

Exercises Condensed Matter Physics (Experimentalphysik 5c), WS16/17

1. Madelung Constant (2 credits)

Read the example on the calculation of the Madelung Constant of NaCl in Wikipedia:

https://en.wikipedia.org/wiki/Madelung_constant

Please indicate the first two terms of the sum required for the calculation of the Madelung constant of CsCl.

2. Ionic radius and structure type (2 credits)

Evaluate the ratio of the ionic radii r_M/r_X , at which the X ions of an MX compound with CsCl structure type touch each other.

3. Close-packing of equal spheres (2 credits)

Evaluate the packing density (partition of occupied volume) of close-packed equal spheres.

4. Primitive unit cell (2 credits)

A unit cell is called primitive, if, upon translation by an arbitrary Bravais lattice vector, it fills the complete volume of the crystal without overlapping.

Draw a primitive unit cell of a 2-dimensional close-packed lattice.