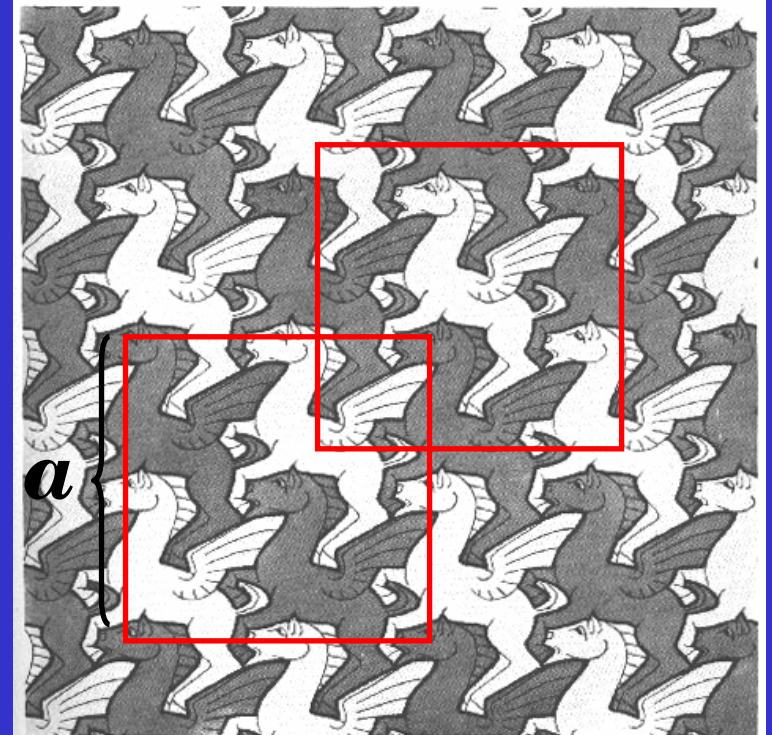
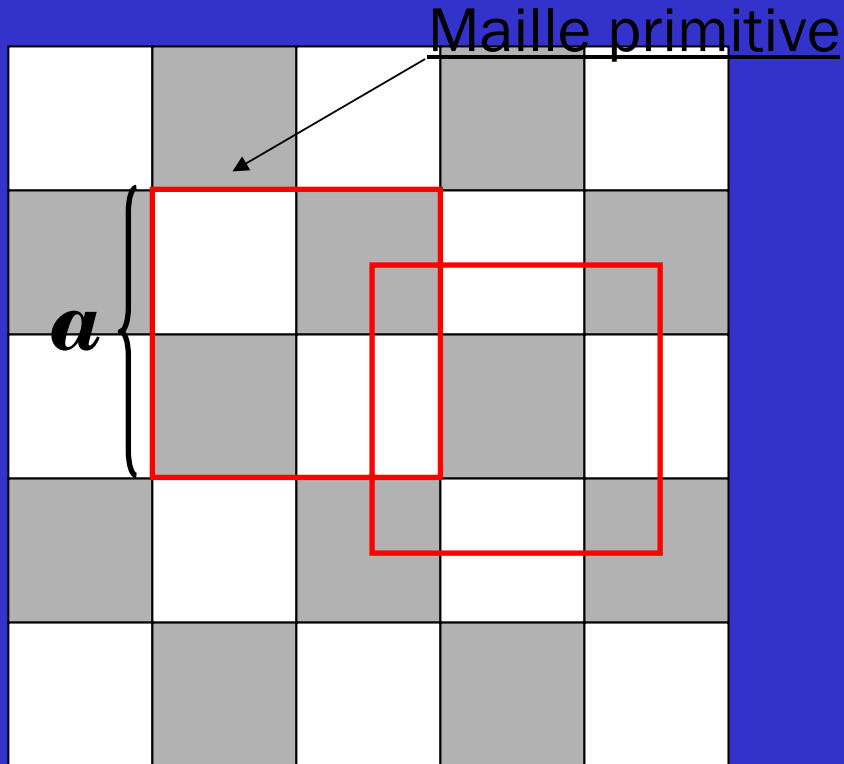


COURS IV

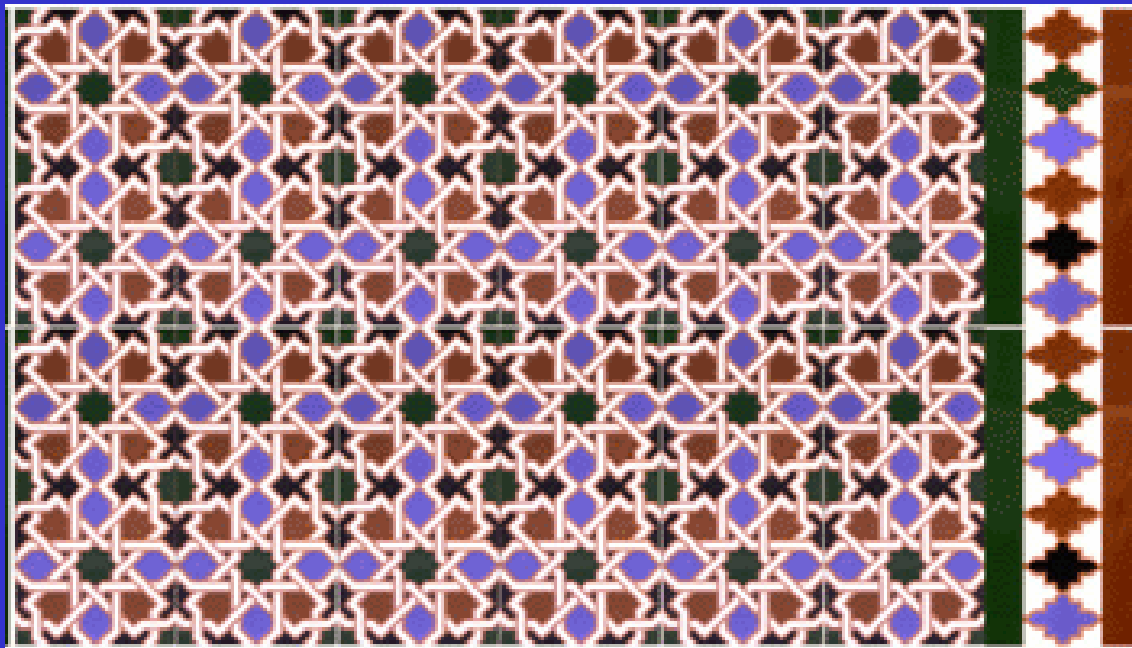
1. Réseaux cristallins en 2D et 3D
2. Nœuds et motifs d'un réseau
3. Maille élémentaire (primitive) et réduite
4. Réseaux réciproques. Vecteurs de base du réseau réciproque
5. Zones de Brillouin

LA SYMETRIE DE TRANSLATION EN 2D

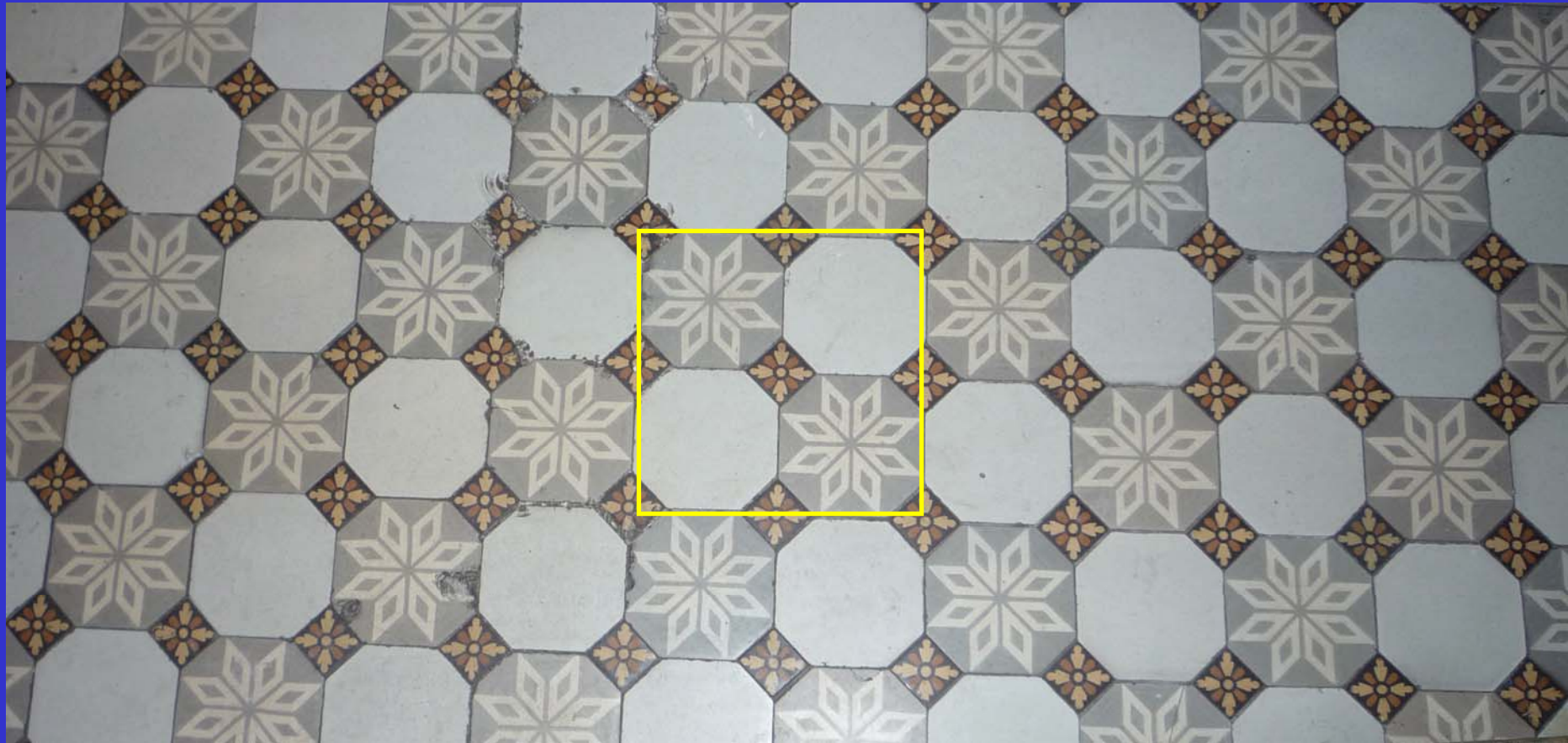


- Même symétrie de translation, mais plans et axes de symétrie différents
- Le choix de la maille primitive (ou élémentaire) n'est pas unique

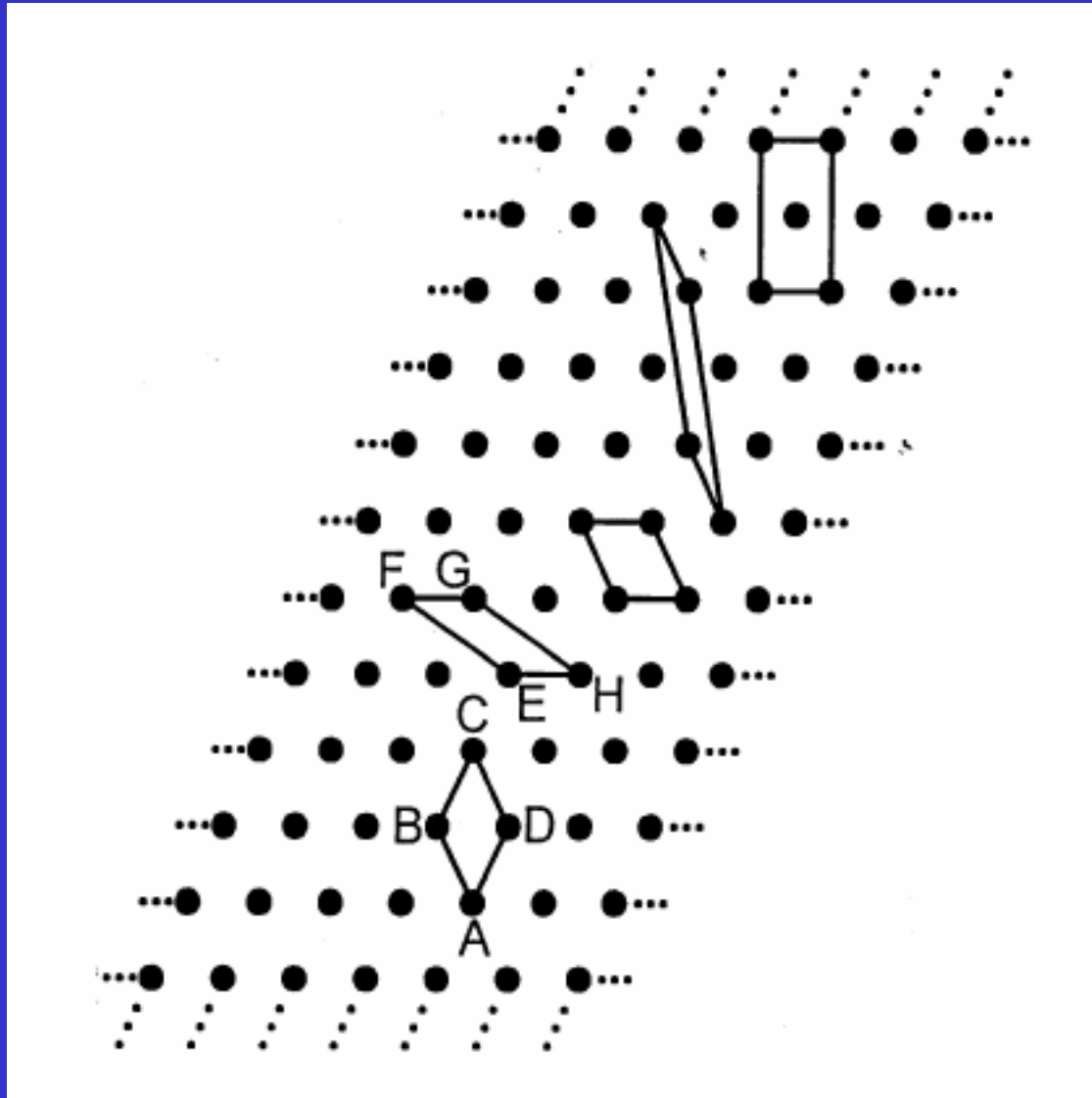
CARRELAGES COMPLEXES



SYMETRIE DE TRANSLATION EN 2D: LES CARRELAGES

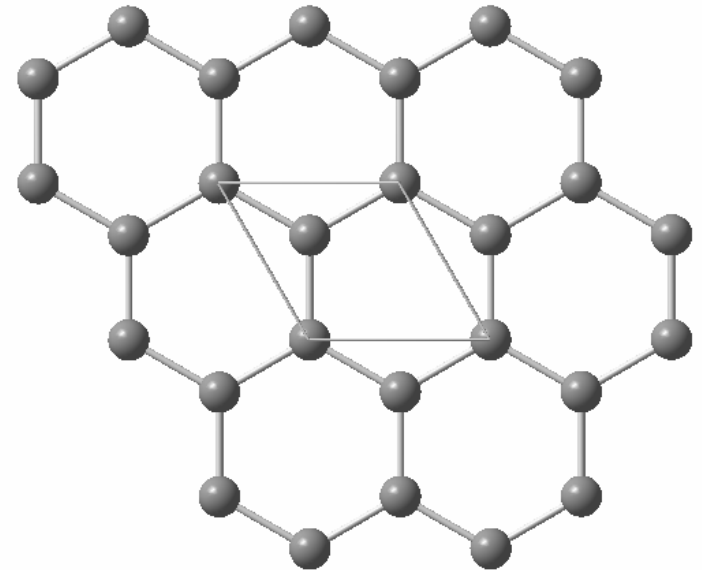
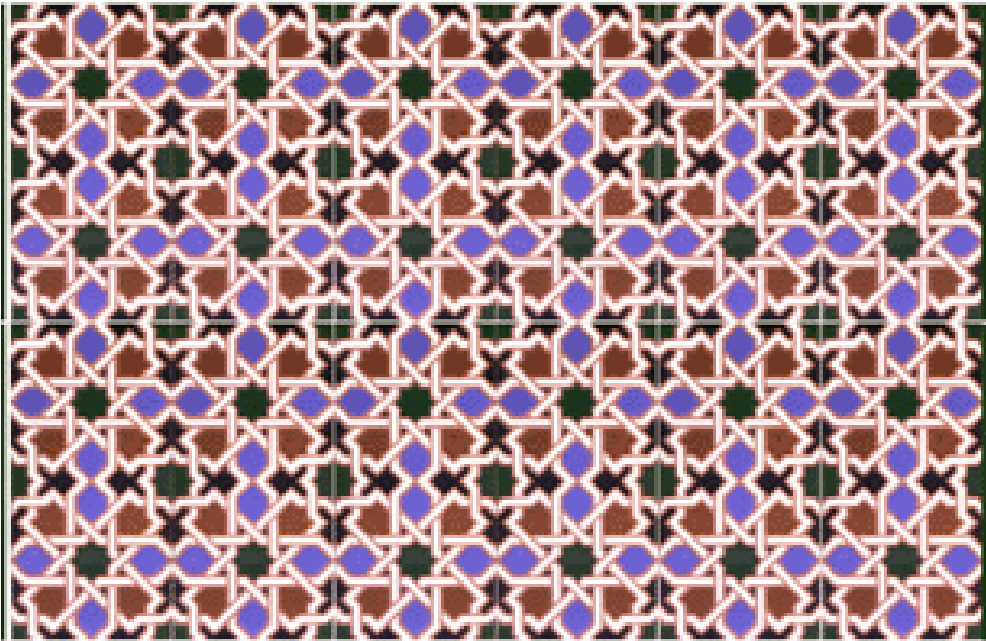
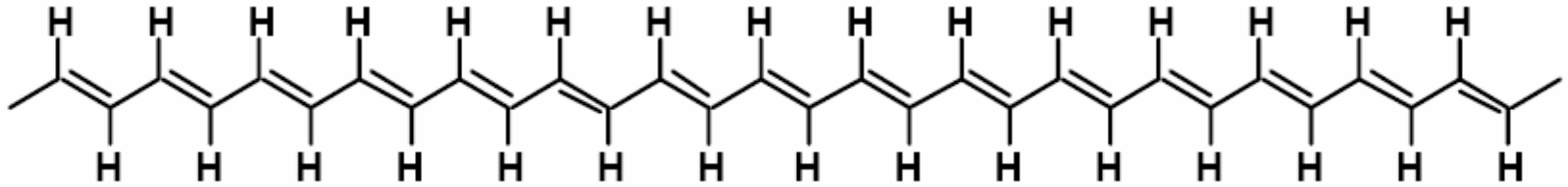


MAILLE PRIMITIVE ET MAILLE REDUITE

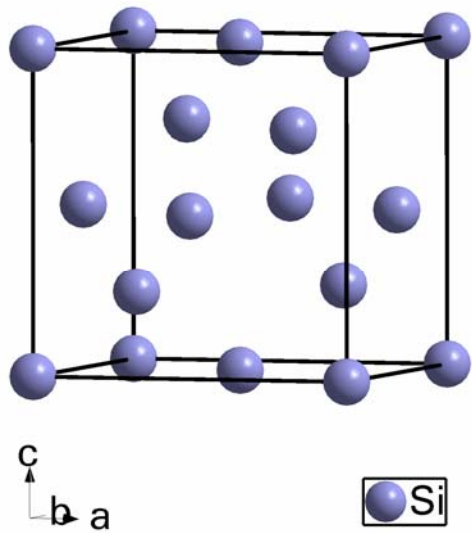


Maille réduite = maille élémentaire avec les plus petits vecteurs de base

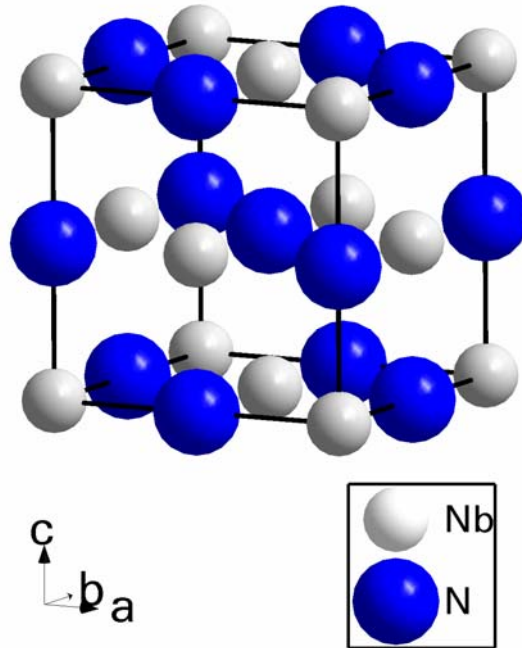
NOEUDS ET MOTIFS D'UN RESEAU



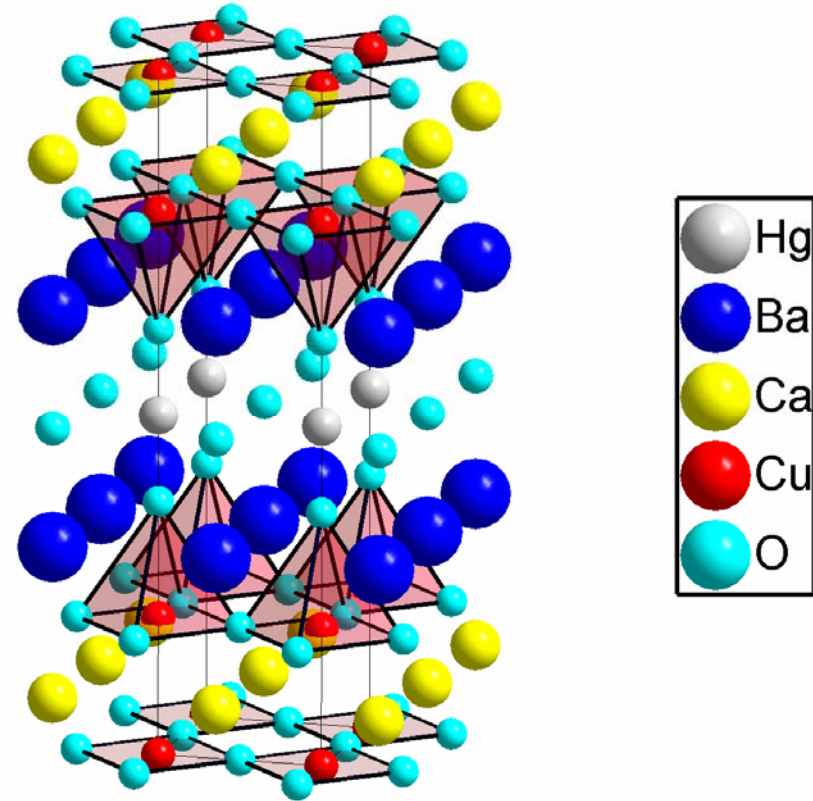
3D: COMPLEXITE DES STRUCTURES CRISTALLINES



Silicium
semiconducteur



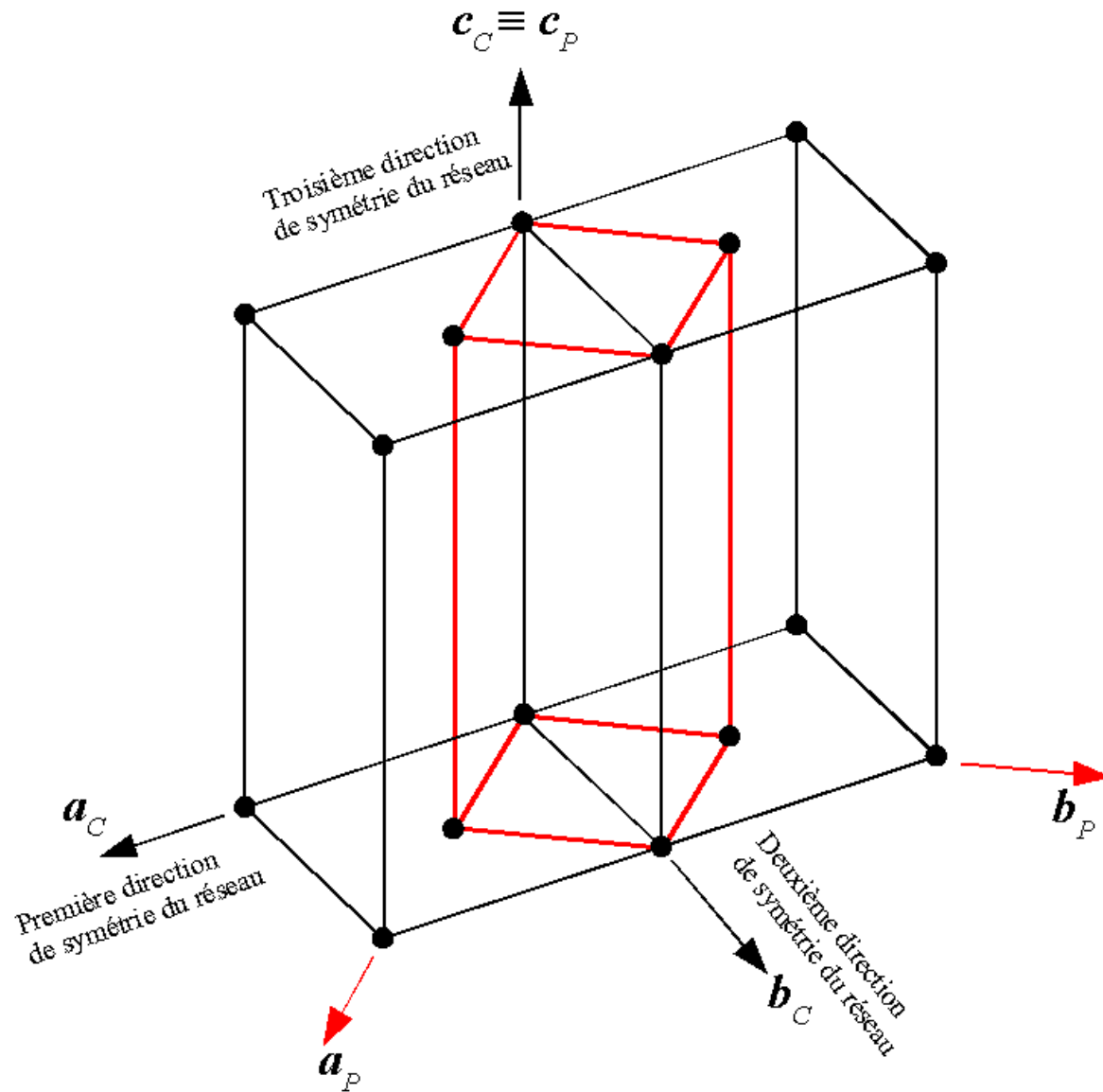
NbN
Supraconducteur



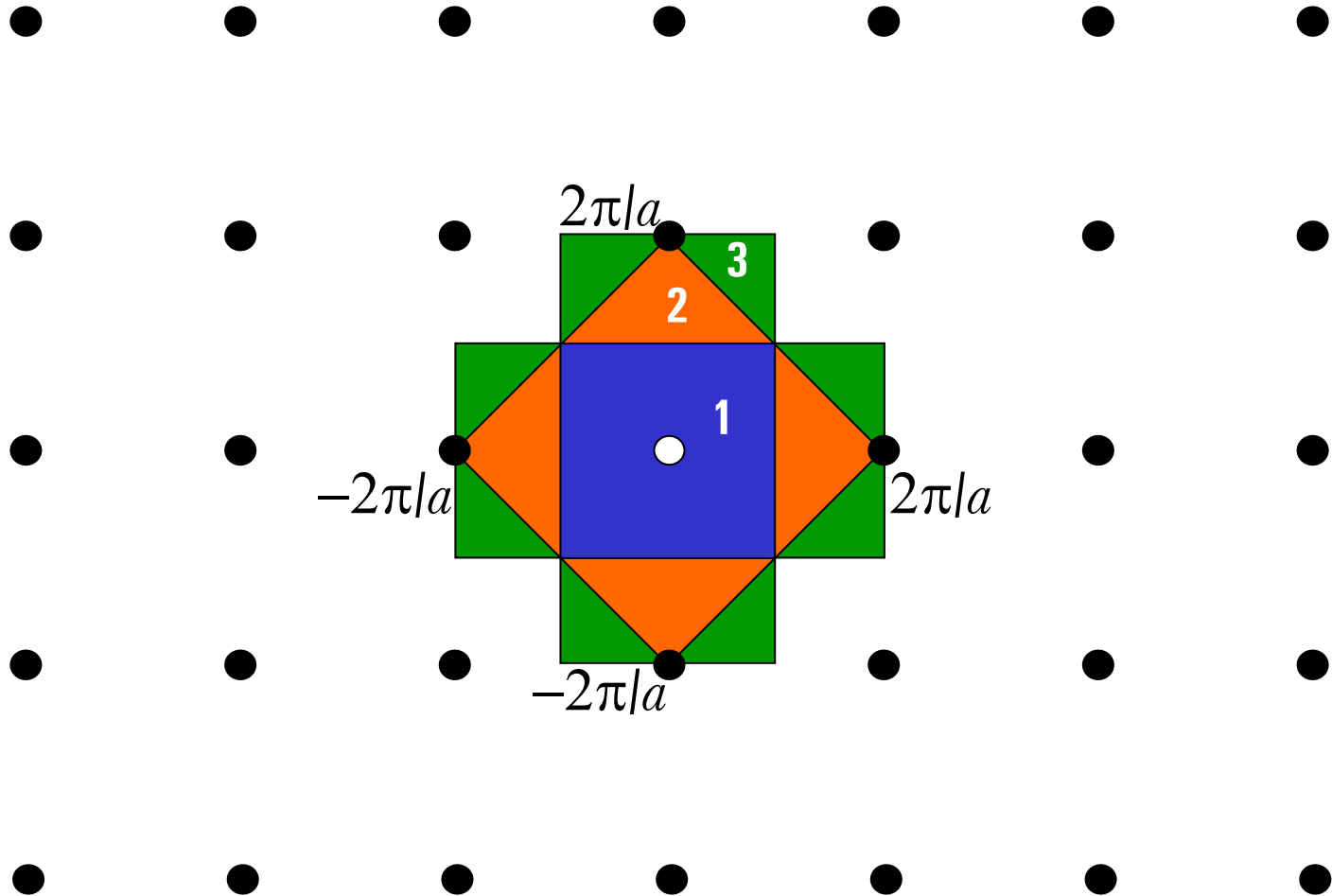
$\text{HgBa}_2\text{Ca}_2\text{Cu}_3\text{O}_8$
Supraconducteur

“Chaque chose doit être rendue aussi simple que possible, mais pas plus” (A. Einstein)

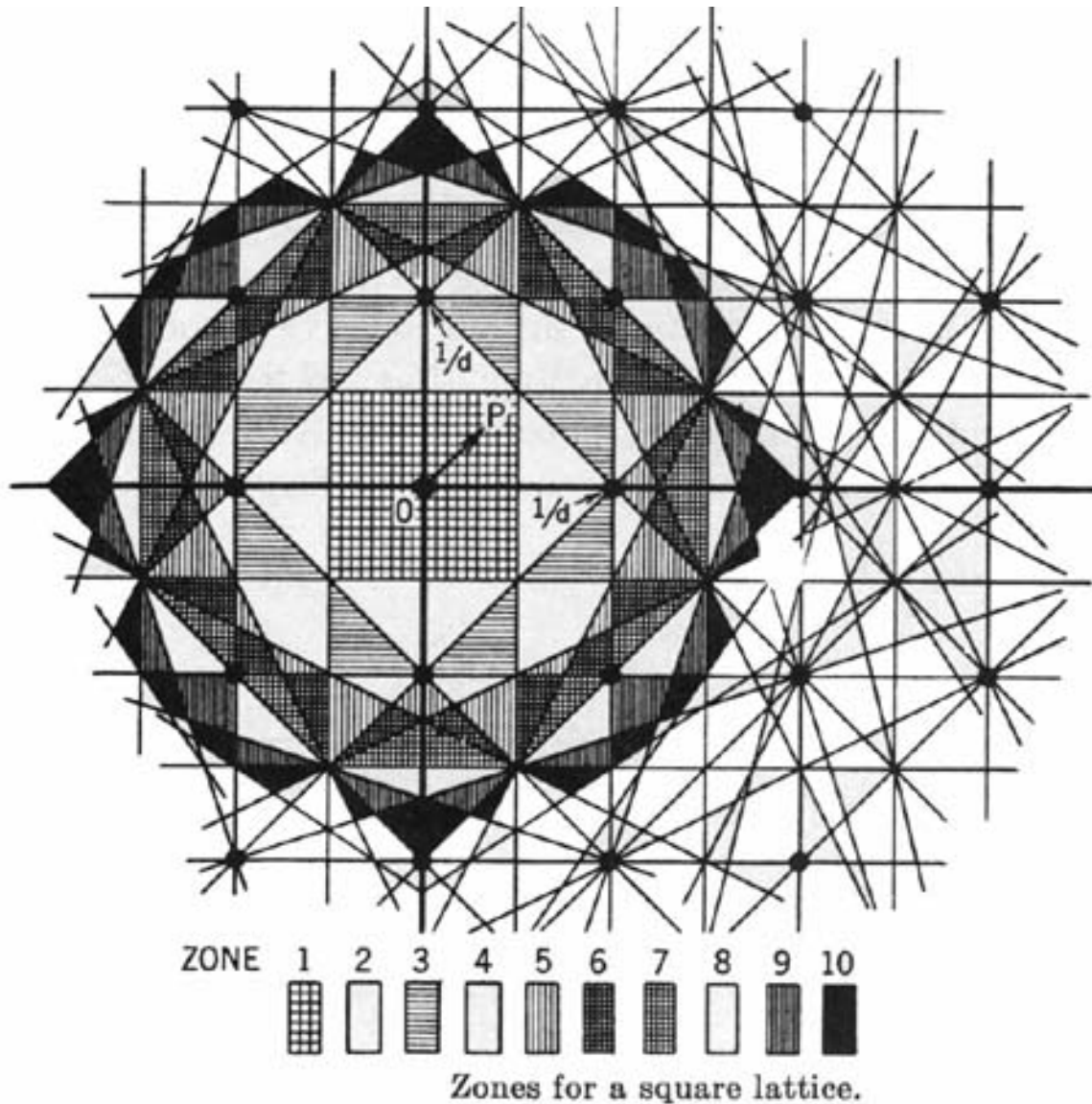
LES MAILLES CONVENTIONNELLE, PRIMITIVE ET REDUITE



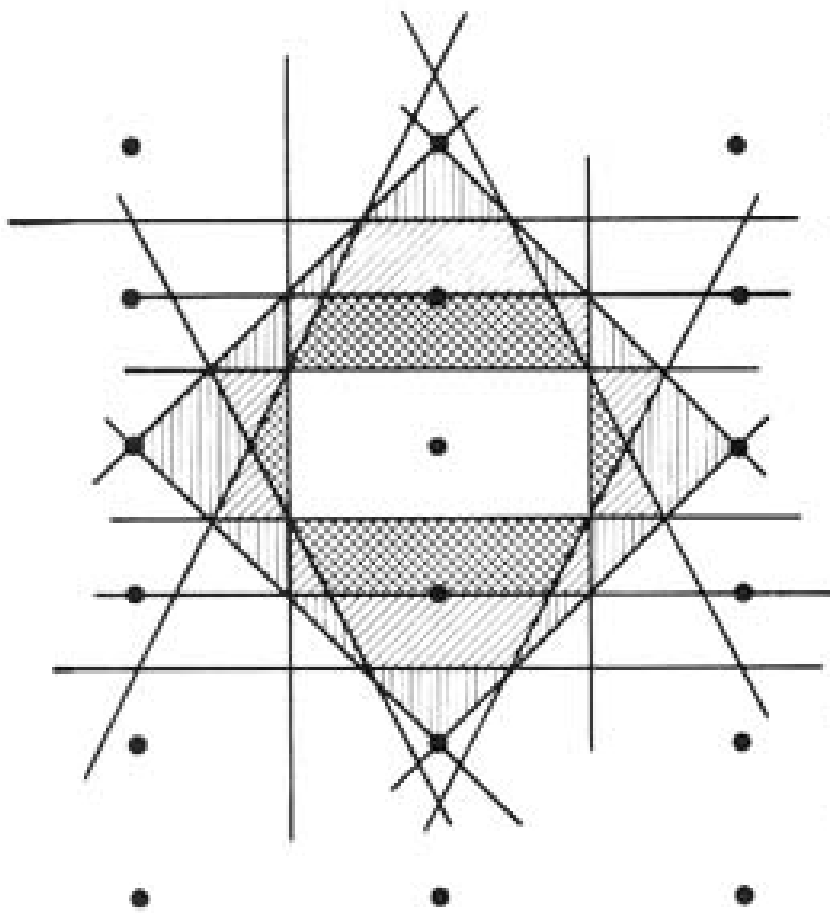
ZONES DE BRILLOUIN EN 2D: RÉSEAU CARRÉ



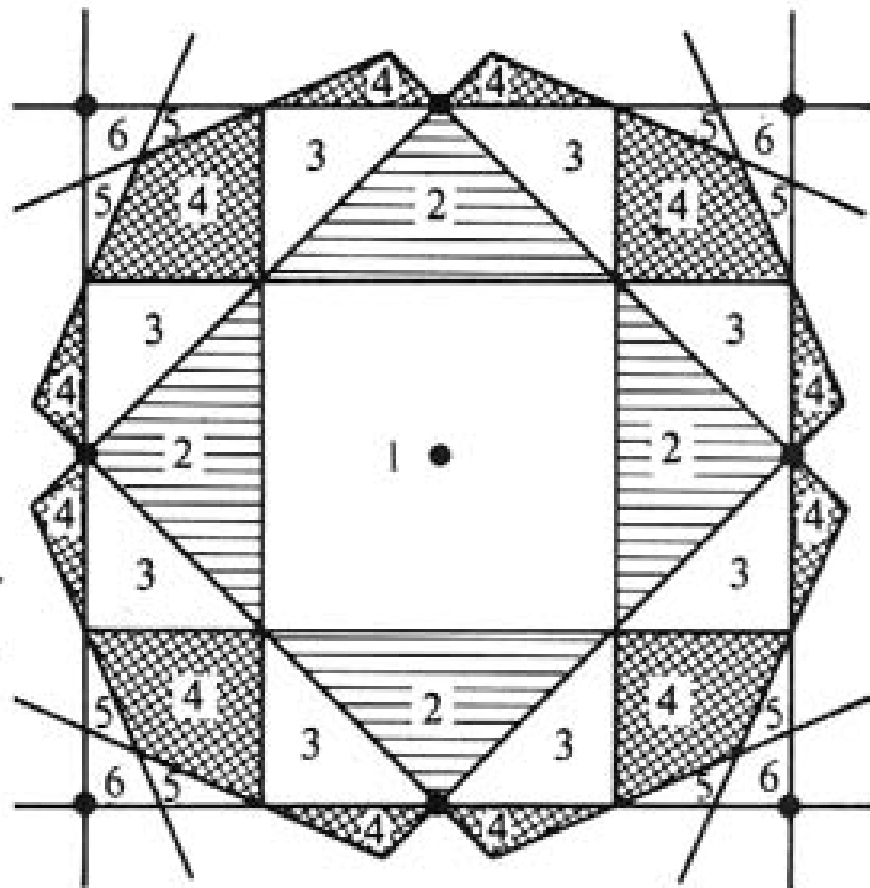
Zones de Brillouin en 2D: réseau carré



C'est un puzzle!

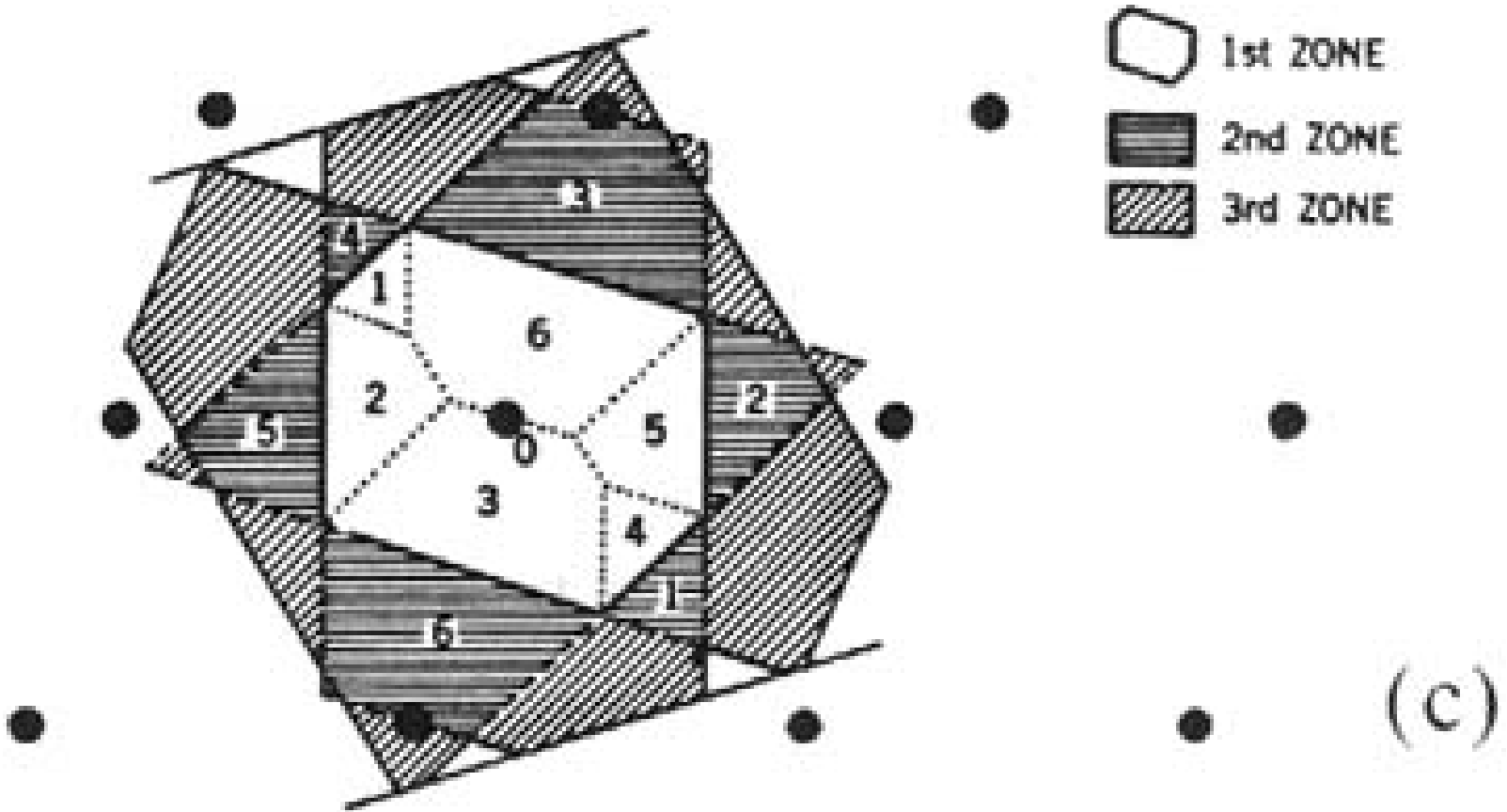


(a)

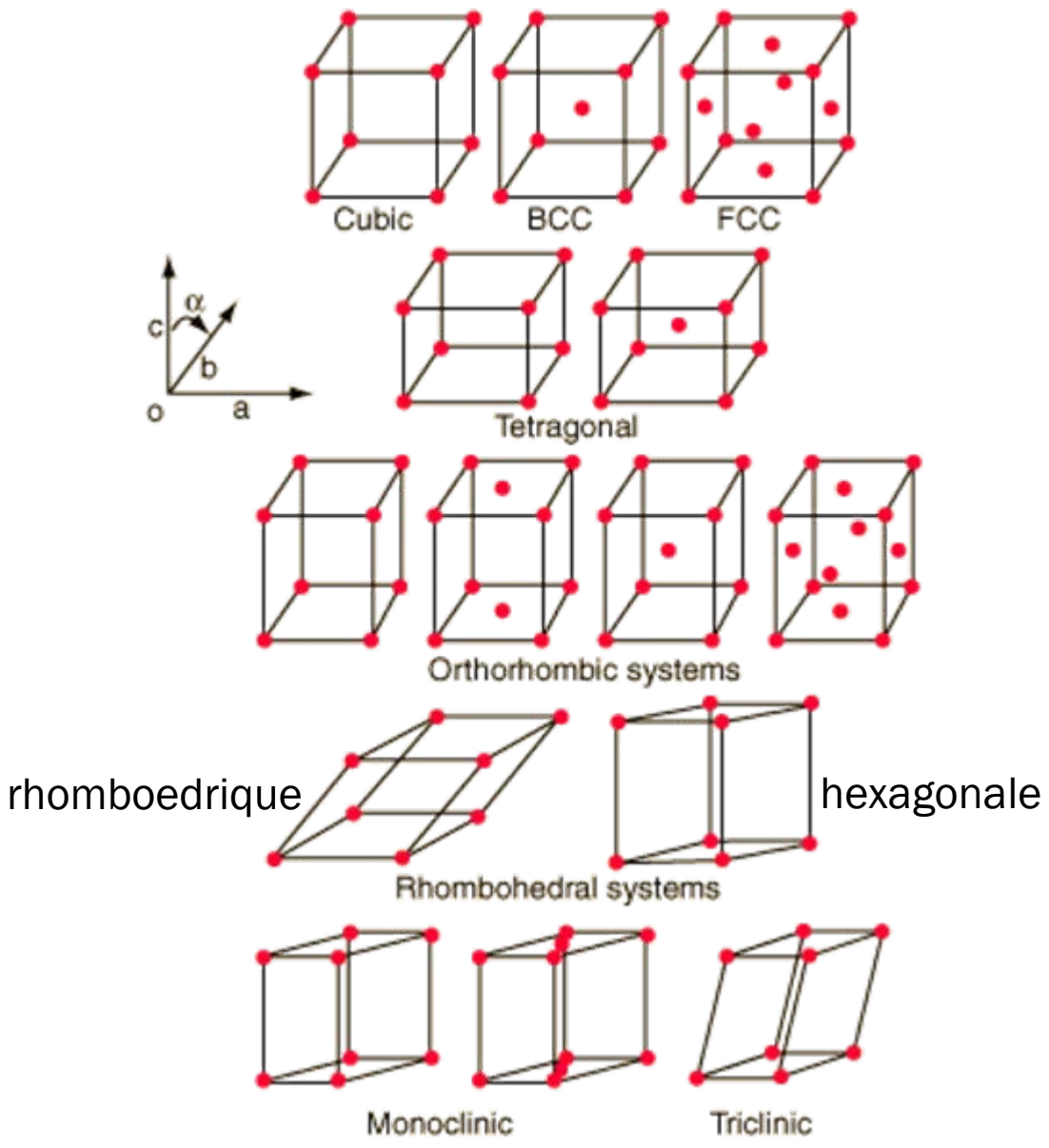


(b)

LE PUZZLE DU RÉSEAU OBLIQUE

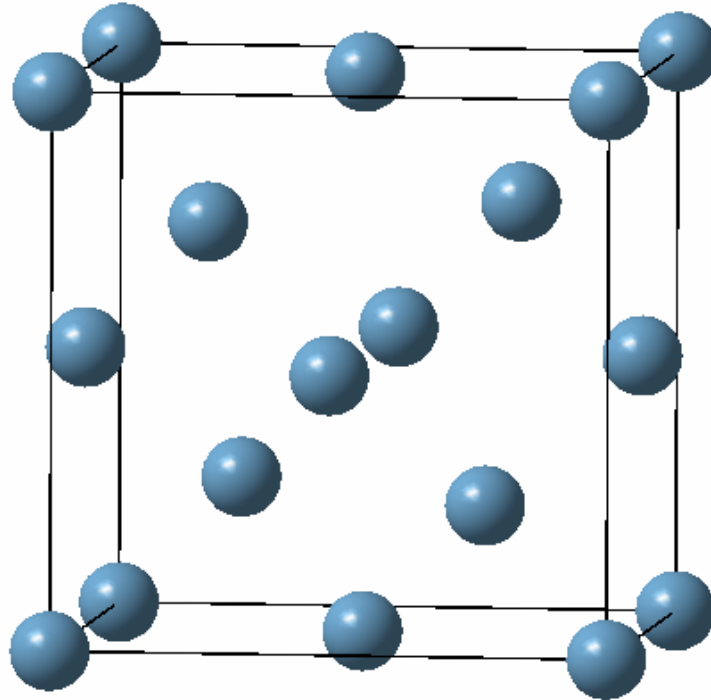


3D: LES 7 SYSTEMES CRISTALLINS ET LES 14 RESEAUX DE BRAVAIS



CRISTAUX EN 3D

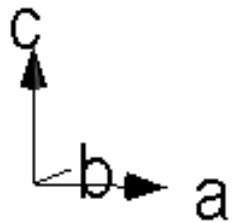
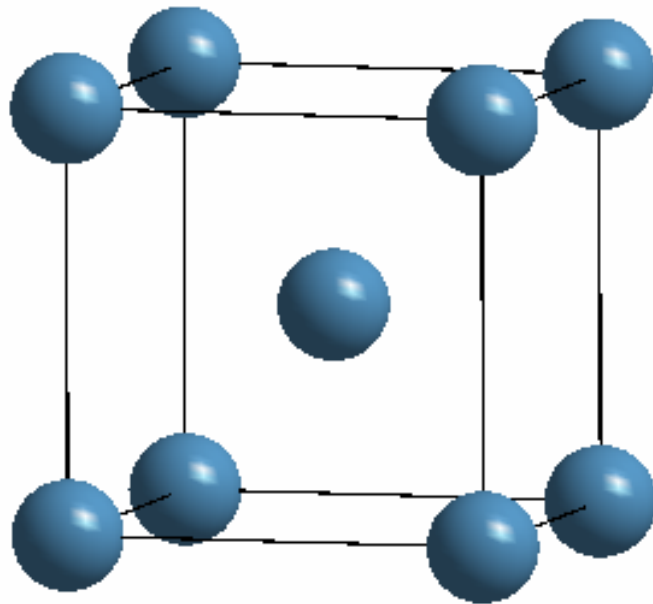
Silicon



Réseau cubique à faces centrés (fcc), $a=5.43 \text{ \AA}$

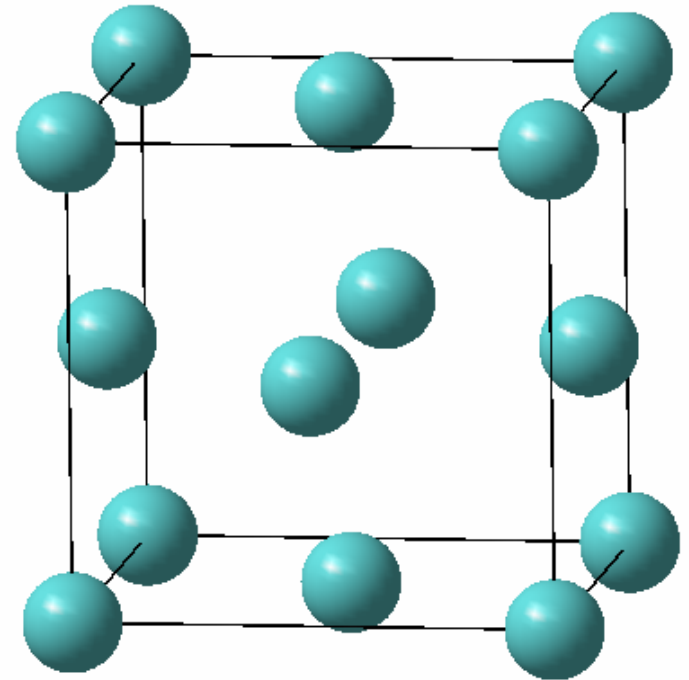
CRISTAUX EN 3D

α -Fe



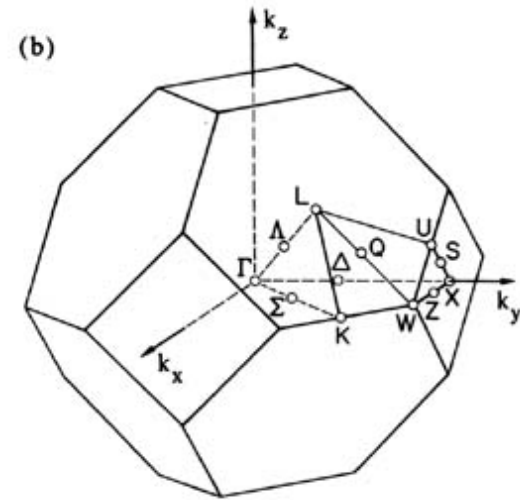
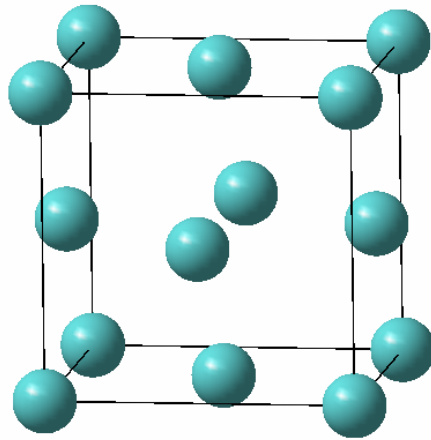
Réseau cubique à corps centré (bcc)

Al fcc

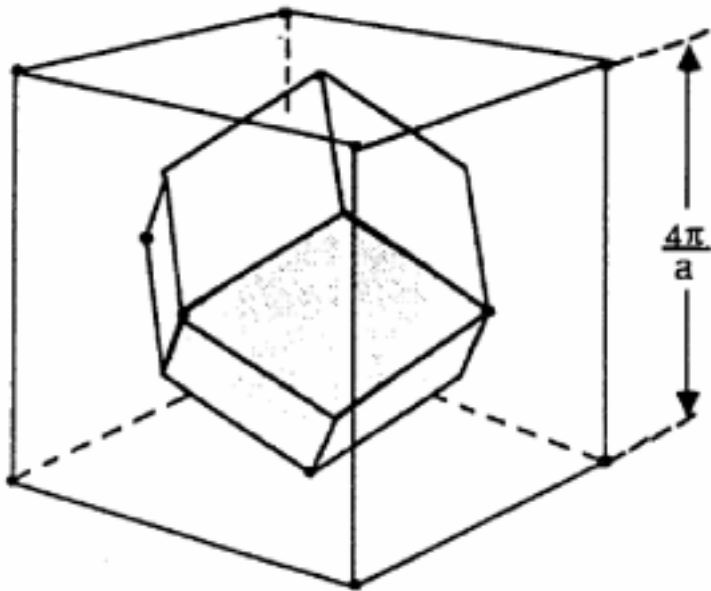


Réseau cubique à faces centrées (fcc)

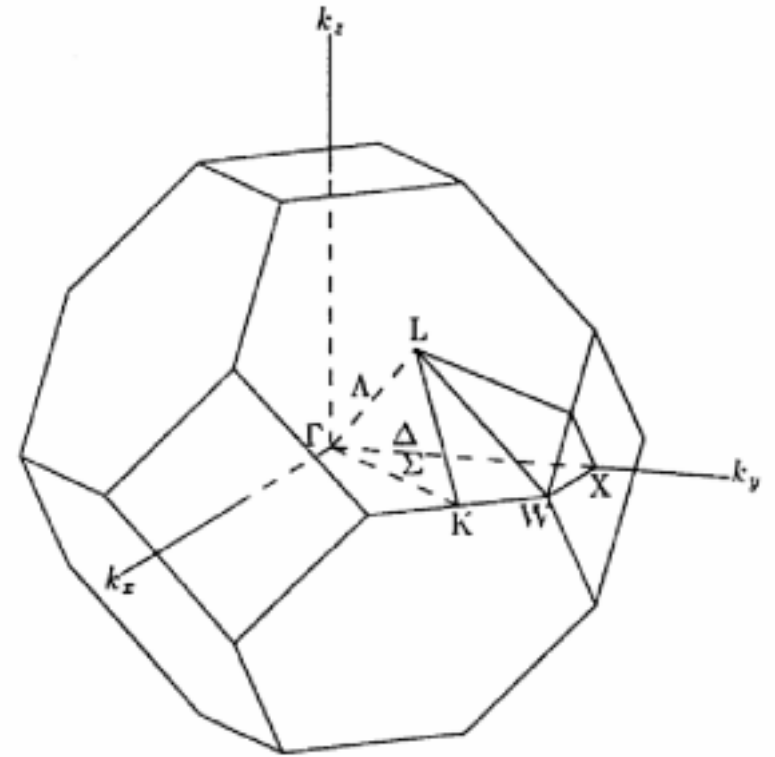
RESEAU DIRECT ET RESEAU RECIPROQUE: L'EXEMPLE DU REEAU CUBIQUE FCC



RÉSEAUX RÉCIPROQUES EN 3D



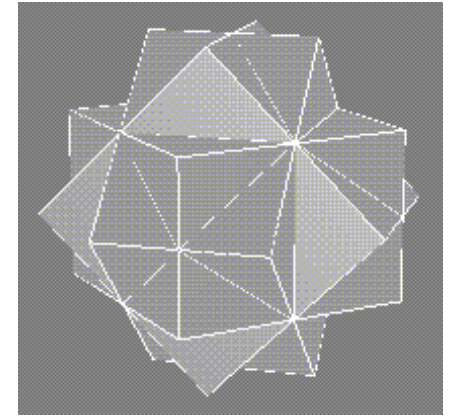
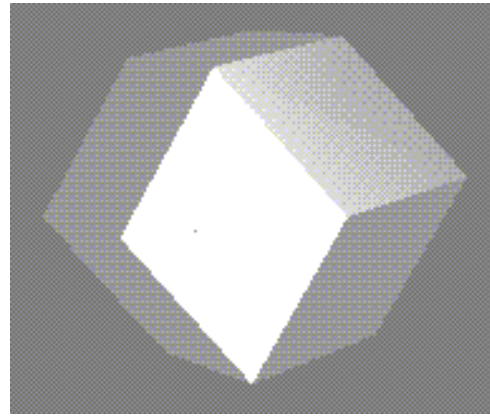
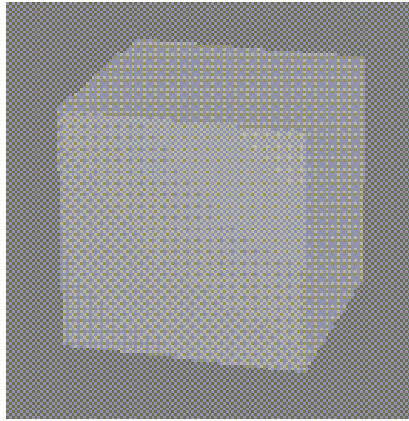
Réseau réciproque de bcc
(fcc)



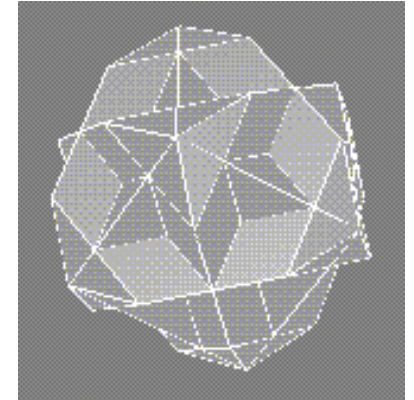
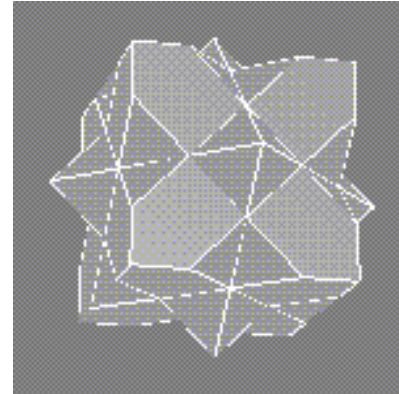
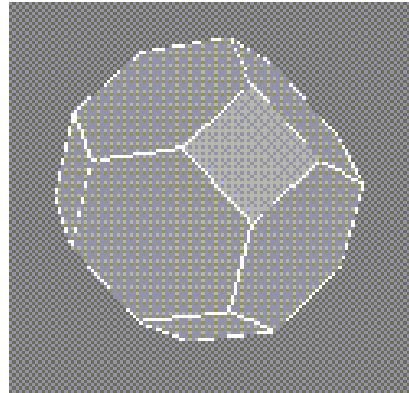
Réseau réciproque de fcc
(bcc)

Zones de Brillouin en 3D

Cubique simple



Cubique fcc



Cubique bcc

