Chapter 2: Crystal Structures

Kittel: Chap 1

Crystal: Periodic arrangement (of atoms)

Lattice: Set of points defined as integer sums of primitive lattice vectors

principle

Example

1D

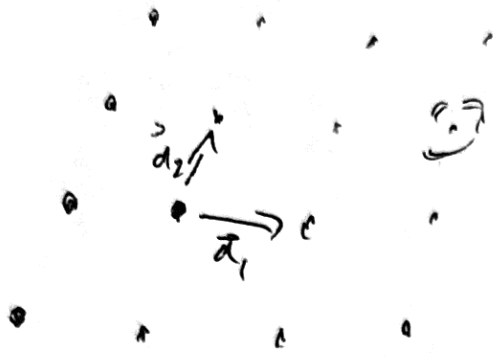
$\vec{R} = n\vec{a}$ ← prim. latt. vector (PLV)

↑ integer

2D $\vec{R} = n_1\vec{a}_1 + n_2\vec{a}_2$

$\vec{a}_1, \vec{a}_2$ are PLV, should be non-colinear

$n_1, n_2 \in \mathbb{Z}$



$\Rightarrow 2\vec{a}_1 + \vec{a}_2$ or $[2,1]$

3D

$$\vec{R} = n_1\vec{a}_1 + n_2\vec{a}_2 + n_3\vec{a}_3$$

$\vec{a}_1, \vec{a}_2, \vec{a}_3$ non-coplanar

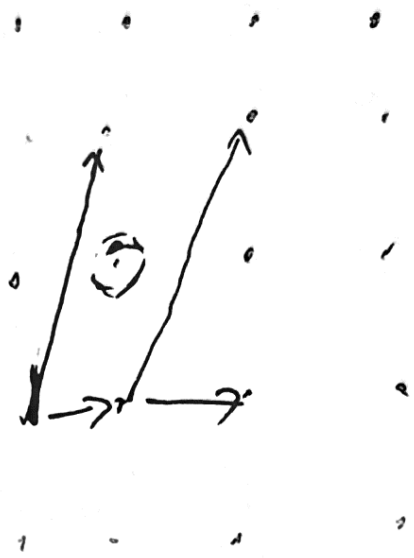
$$\vec{R} = [n_1, n_2, n_3]$$

important:

- choice of PLVs is not unique
- any point on lattice needs to be expressible as integer-multiples of PLVs
- PLVs cannot create points that are not on lattice!

PLVs?

Yes!



No!