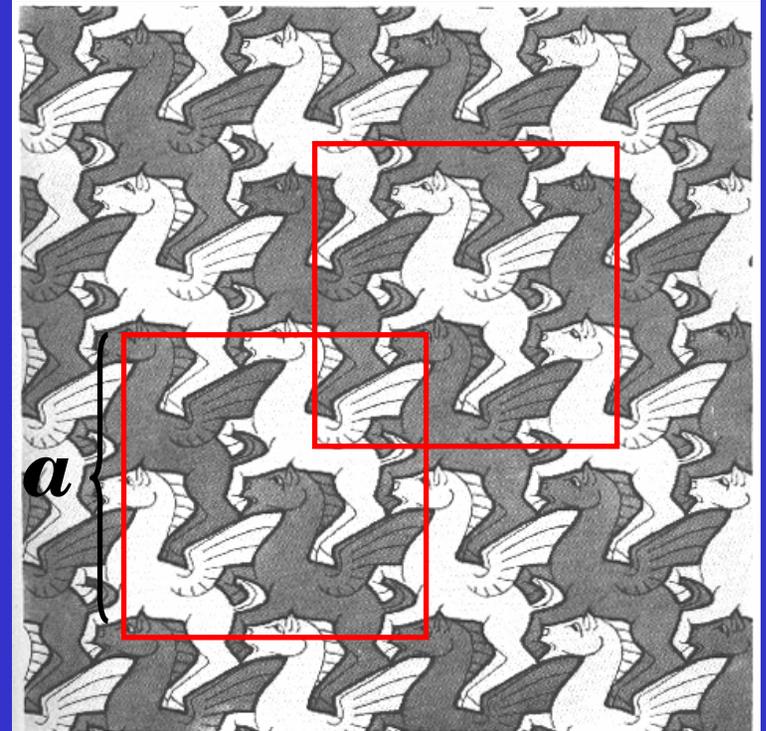
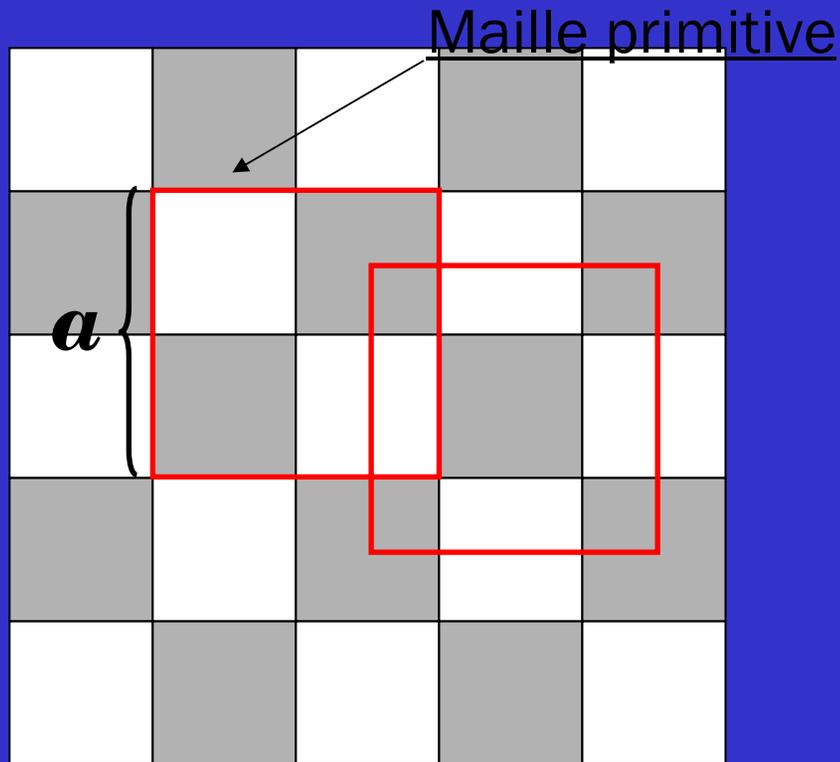


# COURS IV

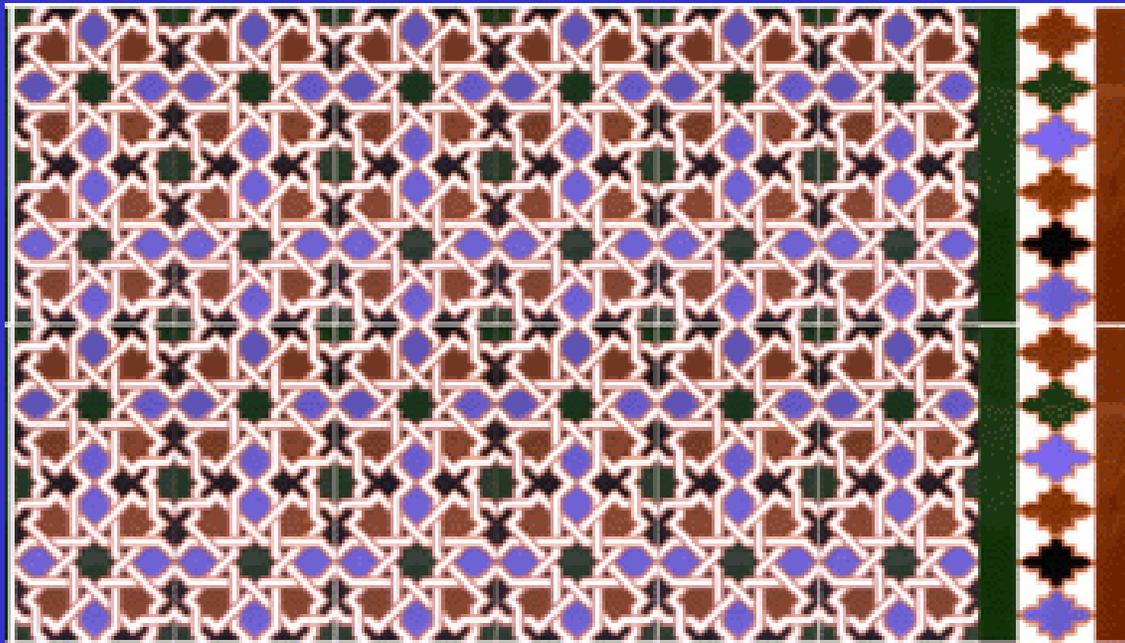
1. Réseaux cristallins en 2D et 3D
2. Nœuds et motifs d'un réseau
3. Maille élémentaire (primitive) et réduite
4. Réseaux réciproques. Vecteurs de base du réseau réciproque
5. Zones de Brillouin

# LA SYMETRIE DE TRANSLATION EN 2D

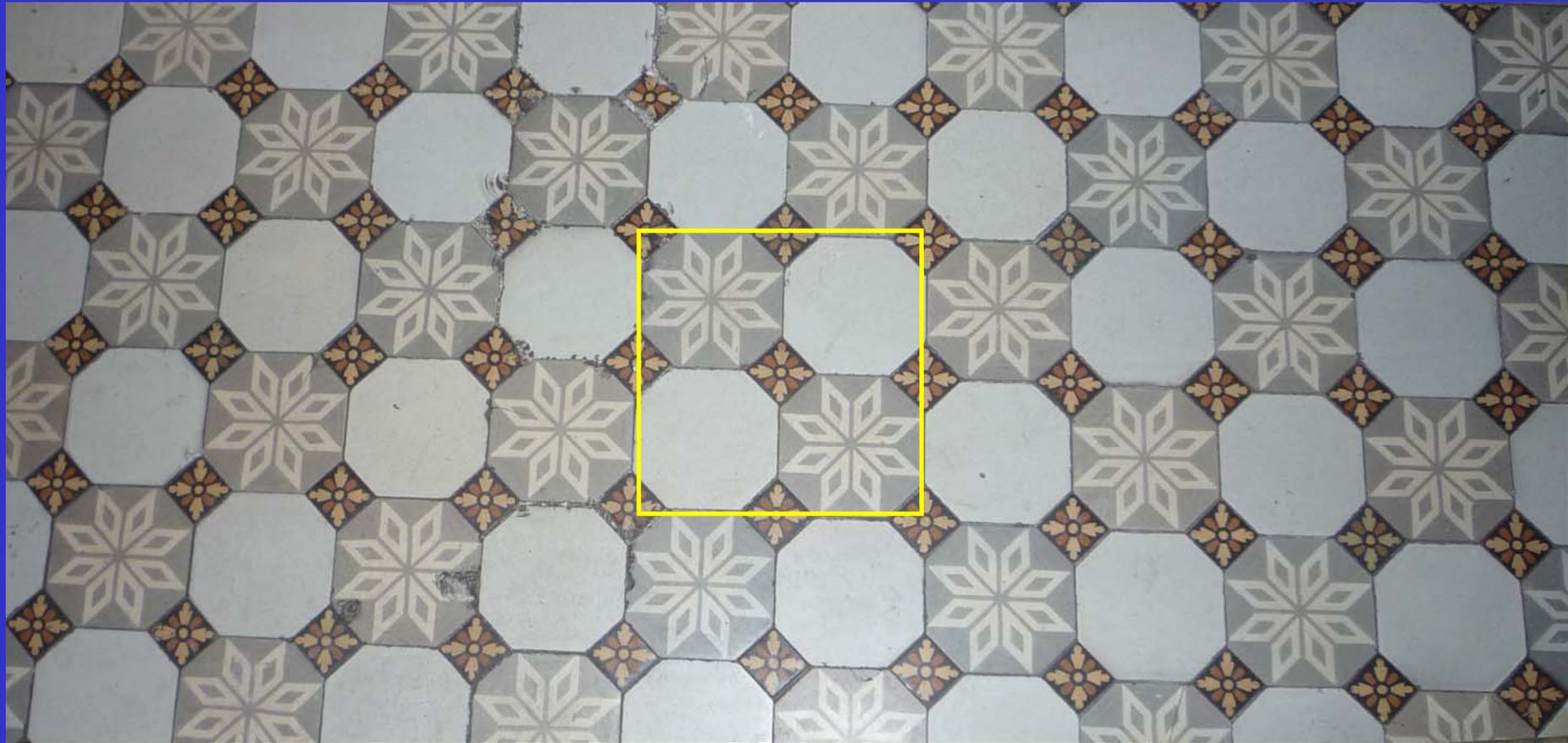


- Même symétrie de translation, mais plans et axes de symétrie différents
- Le choix de la maille primitive (ou élémentaire) n'est pas unique

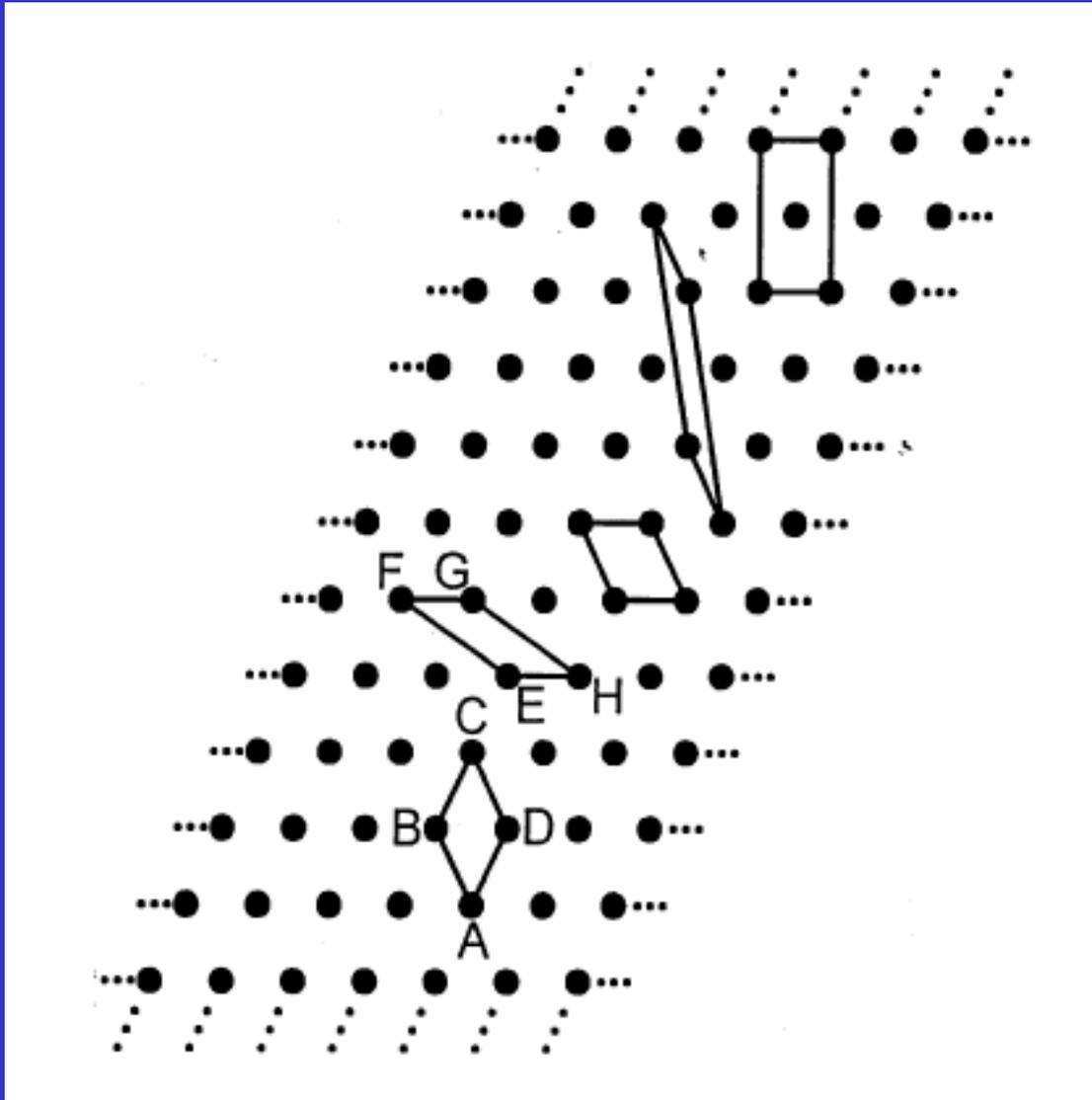
# CARRELAGES COMPLEXES



# SYMETRIE DE TRANSLATION EN 2D: LES CARRELAGES

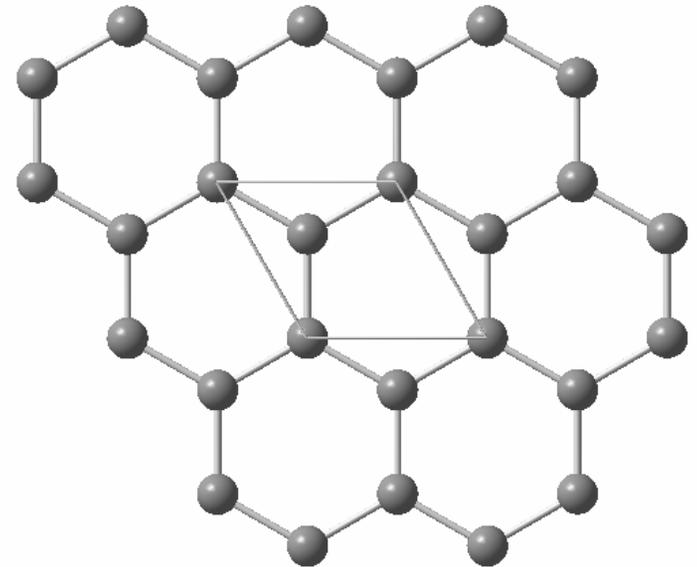
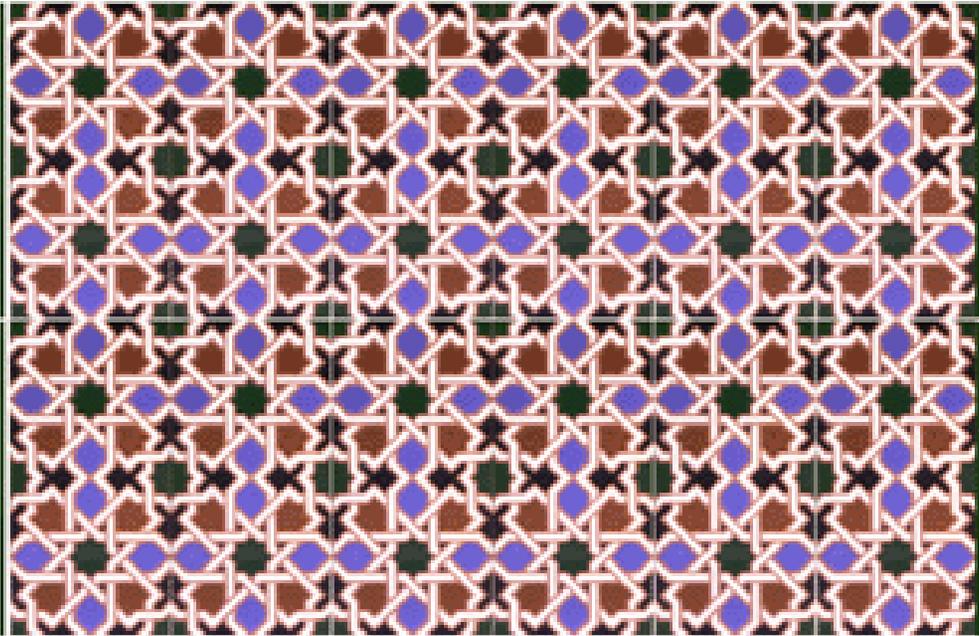
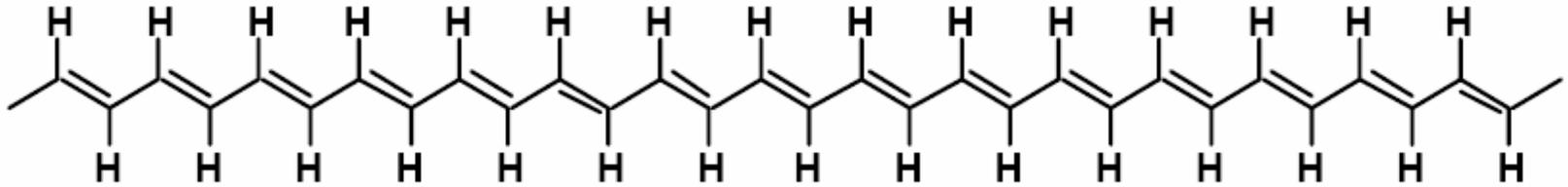


# MAILLE PRIMITIVE ET MAILLE REDUITE

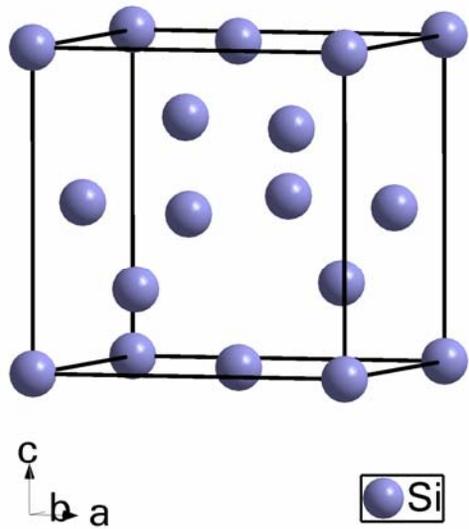


Maille réduite = maille élémentaire avec les plus petits vecteurs de base

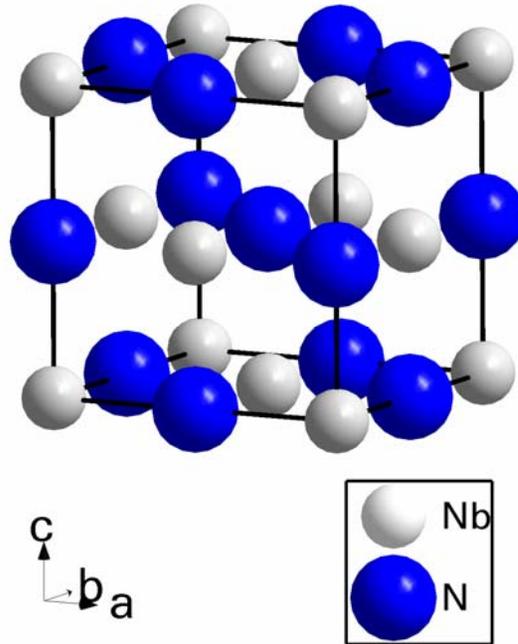
# NOEUDS ET MOTIFS D'UN RESEAU



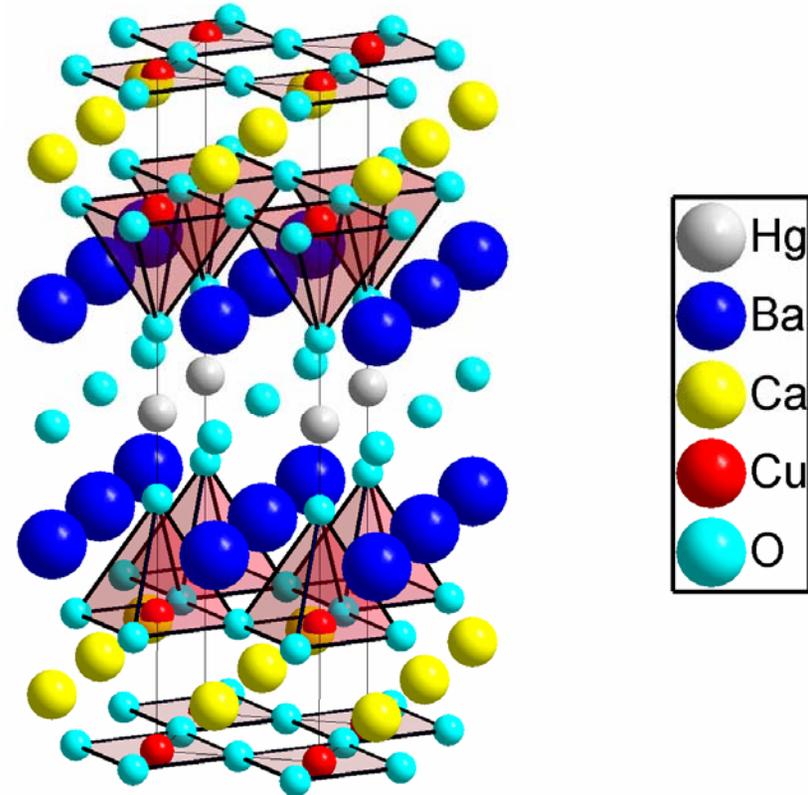
# 3D: COMPLEXITE DES STRUCTURES CRISTALLINES



Silicium  
semiconducteur



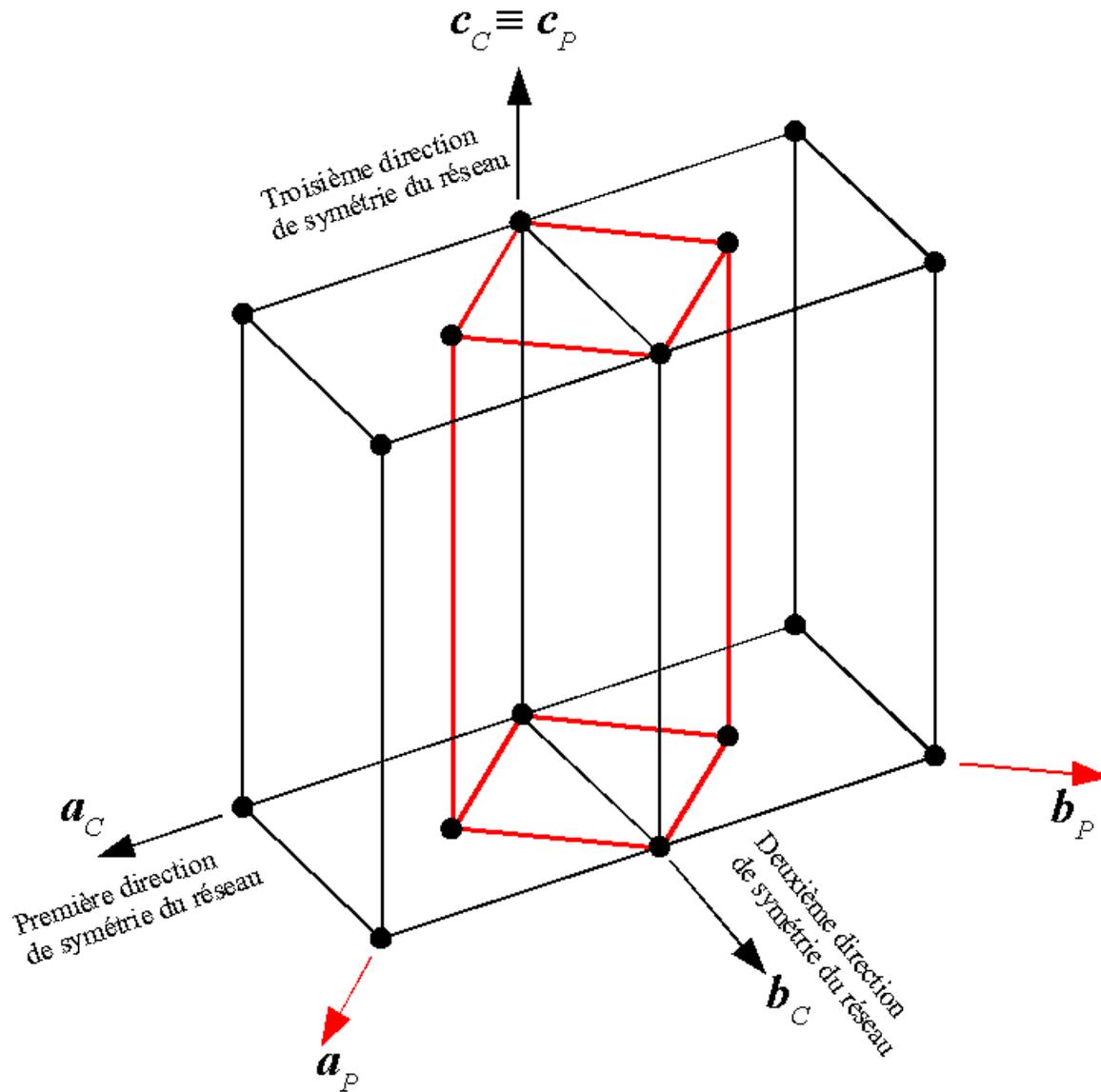
NbN  
Supraconducteur



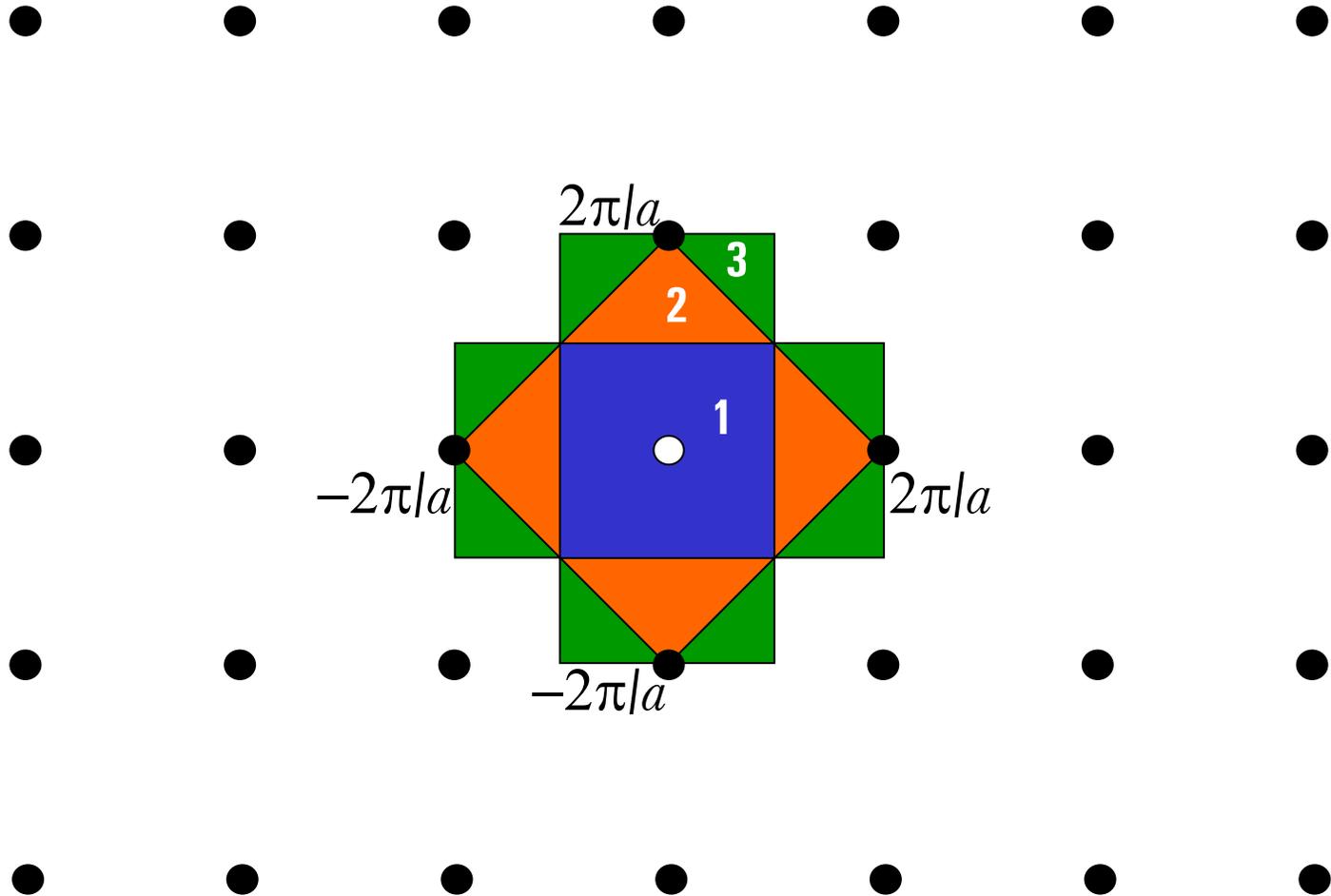
$\text{HgBa}_2\text{Ca}_2\text{Cu}_3\text{O}_8$   
Supraconducteur

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

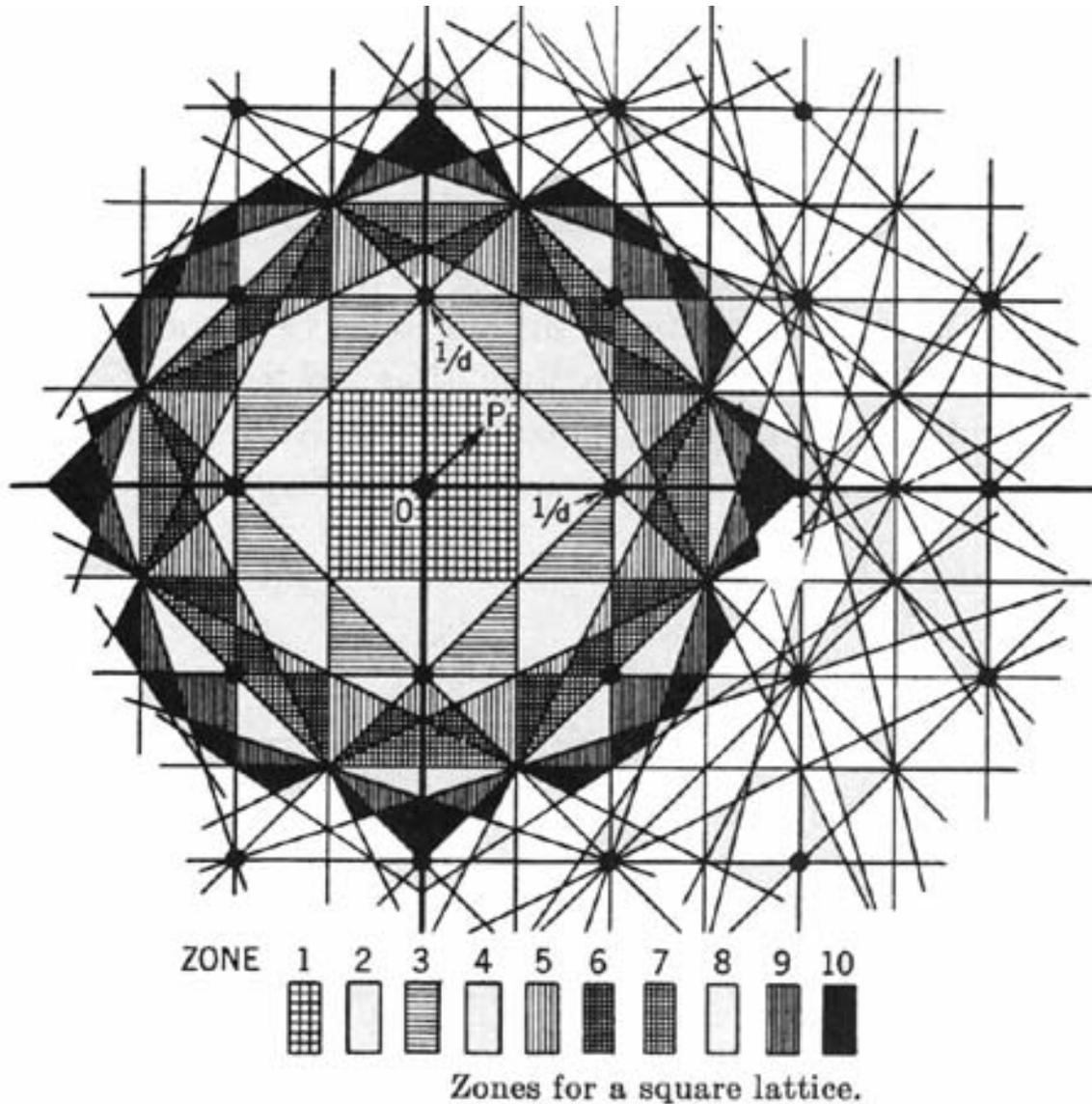
# LES MAILLES CONVENTIONNELLE, PRIMITIVE ET REDUITE



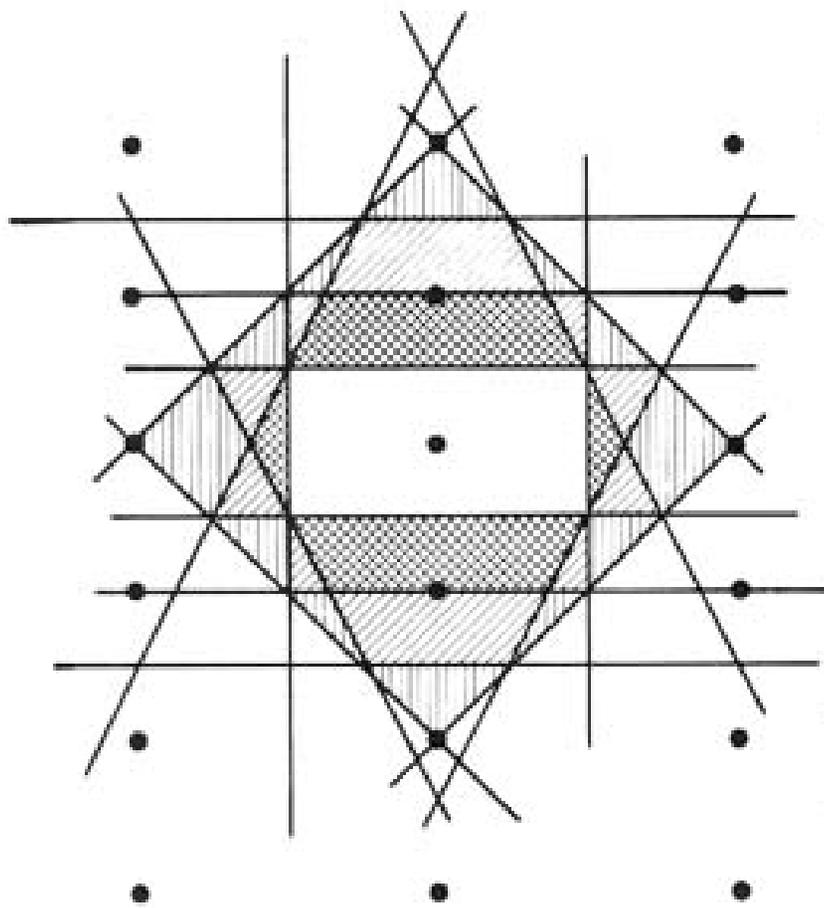
# ZONES DE BRILLOUIN EN 2D: RÉSEAU CARRÉ



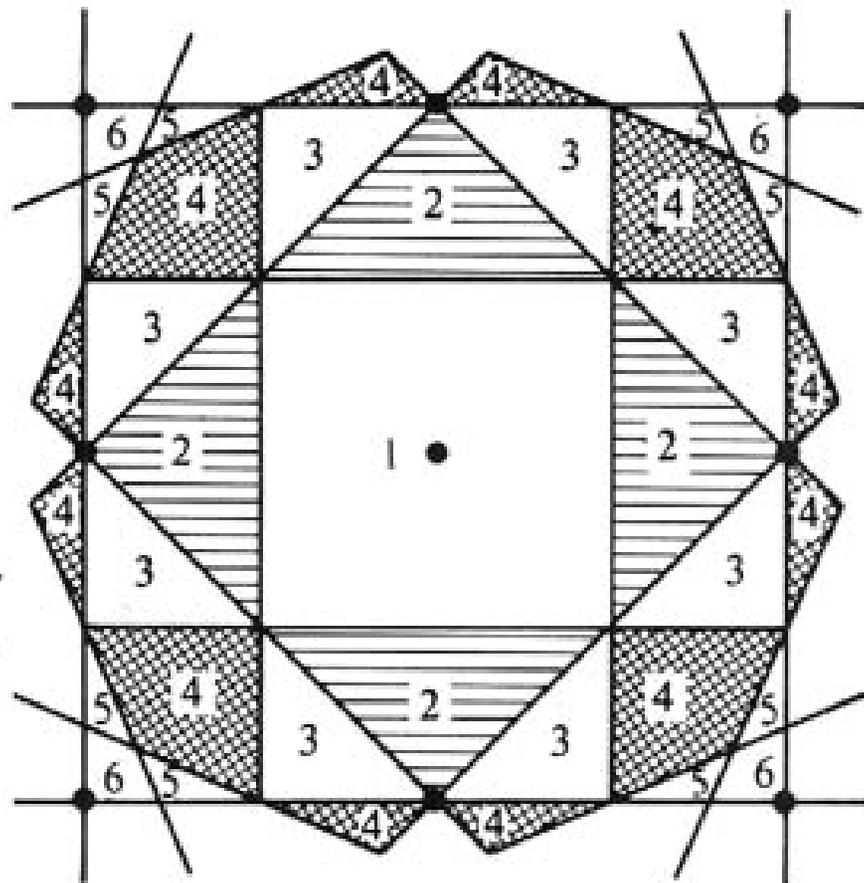
# Zones de Brillouin en 2D: réseau carré



C'est un puzzle!



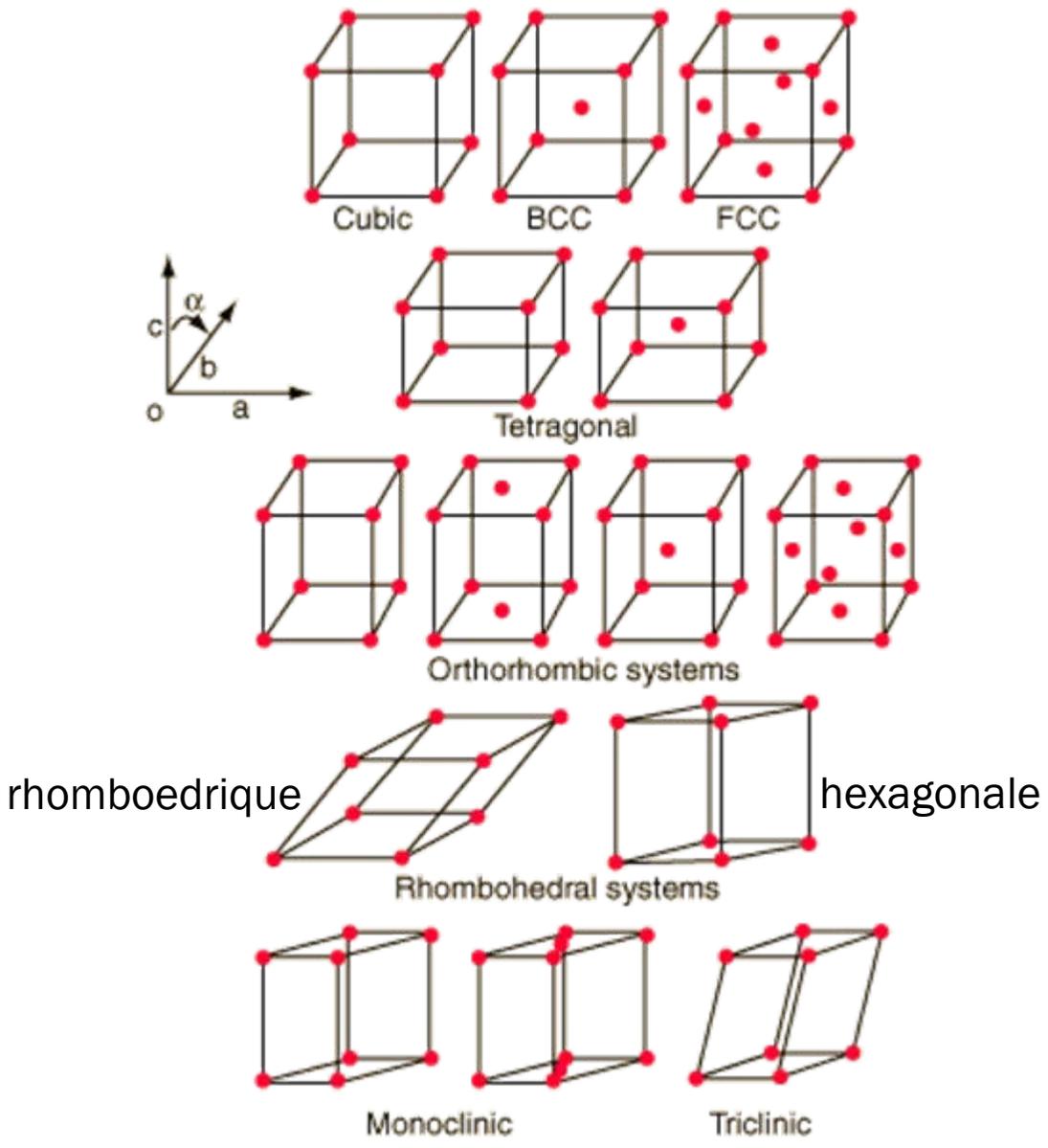
(a)



(b)

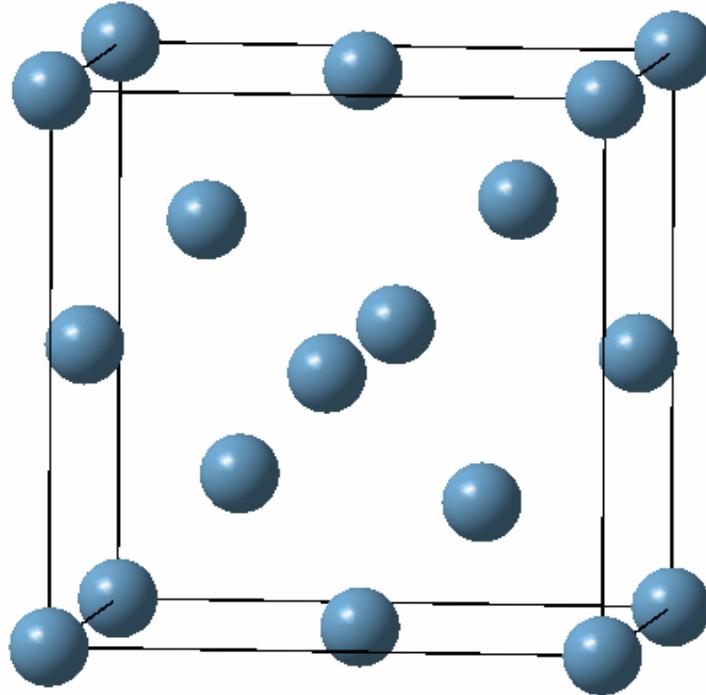


# 3D: LES 7 SYSTEMES CRISTALLINS ET LES 14 RESEAUX DE BRAVAIS



# CRISTAUX EN 3D

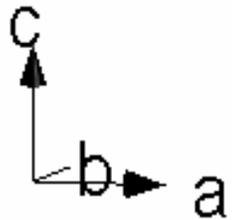
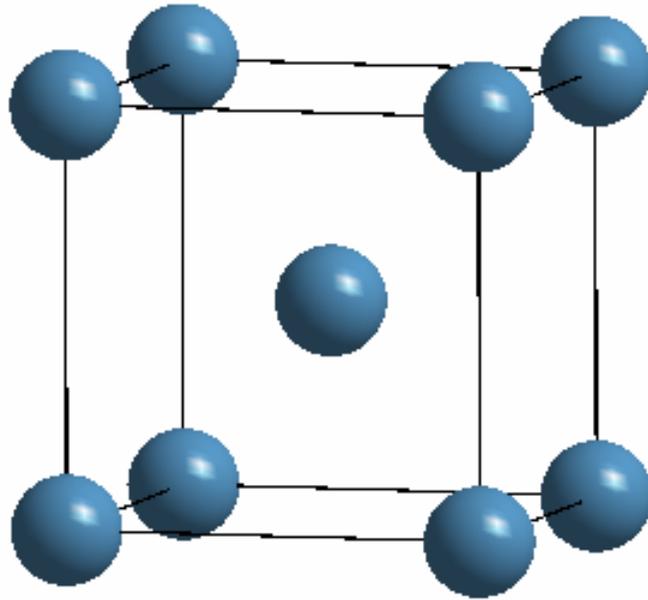
Silicon



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

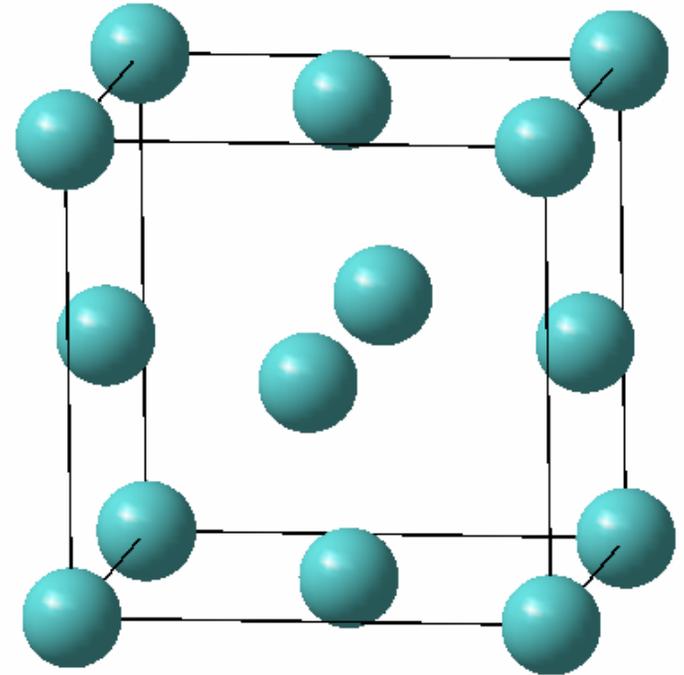
# CRISTAUX EN 3D

$\alpha$ -Fe



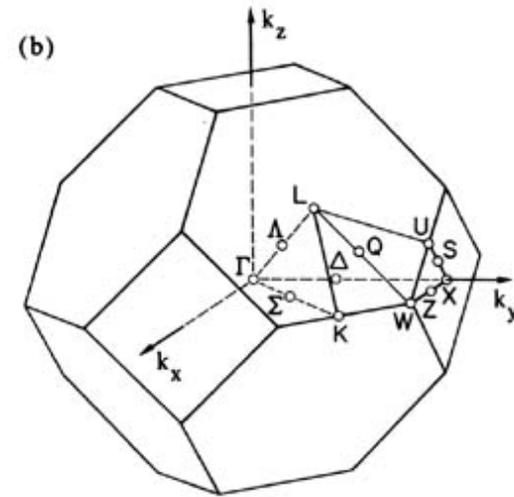
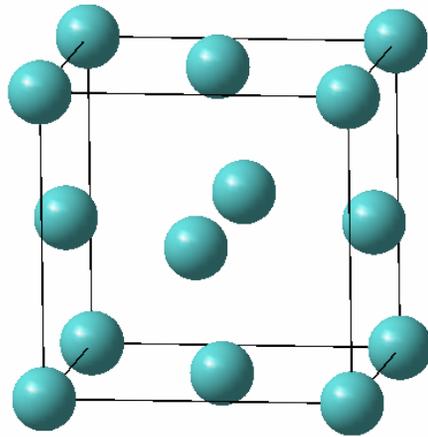
Réseau cubique à corps centré (bcc)

Al fcc

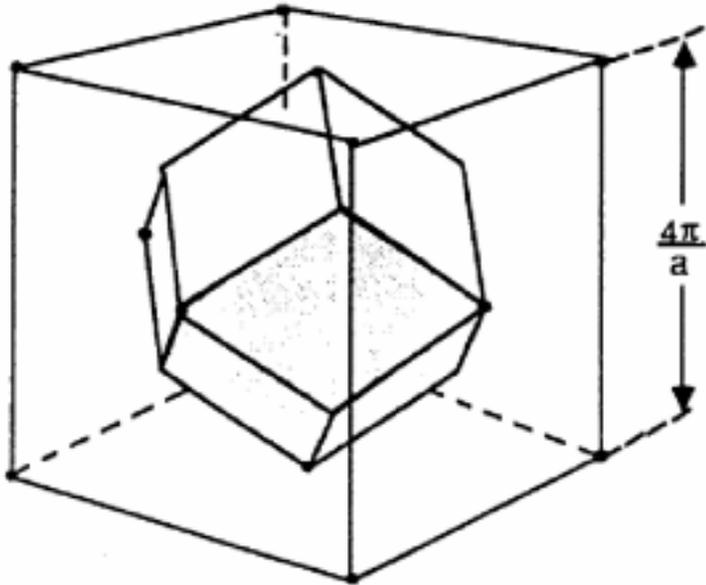


Réseau cubique à faces centrées (fcc)

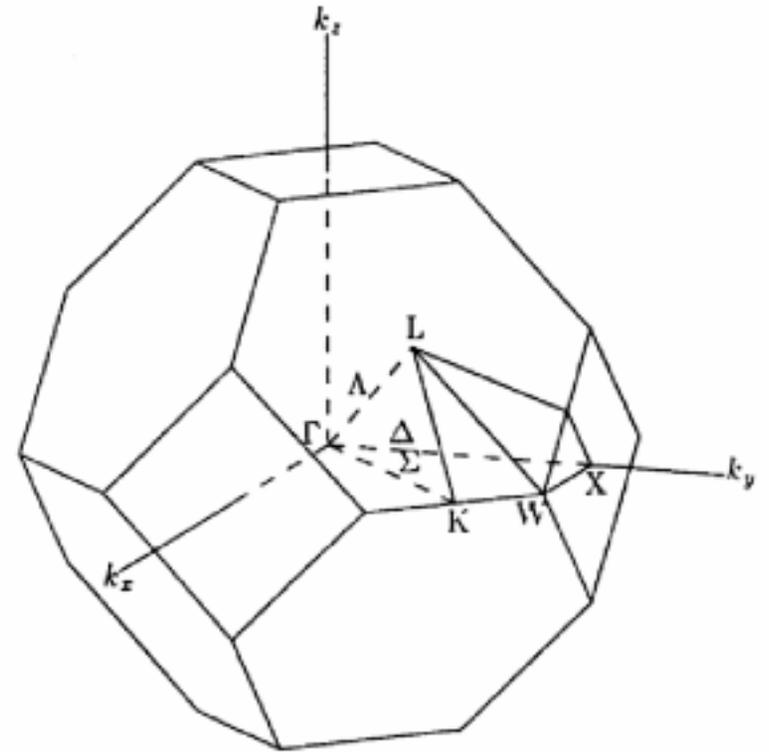
# RESEAU DIRECT ET RESEAU RECIPROQUE: L'EXEMPLE DU REEAU CUBIQUE FCC



# RÉSEAUX RÉCIPROQUES EN 3D



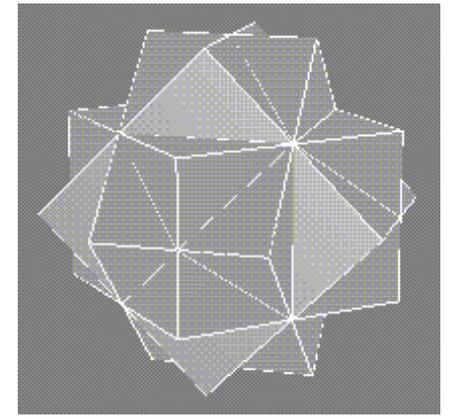
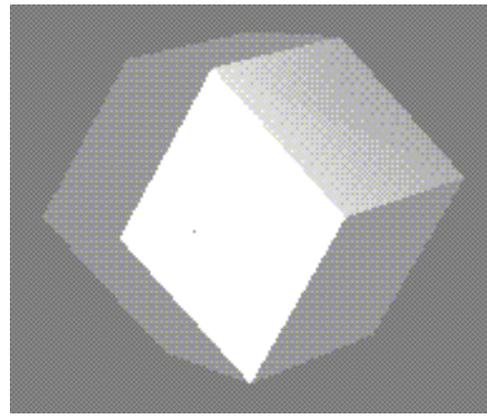
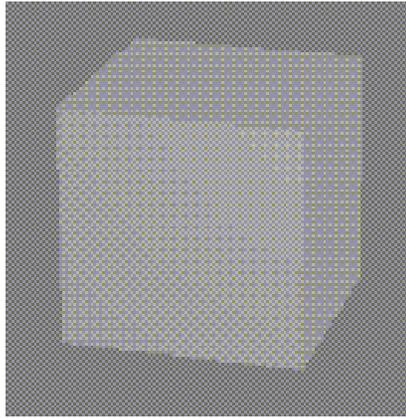
Réseau réciproque de bcc  
(fcc)



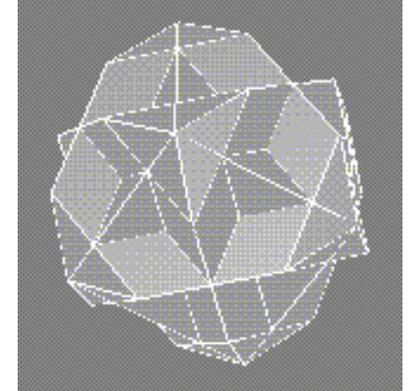
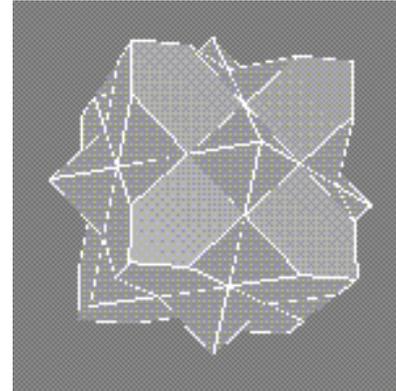
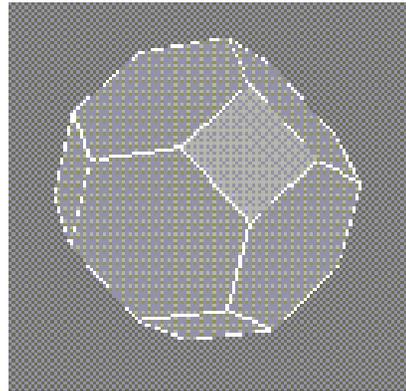
Réseau réciproque de fcc  
(bcc)

# Zones de Brillouin en 3D

Cubique simple



Cubique fcc



Cubique bcc

