Faculty of Physics - University Duisburg - Essen - Campus Duisburg

Lab report: **B10 X-ray radiation**
Date: .....

Participants: group:..... names:.....

.....

Supervisor:..... Sign..... Date.....

Bragg-Reflection:
interference of x-rays on a NaCl - single crystal

Bragg-condition: $n\lambda = 2\,d \sin\theta_n$

n = 1, 2,...: , λ: x-ray wave length,
d: lattice distance of crystal,
θ_n: Glanzwinkel n. order

radiation source: X-ray anode Cu.
U_A ca. 30kV
$\lambda_{K\alpha}$ = 154 pm,

NaCl-crystal: lattice distance d = 282,5 pm (Literature)

Durchführung: 1) search for interference maxima by scanning in 4° steps by measuring x-ray intensity with Geiger Müller counter

2) at maxima increasing resolution as suitable plotting diagram of maxima from table

final result: lattice distance of NaCl:

n = 1 : θ_1^m = ...
n = 2 : θ_2^m = ...
n = 3 : θ_3^m = ...

$$d = \frac{n\lambda}{2 \sin\theta_n}$$

error discussion:

mean value: $$\bar{d} = \frac{1}{m} \sum_i d_i$$

m: number of single values

standard deviation of the single value: $$s_d = \sqrt{\frac{\Sigma (d_i)^2 - \frac{1}{m} (\Sigma d_i)^2}{m - 1}}$$

Lattice distance of NaCl: d = (±) pm

deviation from the literature value ..... % :

principal accuracy of experiment:

what is the measurable thickness range of the setup?