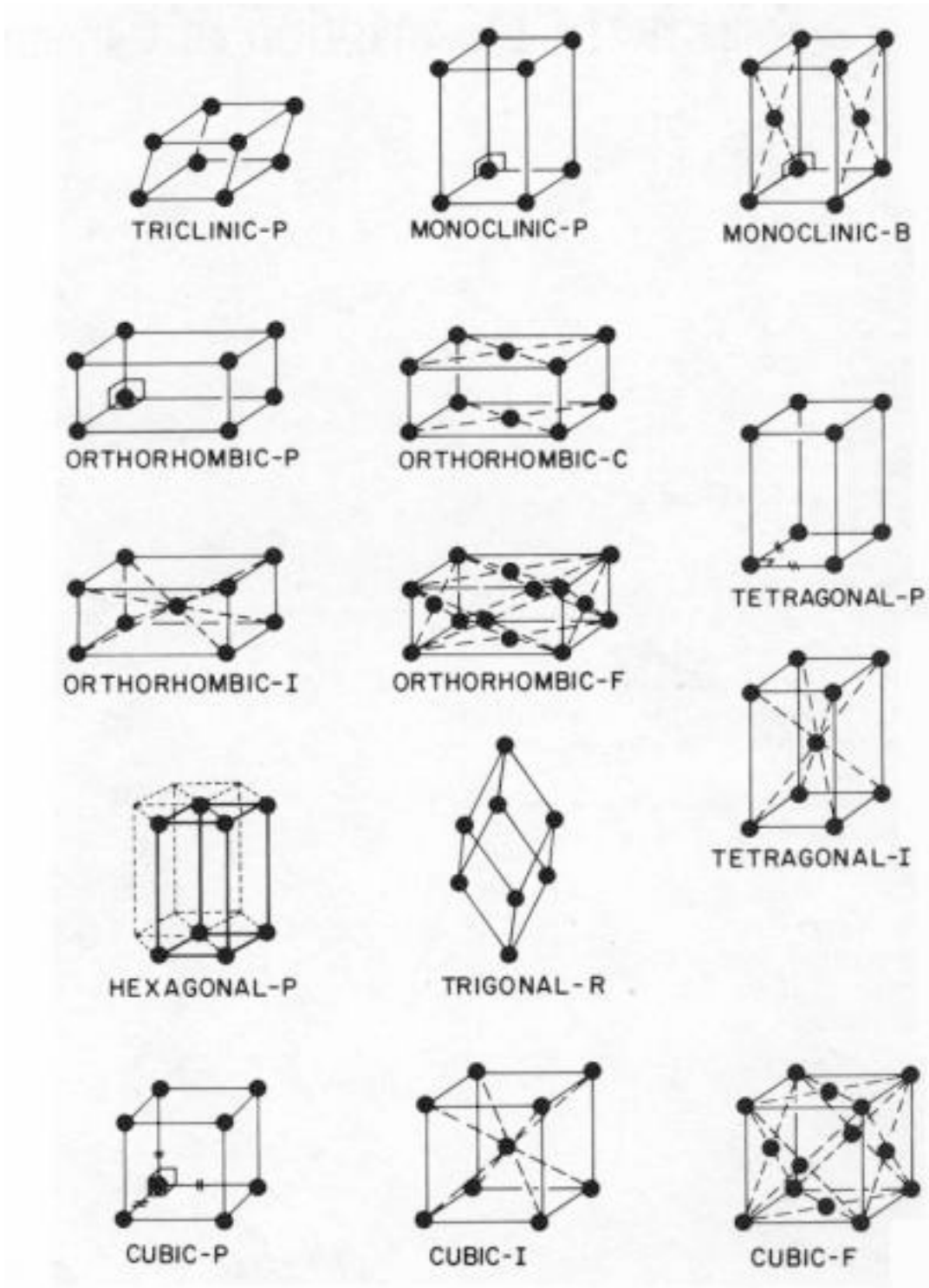
again on direct lattices...

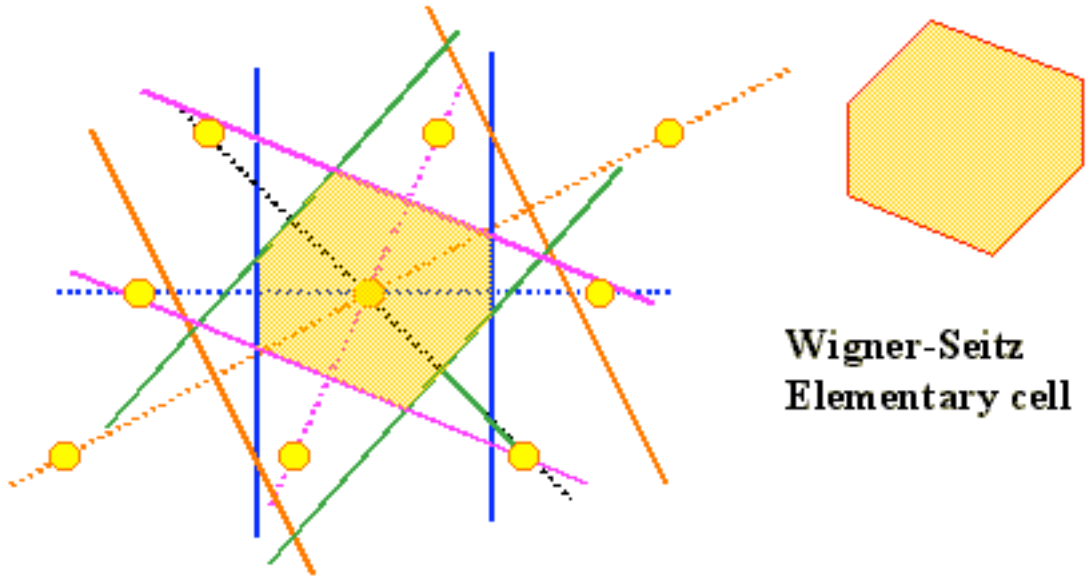
The 14 Bravais lattices



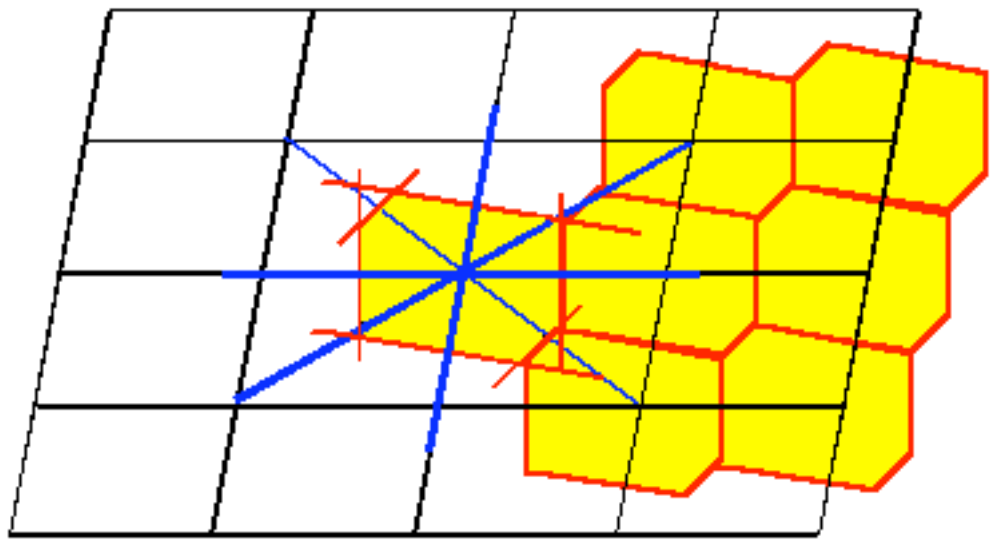
Wigner-Seitz cell around a lattice point

- region of space that is closer to that point than to any other lattice point (topological def.)
- each point pertains to 1 WS cell
- translation -> covers the whole space
- no reference to any particular choice of the Bravais lattice: symmetric as the lattice!

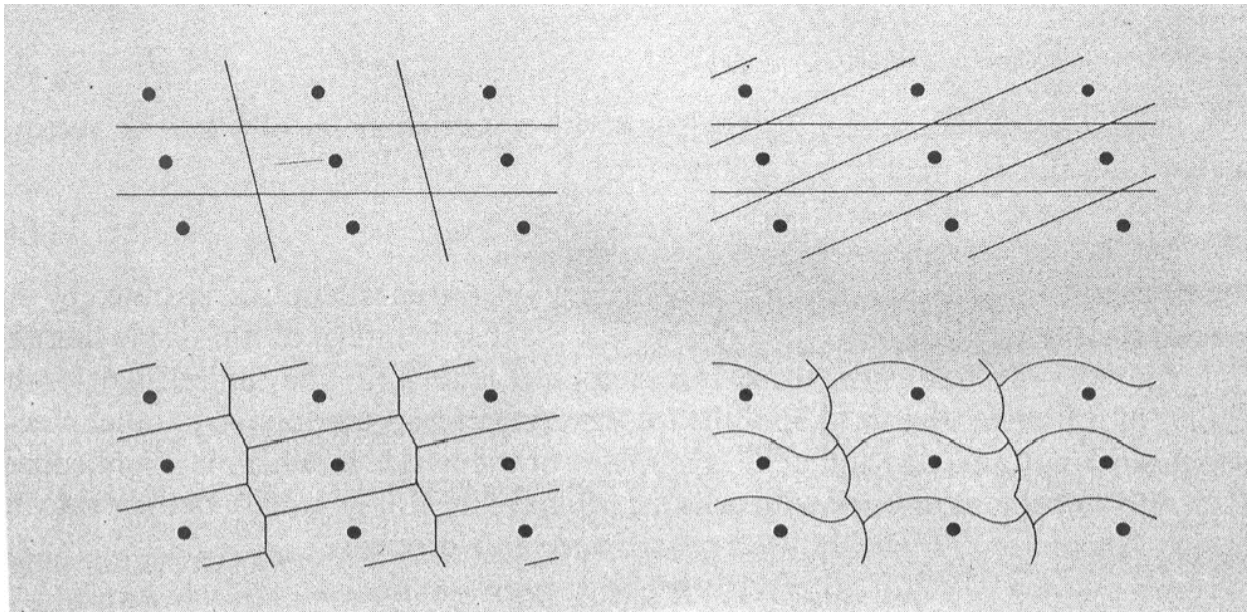
a Wigner-Seitz cell: construction and properties



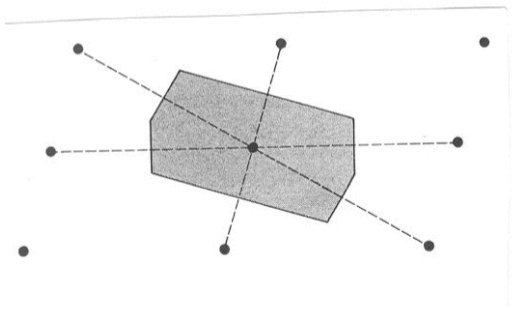
Wigner-Seitz
Elementary cell



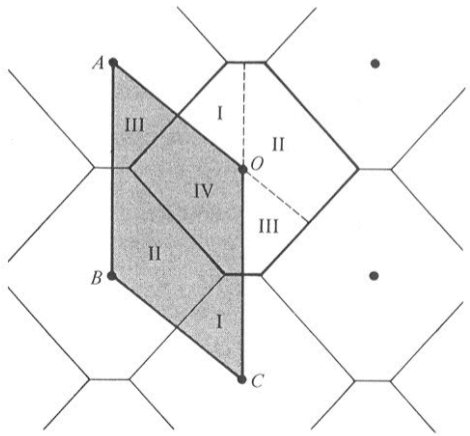
2D examples



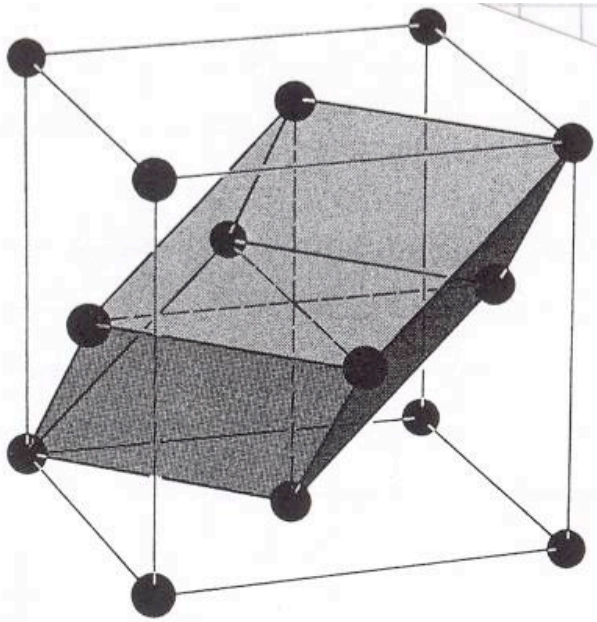
some unit primitive cells for oblique lattice



Wigner-Seitz cell for oblique lattice

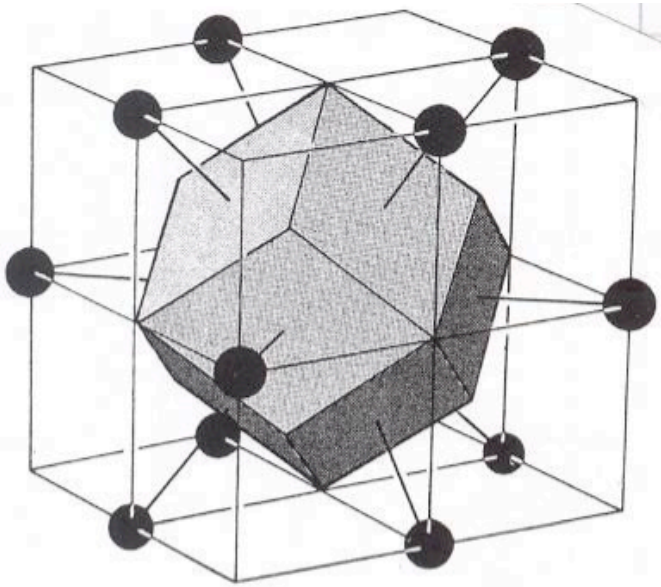


3D - cubic lattices : example of FCC



Primitive and conventional unit cells for the face-centered cubic Bravais lattice. The conventional cell is the large cube. The primitive cell is the figure with six parallelogram faces. It has one quarter the volume of the cube, and rather less symmetry.

unit primitive ; conventional

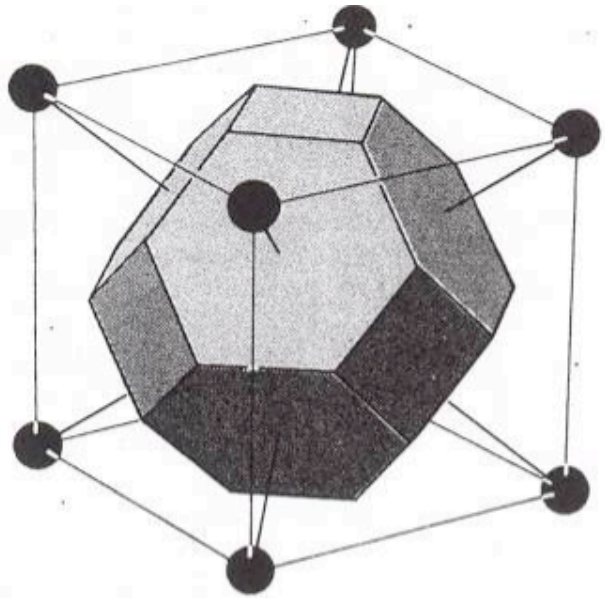


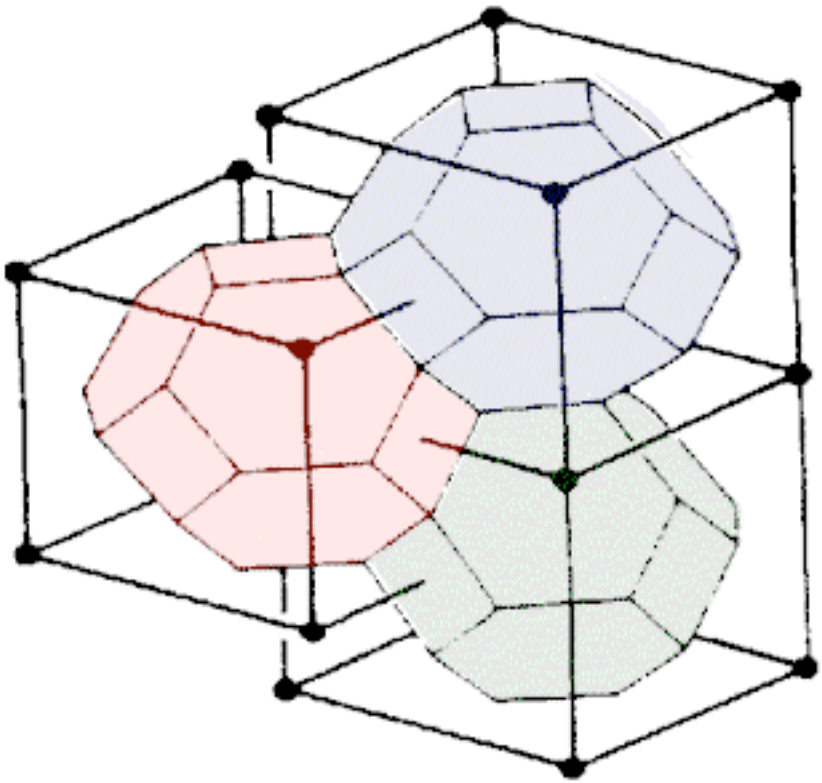
Wigner-Seitz cell for the face-centered cubic Bravais lattice (a "rhombic dodecahedron"). The surrounding cube is *not* the conventional cubic cell of Figure 4.12, but one in which lattice points are at the center of the cube and at the center of the 12 edges. Each of the 12 (congruent) faces is perpendicular to a line joining the central point to a point on the center of an edge.

Wigner-Seitz

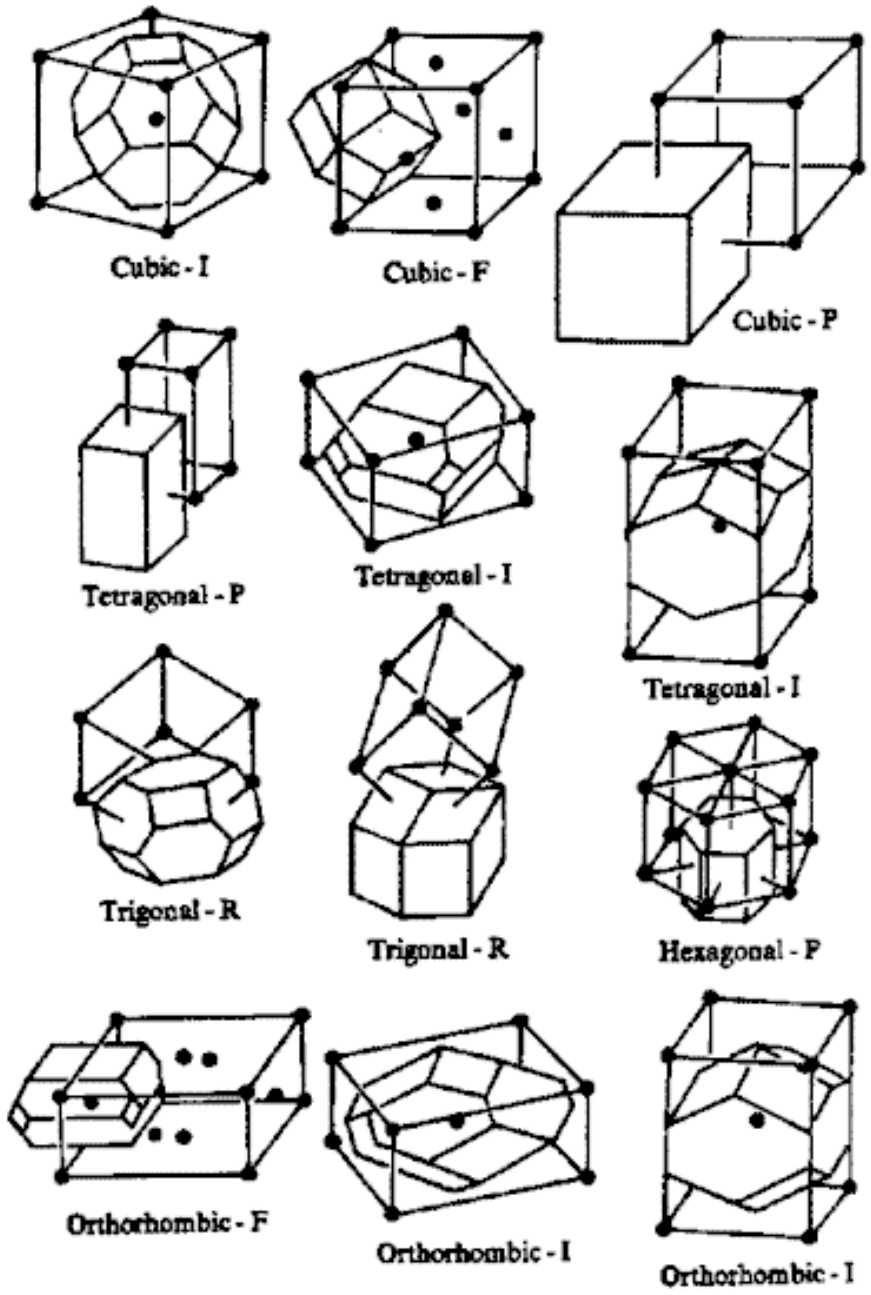
Wigner - Seitz for BCC

The Wigner-Seitz cell for the body-centered cubic Bravais lattice (a "truncated octahedron"). The surrounding cube is a conventional body-centered cubic cell with a lattice point at its center and on each vertex. The hexagonal faces bisect the lines joining the central point to the points on the vertices (drawn as solid lines). The square faces bisect the lines joining the central point to the central points in each of the six neighboring cubic cells (not drawn). The hexagons are regular (see

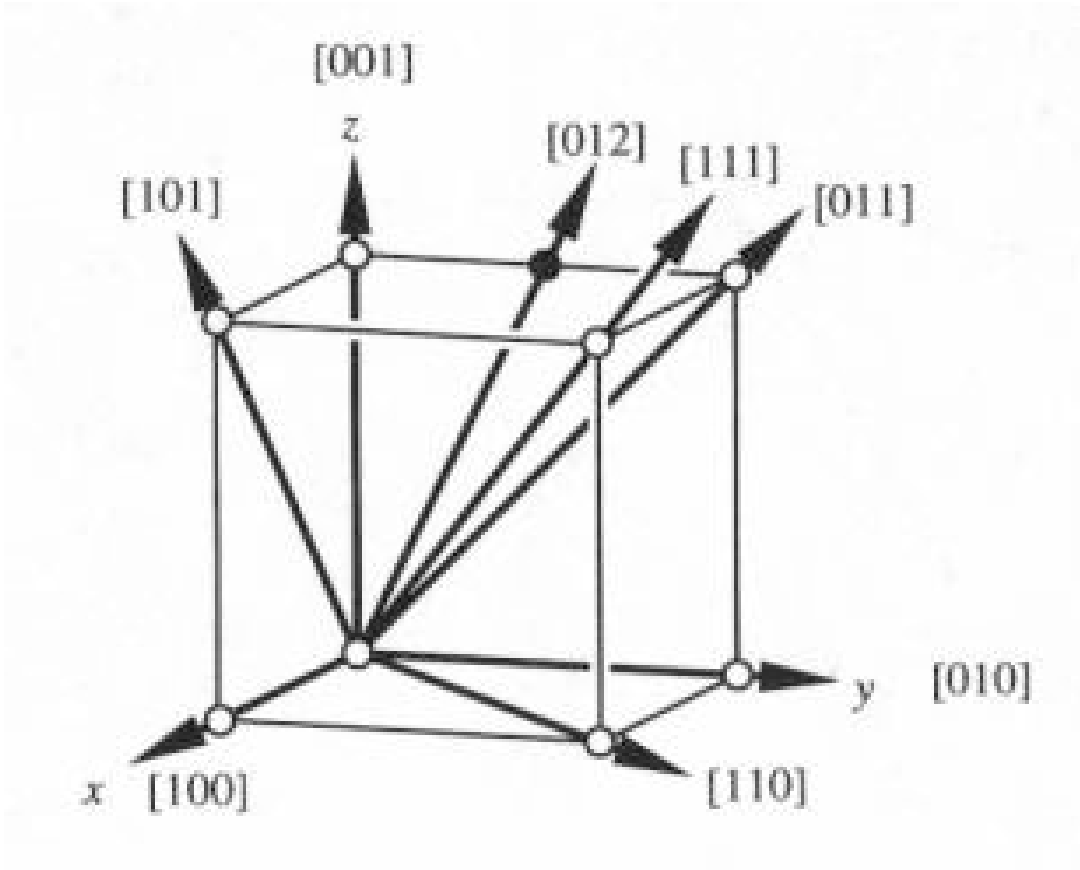




Wigner - Seitz for all Bravais Lattices



Directions



Miller indexes