Lab 4, Part II.

Not a report. Not real data. Just for the ideas.

This is a sketch for this part of the lab. We will denote receiver w/ R, Transmitter w/ T, and Bragg planes w/ BP1 and BP2 as shown in fig. 1.

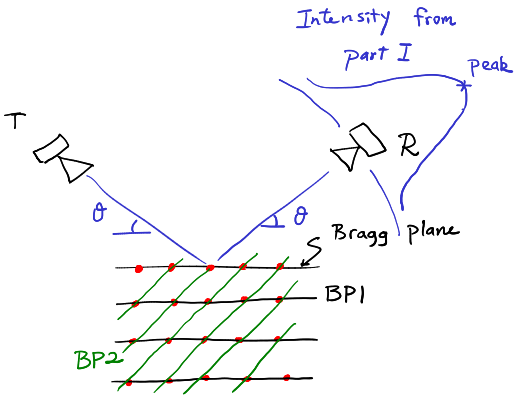

Figure 1. The profile from part I.

Procedure: We consider BP1 first. For each angle θ, between T and BP1, we measure either the peak reading on the R, or when angle between R and BP1 is also θ.

θ/deg ±1°	I/mA
0°	— ± —
5°	— ± —
⋮	⋮
85°	— ± —

Table 1. Ref. peaks at different θ.

$2d \sin \theta^{(1)}_{max} = 1\lambda$

$d = \dots \pm \dots$

$2d \sin \theta^{(2)}_{max} = 2\lambda$

$d = \dots \pm \dots$

$d = \dots \pm \dots$

Figure 2. Reflection peaks measured at different θ. Based on data from table 1.

Now we zoom in around maximums of this graph and do a quadratic curve fit, as shown in fig. 3.

→ Exact same procedure for BP2.

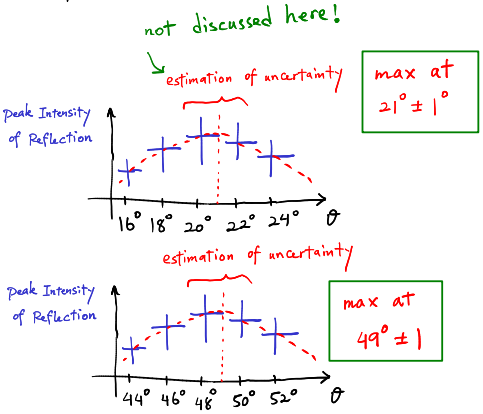

Figure 3. Finding maxima of graph in fig. 2, using quadratic curve fits.

The main source of error is the assumption that θ stays constant for the parallel Bragg planes. Because d is not very small w/ respet to the distances between T or R from 'crystal'. One can estimate this error (exercise). See fig. 4

In this experiment you can find d w/ less than 10% error!

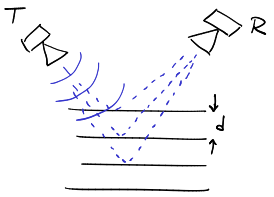

Figure 4. θ not being the same for parallel Bragg planes.