Bandstruktur und Fermi Flächen

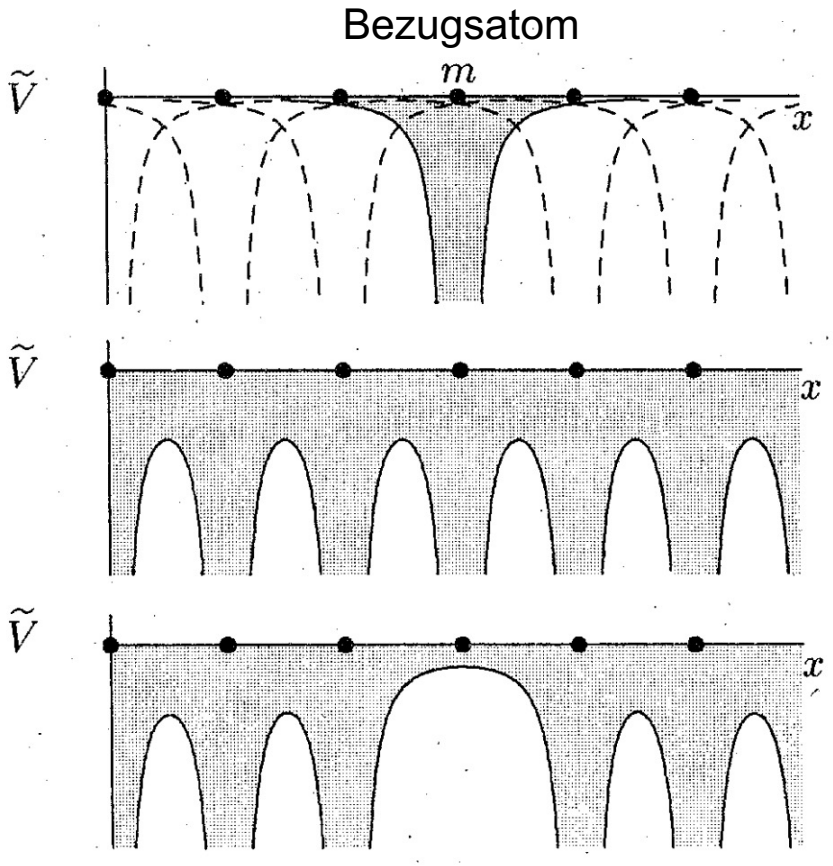
1. Die Näherung stark gebundener Elektronen
2. Bandstruktur
3. Metalle, Halbleiter, Isolatoren
4. Fermi Flächen 2D
5. Fermi Flächen 3D

Die Näherung stark gebundener Elektronen

Potential der Einzelatome

Überlagerung der Einzelpotentiale

resultierendes Störpotential



Räumliche Variation des Realteils der Wellenfunktion in der „tight-binding“ Näherung

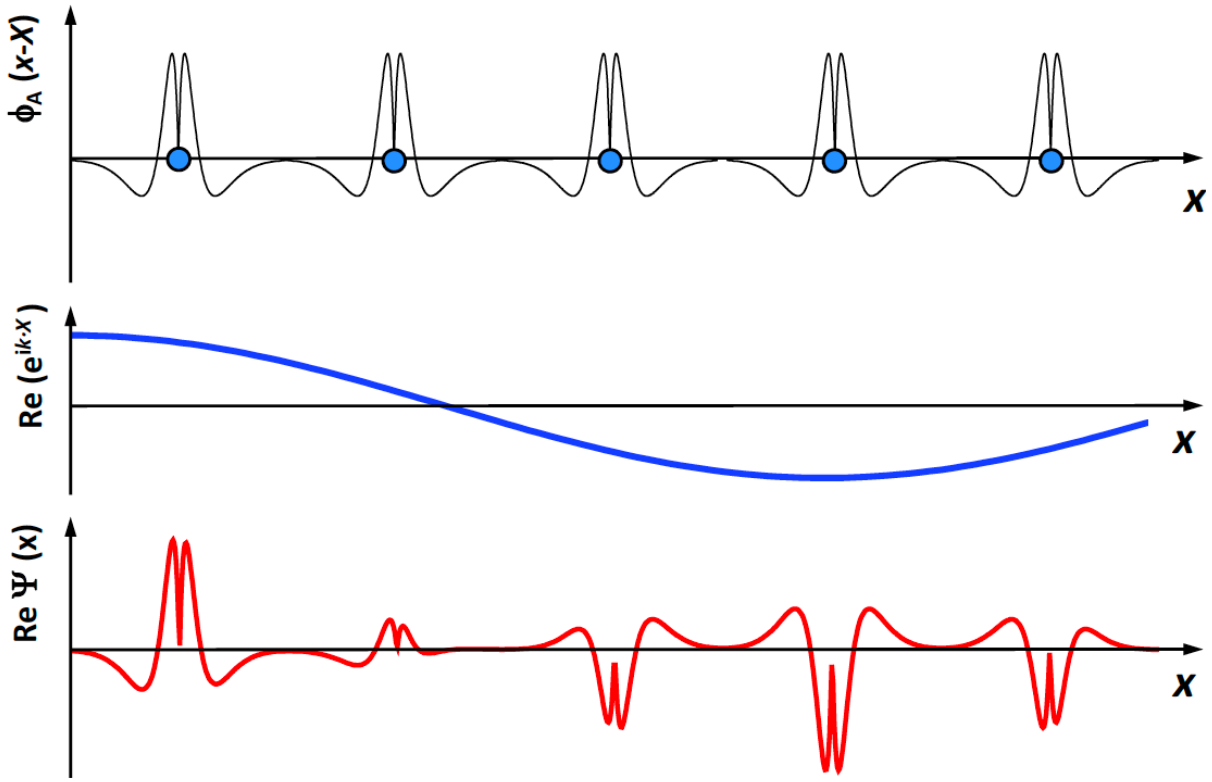
Hunklinger

Die Näherung stark gebundener Elektronen

atomare Wellenfunktionen

ebene Welle

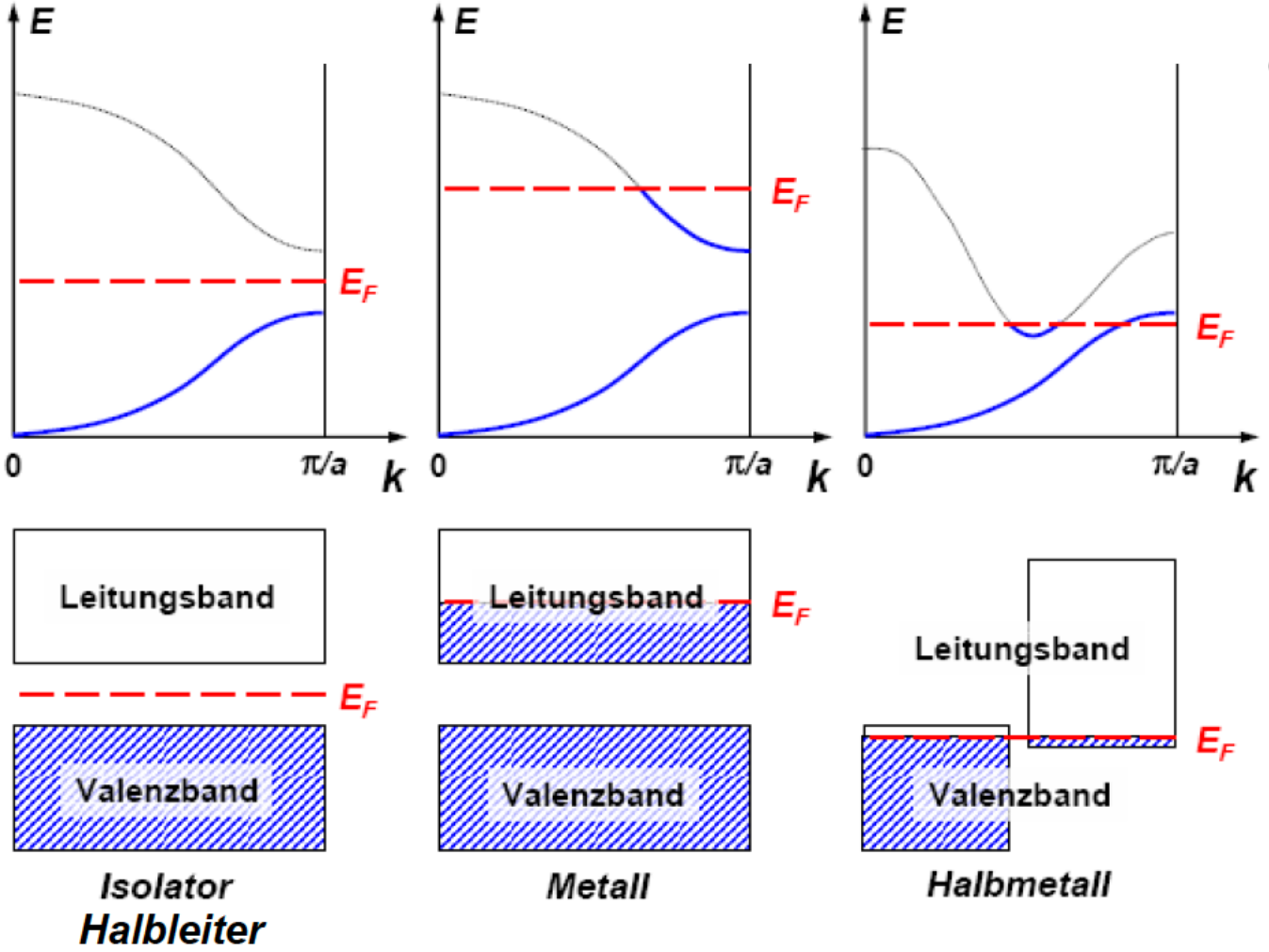
Wellenfunktion



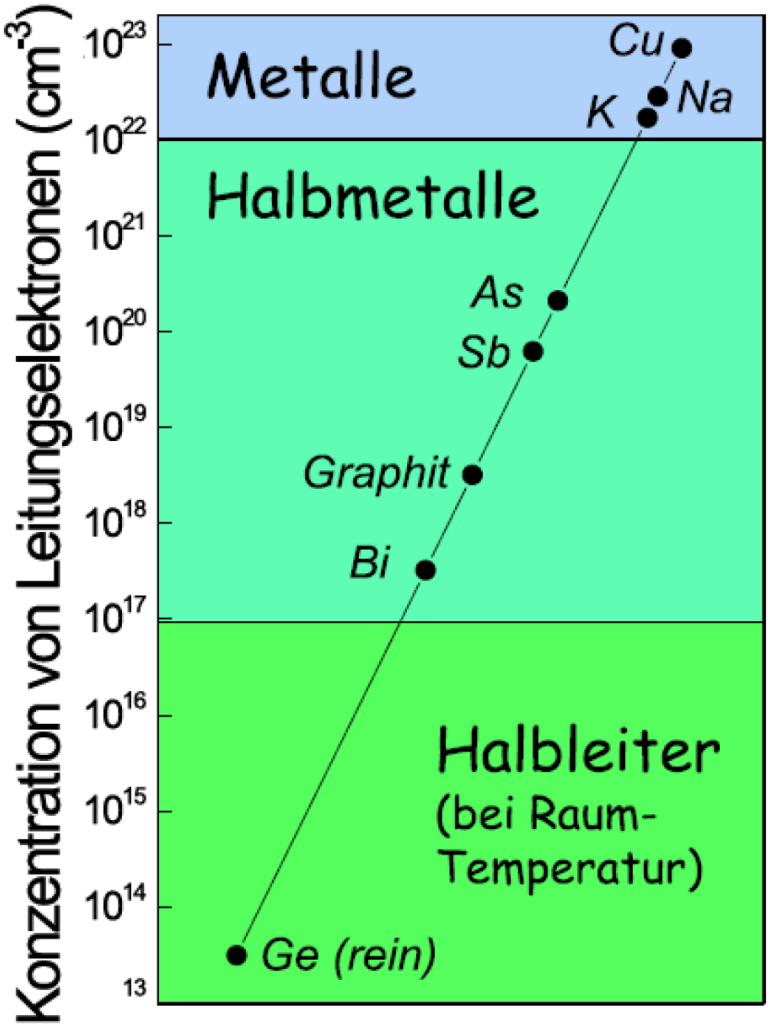
Räumliche Variation des Realteils der Wellenfunktion in der „tight-binding“ Nähherung

Gross und Marx

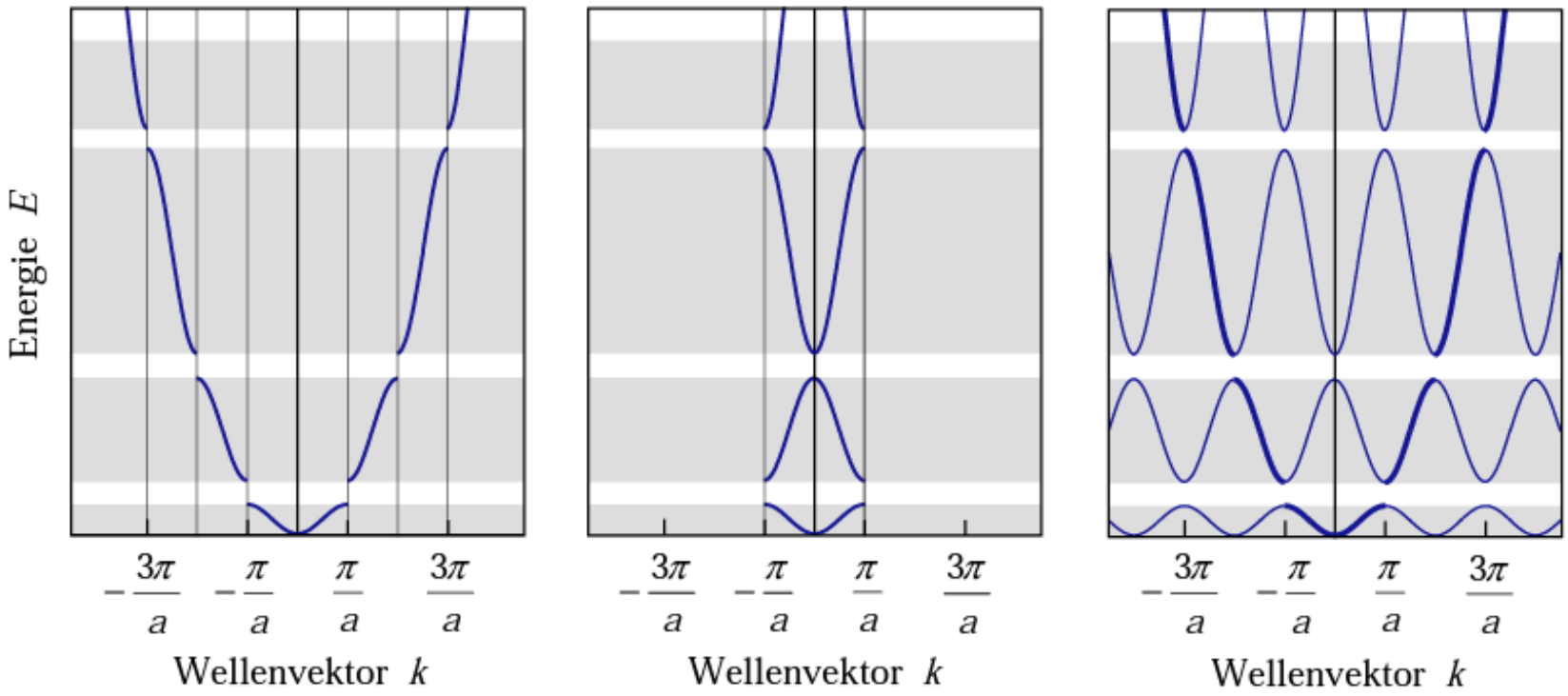
Lage des Fermi-Niveaus im Bänderschema



Ladungsträgerkonzentration: Halbleiter, Halbmetalle, Metalle



1D Energiedispersionskurven

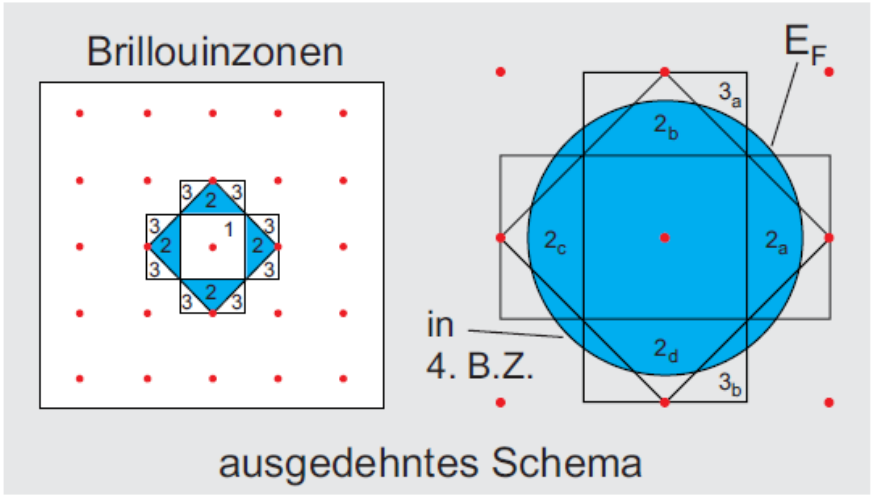


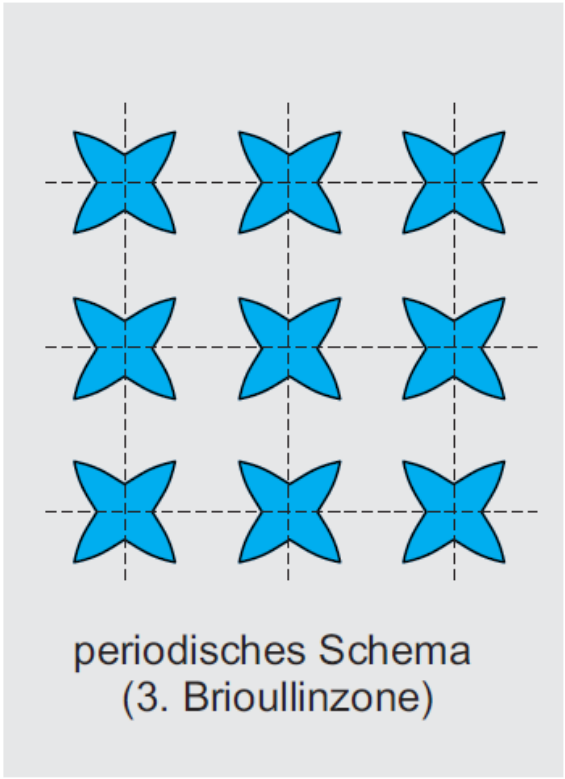
erweitertes Zonenschema

reduziertes Zonenschema

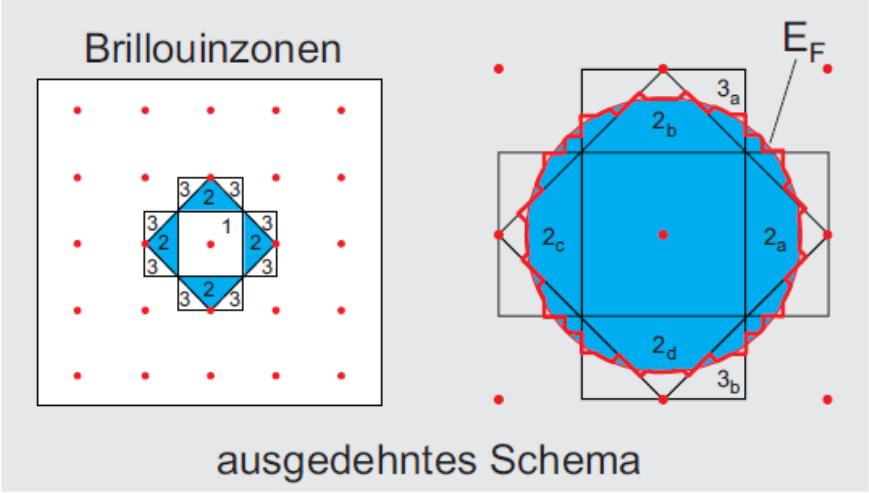
periodisches Zonenschema

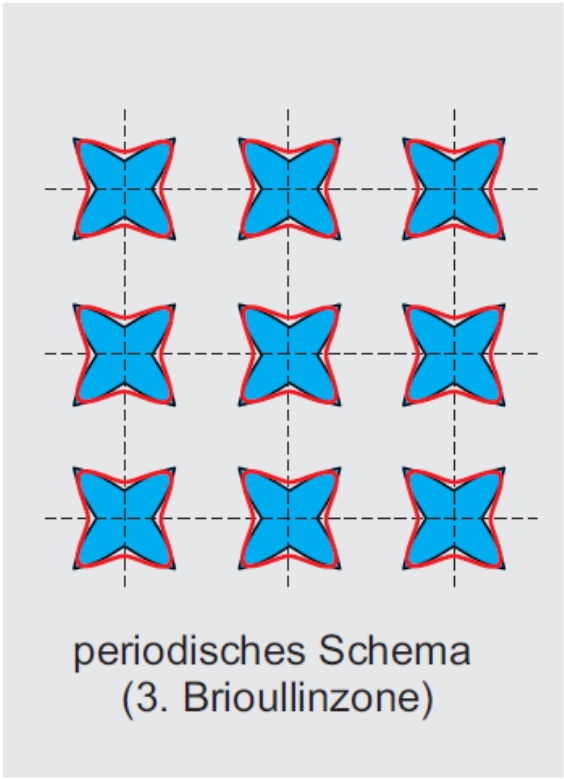
2D Fermi Fläche des freien Elektronengases



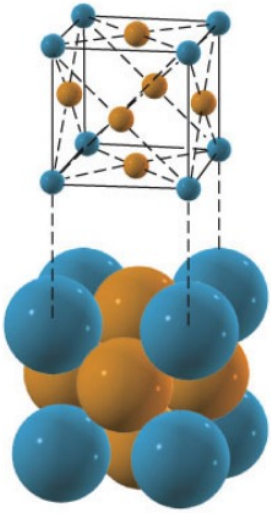


2D Fermi Fläche für Elektronen im periodischen Potenzial

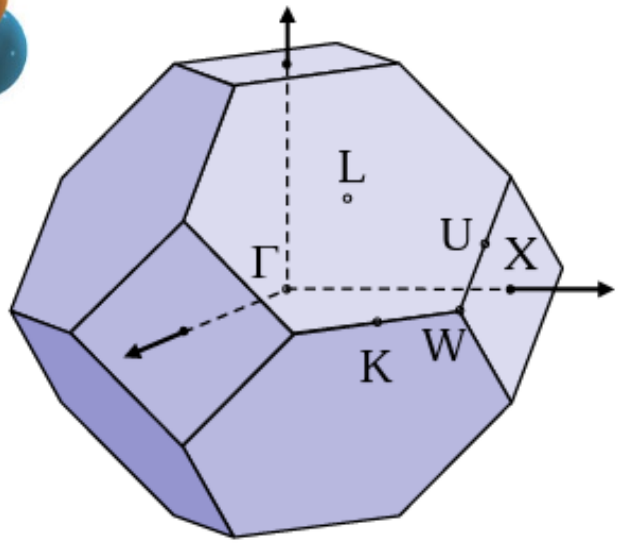




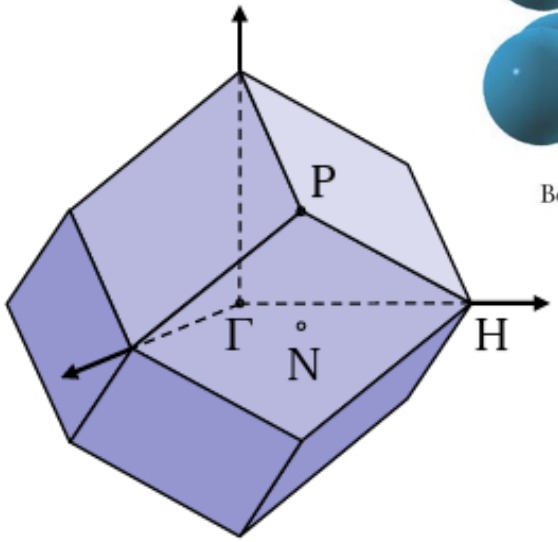
1. Brillouin Zone 3D



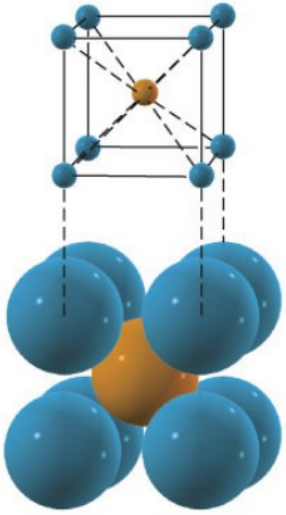
Face-centered



fcc



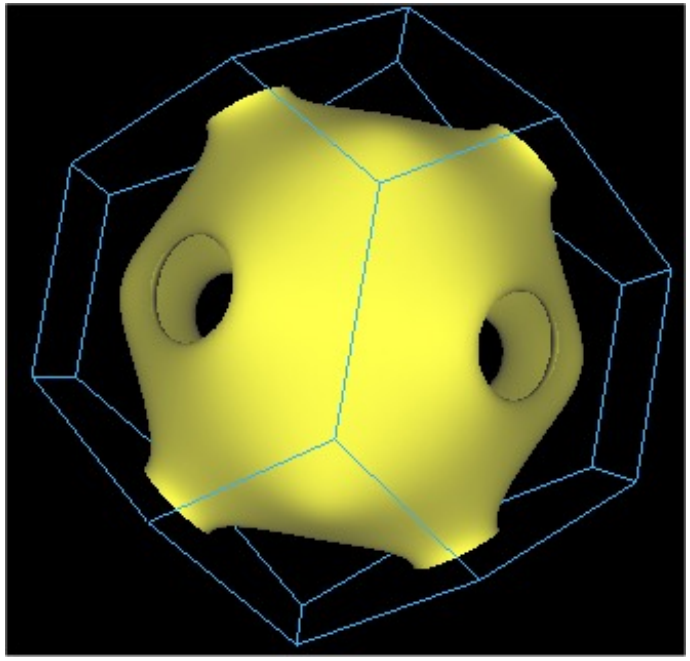
bcc

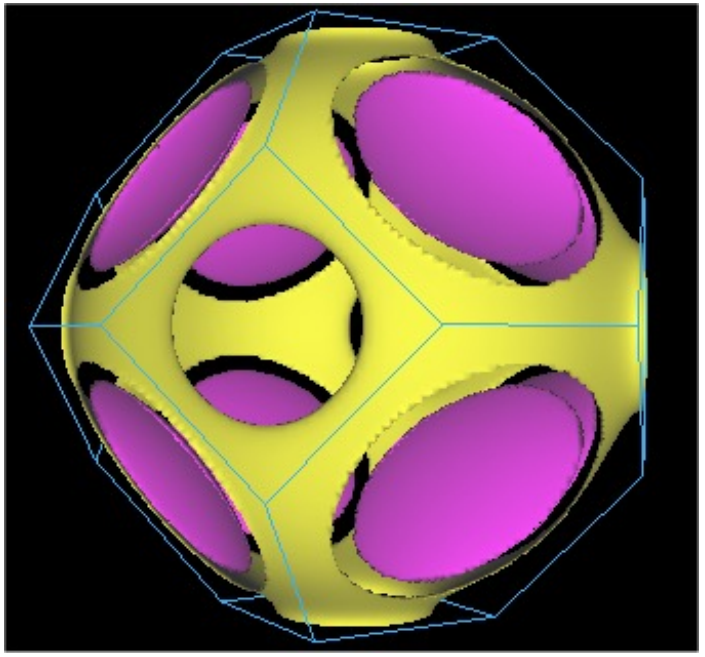


Body-centered

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

fcc



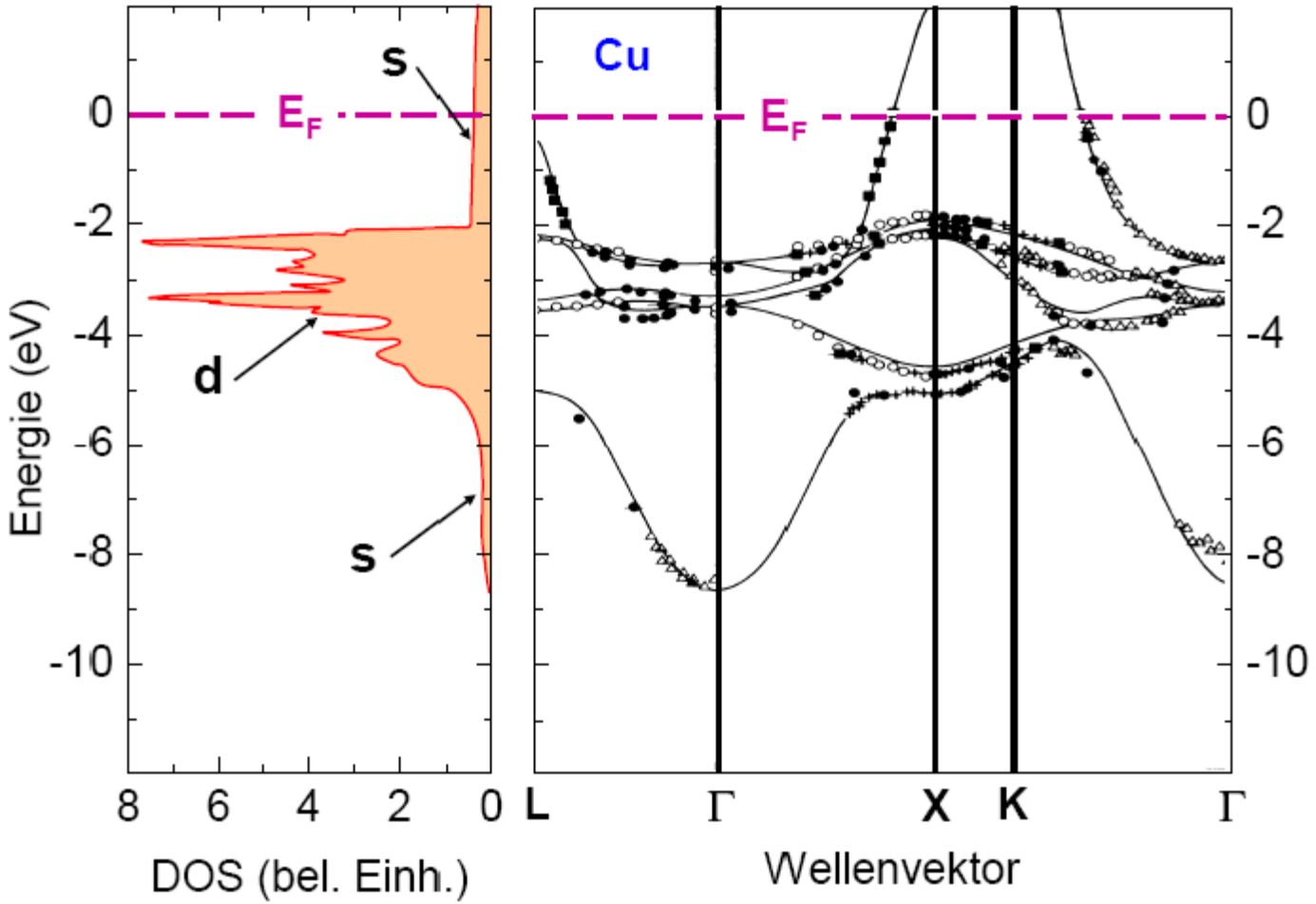


Cu

Zn

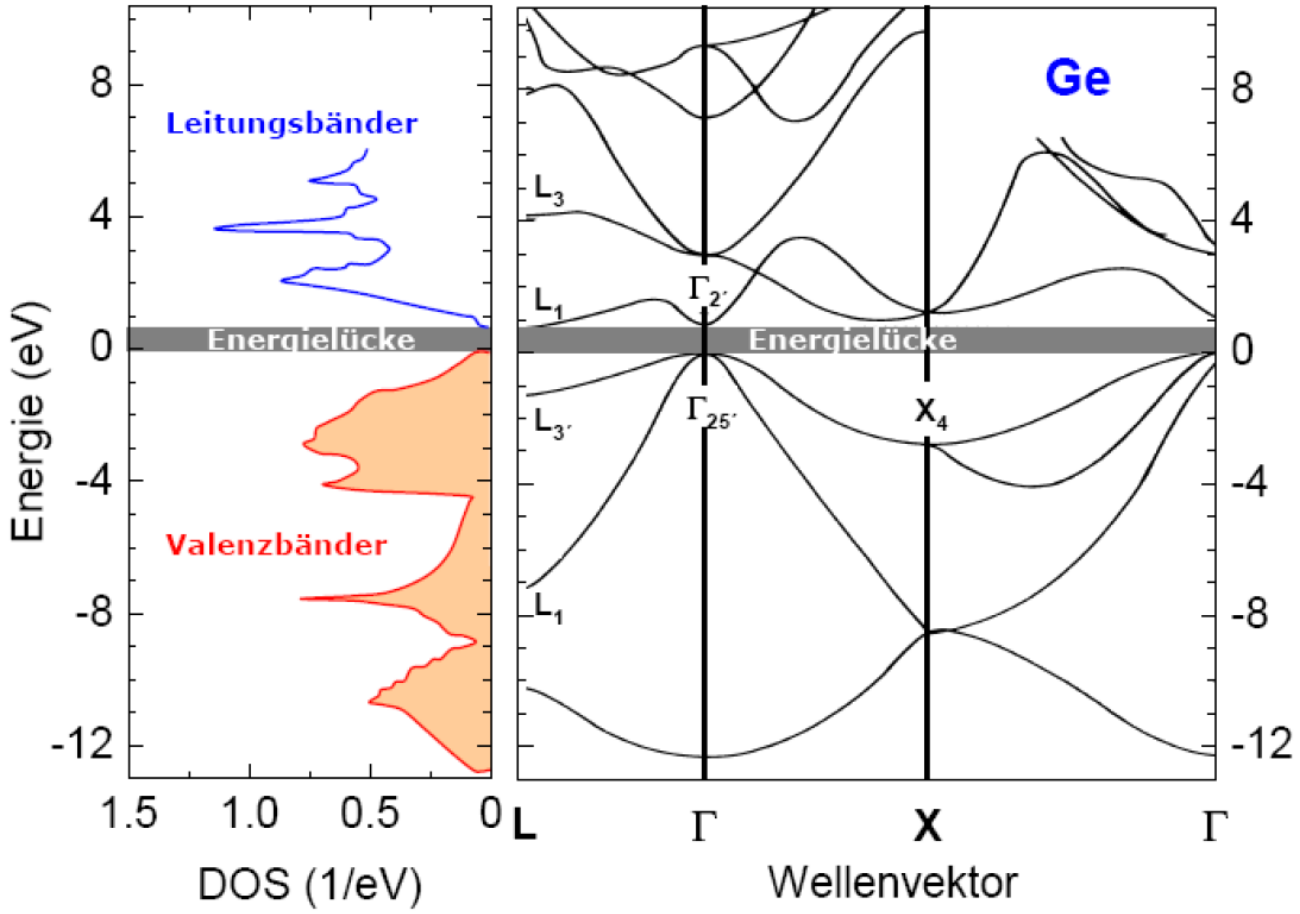
Bandstruktur von Kupfer

Elektronenkonfiguration: [Ar] $3d^{10}4s^1$



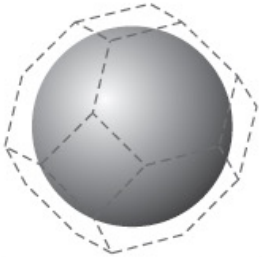
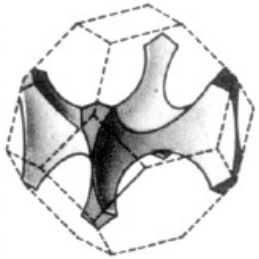
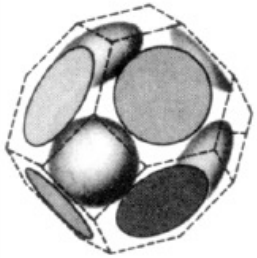
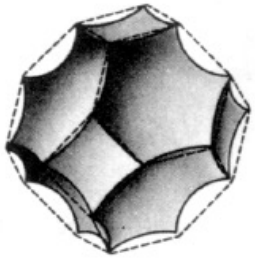
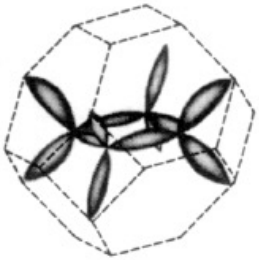
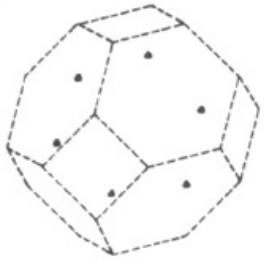
Bandstruktur von Germanium

Elektronenkonfiguration: [Ar] $3d^{10}4s^24p^2$



Fermiflächen von fcc-Metallen für freie Elektronen

Anteile in verschiedenen Brillouin-Zonen

	erste Zone	zweite Zone	dritte Zone	vierte Zone
einwertig		—	—	—
zweiwertig			—	—
dreiwertig	—			

The Fermi Surface Database
http://www.phys.ufl.edu/fermisurface/