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TAKING ENERGY FROM ENVIRONMENT

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Abstract. *In this paper, we formulate a physical principle, and propose a semiconductor device producing coherent electromagnetic energy by heat absorption from the environment. This device is a superradiant semiconductor chip, included in a Fabry-Perot cavity, and in intimate contact with a huge radiator. This radiator is designed for a very efficient heat transfer from the environment to the semiconductor structure, which by operation becomes colder than the environment. This structure is composed of a packet of n-i-p-n semiconductor elements that we call superradiant transistors, operating by current injection. On the basis of a physical model of the dissipative superradiant dynamics, we recently elaborated in the framework of the quantum theory of open systems, we show that the energy of the electromagnetic field radiated by quantum transitions in the emitter-base junctions is much larger than the energy electrically dissipated by injection of electrons, the energy difference being obtained by heat absorption in the base-collector junction.*

Keywords: superradiant semiconductor chip, heat transfer from the environment, quantum theory of open systems

1. Introduction

The most energy production is based on a discovery made 500’000 years ago: the fire. Nowadays, the most motors or energy generators, called thermal motors/generators, operate by using a burning process (Fig. 1). With an active fluid and an appropriate mechanical system, the heat obtained by burning a fuel is partially converted into usable energy. By the burning process, the temperature of the active fluid is increased from the initial temperature T_0 to the final temperature T_1, while an energy $\nu N\left(T_1 - T_0\right)$ is absorbed by this fluid, where N is the number of molecules, and ν is the number of the degrees of freedom. By an adiabatic expansion, while temperature decreases from T_1 to T_2, a usable energy $\nu N\left(T_1 - T_2\right)$ is obtained. To close the operation cycle, the temperature of the active fluid is decreased from T_2 to T_0,

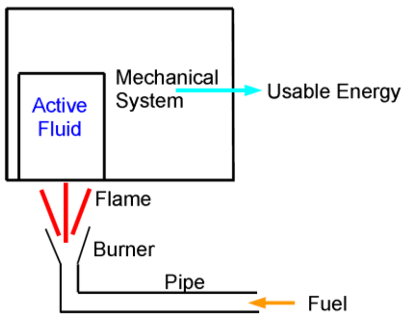

Fig. 1. Motor, converting the heat into usable energy

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