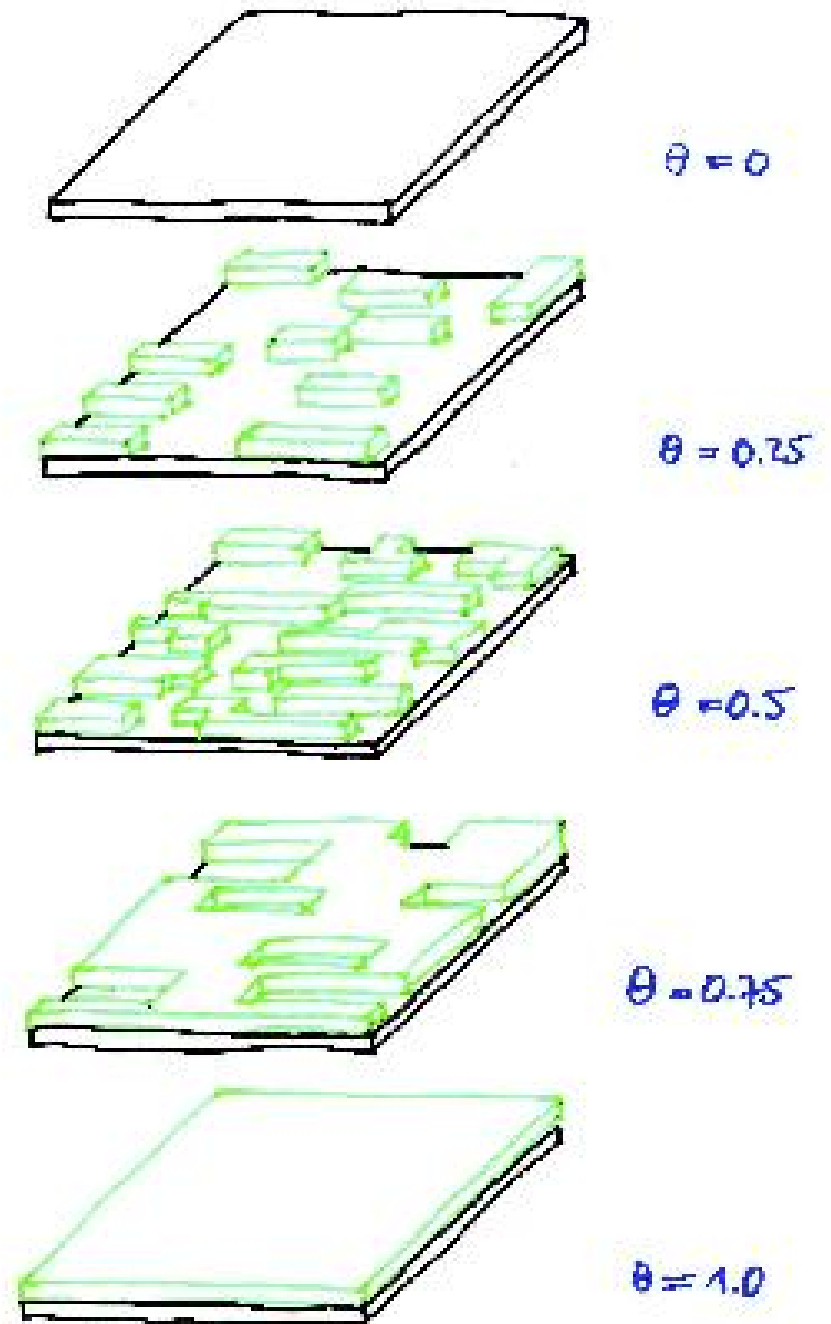
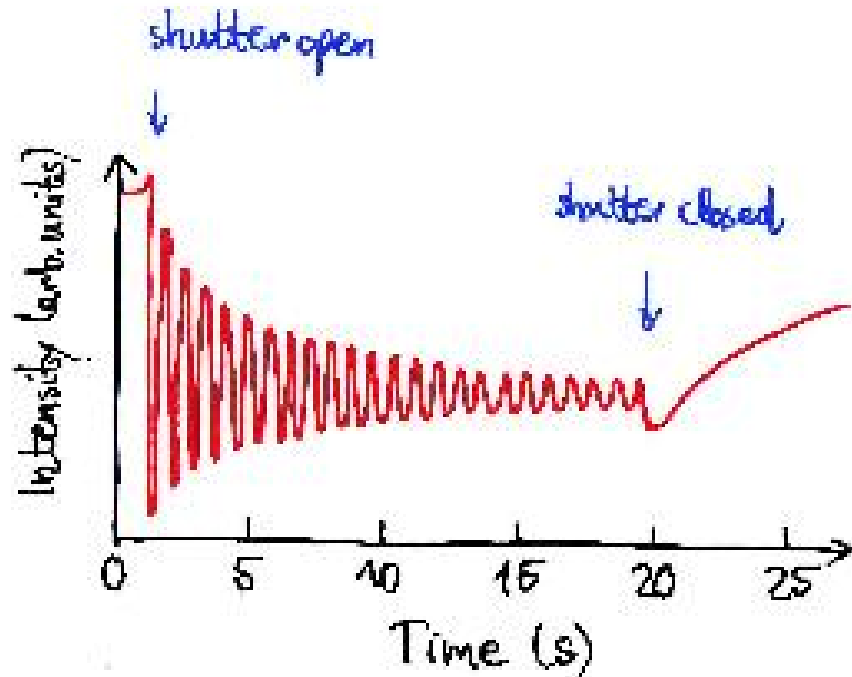
Schwach gestuft



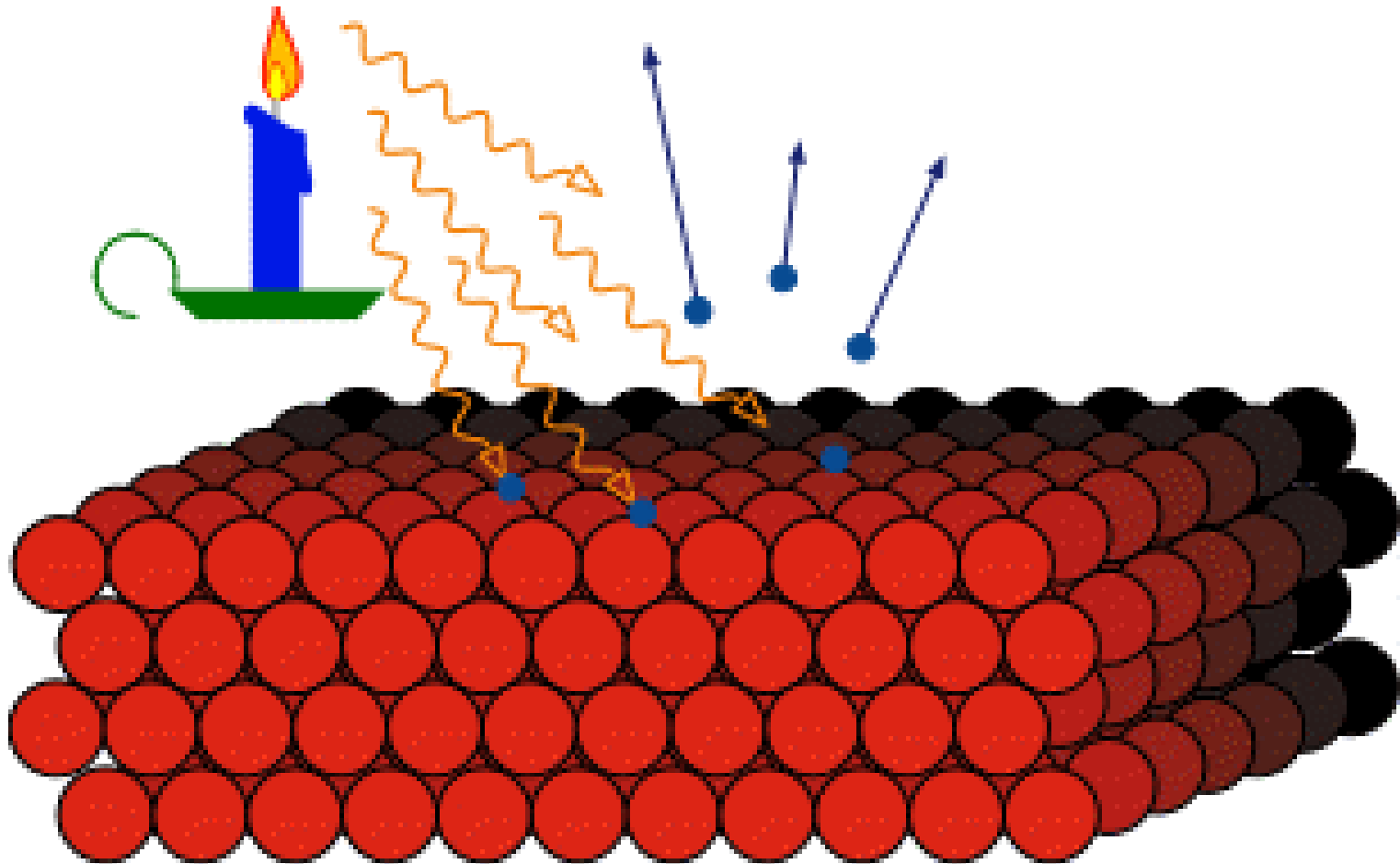
Stark gestuft, 3D-Inseln



RHEED oscillations

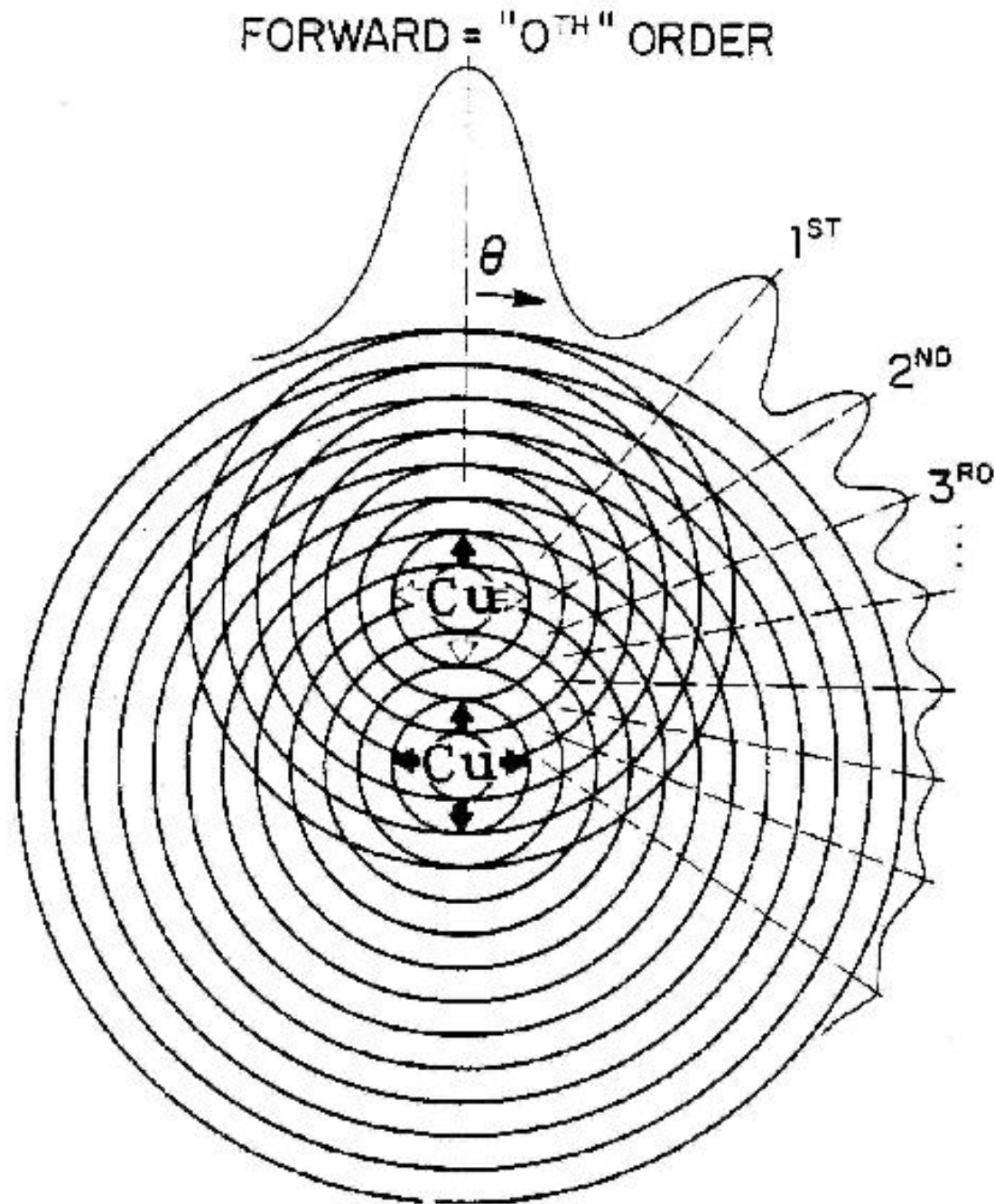


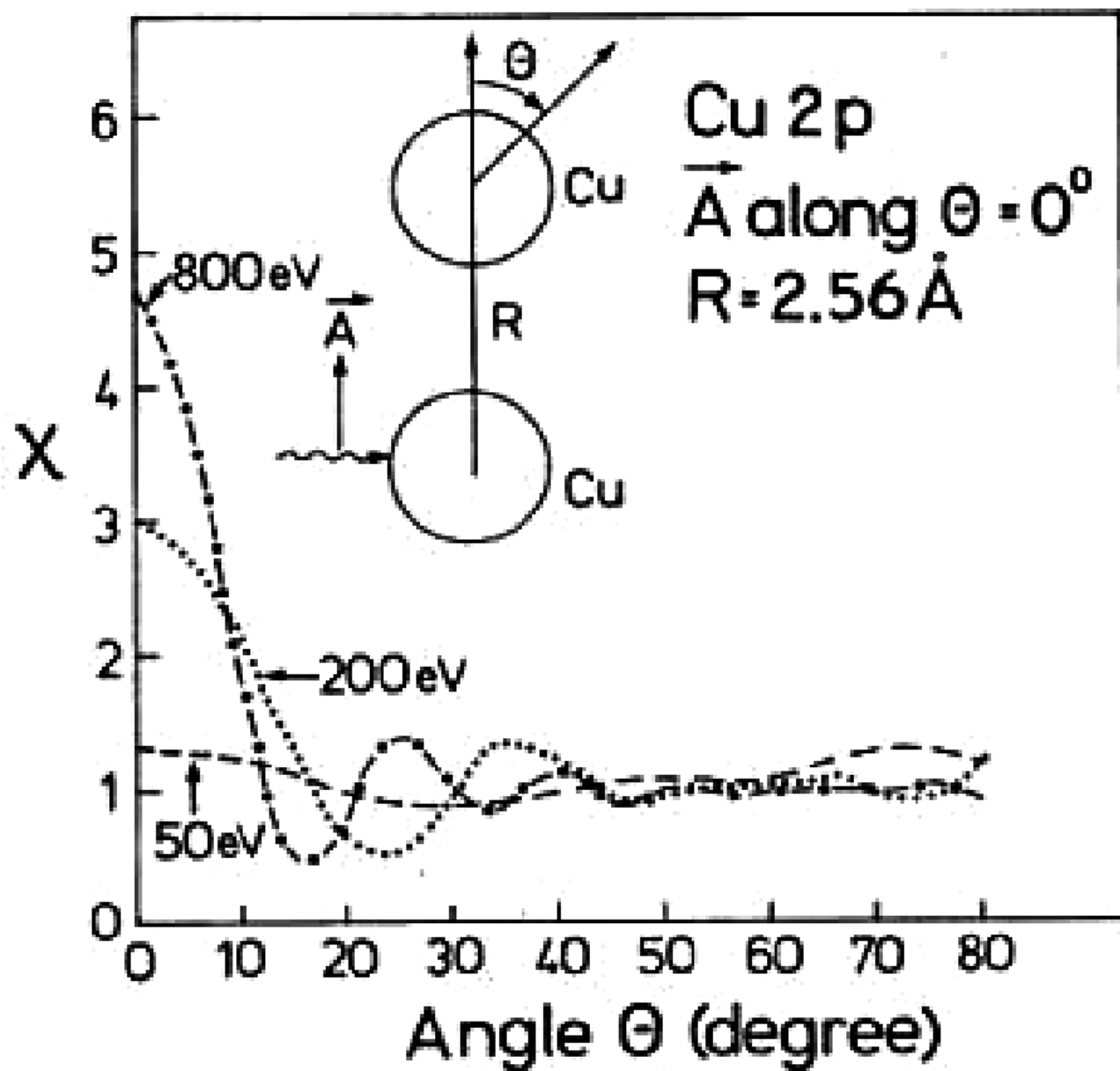
A slightly simplified view on photoemission



(details later)

Photoelectron Diffraction (PED)





HAS

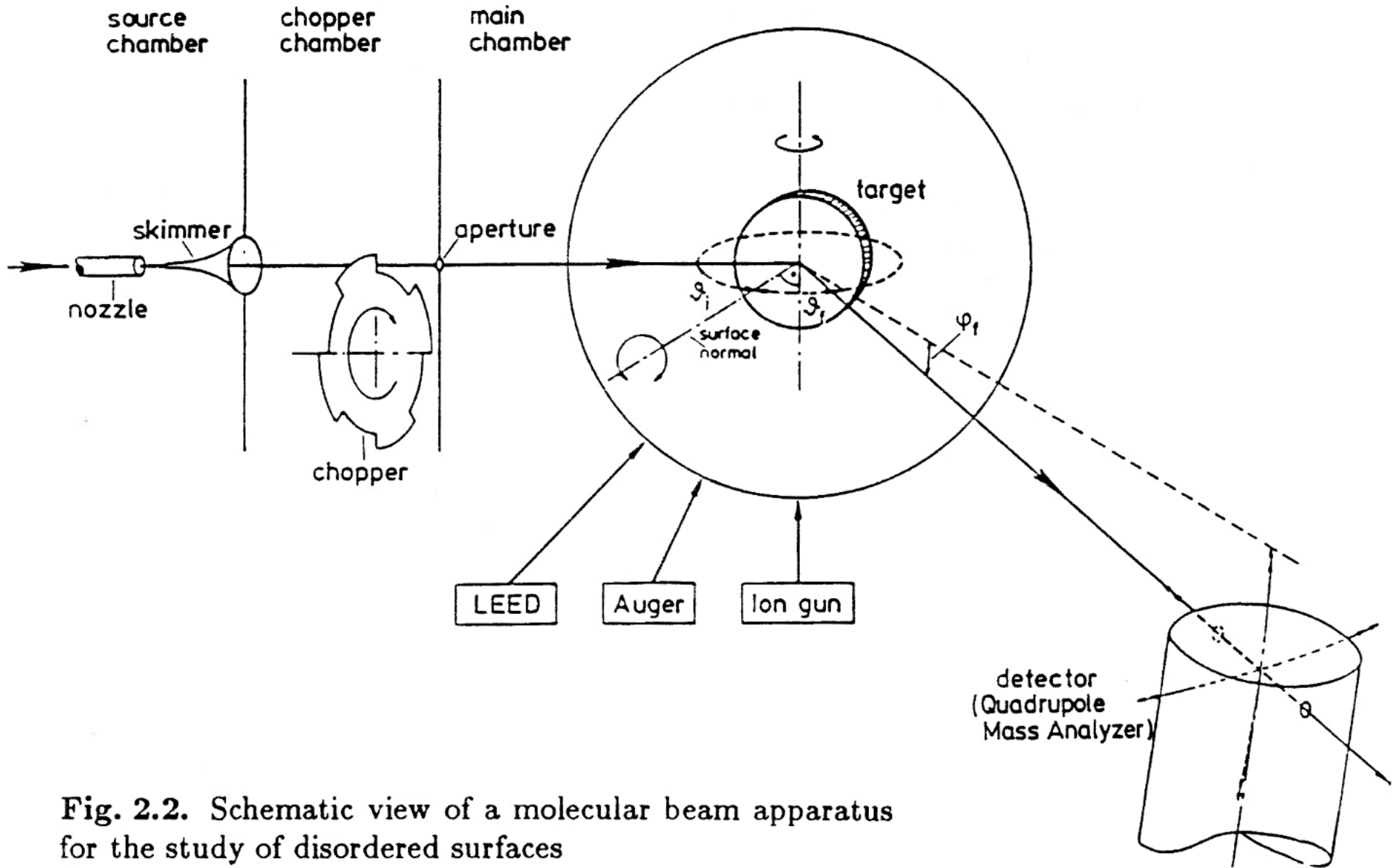


Fig. 2.2. Schematic view of a molecular beam apparatus for the study of disordered surfaces

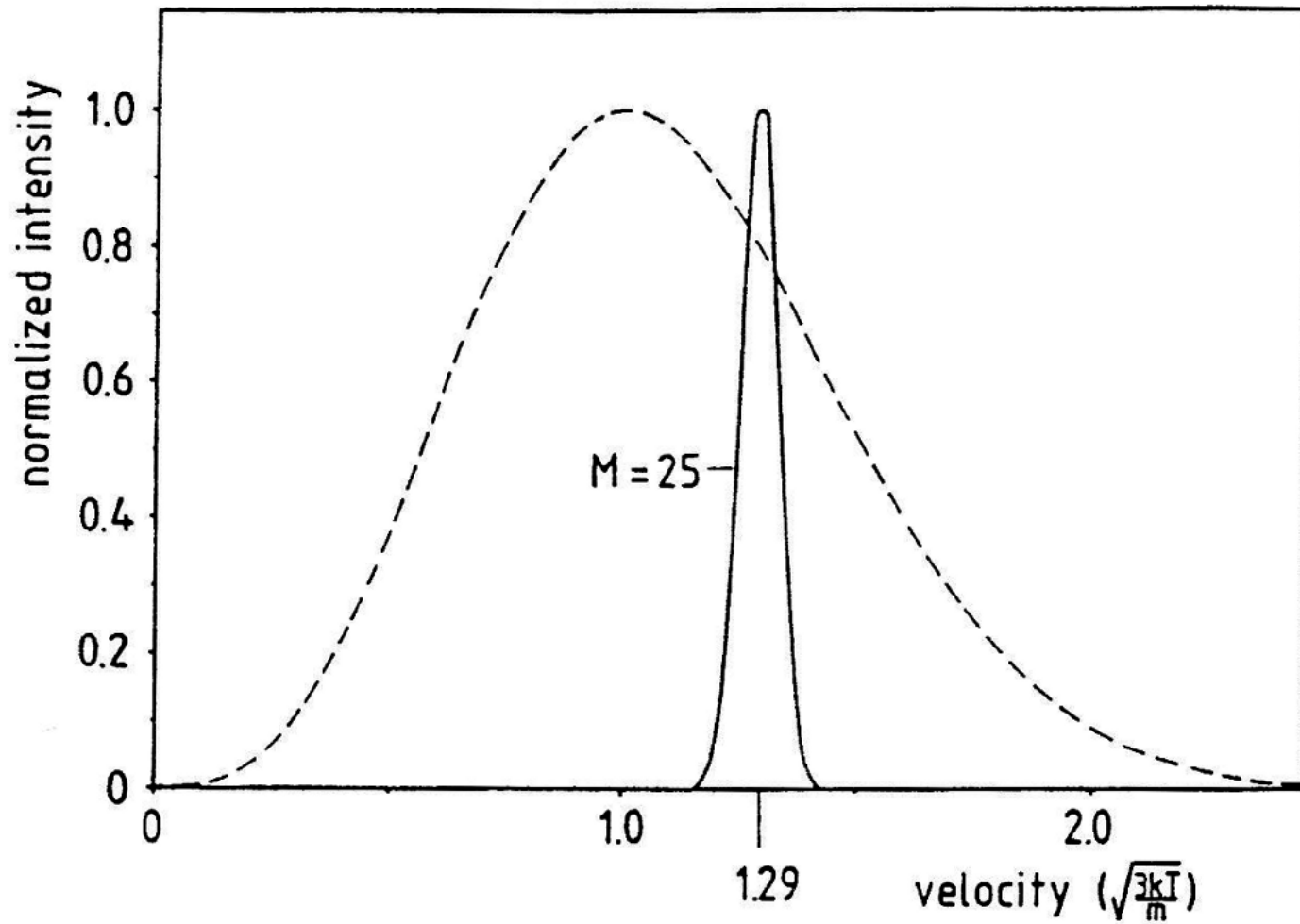
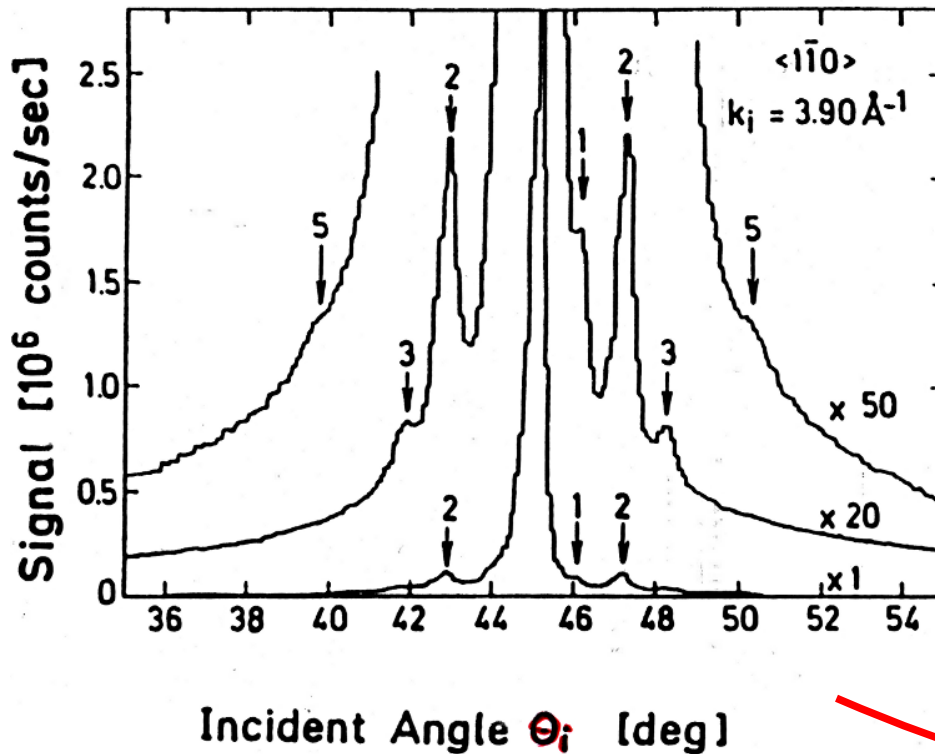
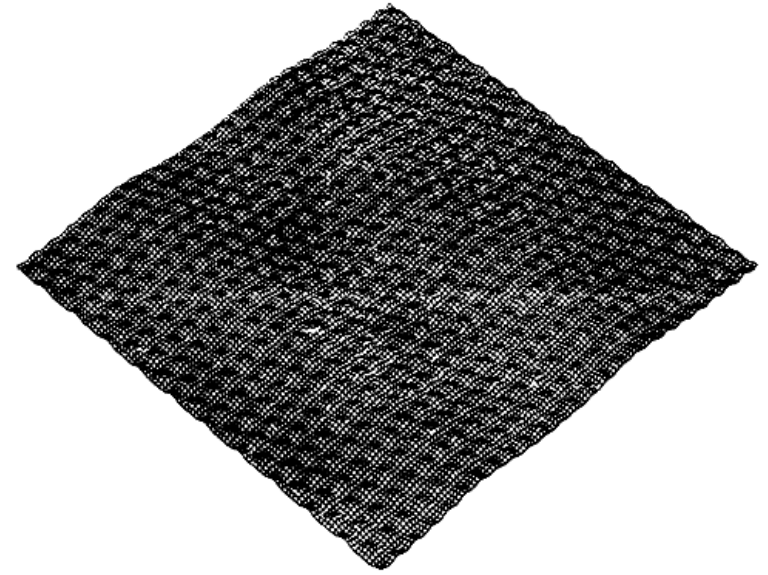
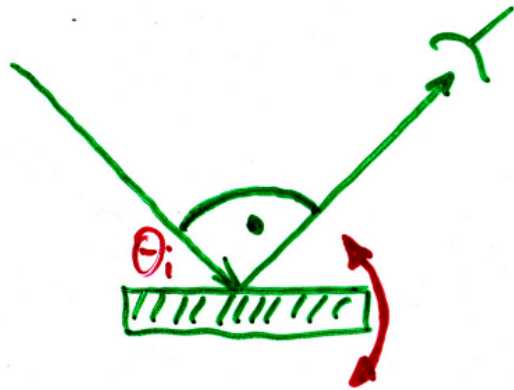
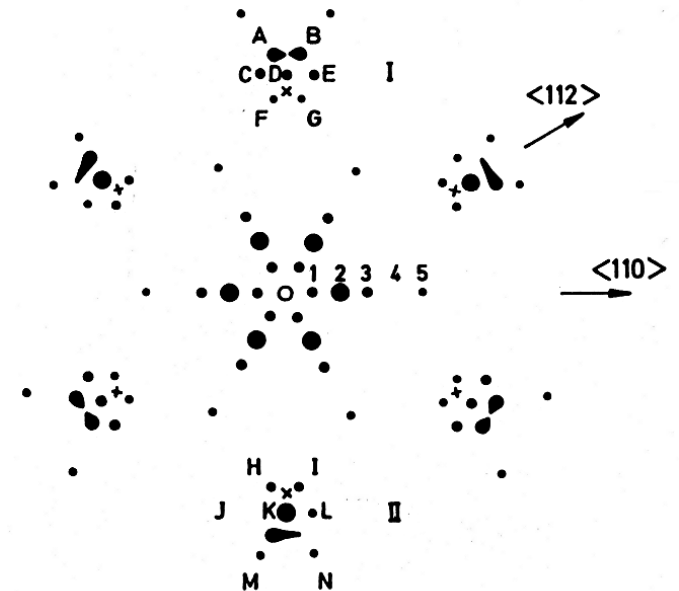
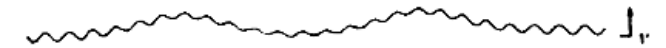


Fig. 2.1. Normalized velocity distributions of the flux of an effusive He beam (*dashed curve*) and of a He nozzle beam with Mach number $M = 25$ (*solid curve*) in units of the most probable flux velocity in an effusive beam

Heliumstreuung: Au(111) Harten et al., 1985



Streurechnung an 'harte Wand'-Modellen



Viele Winkelverteilungen

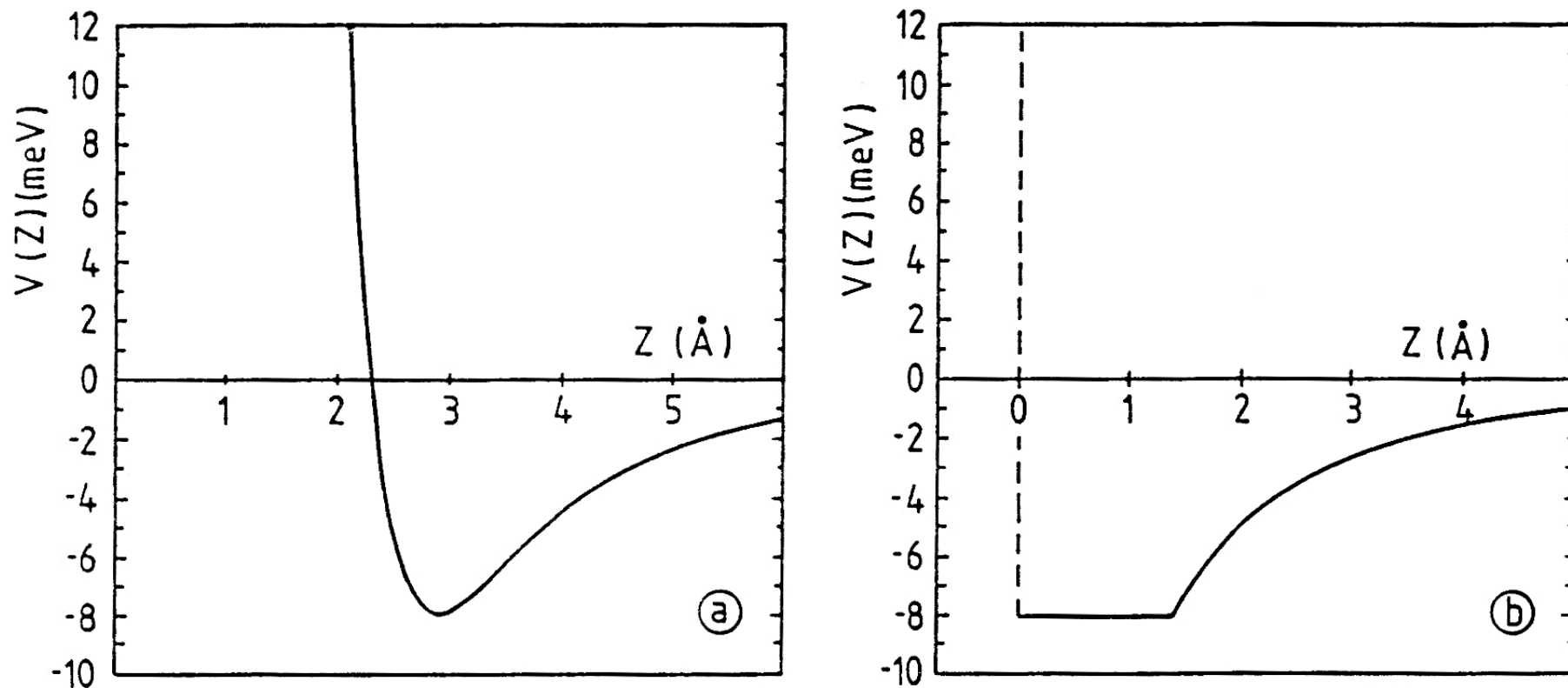
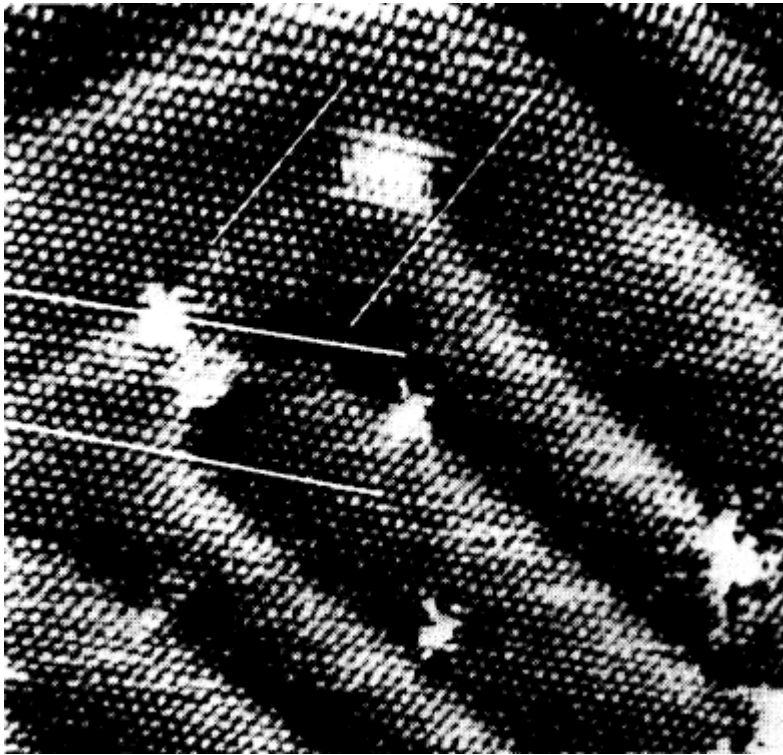
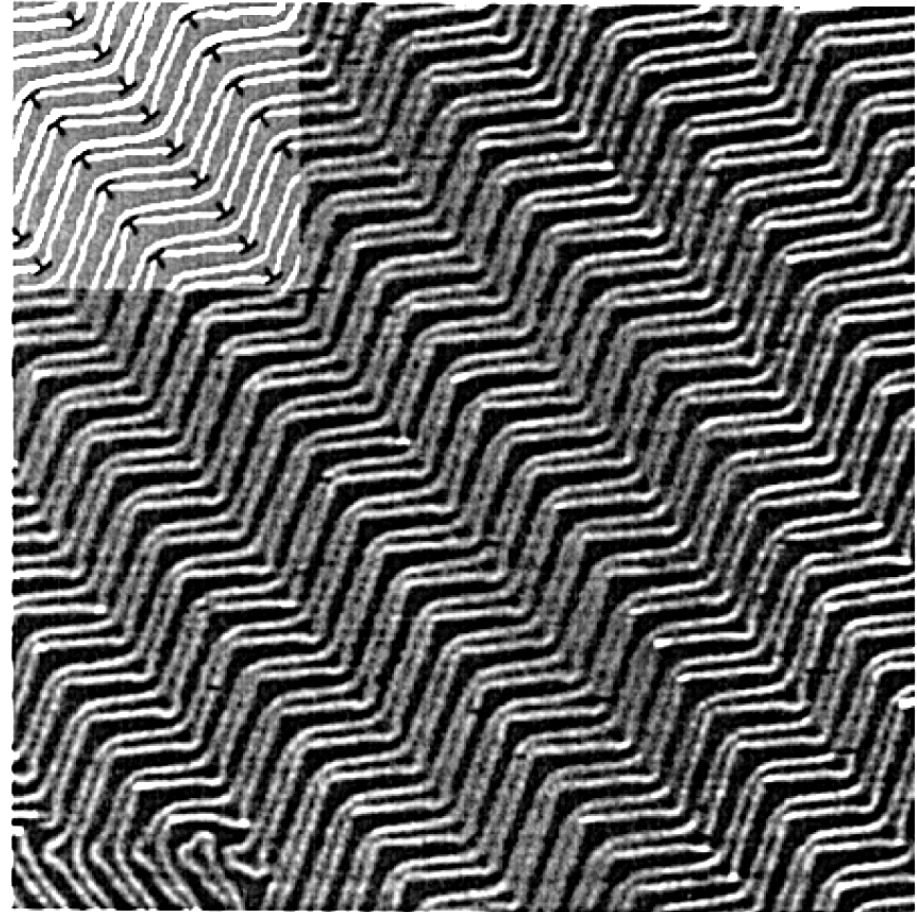


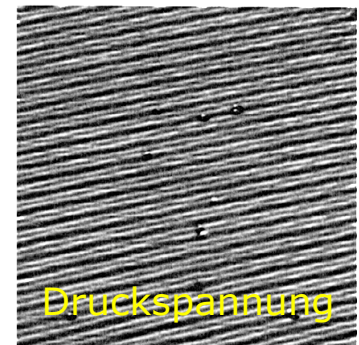
Fig.3.1a,b. Potential for helium-substrate interaction: (a) calculated for Au jellium [Zaremba and Kohn, 1976], (b) in the hard-wall approximation (see text)



Kante: 16 nm
J. V. Barth, Dissertation



Kante: 170 nm
Schaff at al., Mat. Sci. Eng. A **319-321** (2001) 914



Initial
sticking coefficient

$$\Sigma = 315 \text{ \AA}^2$$

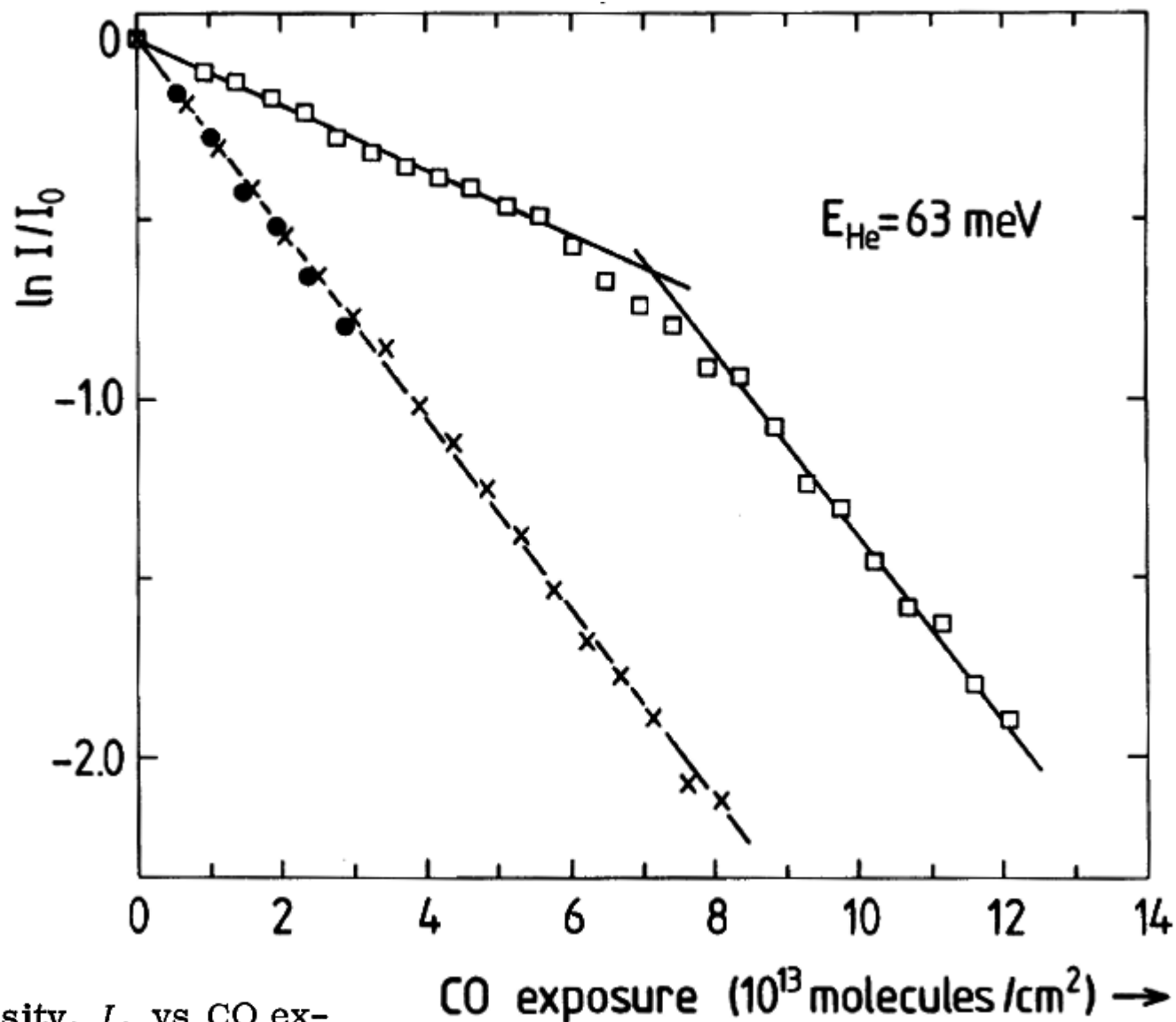


FIG. 1. He specular-beam intensity, I , vs CO exposure at constant pressure ($p_{\text{CO}} \approx 3 \times 10^{-9}$ mbar) and constant temperature. The He beam is scattered from an "ideal" Pt(111) surface at 293 K (crosses) and from a Pt(111) surface with defects at 293 K (open squares) and 107 K (filled circles). I_0 is the He intensity from the corresponding clean surface at the temperature of the respective adsorption experiment.

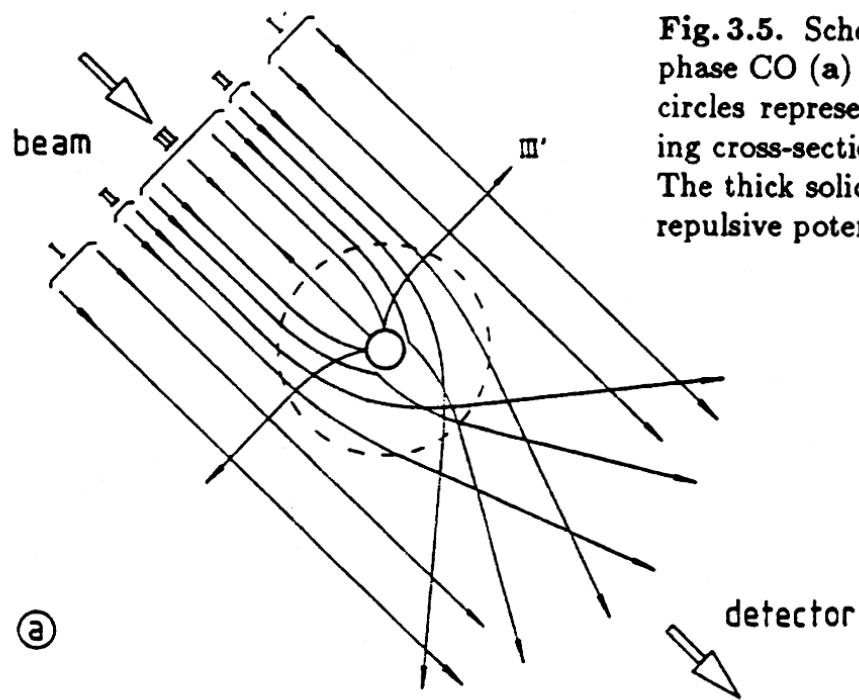


Fig. 3.5. Schematic view of He scattering on gas phase CO (a) and adsorbed CO (b). The dashed circles represent the intersection of the scattering cross-sections with the plane of the drawing. The thick solid lines represent the contour of the repulsive potential at 60 meV (see text)

