Stony Brook University

Department of Physics and Astronomy
Introductory Physics Laboratories
PHY 134

Wiring DC Circuits for Ohm's Law

The Equipment

In the Ohm's Law lab you will use a Lambda LL-902 power supply, a voltmeter, an ammeter and circuit elements. To the right is a photo of the power supply connected to the voltmeter (this is **not** a circuit from the lab).
Notice the following:

i) The Power switch for the Power Suppy is in the upper left. When the unit is ON, an LED in the lower left will (probably) be lit. The On/Off switch for the voltmeter (and ammeters) is in the upper right; sliding the switch toward the "1" (up, in this picture) turns the unit ON.
ii) The analog meter on the Power Supply can display the output Voltage or Current, selected by a switch in the upper right. In the figure, you can see the analog meter is displaying ~5 Volts on a 0-20V scale; the voltmeter is giving a more precise value of 5.6 Volts (V_{dc}).
iii) The range switch for the voltmeter is in the upper left. In this figure the selcted range is 20V, which means that the highest voltage which will be measured and displayed is 20V. For smaller voltages, one can choose a lower range (ex. 200mV) to give greater precision.
iv) The wiring in the figure follows the usual convention for DC circuits: Red for + and Black for - . Note the red & black terminals on the power supply and that the voltmeter has + connection on the right and - connection on the left.

Preliminary Steps

Your Teaching Assistant will make a precise measurement of your resistor values using a good quality multimeter.

It is always wise to make your connections with the power supply, voltmeter and ammeter **OFF**. These devices do not present significant danger to people (the voltages and current capability are low) but
i) incorrect wiring can cause the protective fuses to "blow" (ex. exposing the ammeter to more than 2 Amps by creating a "short circuit"); and
ii) using good electrical practices will be valuable when you work with higher voltages and currents in the future.

Try to follow the convention that connections at the "high side", ie, close to the + terminal of the power supply, should be done with Red wires. Connections on the "low side" (close to the - terminal and closer to 0 Volts) should be done in **Black**. However, if it is not clear whether a connection should be red or black (or you don't have enough of one color) do not worry: just make a good connection with either color.

If two wires are going to the same terminal of a circuit element (resistor or lamp), you may use multiple alligator clips or "piggy-back" banana connectors.

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Part 1 Measuring V and I for a single resistor

Figure 3 With units off, connect a red wire from the + terminal of the power supply to the 250 mA (max) + terminal of the ammeter.

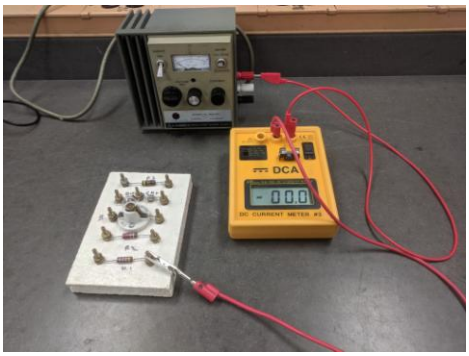

Figure 4 Add an alligator clip to the end of a red wire and use that wire to connect the Common terminal of the ammeter to the resistor you are testing.

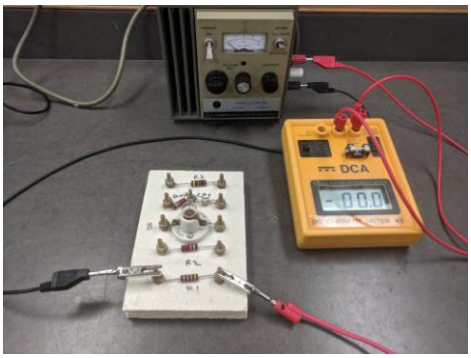

Figure 5 Add an alligator clip to the end of a black wire and use that wire to connect the "other" side of the resistor to the - terminal of the power supply.

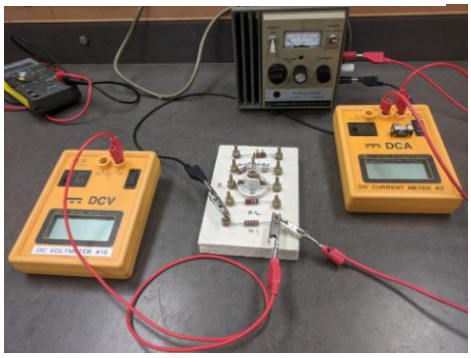

Figure 6 To put the voltmeter in "parallel" with the resistor, add a red wire from the + terminal of the voltmeter to the side of the resistor which goes to the + of the power supply.

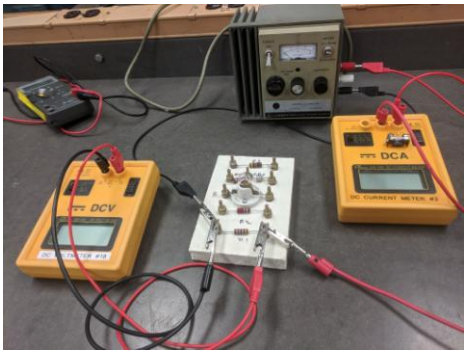

Figure 7 Complete the circuit by adding a black wire from the - terminal of the voltmeter to the "low" side of the resistor.

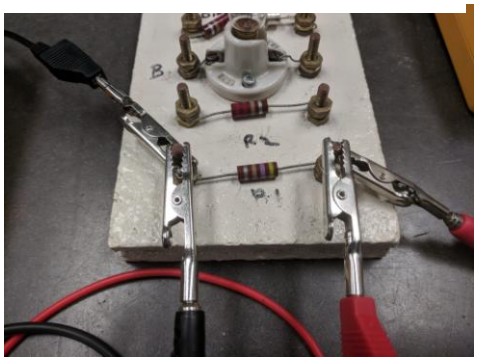

Figure 8 Here, connections are made to R1.

To measure negative currents and voltages, swap the connections at the power supply. YES, put the red banana into black and black banana into red. The I and V meters now read negative.

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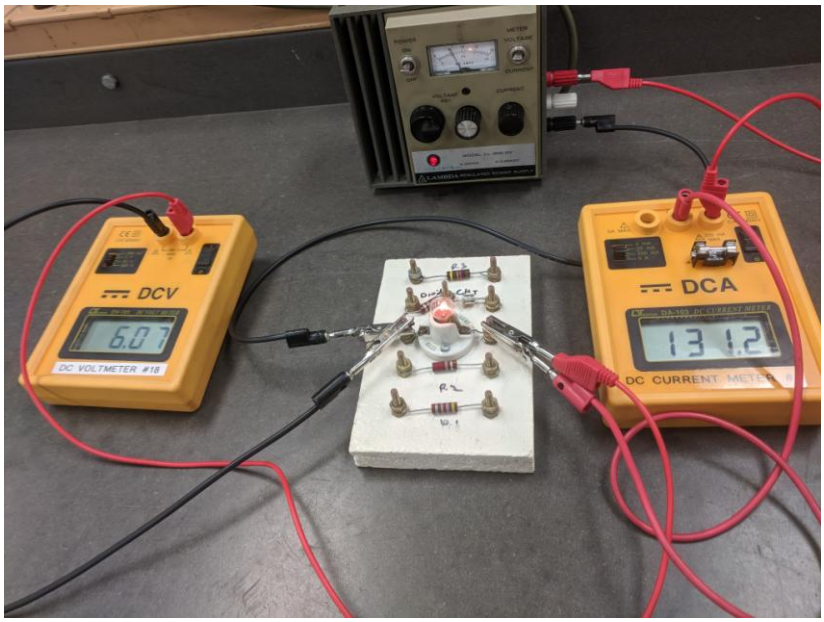
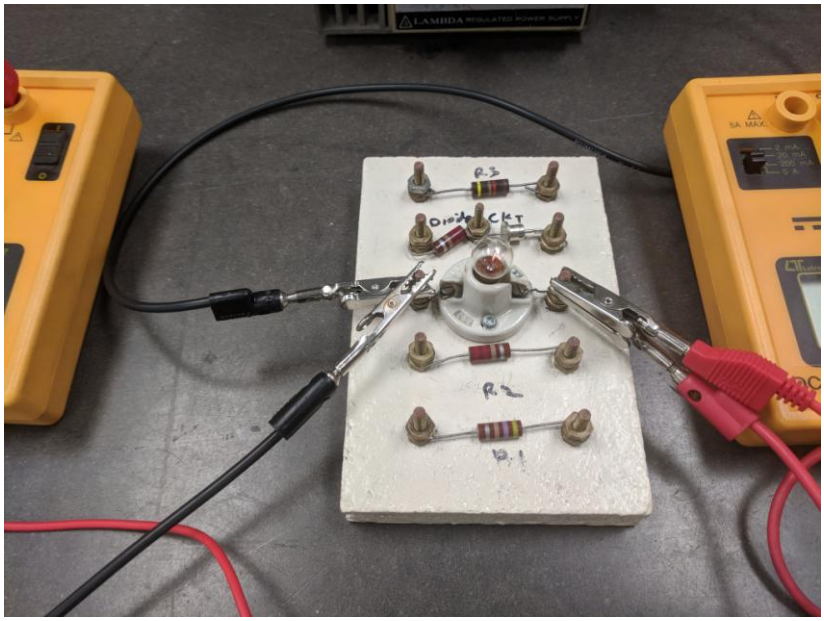
Part II Measuring V and I for a light bulb



The circuit for measuring properties of the lamp is the same as in Part I for measuring a single resistor.



Here are the connections on the board for Part II