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Photon transport in low-dimensional nanostructures TEEMU OJANEN, TERO HEIKKILA, Low Temperature Laboratory, Helsinki University of Technology — At low temperatures when the phonon modes are effectively frozen, photon transport is the dominating mechanism of thermal relaxation in metallic systems [1]. Starting from a microscopic many-body Hamiltonian using the equation-of-motion technique for nonequilibrium Green's functions, we study the energy transport by photons in nanostructures. We obtain a formally exact expression for the energy current between a metallic island and a one-dimensional electromagnetic field supported by a parallel strip transmission line. From this expression we derive the quantized thermal conductance as well as show how the electron shot noise affects the photon transport. Frequency-dependent current noise essentially determines the transport process, thus providing a close connection between electron transport and photon transport [2].

[1] M. Meschke, W. Guichart and J. P. Pekola, Nature **444**, 187 (2006).
[2] T. Ojanen and T. T. Heikkilä, to be published.

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