**Absorption refrigerators based on Coulomb-coupled single-electron systems**

Fabio Taddei

We analyze a simple implementation of an absorption refrigerator, a system that requires heat and not work to achieve refrigeration, based on two Coulomb coupled single-electron systems. We analytically determine the general condition to achieve cooling-by-heating, and we determine the system parameters that simultaneously maximize the cooling power and cooling coefficient of performance (COP) finding that the system displays a particularly simple COP that can reach Carnot's upper limit. We also find that the cooling power can be indirectly determined by measuring a charge current. Analyzing the system as an autonomous Maxwell demon, we find that the highest efficiencies for information creation and consumption can be achieved, and we relate the COP to these efficiencies. Finally, we propose two possible experimental setups based on quantum dots or metallic islands that implement the non-trivial cooling condition. Using realistic parameters, we show that these systems, which resemble existing experimental setups, can develop an observable cooling power.

Attivitá svolte in conformitá al progetto di ricerca dal titolo Quantum Transport in nanoelectronic systems (QUANTRA), nell'ambito del bando 2016 emanato dal Ministero degli Affari Esteri e della Cooperazione Internazionale (MAECI).