

# **Protocol Laboratory: Electrical Engineering #5**

**Hochschule Rhein-Waal**

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**Course name:**        Laboratory: Electrical Engineering

**Group:**                C

**Faculty:**              Communication and Environment

**Deadline:**            18.07.2019

**Semester:**            SS 2018/19

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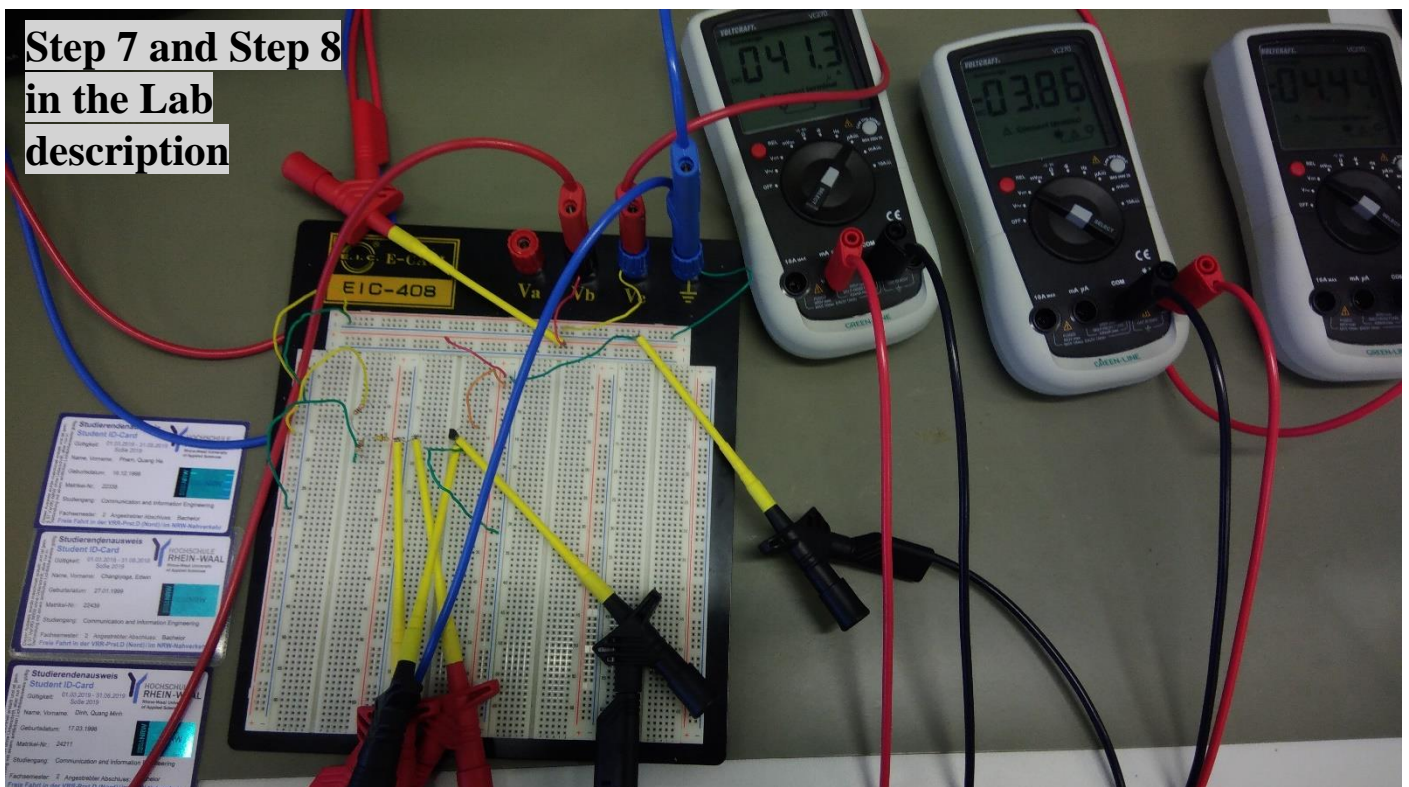
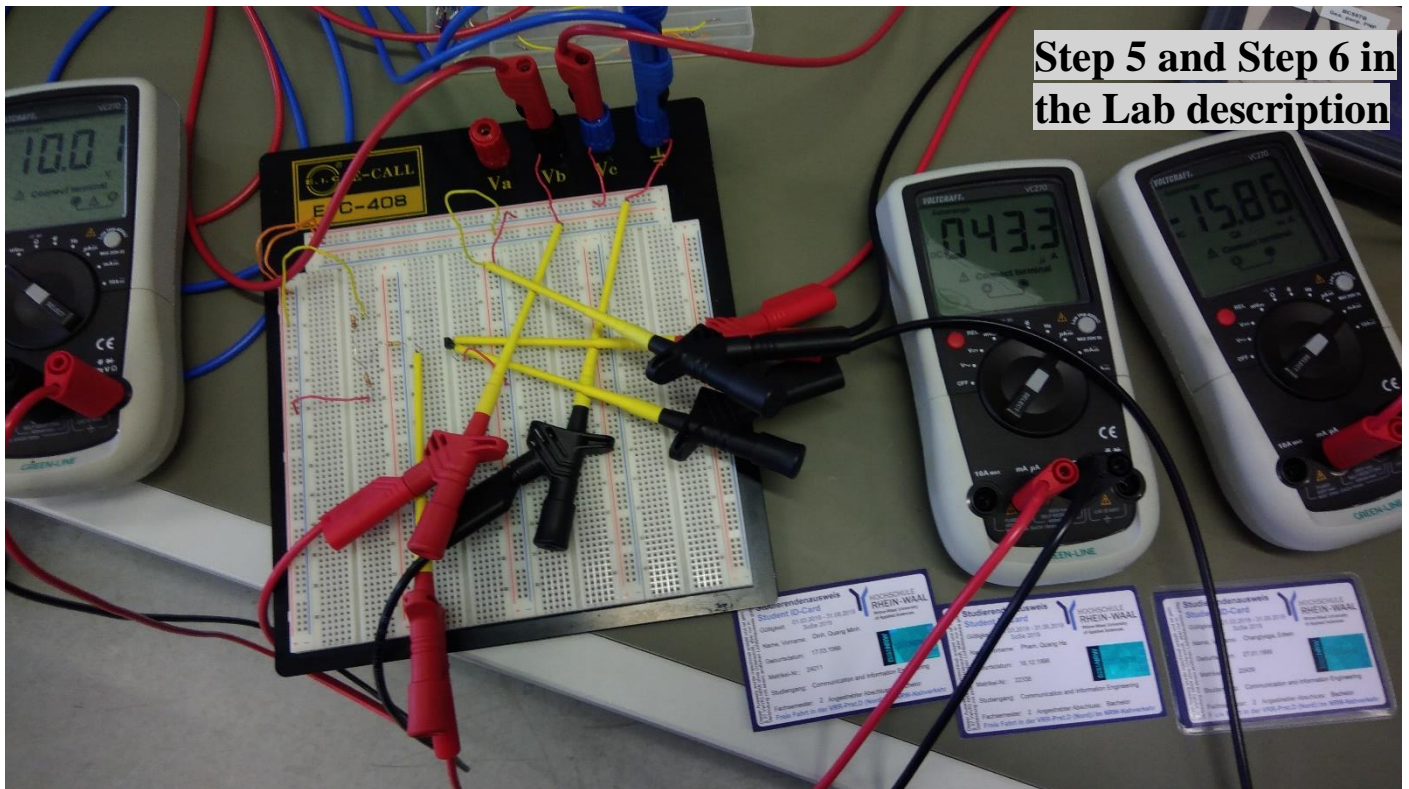
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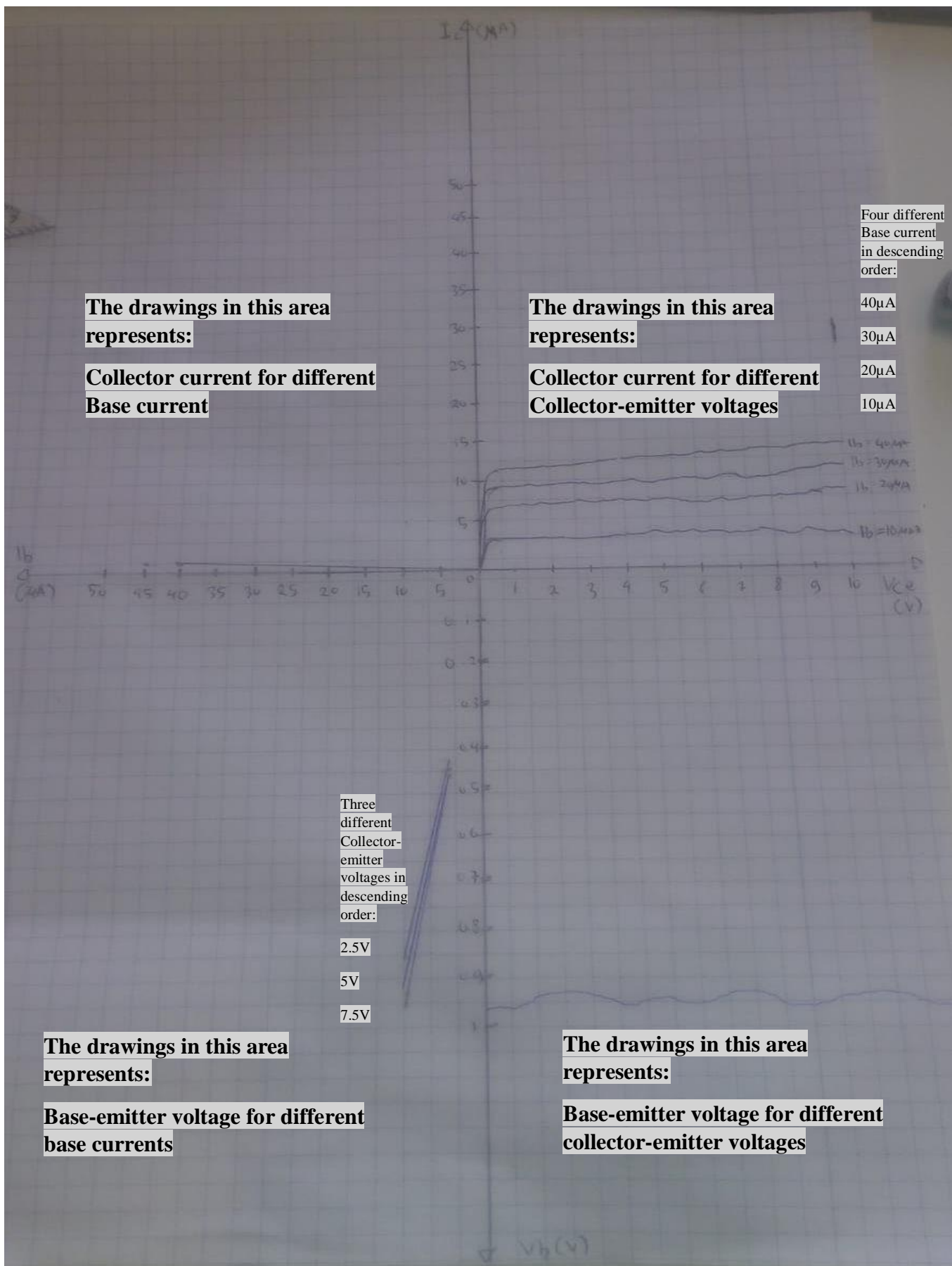
# Challenge #1

## Abstract:

Our group managed to completed the challenge by following the steps given in the Description of the Laboratory booklet.

## Pictures:





The drawings in this area represents:

Collector current for different Base current

The drawings in this area represents:

Collector current for different Collector-emitter voltages

Four different Base current in descending order:

40  $\mu A$

30  $\mu A$

20  $\mu A$

10  $\mu A$

Three different Collector-emitter voltages in descending order:

2.5V

5V

7.5V

The drawings in this area represents:

Base-emitter voltage for different base currents

The drawings in this area represents:

Base-emitter voltage for different collector-emitter voltages

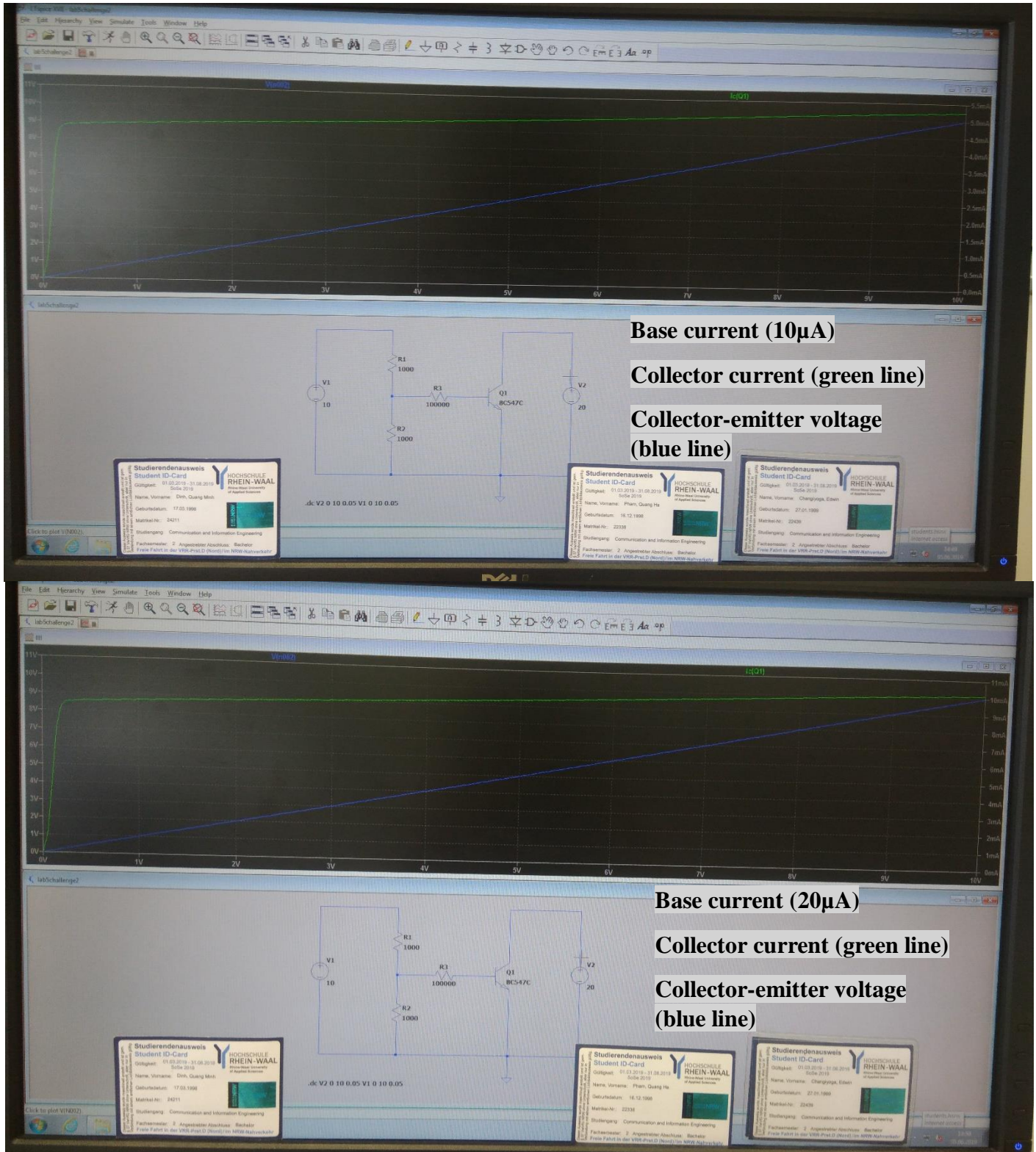


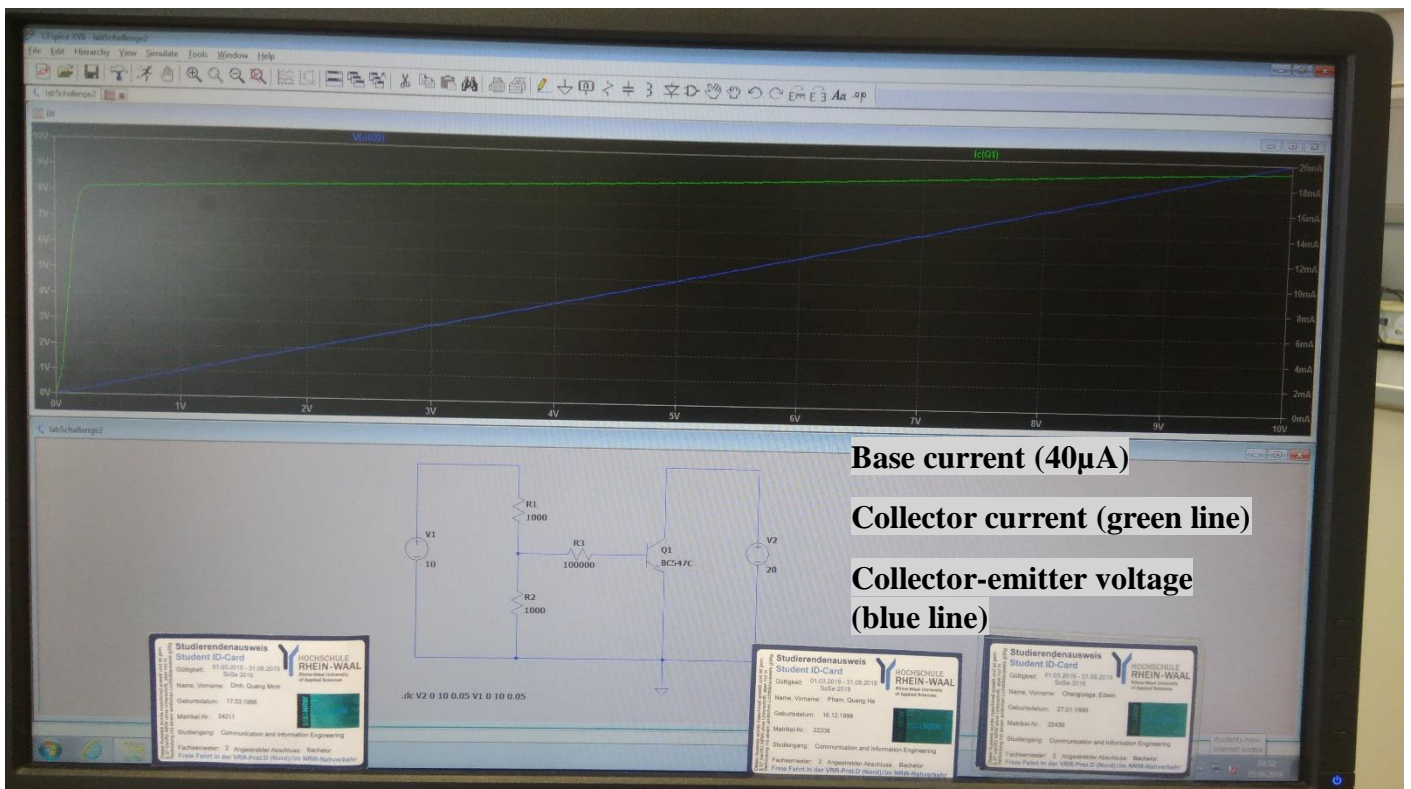
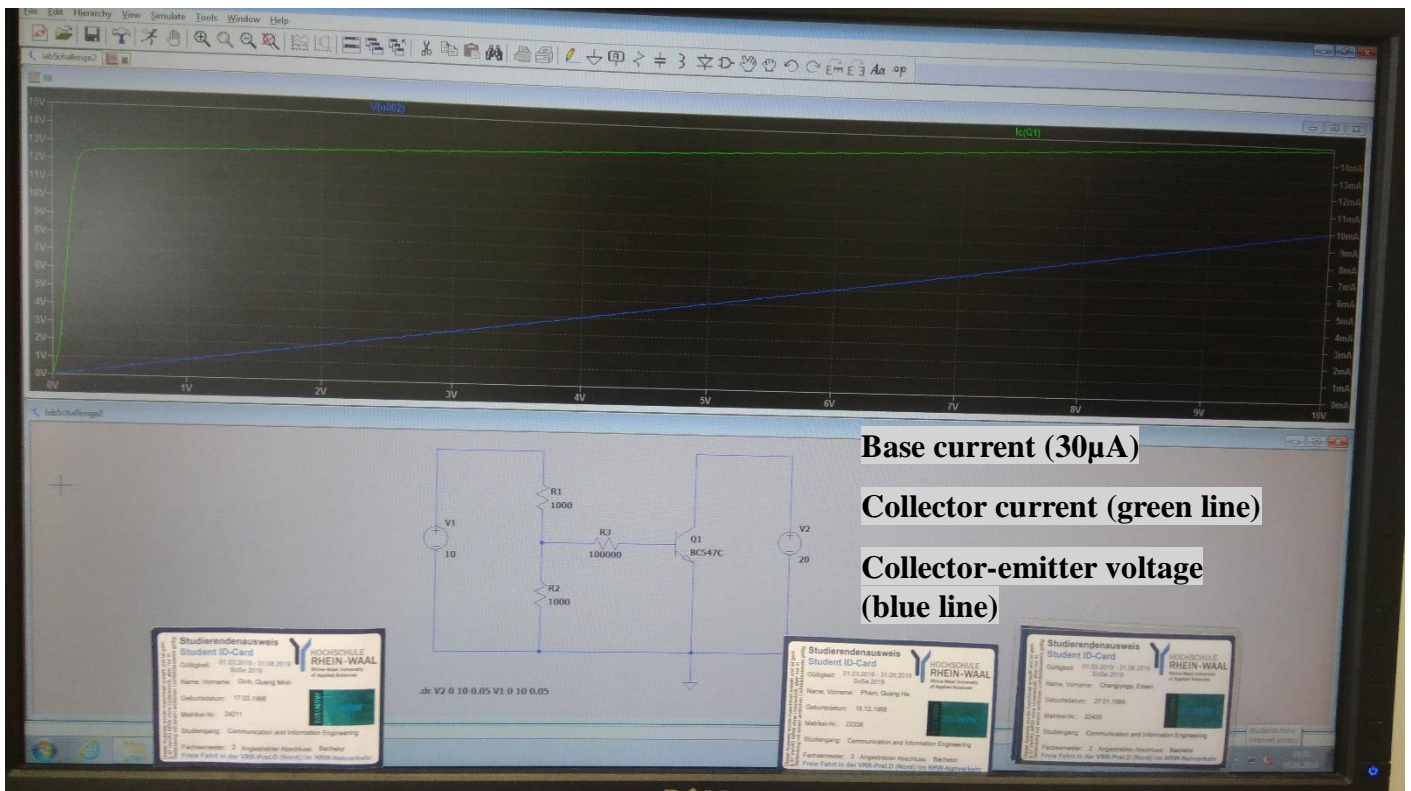
## Challenge #2

### Abstract:

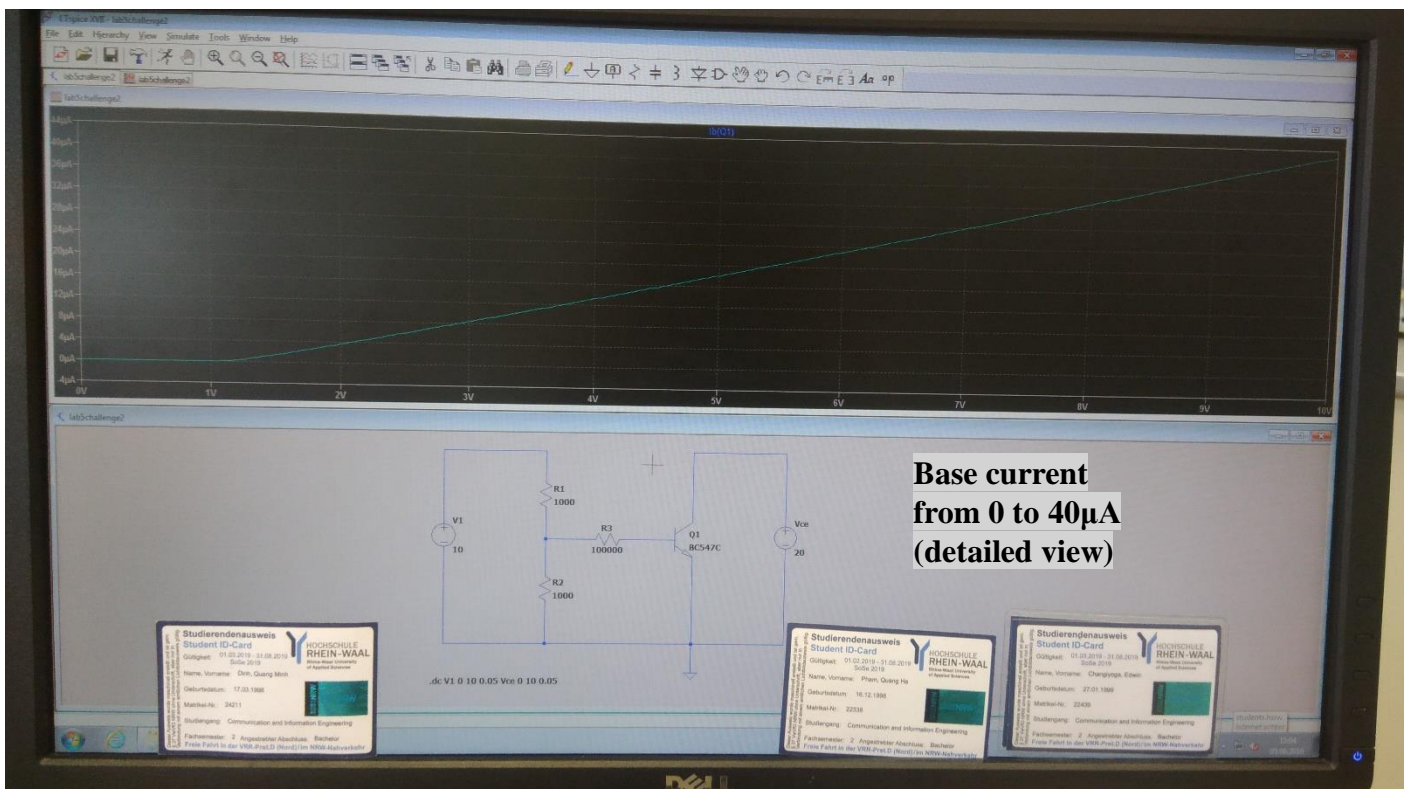
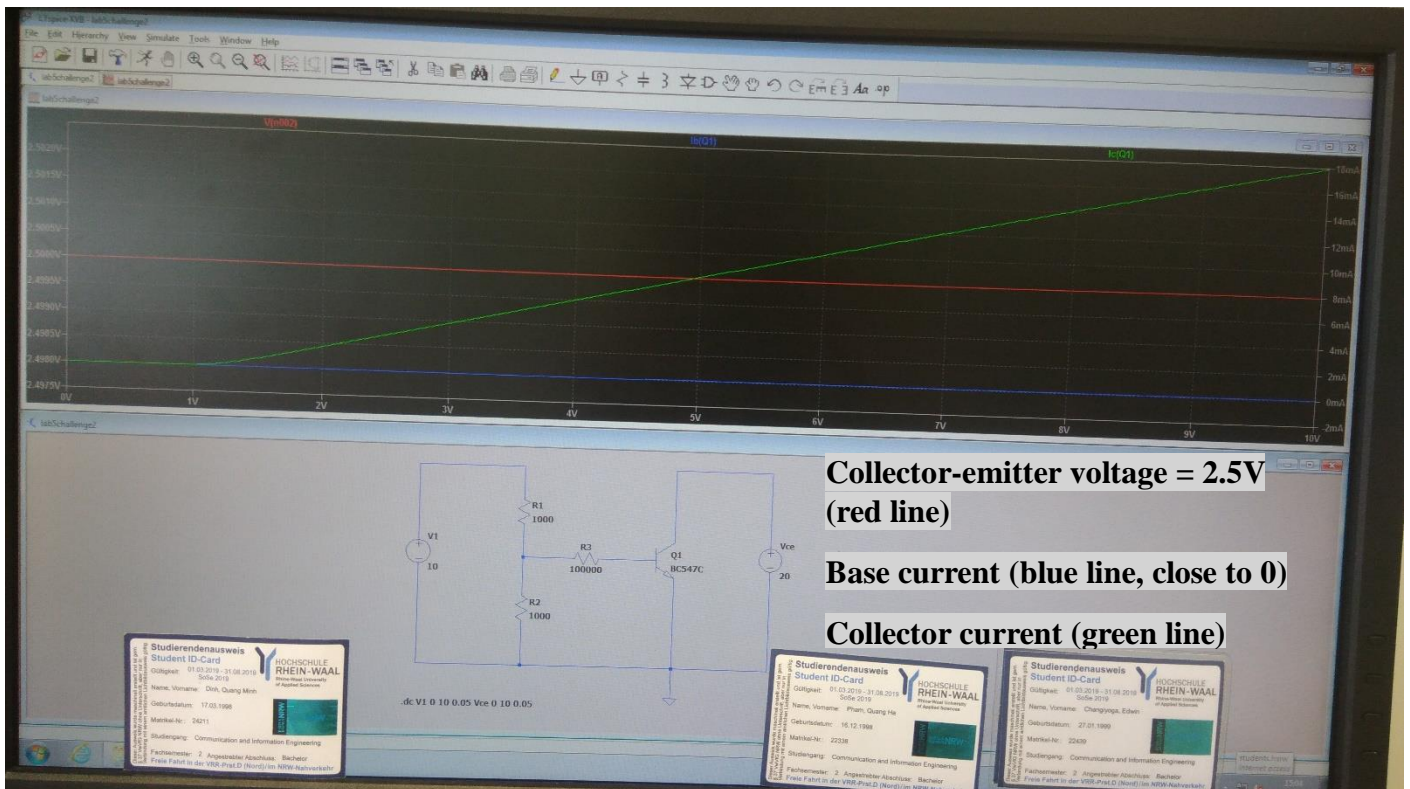
Our group managed to completed the challenge by following the steps given in the Description of the Laboratory booklet.

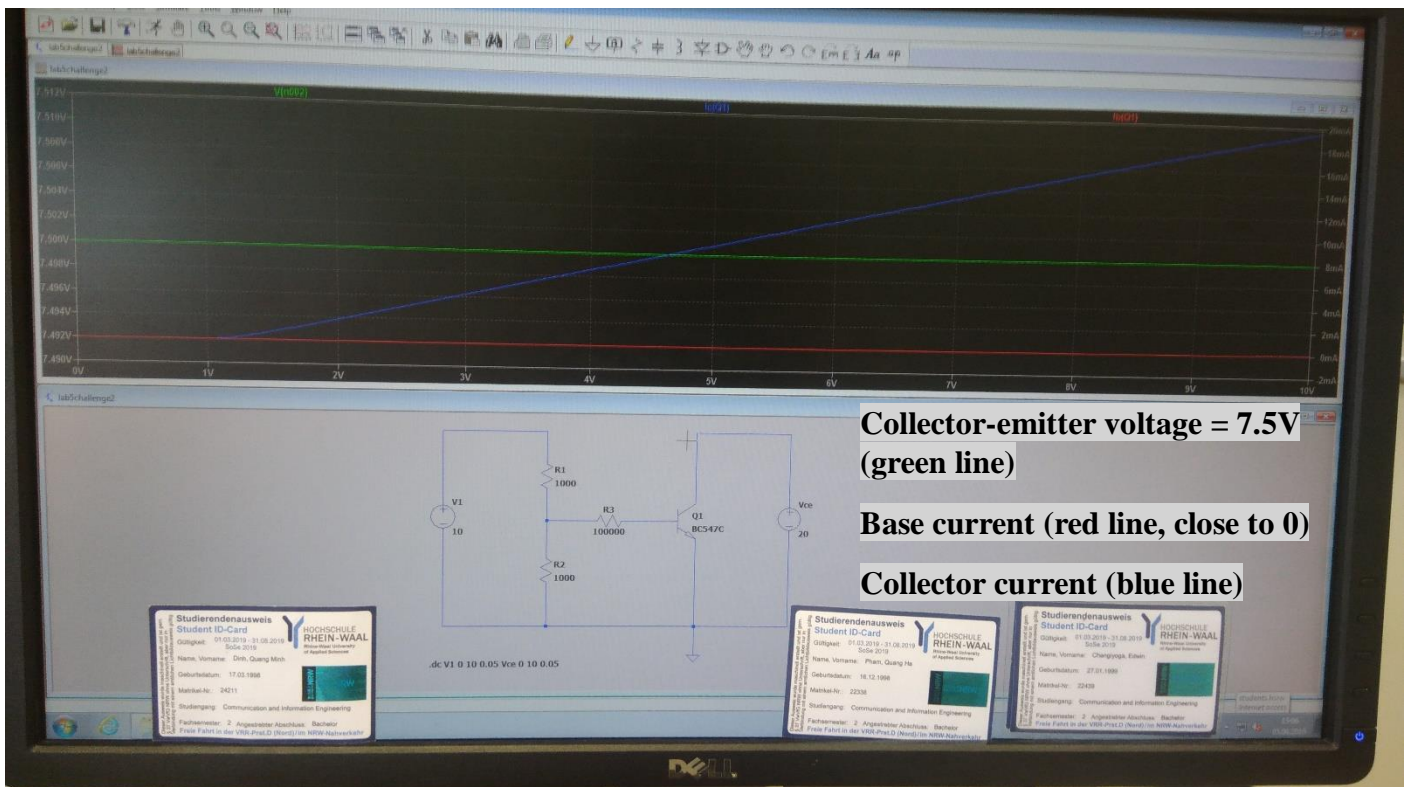
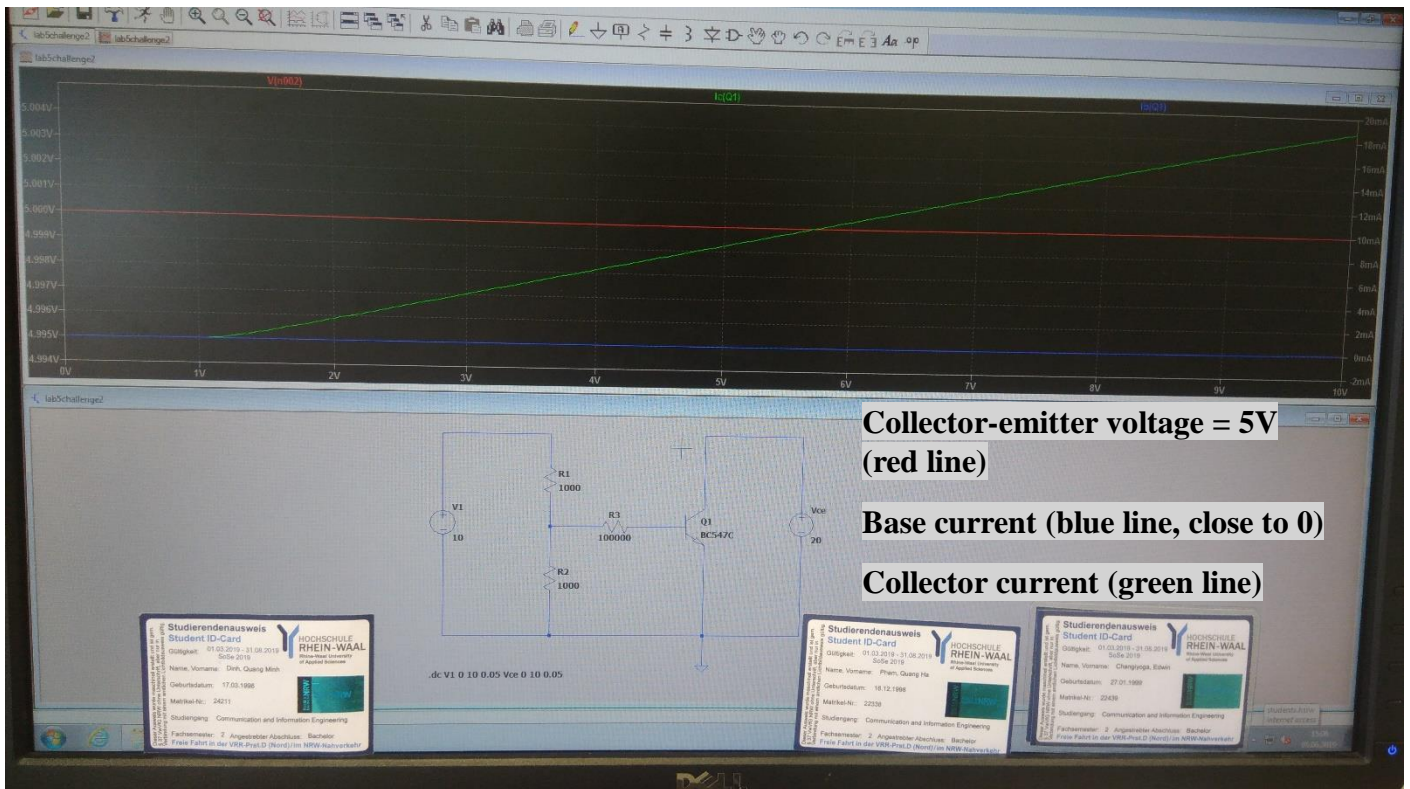
### Pictures:



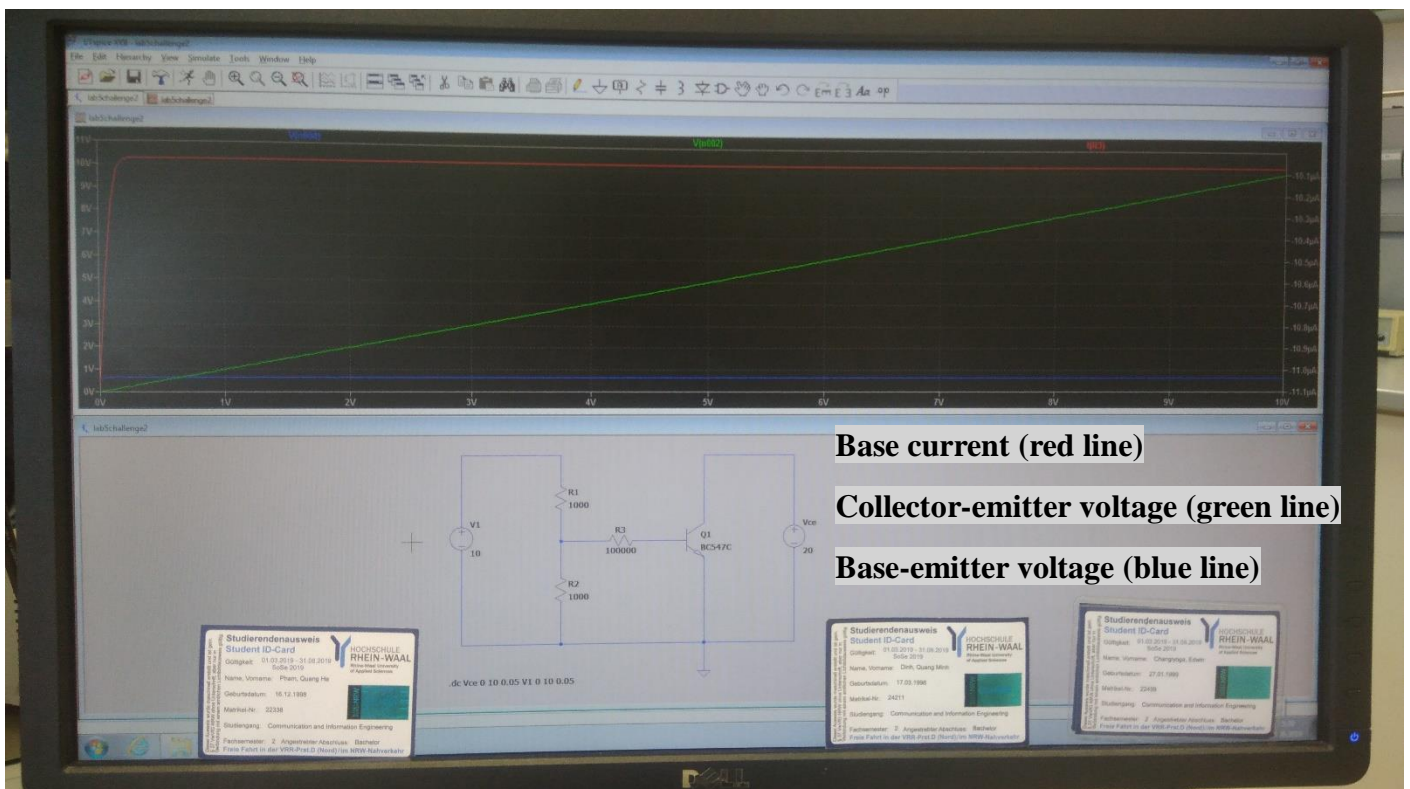
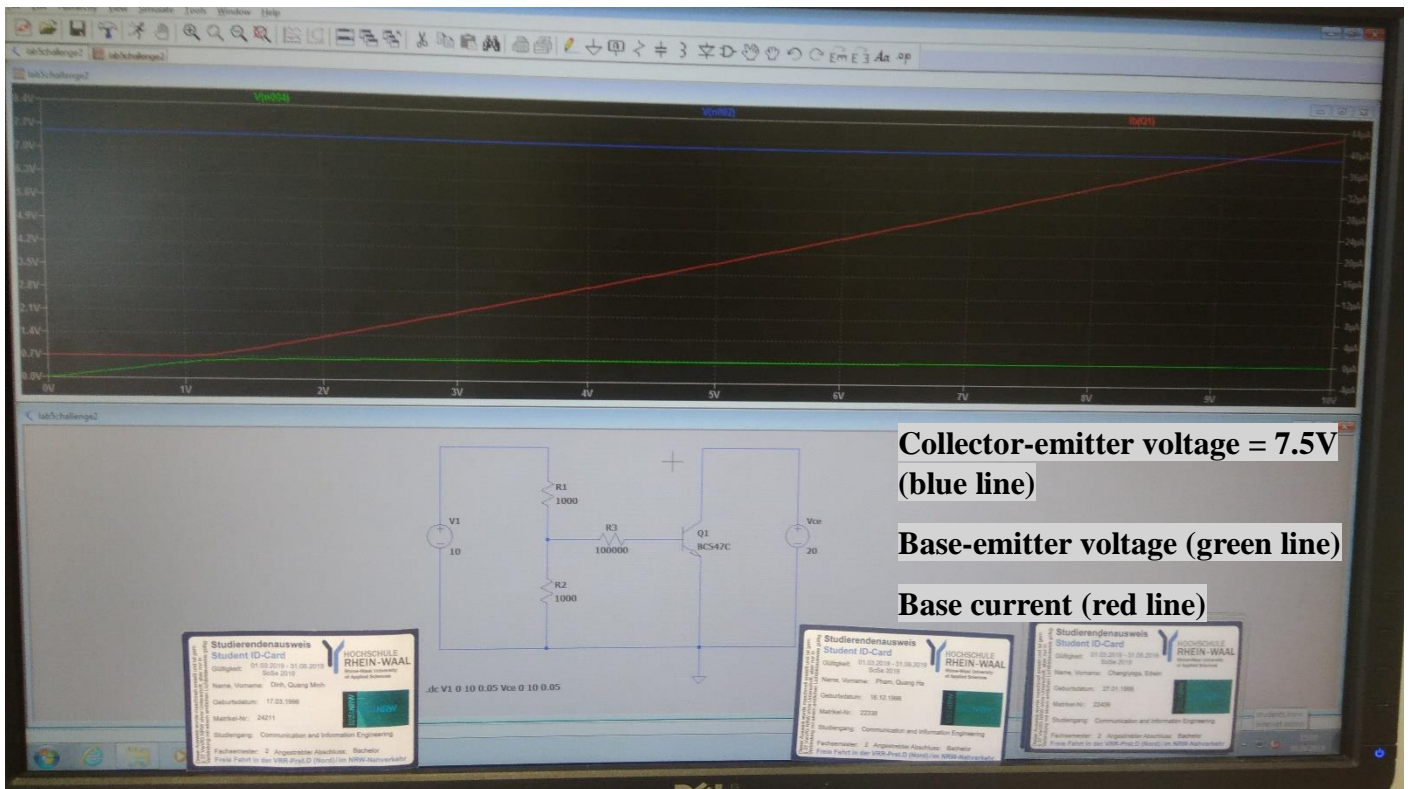


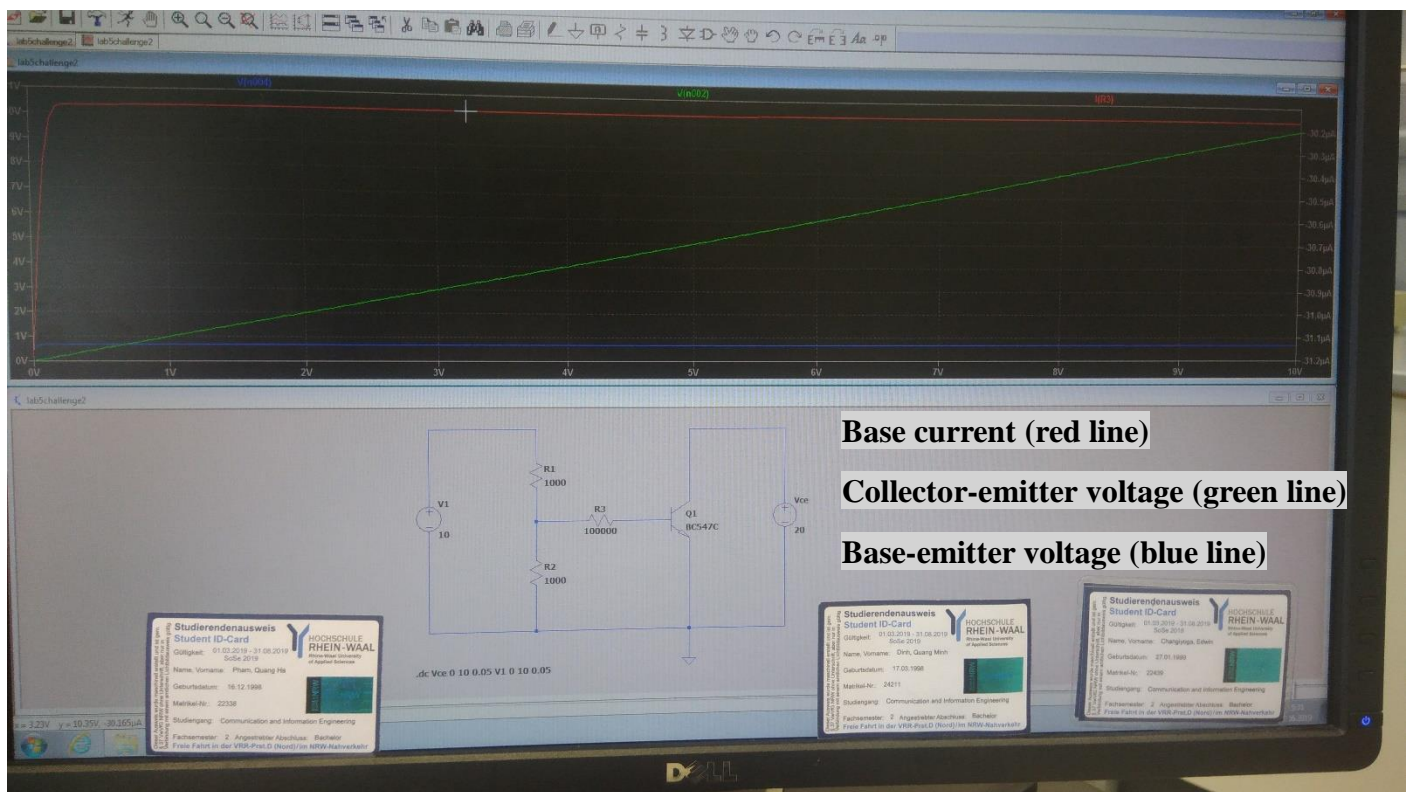
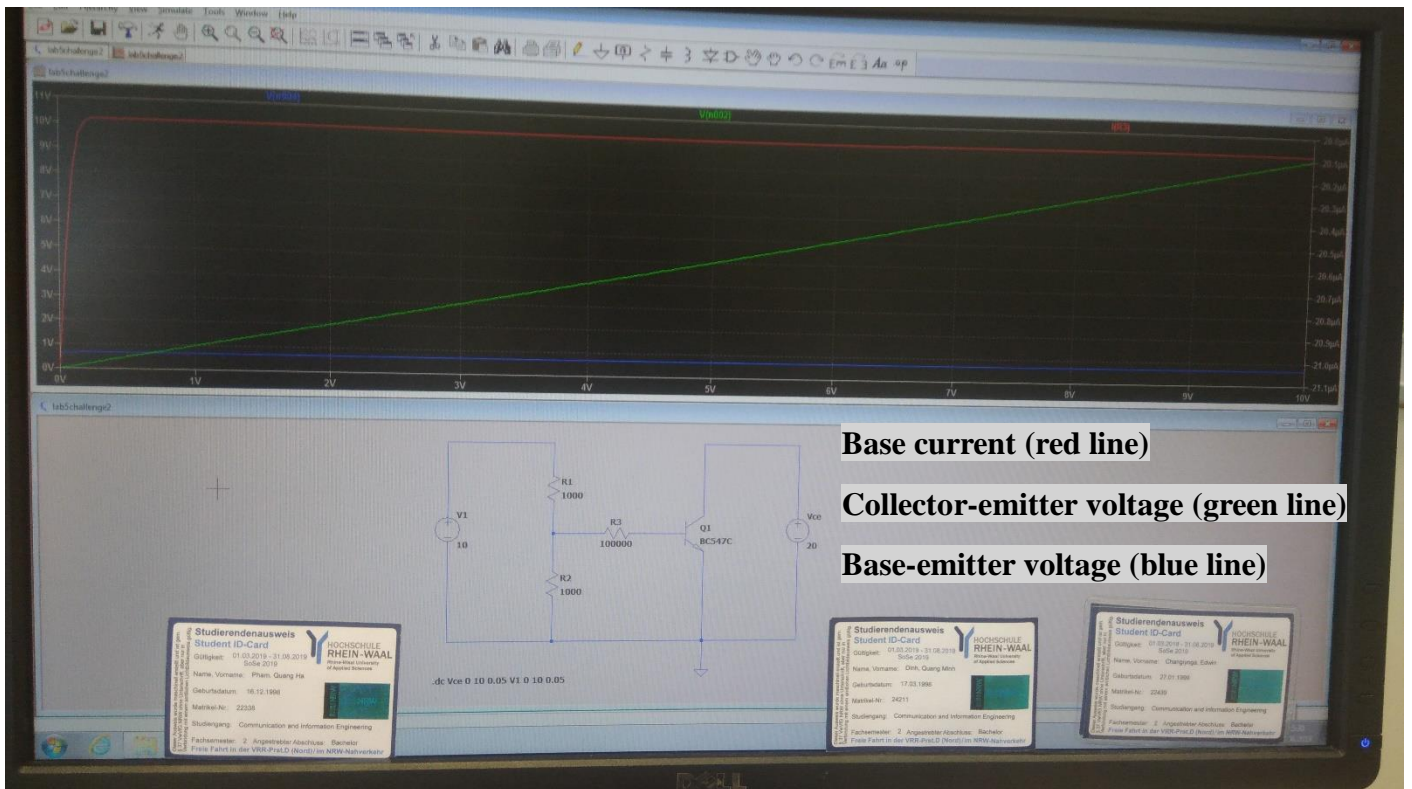




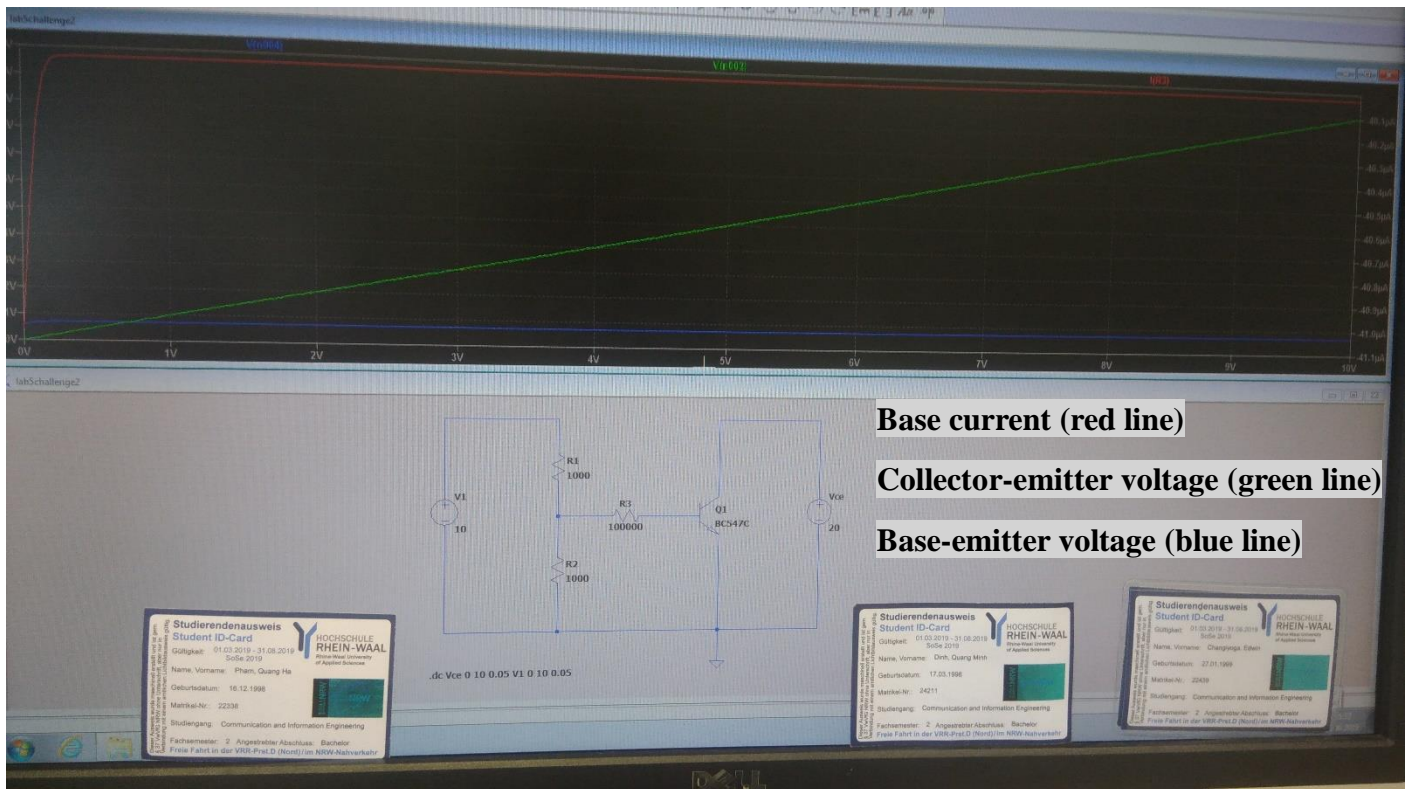












## **Results:**

### **Collector current for different collector-emitter voltages:**

The shape of the plot that we measured has the same shape as LTSpice's plot.

However, the magnitude of our measurements was only half of what we got from LTSpice. We don't know why this is happening.

### **Collector current for different base currents:**

The collector current that we measured was the same throughout with different base currents, similar to the result using LTSpice.

But again, our measurements for Collector current (roughly 1mA) was barely the amount of what we got from LTSpice (18mA). We don't know why this is happening.

### **Base-emitter voltage for different base currents:**

The shape of the plot that we measured has the same shape as LTSpice's plot. It is a linear straight line.

However, our group cannot get our Ammeter to measure the base current above 10 $\mu$ A. That is why the shape of our plot was narrow and stops at 10 $\mu$ A.

### **Base-emitter voltage for different collector-emitter voltages:**

Our group's measurement for Base emitter voltage was erratic, it oscillates between 0.93V and 0.96V, unlike the result from LTSpice where the value for Base emitter voltage increase sharply from 0 then it quickly straightens out at 0.8V.

In summary, the plot that our group made from our measurements has the same shape as the one simulated in LTSpice, but the actual values for Voltages and Currents are wildly different in LTSpice compared to what we measured in real life. We suspects that this indicates something is wrong with our circuit configuration.

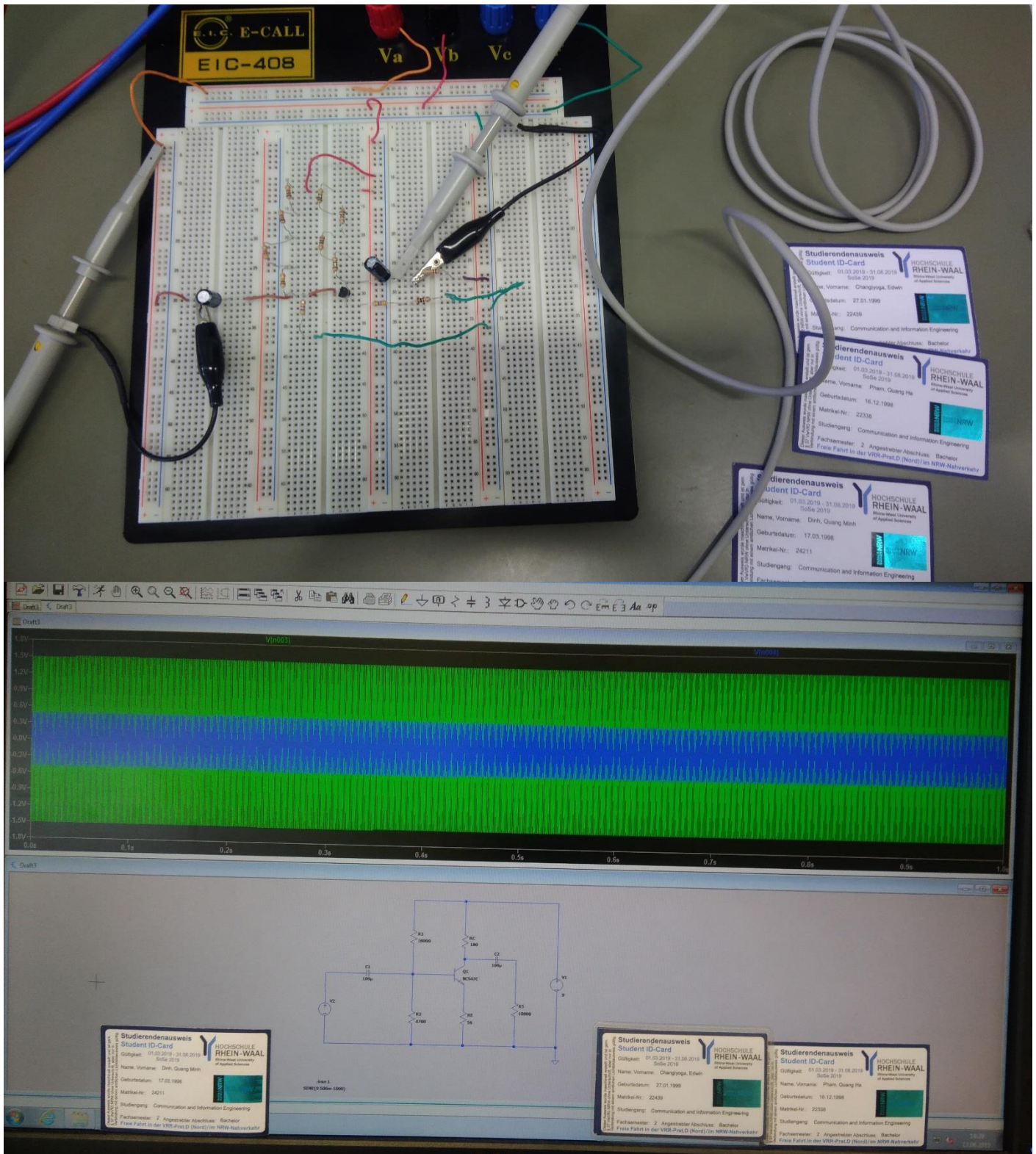


## Challenge #3

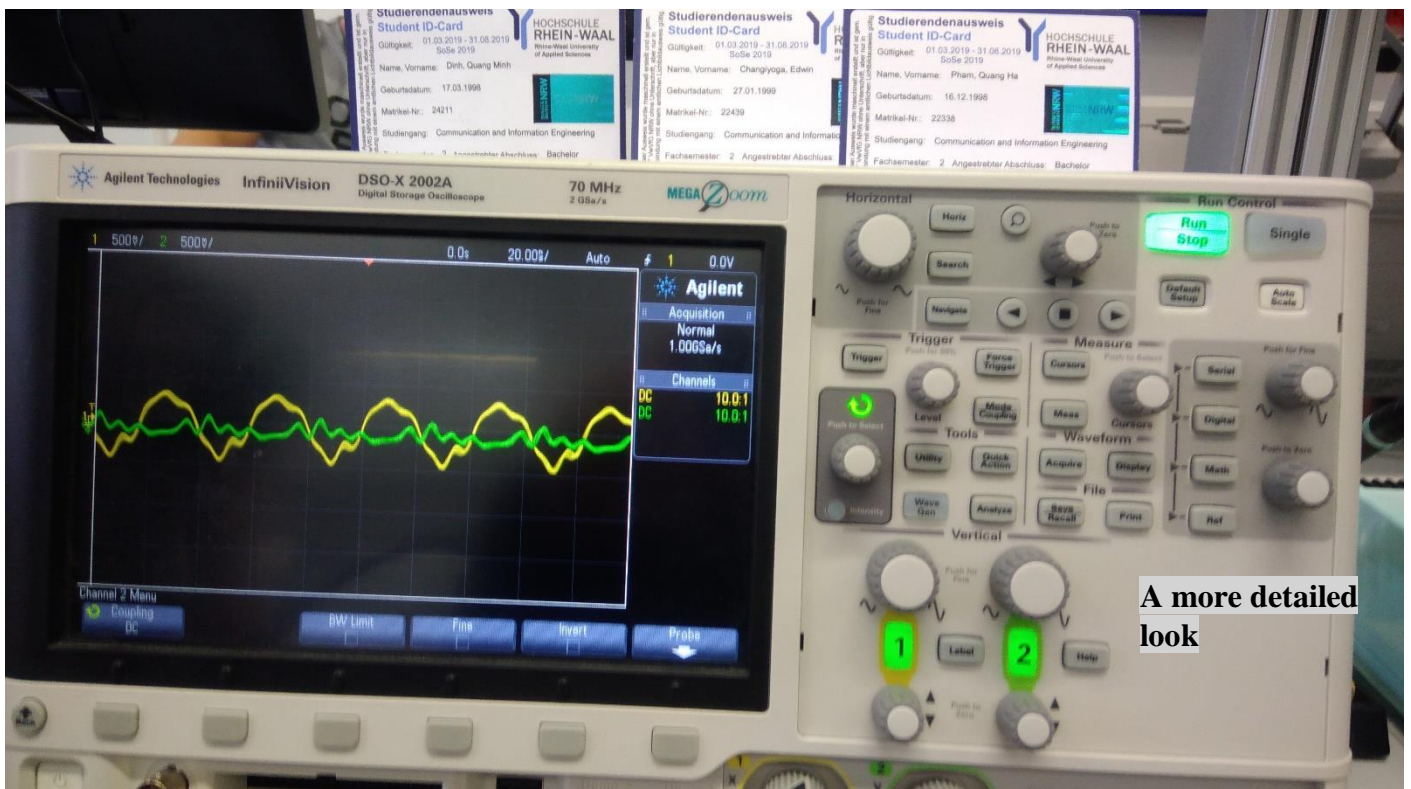
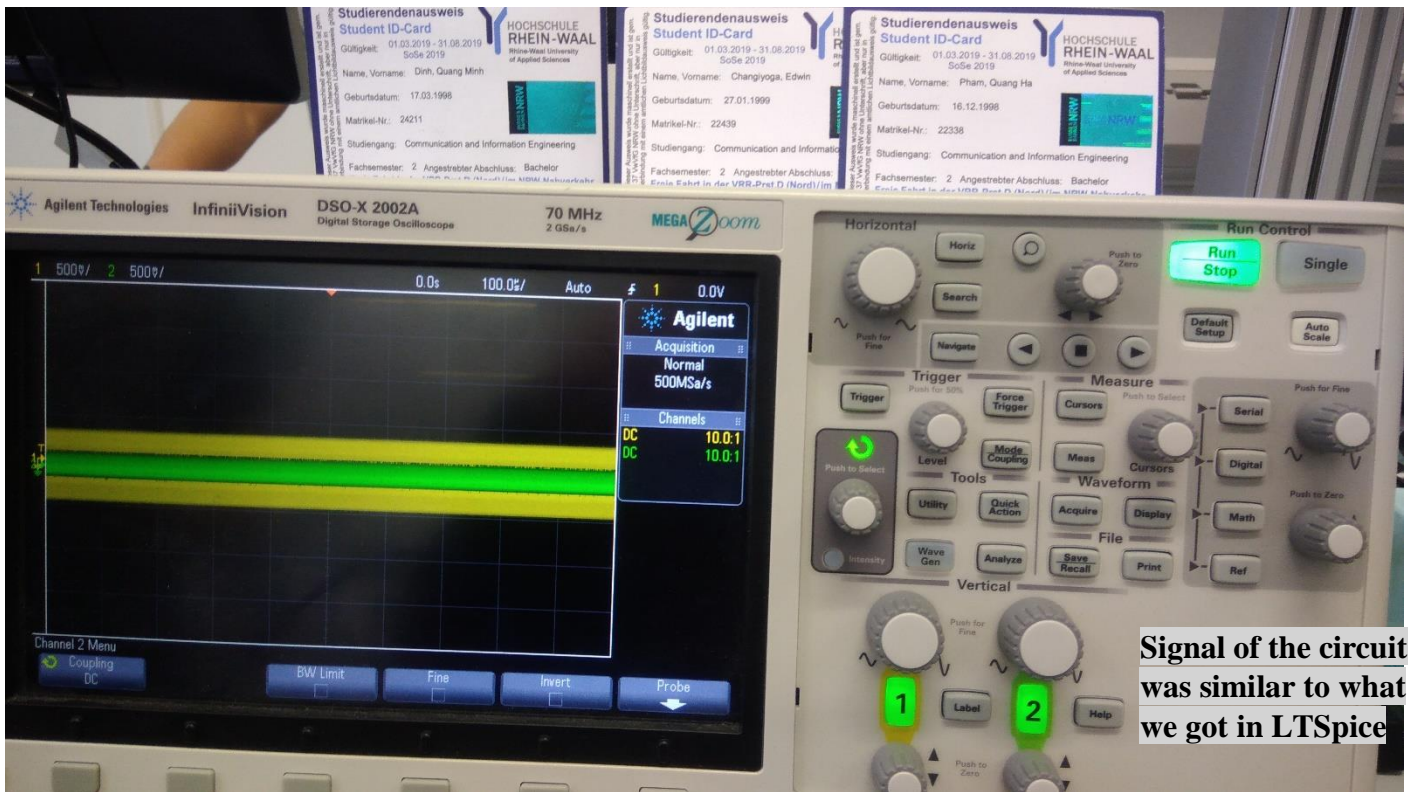
### Abstract:

Our group managed to completed the challenge by following the steps given in the Description of the Laboratory booklet.

**Pictures:**









**Results:****What is the Amplification factor?**

Amplification factor is the factor by how much an amplifier managed to strengthens the input signal.

**What is Phase shift?**

The Phase Shift is the displacement of two signals when they are transmitting in a time frame. Or in other words: the two signals are at different points of their cycle at a given time.

Our group managed to measure the signal from the circuit in real life using the Oscilloscope and from LTSpice, the resulting signal from two methods both have a similar shape.