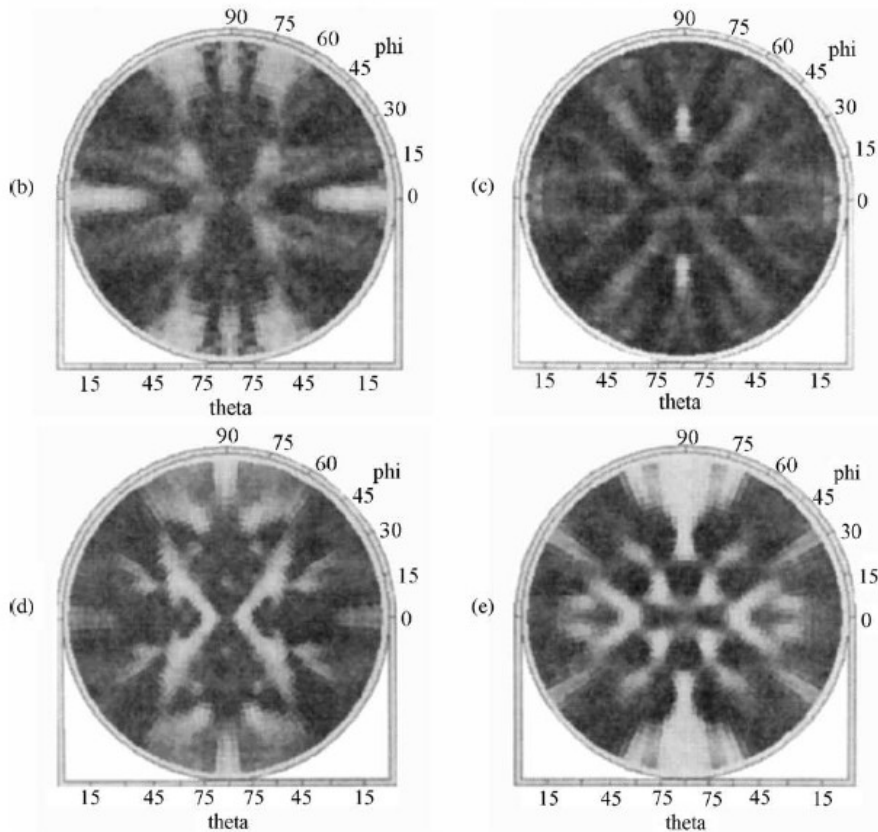
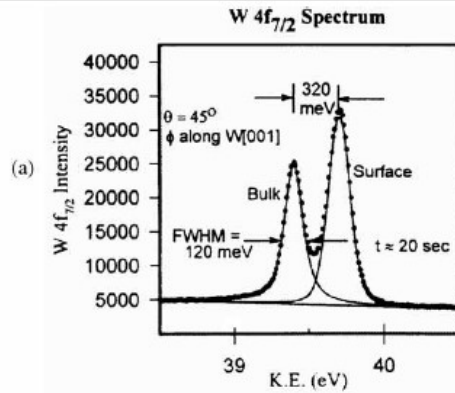


Photoelectron Diffraction

*The Study of Surface Structures by
Photoelectron Diffraction and Auger
Electron Diffraction*

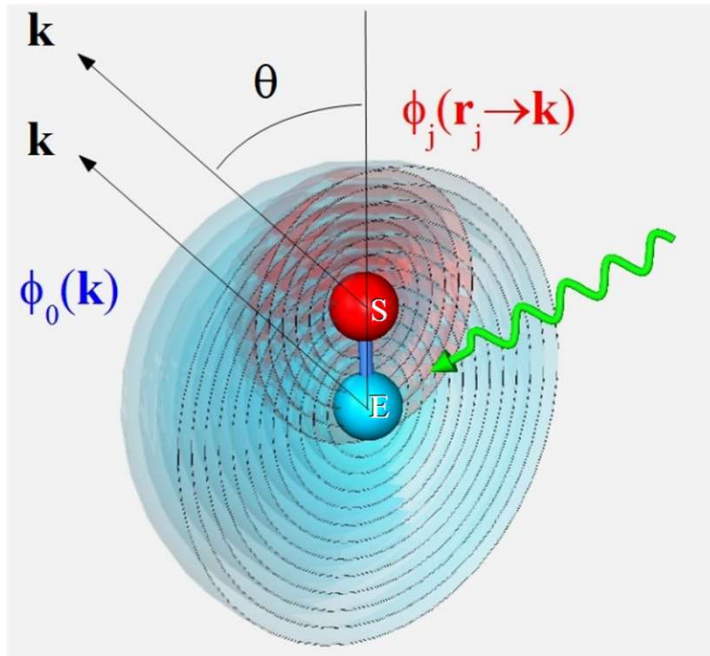
Charles S. Fadley

Synchrotron Radiation Research: Advances in Surface and Interface Science, Volume 1: Techniques,
edited by Robert Z. Bachrach. Plenum Press, New York, 1992.



In generale, sperimentalmente, si osserva una modulazione dell'intensità dei picchi di fotoemissione in funzione dell'angolo di emissione..... Essa dipende dall'intorno geometrico dell'atomo emettitore.

Photoelectron Diffraction



E: Emitting Atom
S: Scattering Atom

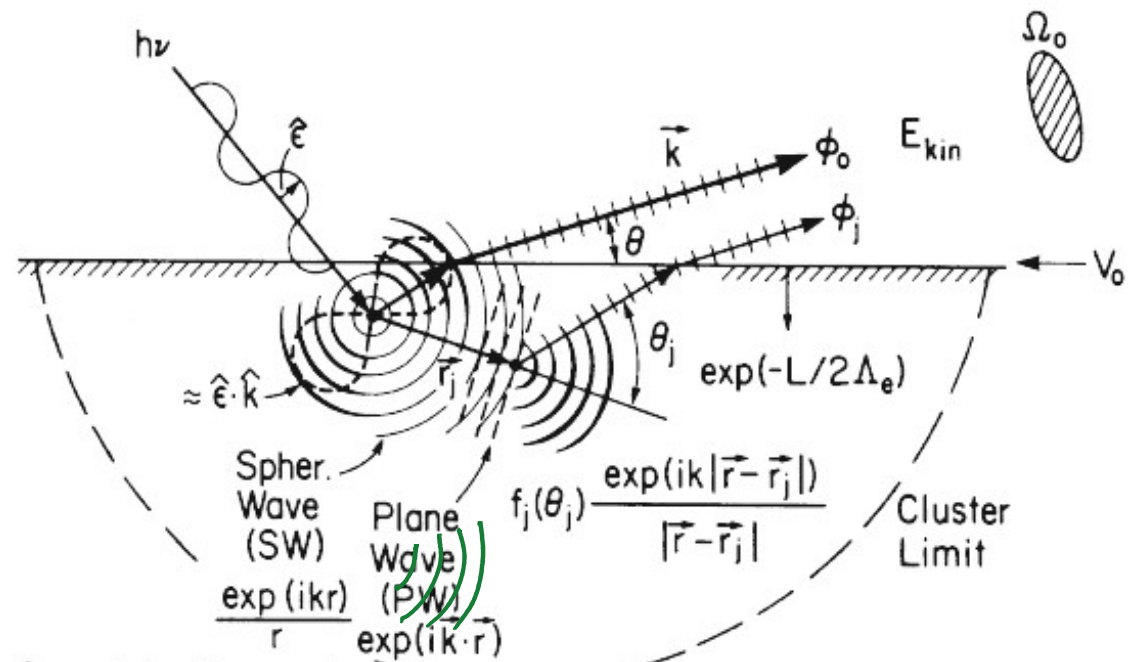
Based on Photoemission
Excitation of a **core photoelectron**

Measurement of the angular modulations

Interference of **directly emitted photoelectrons** with **the scattered ones**

each atom around the emitter is scattering point

- Atomic, chemical-state or site specificity
- Short range order probing around the selected emitter
- Comparison to numerical simulations



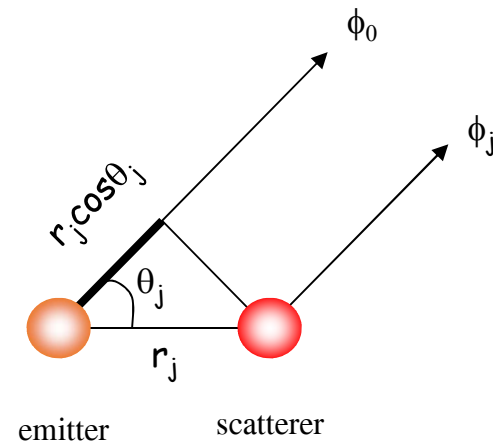
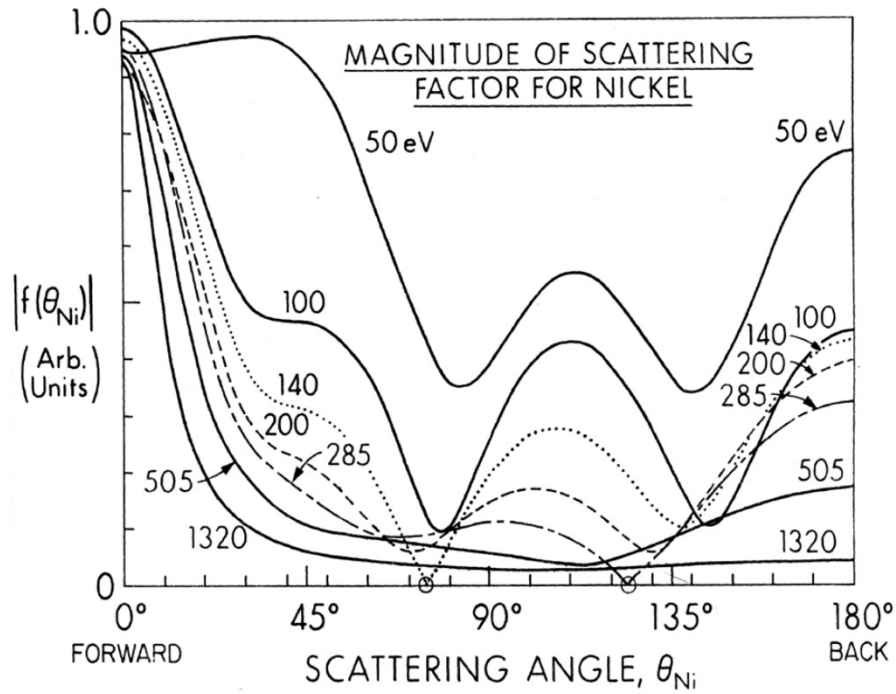
- $\hat{\epsilon}$ = polarization vector
- \vec{k} = observed e⁻ wave vector
- $\hat{\epsilon} \cdot \hat{k}$ = matrix element (s emission)
- θ = observation angle
- \vec{r}_j = position of jth scatterer
- θ_j = scattering angle
- $f_j(\theta_j) = |f_j(\theta_j)| \exp \psi_j(\theta_j)$
= scattering factor
- Λ_e = inelastic attenuation length
- L = total path length below surface
- V_0 = inner potential
- $\overline{U_j^2}$ = mean squared atomic displacement
- W_j = Debye-Waller factor
= $\exp[-\Delta k^2 \overline{U_j^2}]$
- Ω_0 = analyzer solid angle

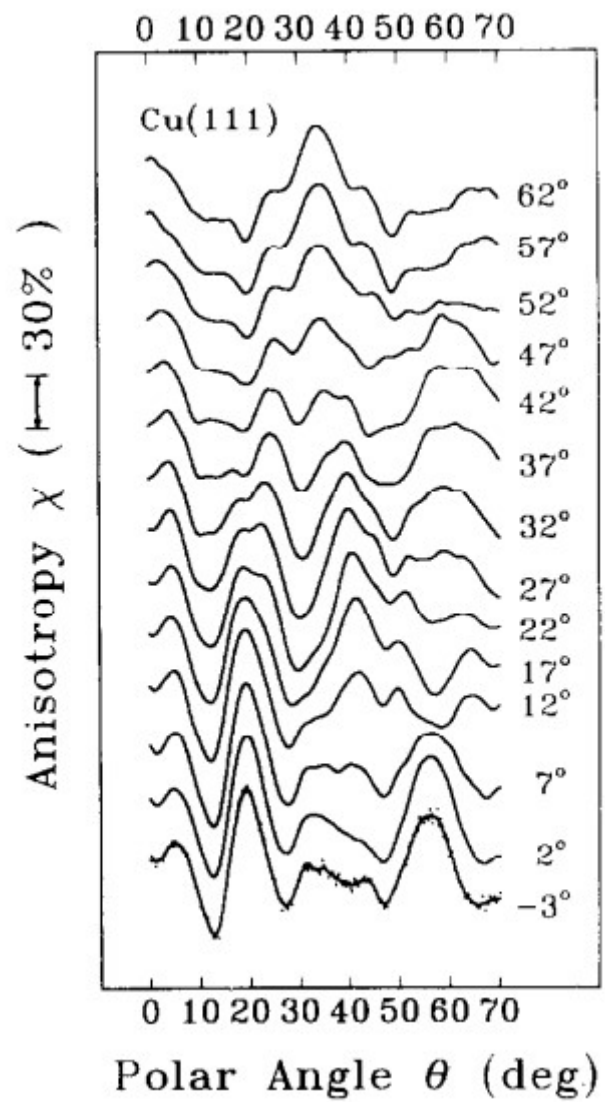
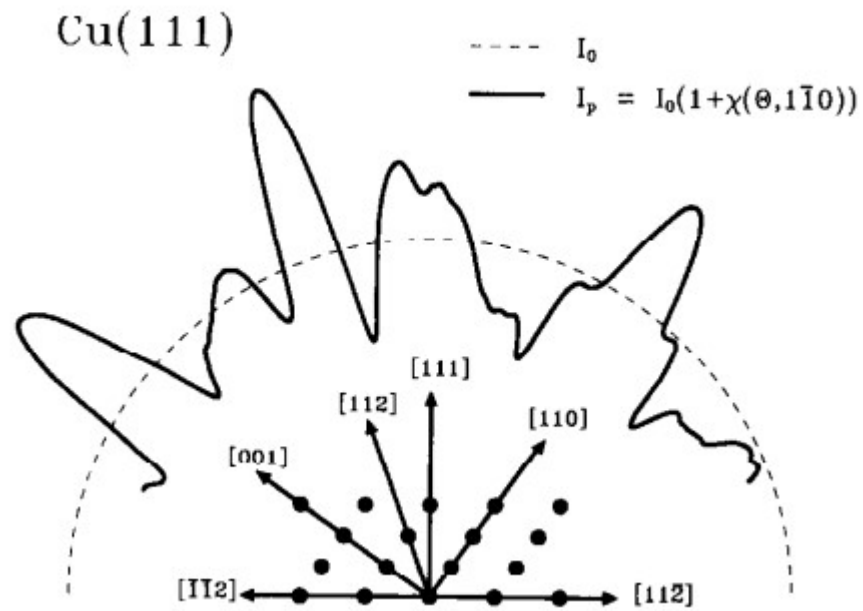


Muffin tin approximation

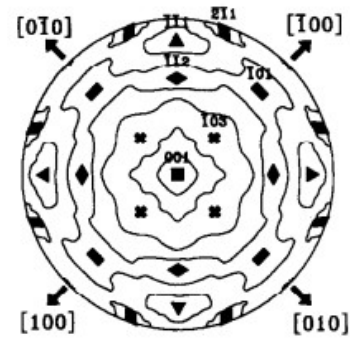
Forward focusing

Enhancement of the intensity along the bond directions

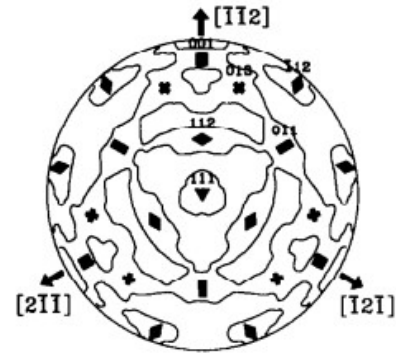




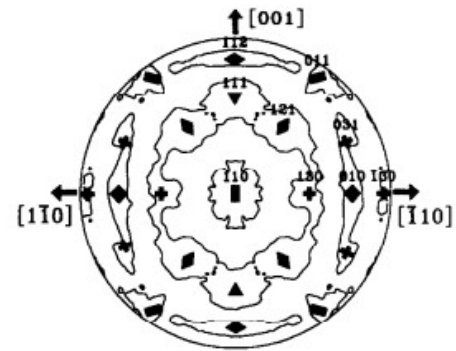
Cu (001)



Cu(111)

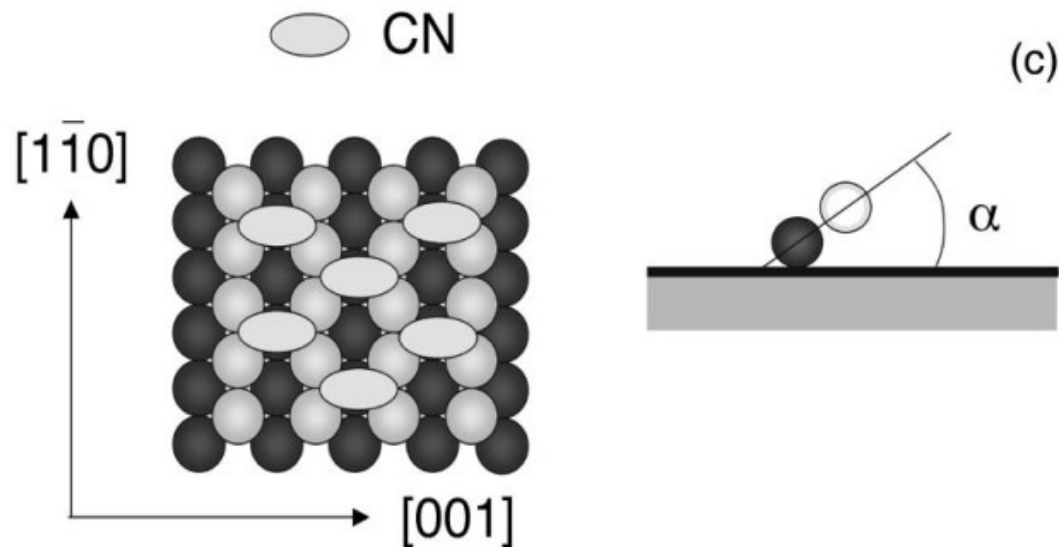
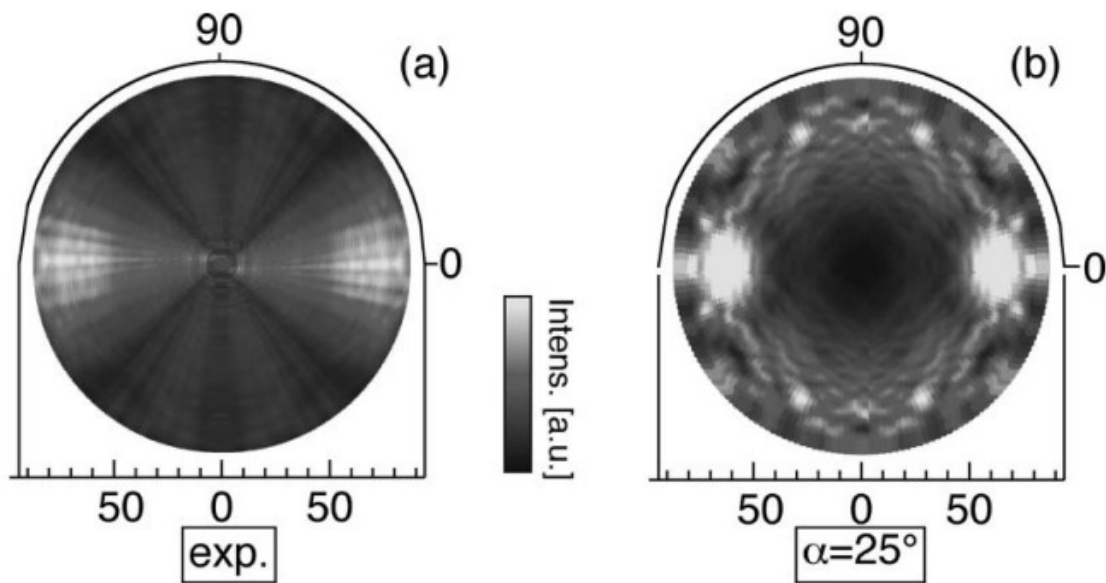


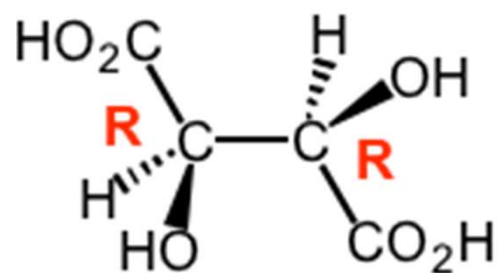
Cu(110)



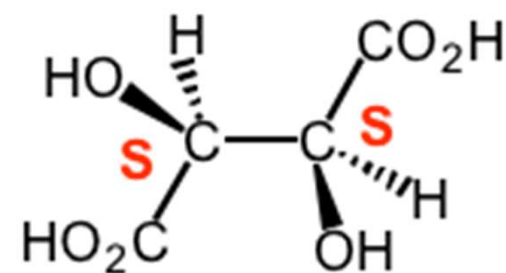
■: <100> ■: <110> ▲: <111> ◆: <211> ✦: <310>

Molecular orientation of CN adsorbed on Pd(110)





(+)-tartaric acid



(-)-tartaric acid

