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Excess Volltage-Dependent Noise in Atomic-Scale Au Contacts PATRICK WHEELER, RUOYU CHEN, Department of Physics and Astronomy, Rice University, KENNETH EVANS, Applied Physics Program, Rice University, JEFFREY RUSSOM, NICHOLAS KING, DOUGLAS NATELSON, Department of Physics and Astronomy, Rice University — An atomic-scale metal contact shows nonlinear scaling of excess noise power with applied bias. While this excess noise scales more rapidly with voltage than the linear dependence expected from pure shot noise, we do observe clear suppression of the noise power at the first few conductance quanta, $G_0 \equiv 2e^2/h$, $2G_0$, and $3G_0$. Using high frequency techniques, data is taken at room temperature in mechanical break junctions. We employ lock-in techniques combined with an rf amplifier chain to measure the excess noise power simultaneously with the dc conductance. We describe the dependence of the noise on bias voltage and analyze the noise vs. conductance histograms. This additional excess noise provides a possible probe for local electronic heating of the junction.

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