Wed. Oct. 17

- It has been a few days, but we were talking about ordering in solids → crystals
- Recall the lattice is a repeating set of points

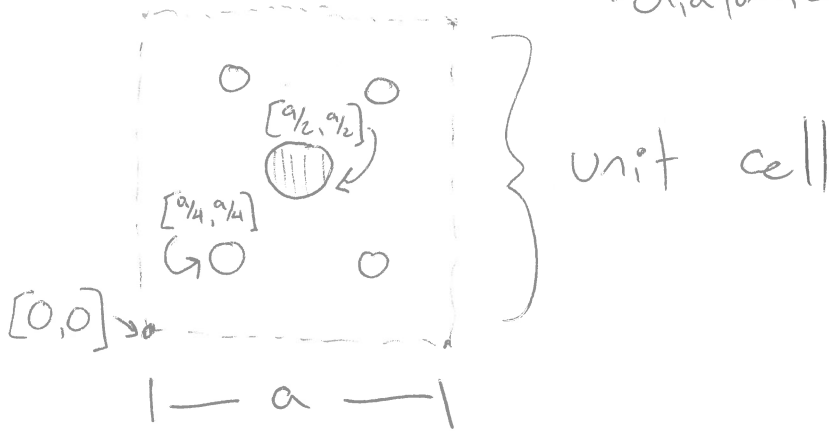
$$\vec{R} = n_1\vec{a}_1 + n_2\vec{a}_2 + n_3\vec{a}_3$$

where $\vec{a}_1, \vec{a}_2, \vec{a}_3$ ≡ primitive lattice vectors

- the Bravais lattice → all points are geometrically identical
- the unit cell is a building block which allows us to reconstruct the entire lattice when tiled
- primitive unit cell has just one lattice point
- we have not discussed the "basis" yet
- the basis relates the lattice to the actual atoms making up the solid

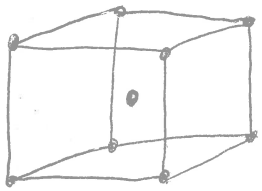
- Example of a basis in 2D

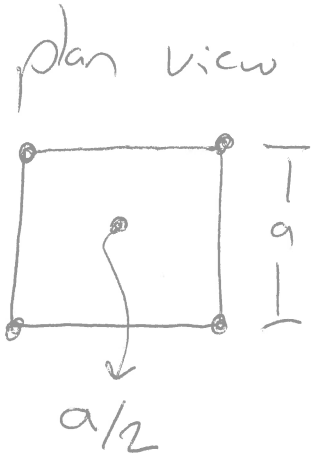
- diatomic solid



- Crystals in 3D:

ex: body-centered cubic (bcc)

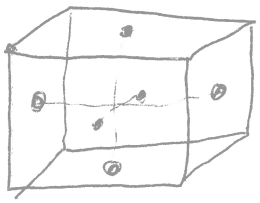




- one point in the center of the body, thus (bcc)

Ex: face-centered cubic (fcc)

- each face has a lattice point



- face points only points drawn

- both cells drawn are "conventional"
- primitive cells have only one lattice point
  → create using Wigner-Seitz method (see slides)

- We now take a closer look at the geometry of the reciprocal lattice

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