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Laboratory III

Laboratory Report

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1 Measurement Setup and Preparations

Setup

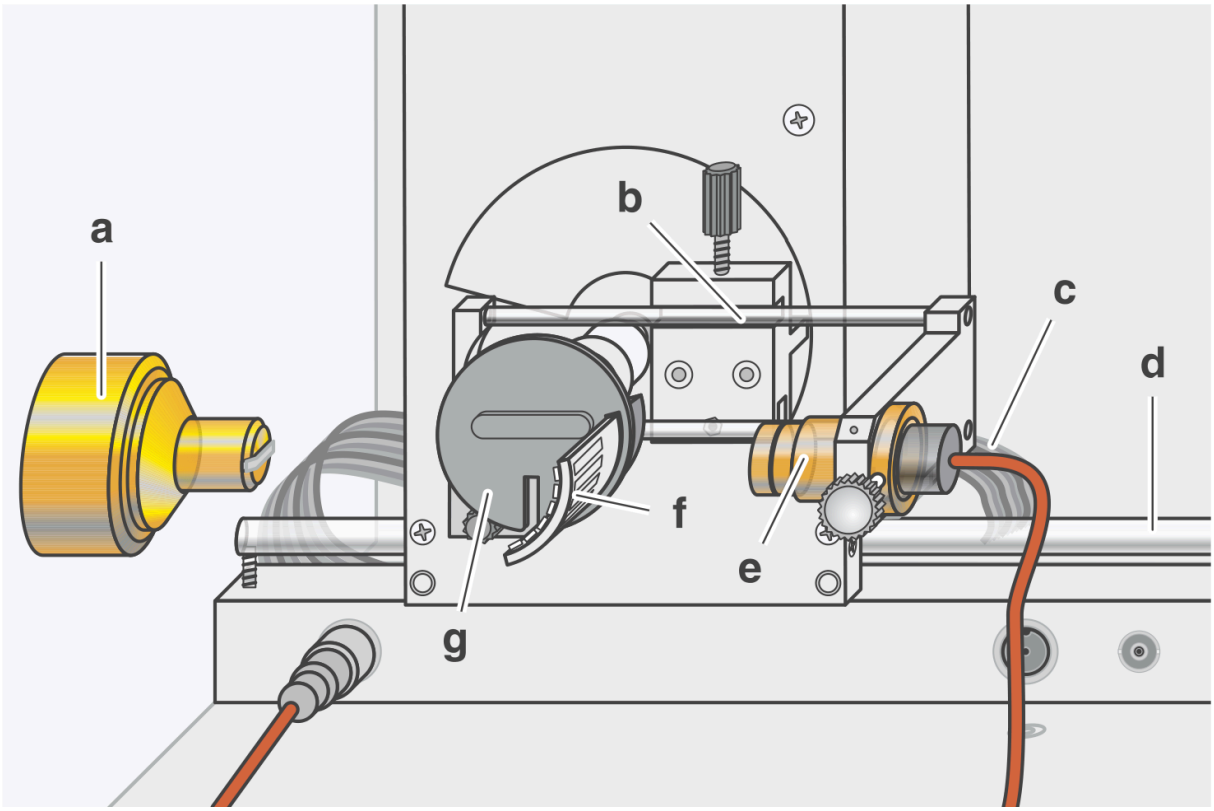

Figure 1: Measurement Setup with following compenents: (a) collimator mount, (b) sensor holder, (c) flat ribbon cable, (d) goniometer guide rods, (e) sensor mount, (f) insertion edge of absorber set l, and (g) goniometer target holder.

Preparations

- Carefully align the guide rod while inserting the collimator into the collimator mount (a).
- Secure the goniometer onto the guide rods (d) before connecting the flat ribbon cable (c) for control.
- After removing the protective cap, install the window counter tube into the sensor mount (e) and plug its cable into the GM-tube socket in the experimental area.
- Remove the goniometer's target holder (g) to lift off the target table.
- Slide the insertion edge of absorber set l (f) into the quarter-circle groove of the target holder until it clicks into place.
- Swap out the sensor holder with X-ray energy detector for the holder equipped with the window counter tube.
- Reinstall the target holder carrying absorber set l.
- Press the "Zero" button to set target and sensor to their null positions.
- Verify (and adjust if needed) the zero position of both the blank aperture in the absorber set and the sensor (see "Setting the measurement zero position" in the X-ray manual).
- Finally, slide the goniometer to position the collimator at 5 cm from the blank aperture, then slide the sensor holder (b) to set 5 cm between aperture and sensor slit. = Dependence of attenuation on absorber thickness

2 Dependence of attenuation on absorber thickness

2.1 Measurement without a zirconium filter

d in mm	R in 1/s
0	977.9
0.5	428.6
1	210.1
1.5	106.1
2	49.1
2.5	30.55
3	16.11

Table 1: Some Caption

2.2 Measurement with a zirconium filter

d in mm	R in 1/s
0	969.4
0.5	426.1
1	197.3
1.5	84.29
2	40.51
2.5	19.48
3	9.52

Table 2: Some caption

2.2.1 Measurement Results

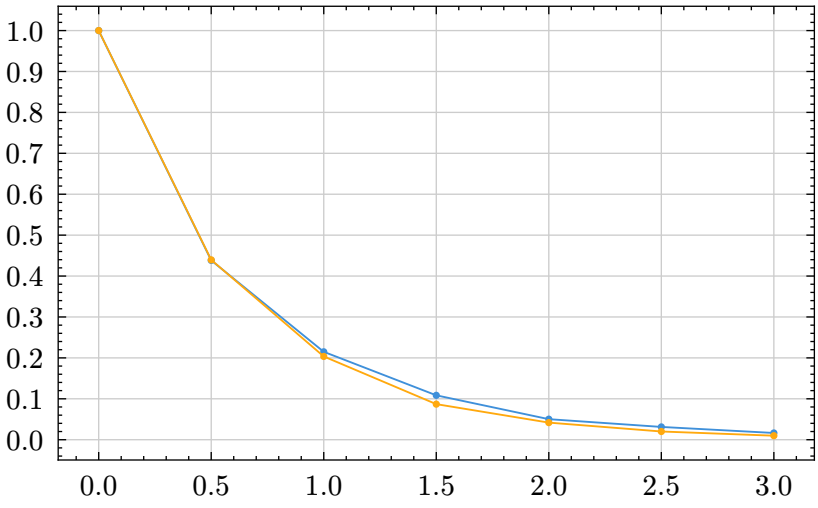

Figure 2: Some Caption

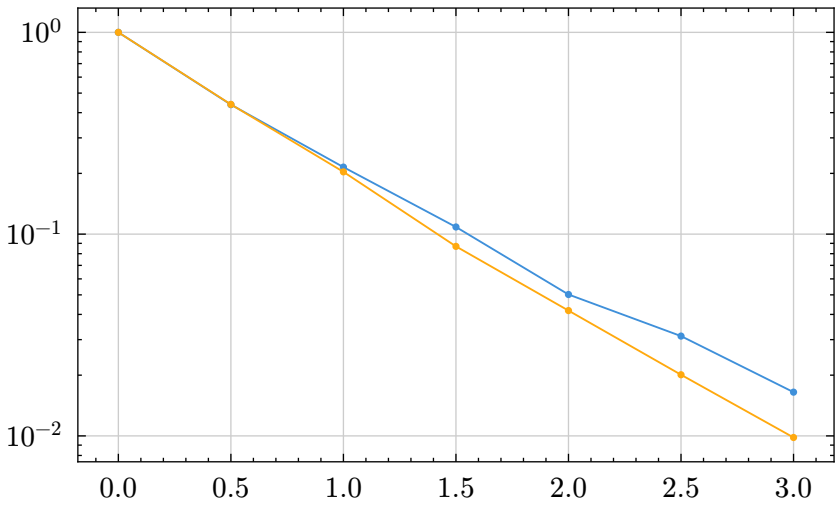

Figure 3: Some Caption

3 Dependence of attenuation on the absorber material

3.1 Measurement without zirconium filter

Absorber	Z	I / mA	Δt / s	R / s^{-1}
leer	0	0.02	30	977.9
C	6	0.02	30	428.6
Al	13	0.02	30	210.1
Fe	26	1	300	106.1
Cu	29	1	300	49.1
Zr	40	1	300	30.55
Ag	47	1	300	16.11

3.2 Measurement with a zirconium filter

Absorber	Z	I / mA	Δt / s	R / s^{-1}
leer		0.02	30	718.3
C	6	0.02	30	698.4
Al	13	0.02	30	406.1
Fe	26	1.00	300	29.24
Cu	29	1.00	300	6.016
Zr	40	1.00	300	113.9
Ag	47	1.00	300	24.52

3.3 Measurement of the Zeroeffect