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High bias shot noises measurement and electronic heating in STM style gold junctions at room temperature RUOYU CHEN, PATRICK WHEELER, DOUGLAS NATELSON, Department of Physics and Astronomy, Rice University — Shot noise is a powerful tool in transport measurements, which encodes individual transmission channel's behavior; thus shot noise provides more information than solely conductance measurements. Using a STM-style gold break junction method, we can measure shot noise and conductance simultaneously at room temperature to study its bias-dependence and the distribution of noise and so on. Quantum suppression of shot noise remains very robust even at room temperature. The standard Landauer-Buttiker treatment of shot noise in nanoscale junctions at finite temperature assumes that the electronic temperature in the source and drain electrodes is unaffected by the applied bias. That is, the applied bias is assumed to shift the relative chemical potentials of the electrodes without broadening the electronic distributions. We perform noise measurements at biases as high as 0.5 V (an energy scale much larger than room temperature) and analyze the noise to determine if its bias dependence shows evidence of electronic heating. We will discuss the evolution of shot noise with bias voltage in detail and the role of electronic heating in this experiment.

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