

# Report Lab 1

Experimental Physics for AI 2

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First semester 2024 - 2025

## Chapter 1

# Measurement of the current-voltage characteristic of a resistor

## Chapter 2

# Measurement of the current-voltage characteristic of a diode

### 2.1 Goal

Now we want to measure the current-voltage characteristic of a diode, which should not be linear. Indeed, according to Shockley's law, it is exponential:

$$I = I_0 \left( e^{\frac{qV}{gkT}} - 1 \right)$$

where  $I_0$  is the reverse saturation current,  $q$  is the electron charge,  $k$  is the Boltzmann constant,  $T$  is the temperature, and  $g$  is the diode type-dependent constant. In this chapter we will try to verify this law.

Moreover for practical applications it's common practice to define the diode's *threshold voltage* as the voltage at which the diode starts conducting a "significant" current. We will try to measure this value as well.

### 2.2 Method

Using a similar setup as the one in part one, we recorded the measured values of current at different voltages. The setup is shown in figure 2.1.

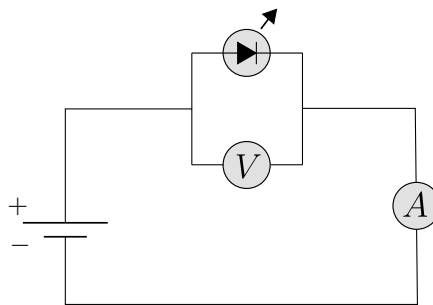


Figure 2.1: Setup diode

## 2.3 Data

The data we collected is shown in table 2.1 and is represented graphically in figure ??.

Voltage (V)		Current ( $\mu A$ )	
0.499	0.002	0.03	0.05
0.999	0.002	0.08	0.05
1.499	0.003	0.12	0.05
1.999	0.003	0.16	0.05
2.099	0.003	0.17	0.05
2.200	0.003	0.19	0.05
2.299	0.003	0.26	0.05
2.399	0.003	1.74	0.05
2.409	0.003	2.33	0.05
2.419	0.003	3.16	0.05
2.428	0.003	4.33	0.05
2.438	0.003	5.95	0.05
2.448	0.003	8.19	0.05
2.458	0.003	11.28	0.06
2.467	0.003	15.47	0.06
2.477	0.003	21.16	0.06
2.486	0.003	28.55	0.06
2.495	0.003	38.42	0.07
2.504	0.003	51.03	0.08
2.512	0.003	66.50	0.08
2.520	0.003	84.54	0.09
2.528	0.003	105.8	0.1
2.535	0.003	130.0	0.1
2.542	0.003	158.8	0.1
2.549	0.003	189.2	0.1
2.556	0.003	222.6	0.2
2.562	0.003	258.5	0.2
2.568	0.003	296.5	0.2

Table 2.1: Data collected for the diode