Z39(X1) - X Radiation

Physics Laboratory II – academic year 2017/2018
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The aim of this experiment is to measure the intensity of X radiation from the lamp with tungsten anode. The intensity of the radiation as a function of Bragg angle is measured with the usage of monocristal and Geiger-Müller counter. Energy of the detected radiation is determined based on the angles of refraction of characteristics lines of X radiation.

Preparatory questions

- X radiation and its interaction with matter [1, 2];

- elements and characteristics of X-ray lamp;

- ionization, energy of ionization [1, 2];

- bremsstralung [1, 2];

- selection rule [1, 2];

Computational assignments

1. Calculate at least 3 values of refraction angles for which one can expect maximas in the intensity distribution of X-ray for copper and LiF crystal.

2. Taking into account given angular resolution and assuming other parameters to be precise, calculate error on the energy levels determination.

Apparatus and materials

- X-ray unit with tungsten anode.

- Geiger-Müller (GM) counter.

- LiF cristal.

- Diaphragm tube.

Experiment

- Measurement of the spectrum of X-rays emitted by tungsten anode as a function of Bragg angle with the usage of LiF monocristal as analysator.

- Determination of energy of characteristic radiation of tungsten.

Data analysis

Based on the measured intensity spectrum of the spectral lines as a function Bragg angle deterrmine energy of each line (using Figure 1).

References

[1] W.R. Leo, *Techniques for nuclear and particle physics experiments*, S.-Verlag 1987.
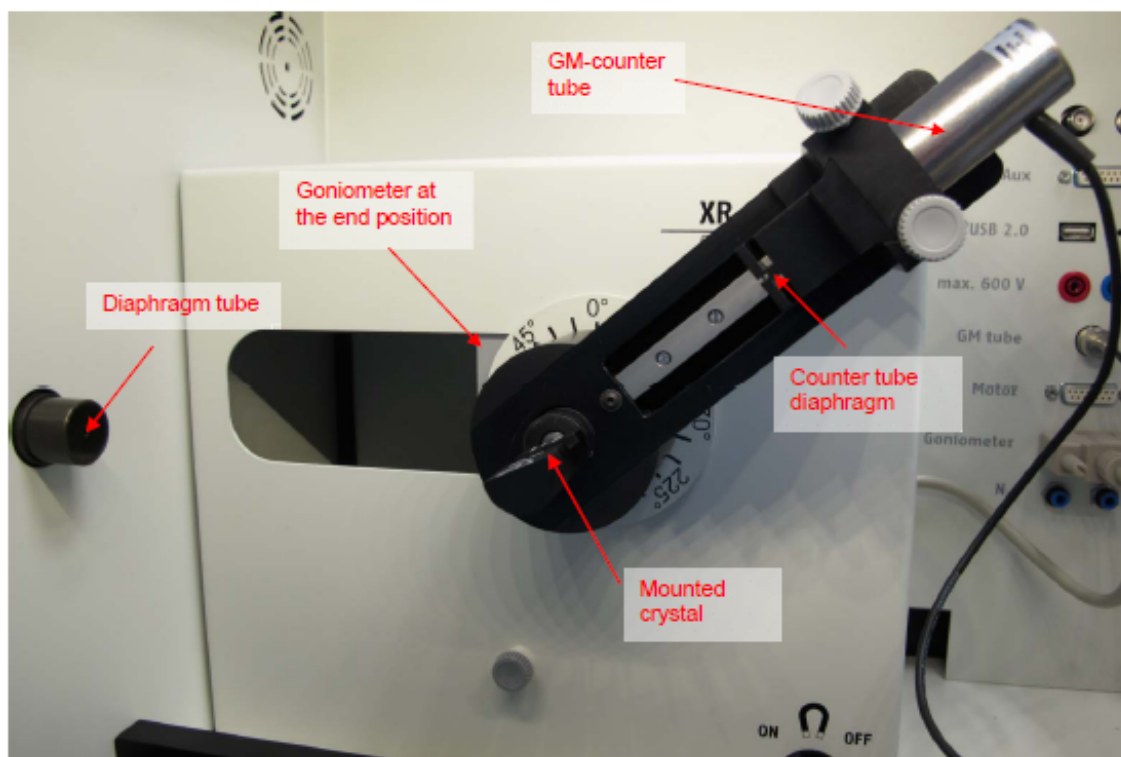
[2] K. S. Krane, *Introductory Nuclear Physics*, John Wiley & Sons

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Figure 1: Experimental apparatus