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Magnetically driven quantum heat engine[1] ENRIQUE MUNOZ, Pontificia Universidad Catolica de Chile, FRANCISCO PENA, Pontificia Universidad Catolica de Valparaiso — In analogy with classical thermodynamics, a quantum heat engine generates useful mechanical work from heat, by means of a reversible sequence of transformations (trajectories), where the "working substance" is of quantum mechanical nature. Several theoretical implementations for a quantum heat engine have been discussed in the literature, such as entangled states in a qubit, quantum mechanical versions of the Otto cycle, and photocells. In this work [1], we propose yet a different alternative by introducing the concept of a magnetically driven quantum heat engine. We studied the efficiency of such system, by considering as the "working substance" a single nonrelativistic particle trapped in a cylindrical potential well, as a model for a semiconductor quantum dot, in the presence of an external magnetic field. The trajectories are driven by a quasistatic modulation of the external magnetic-field intensity, while the system is in contact with macroscopic thermostats. The external magnetic field modulation allows to modify the effective geometric confinement, in analogy with a piston in a classical gas.

[1] E. Munoz and F. J. Pena, Physical Review E 89, 052107 (2014).

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