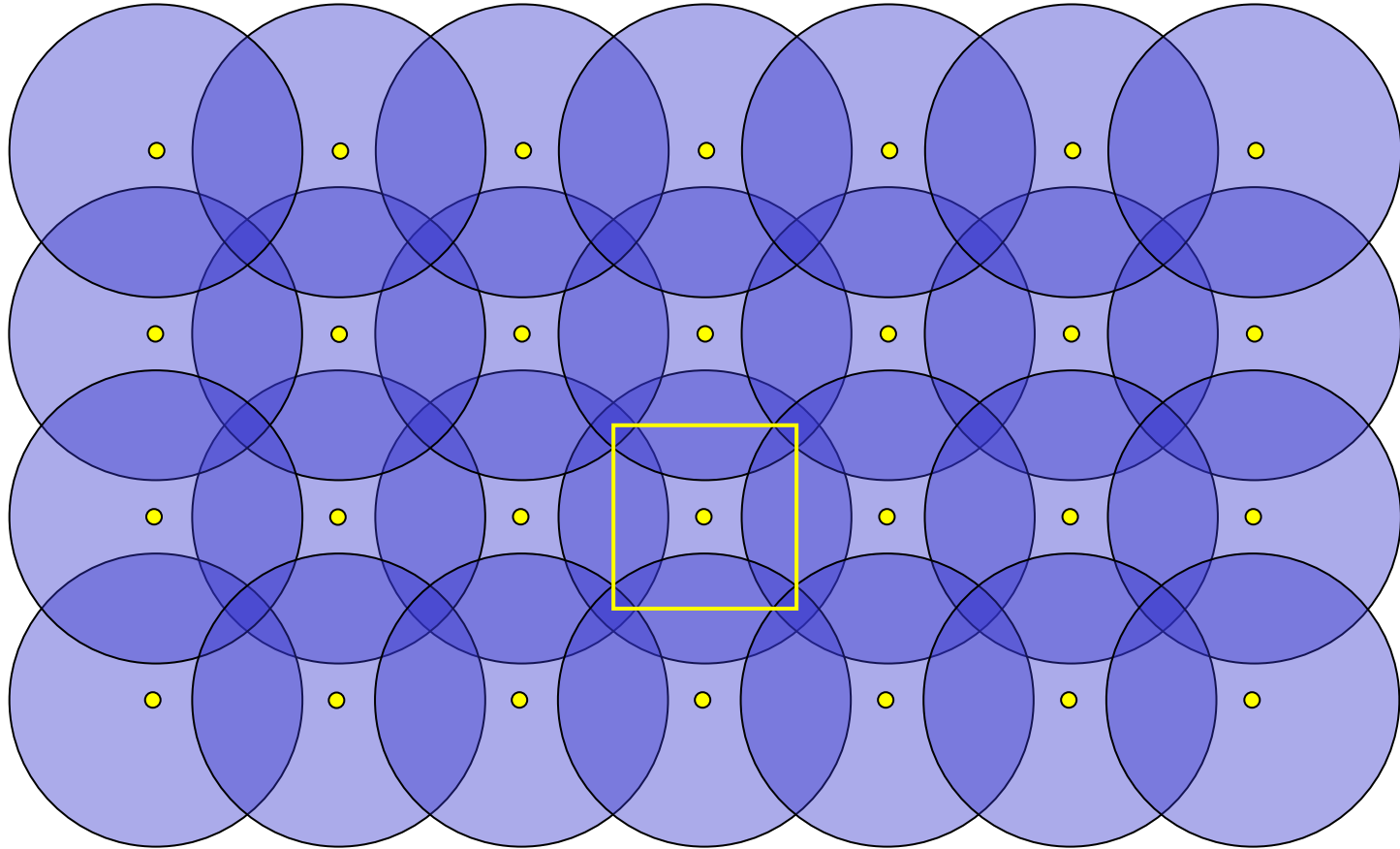


COURS VI

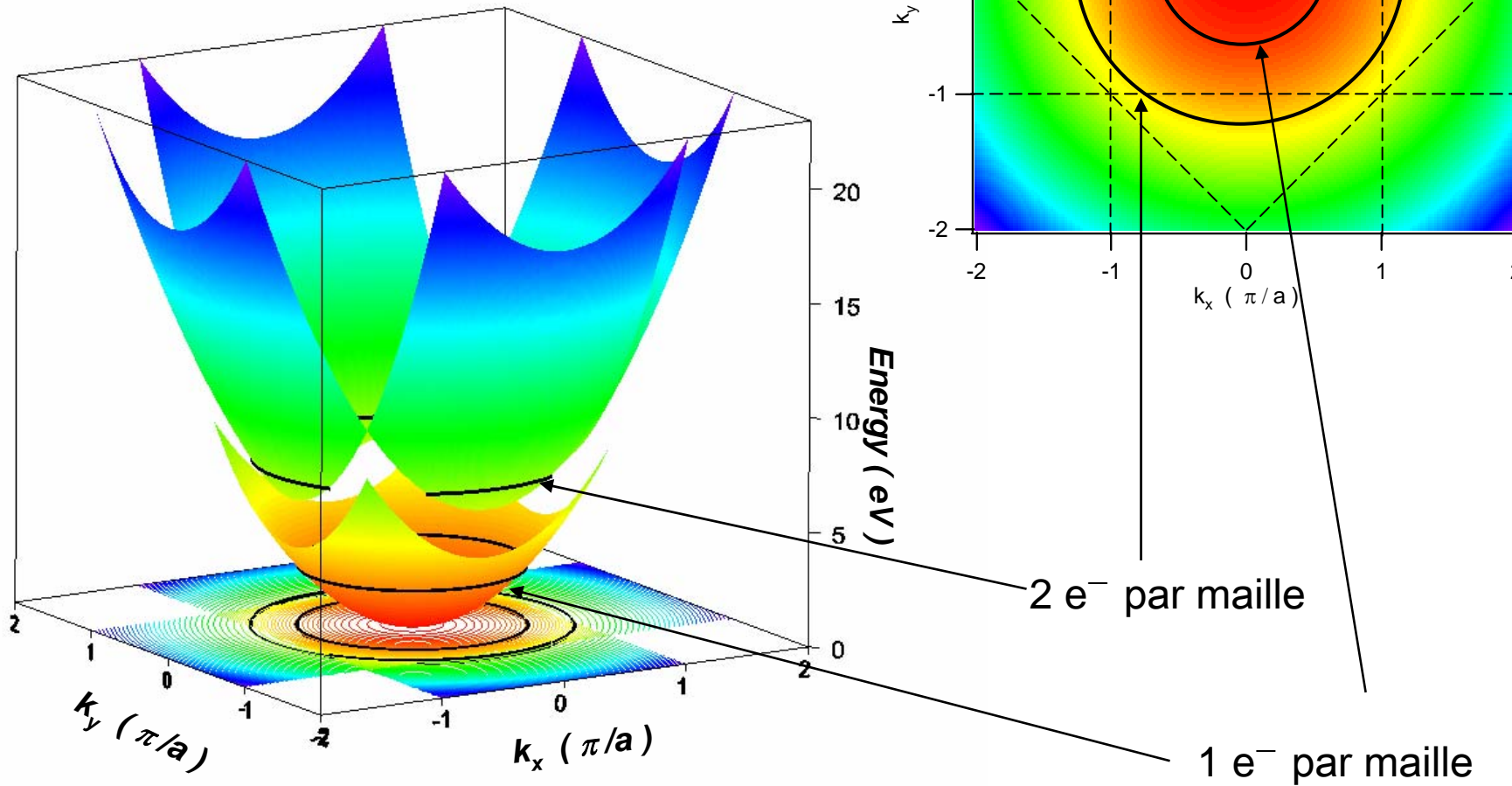
1. Surface de Fermi
2. Techniques spectroscopiques pour l'étude de la structure de bandes
3. Effet de la température sur l'occupation des états: distribution de Fermi

Approximation de l'électron libre: surfaces de Fermi pour un réseau carré



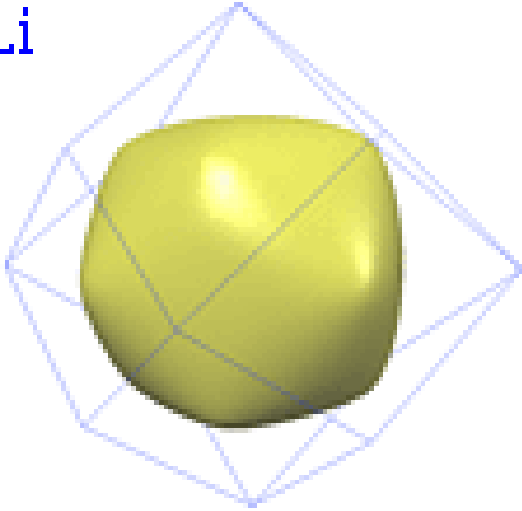
Réseau carré 2D

$a = 3 \text{ \AA}$

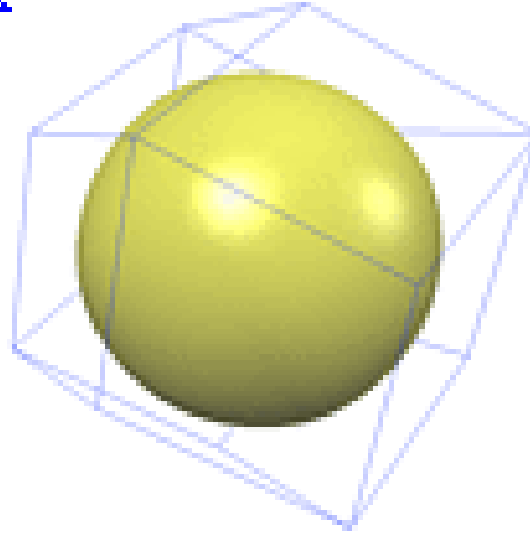


LA ZOOLOGIE DES SURFACES DE FERMII

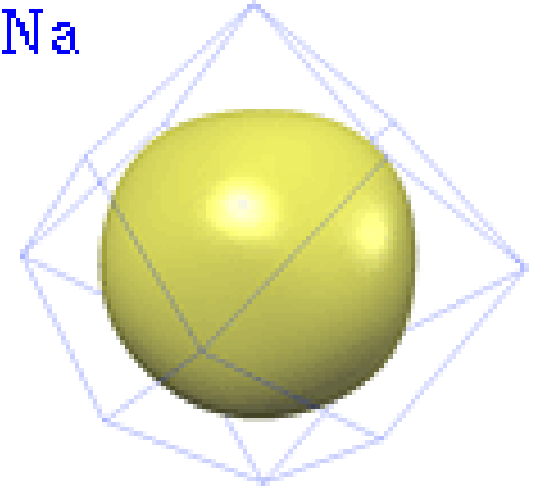
Li



K

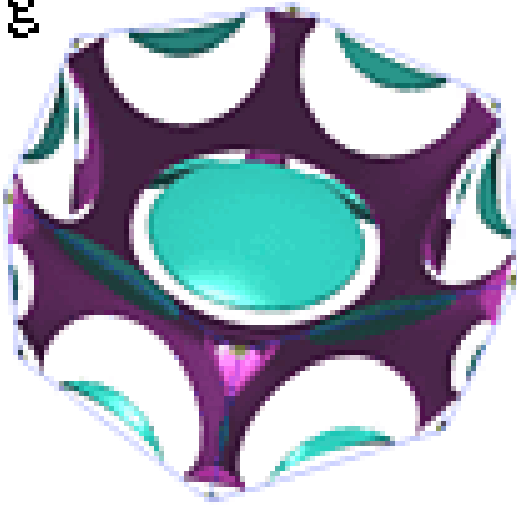


Na

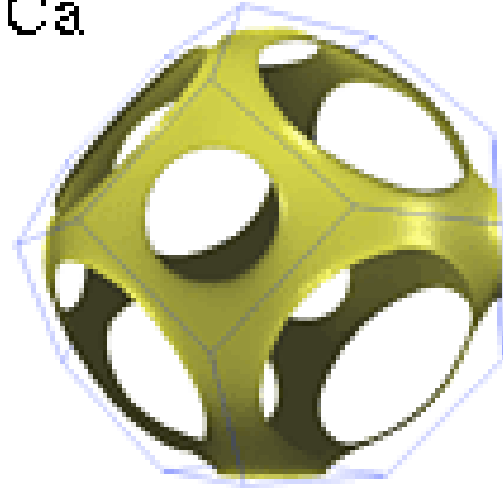


<http://www.phys.ufl.edu/fermisurface/>

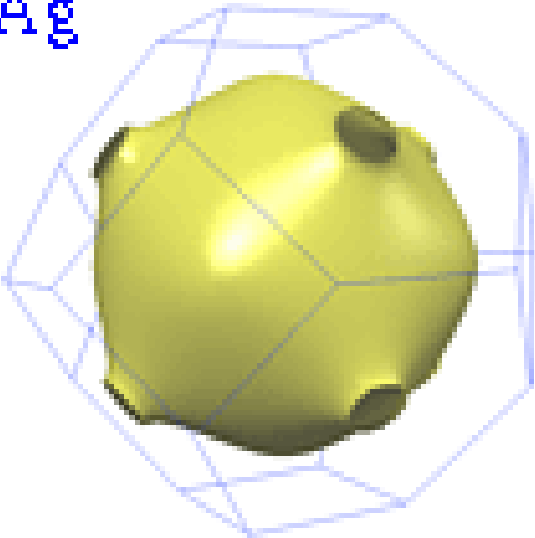
Mg



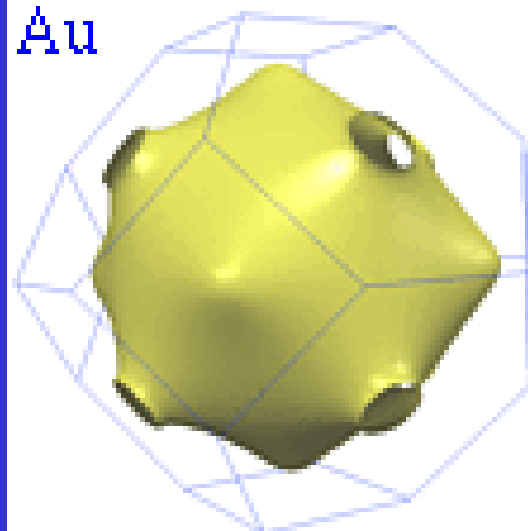
Ca



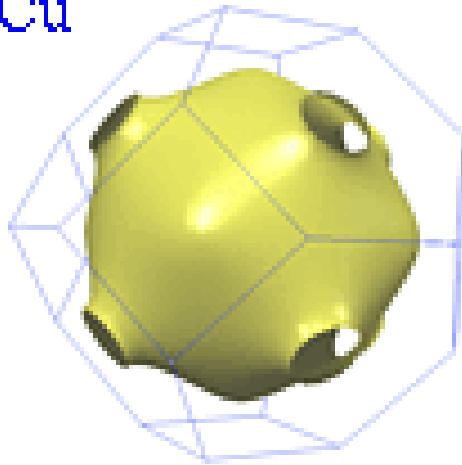
Ag



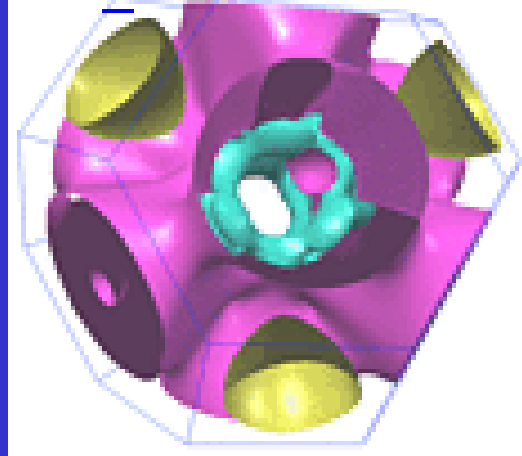
Au



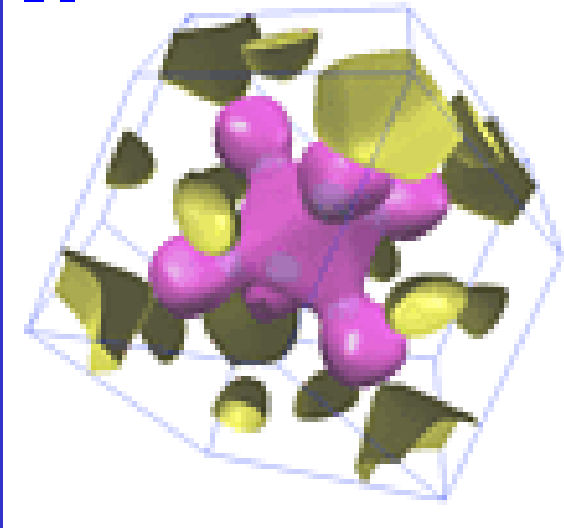
Cu



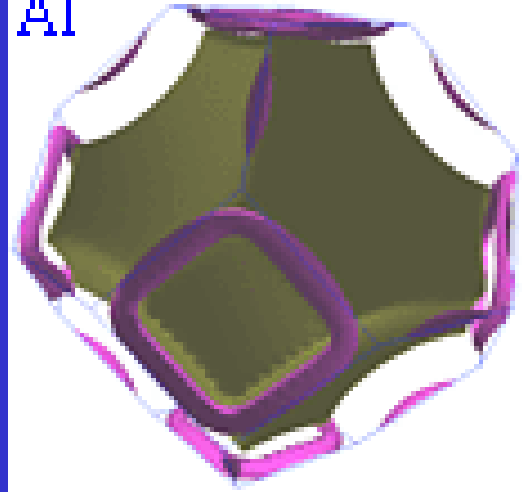
Mn_fcc



Cr



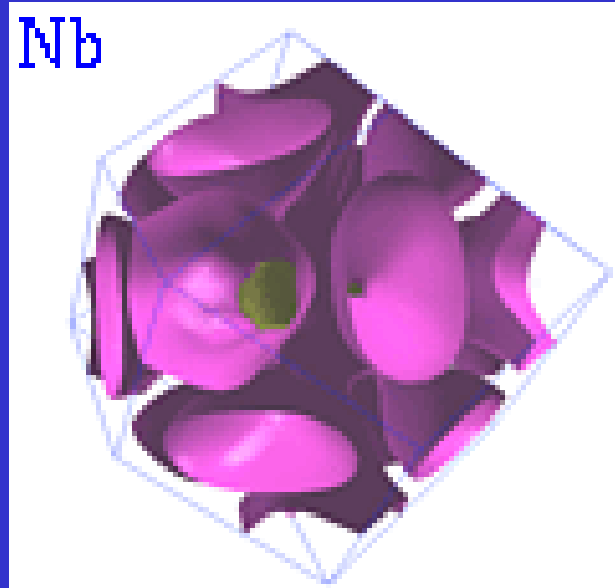
Al



V



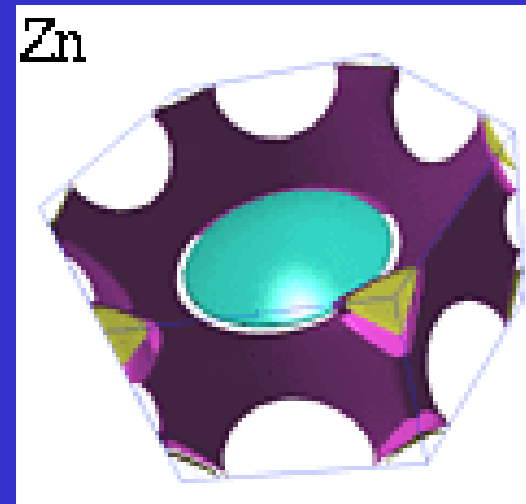
Nb



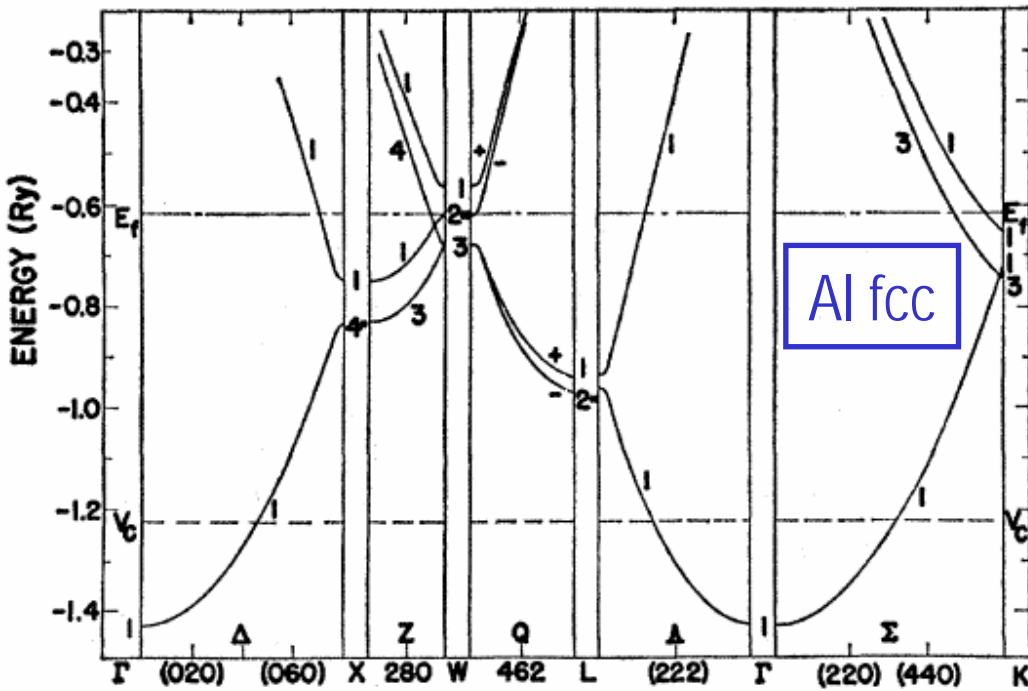
Zn_fcc



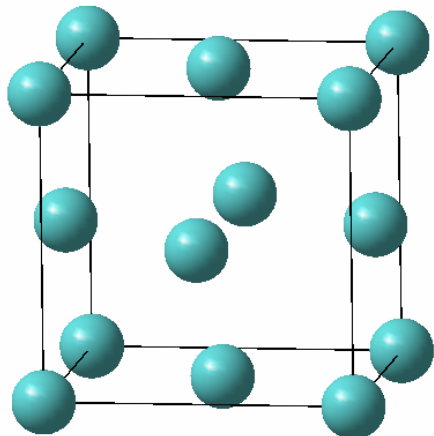
Zn



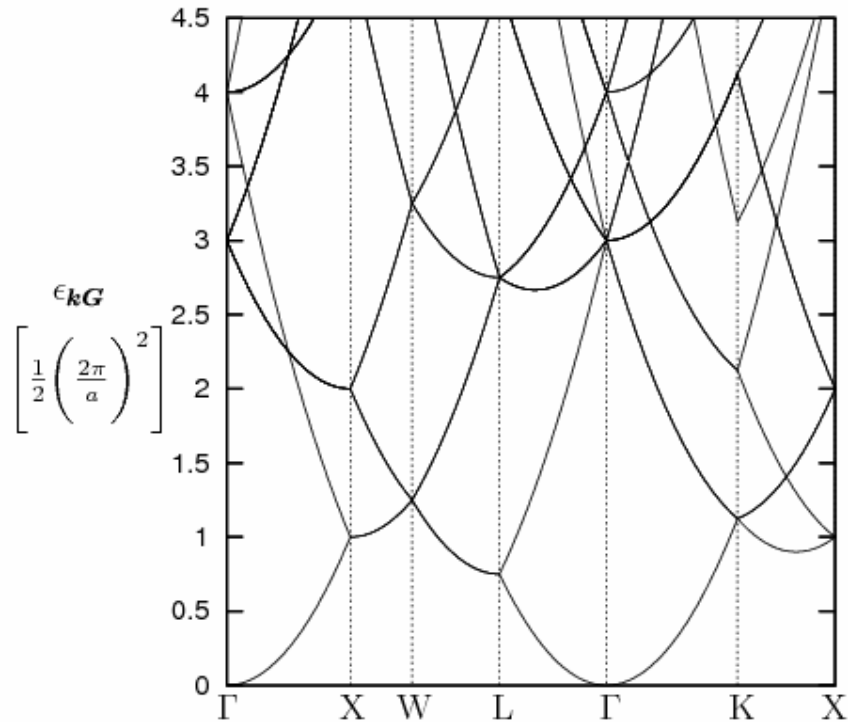
Une "vraie" structure de bande: Al fcc



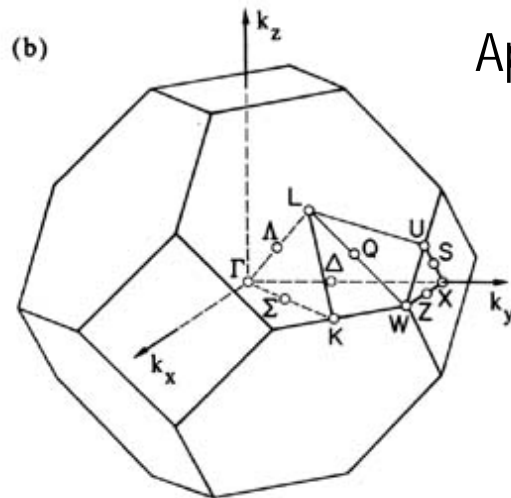
Snow (1967)



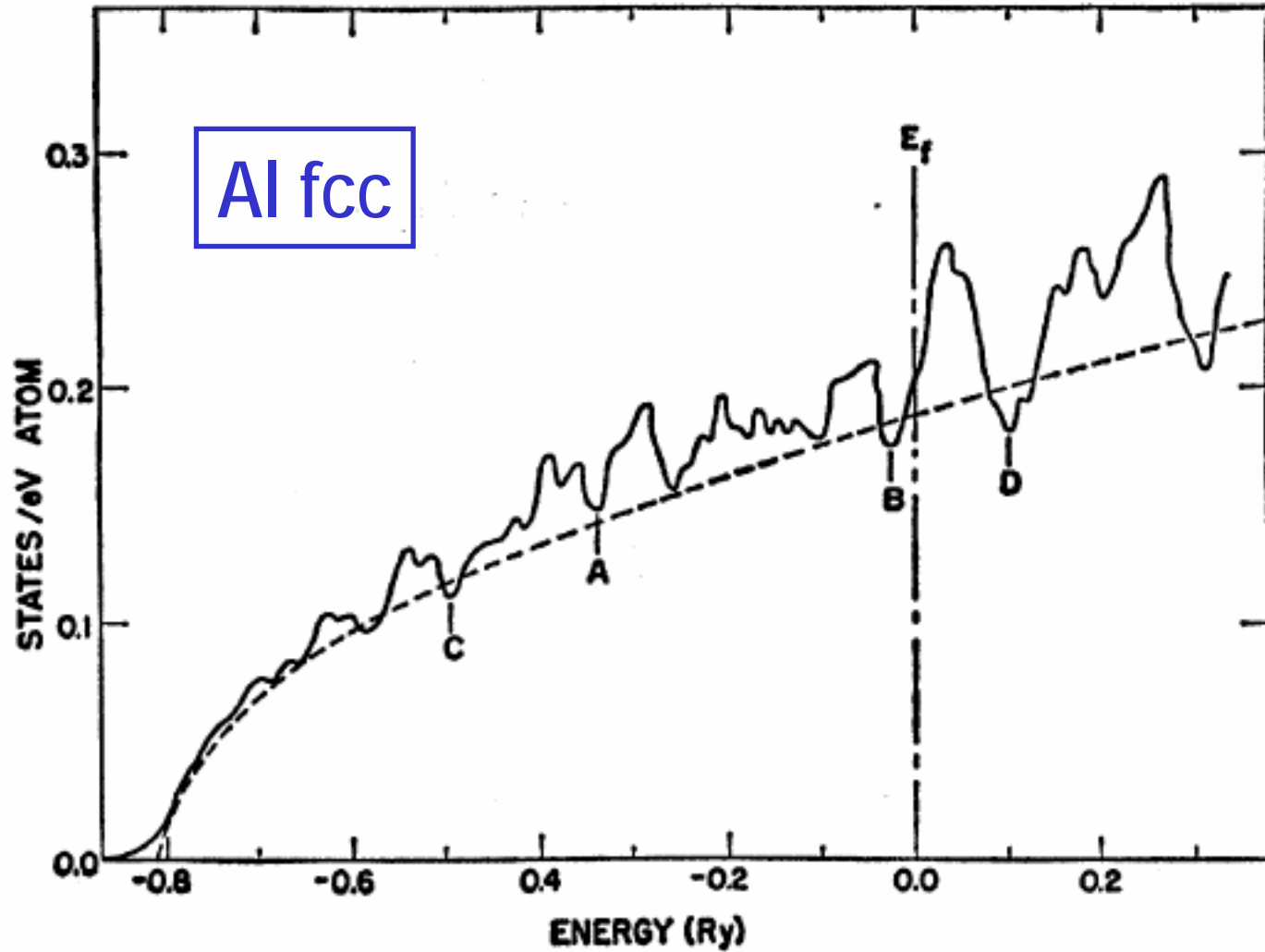
MP024-Gauzzi



Approx. de l'électron libre

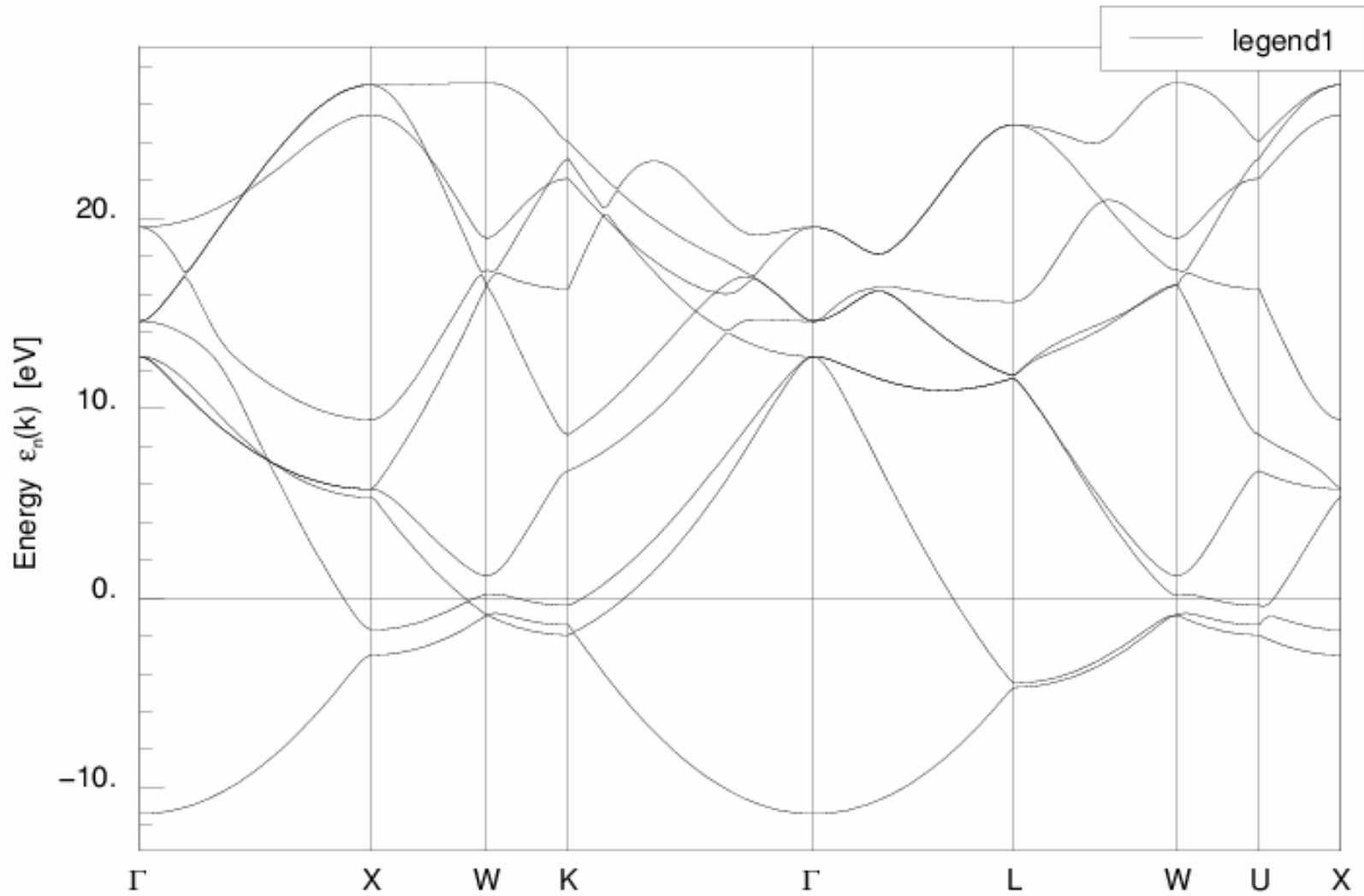


Densité d'états en 3D: Al fcc

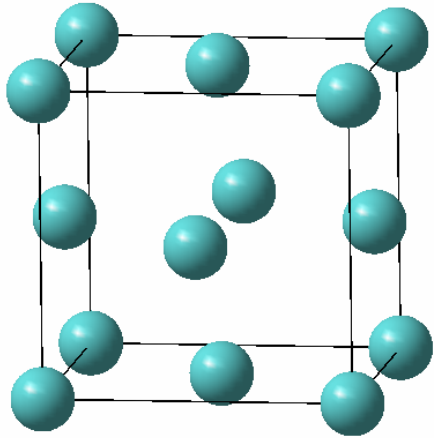


Snow (1967)

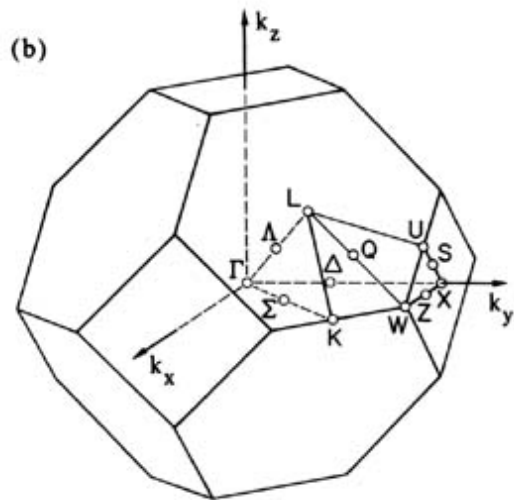
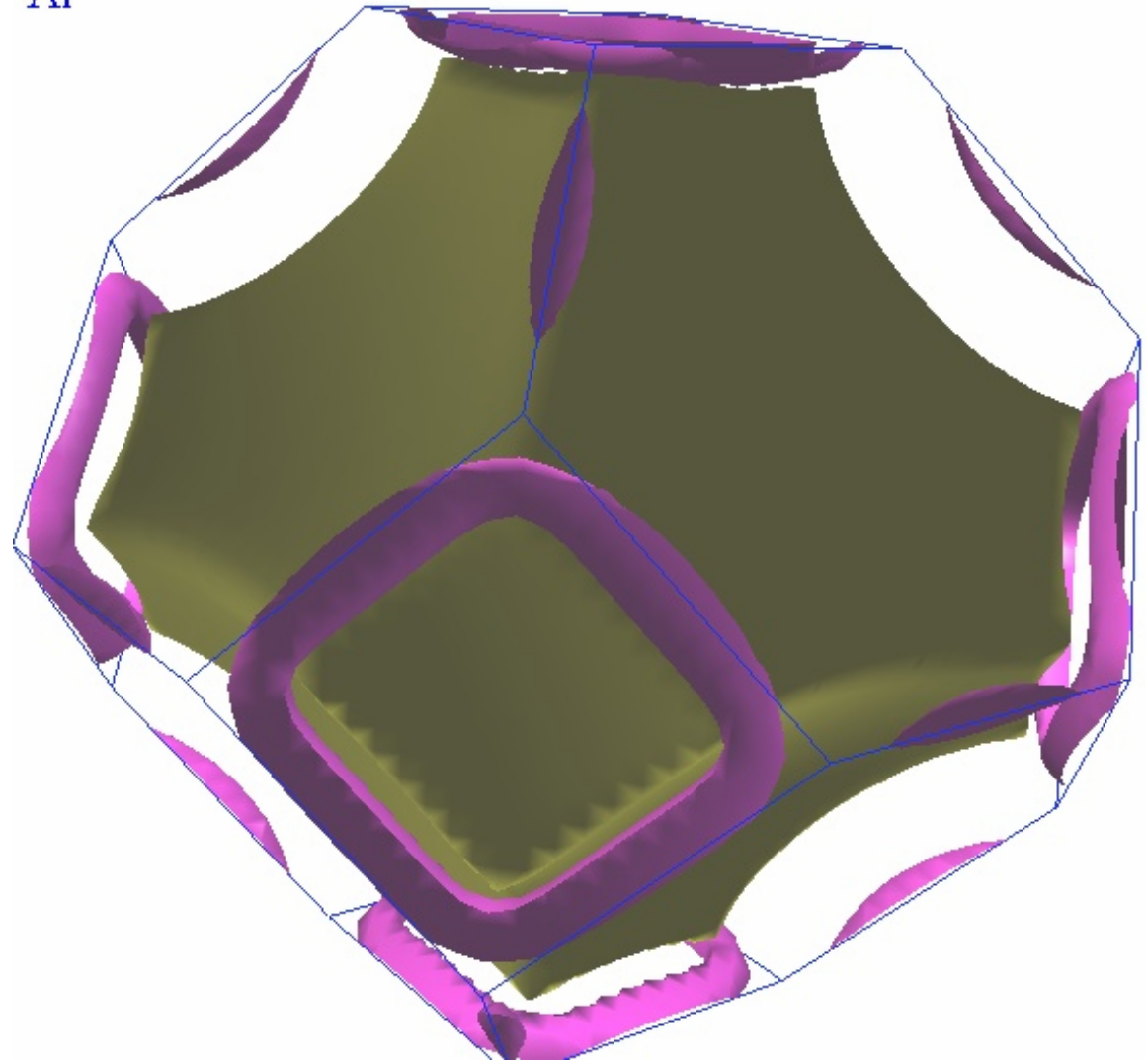
AL FCC: CALCUL DE BANDE "MAISON" (30 min!)



La surface de Fermi de Al fcc



Al



X-RAY PHOTOELECTRON SPECTROSCOPY

Photo-Emitted Electrons (< 1.5 kV)
escape only from the very top surface
($70 - 110 \text{ \AA}$) of the sample

Electron Energy Analyzer ($0-1.5$ kV)
(measures kinetic energy of electrons)

Electron Detector
(counts the electrons)

Focused Beam of X-rays (1.5 kV)

Electron Collection Lens

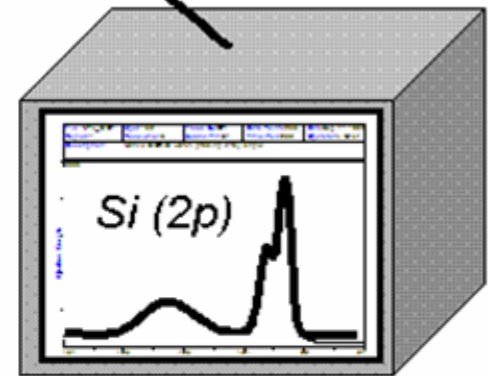
Electron Take-Off-Angle

$\text{SiO}_2 / \text{Si}^\circ$
Sample



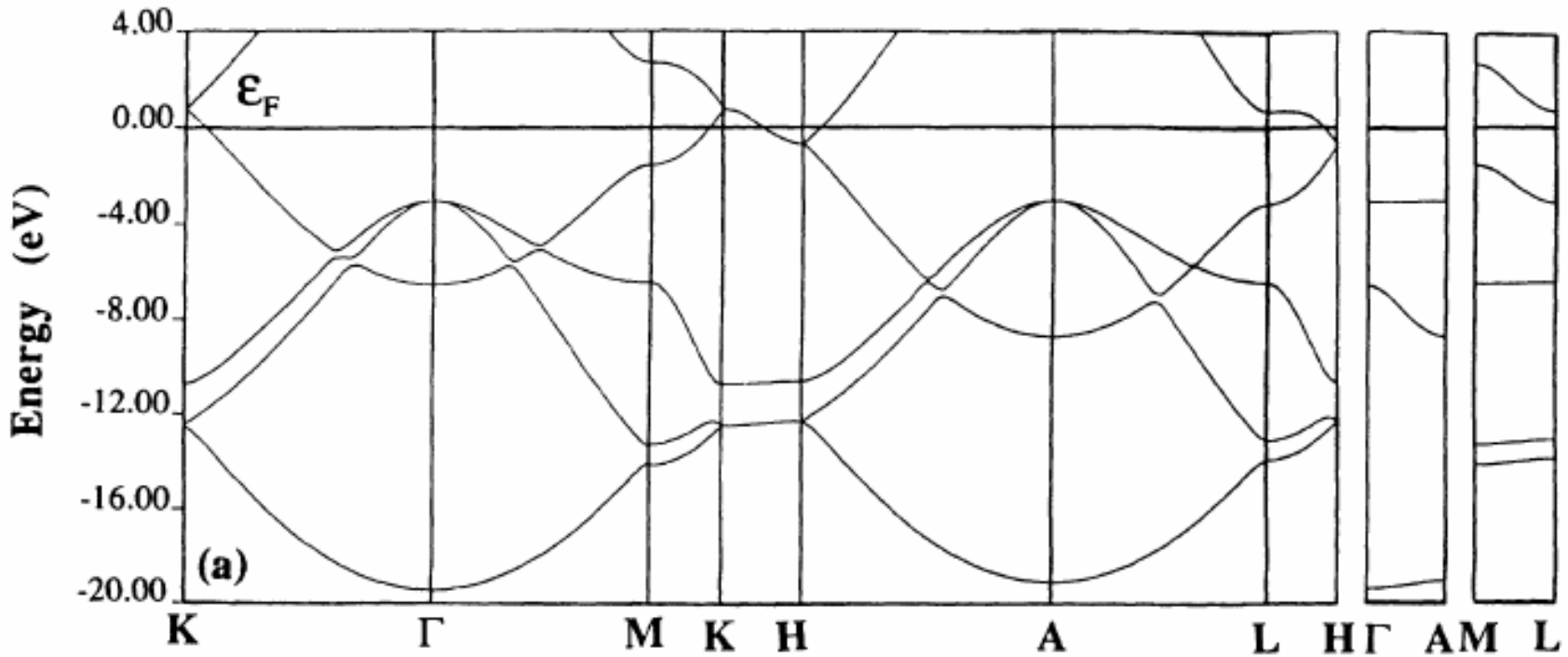
K. Siegbahn
(Nobel prize, 1981)

Samples are usually solid because XPS
requires ultra-high vacuum ($< 10^{-8}$ torr)

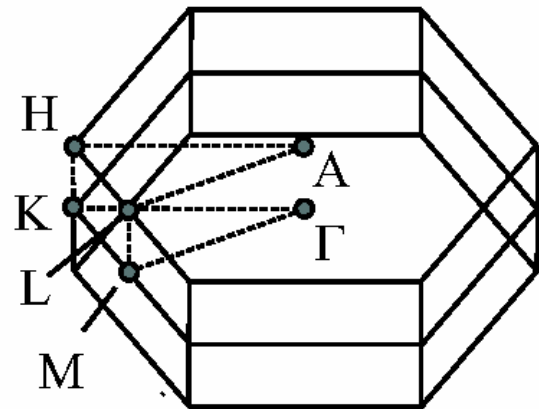


Si (2p) XPS signals
from a Silicon Wafer

Approx. des liaisons fortes: la structure de bande du graphite



Charlier, Michenaud and Gonze (1992)



1^{er} zone de Brillouin

PHOTOELECTRON SPECTROSCOPY ON GRAPHITE

