Mode-selected heat flow through a one-dimensional waveguide network
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**Short Abstract**

Cross-correlated measurements of thermal noise are performed to determine the electron temperature in nanopatterned channels of a GaAs/AlGaAs heterostructure at 4.2 K. Two-dimensional (2D) electron reservoirs are connected by an extended one-dimensional (1D) electron waveguide network where electrons behave like waves. Hot electrons are produced using a current in a source 2D reservoir, are transmitted through the ballistic 1D waveguide and relax in a drain 2D reservoir. We find that the electron temperature increase in the drain is proportional to the square of the heating current. Electron-phonon interaction is negligible for heat transport between 2D reservoirs at temperatures below 4.2 K.

![Diagram](image)

**Above.** Scanning electron micrograph of an identically processed sample. 1D waveguides of about 170 nm lithographic width form an asymmetric ring and are connected to narrow 2D electron reservoirs, labelled A to F. $T_e^*$ indicate the electron temperature of the 2D reservoirs and $I_h$ indicates the path of the heating current. $S_V$ and $U_G$ indicate the thermal noise and the gate-voltage, respectively.