Exercises for the lecture: "Experimental physics 5c, Condensed matter physics" Winter semester 2019/20 Prof. Dr. H.J. Elmers Dr. T. Mashoff



Exercise sheet # 4 Group A: Monday 13-14, Lorentz-Room Group B: Tuesday 10-11, Seminar room A Group C: Wednesday 10-11, Galilei-Room Group D: Friday 14-15 Seminar room 1 KP

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## Exercise 10 (3P)

Calculate the structure factor  $S_{hkl}$  if a simple metal for the following lattices. For which values of (h,k,l) is  $S_{hkl} = 0$ ? a) Simple cubic (sc) b) Diamond lattice

c) GaAs lattice (Zincblende structure)

Exercise 11 (2P)

An X-ray beam with a wavelength of  $\lambda = 82.5 \text{ pm}$  hits the surface of a NaCl-crystal in (100)-orientation. The first reflexes can be observed at angles of  $\Theta_1 = 8.41^{\circ}$  and  $\Theta_2 = 17.01^{\circ}$ . Determine the lattice constant of NaCl from this information. At what angle  $\Theta_3$  the third reflex can be observed?

## Exercise 12 (2P)

Draw the first 4 Brillouin zones of a 2-dimensional square lattice.