

Abstract Submitted
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Comparative Analysis of two Methods for High-Resolution Differential Conductance Measurement¹ DAVID CUSICK, Taylor University, MICHIO NAITO, Tokyo University of Agriculture and Technology, ROBERTO RAMOS, University of the Sciences — We compare two methods of differential conductance measurement. The first is a traditional method in which current and voltage data is acquired via four-wire measurement, then averaged and differentiated numerically. The second method calculates dI/dV in real time by superimposing a small DC signal dI on the input step function, alternating between addition and subtraction of the signal with each step, then averaging the small signal voltage response over three steps to obtain dV . This requires two instruments: a DC current source and a high-resolution voltmeter. Keithley Instruments has commercially promoted the Keithley 622x current source and 2182A nanovoltmeter as means to achieve this measurement; we therefore refer to it as the Keithley method. We compare the two methods by performing high-resolution measurements of the energy gap of MgB₂ thin film Josephson junctions. We show that the Keithley method has advantages of cleaner data, easier implementation, and overall faster data collection, but may lack the traditional method's high resolution.

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