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Electrical Transport Measurements from First Principles: a Senior Undergraduate Experiment

A final year undergraduate experiment has been designed and constructed with the aim of illustrating numerous aspects of low temperature measurements, with the objective of determining the electrical transport properties of materials. The experiment is designed to ensure that the students cannot treat the experimental apparatus as a data-producing “black box”, and the students are obliged to manually control the temperature, take much of the data by hand, and to calibrate the thermocouple used to measure the temperature. The use of a desktop computer and software packages during the experiment are encouraged. Much of the apparatus was assembled at relatively low cost.

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