

Measuring Quantum Conductance in Gold Nanowires

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The purpose of this project is to observe and measure quantum conductance in gold nanostructures. Conductance is an intrinsic property of materials, corresponding to how easily electrons flow through that material when subject to a potential difference. In instances when a wire of a conducting material is thinned to the order of nanometers, the conductance of the material no longer changes continuously, but rather in discrete quantized units. In order to observe the phenomenon, a measurement circuit was built and two methods for creating a gold nanostructure were utilized: (1) the vibrating contact method, and (2) a chemical dissolution method using the acid aqua regia. The conductance quantum is theoretically predicted to be $(2e^2)/h$, where e is the electron charge, h is Planck's constant. The results of both of these methods will be discussed, along with their relative advantages and disadvantages.

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Jacob Long is a graduating senior physics major seeking admittance to graduate school with the intent of obtaining a Ph.D.

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