

SQUID as a shot noise thermometer.

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Abstract

A Squid at the end of a transmission line is used as a Shot Noise Thermometry. This is done by applying a DC current larger than the critical current across the squid. For larger currents, the resistance of the squid becomes linear. The squid can then be used as a shot noise sample to calibrate the gain and the noise temperature of the circuit.

$$S_I(f, V, T, R) = \frac{2k_B T}{R} \left[\frac{eV + hf}{2k_B T} \coth \left(\frac{eV + hf}{2k_B T} \right) + \frac{eV - hf}{2k_B T} \coth \left(\frac{eV - hf}{2k_B T} \right) \right] \quad (1)$$

$$P(f, V, T, R) = GBW \left[k_B T n + \left(\frac{Z_0}{Z_0 + R} \right)^2 S_I(f, V, T, R) \right] \quad (2)$$