

Quantum model of self-oscillations in chemical engines

Tuesday, 5 September 2017 11:00 (30 minutes)

A standard textbook picture of solar, thermoelectric and fuel cells based on a direct transformation of light, heat or chemical energy into a direct current (DC) contradicts the basic principles of electrodynamics and thermodynamics. The proposed solution of this problem involves a single oscillating degree of freedom called work reservoir (depository) or a piston, which executes self-oscillations fed by a constant energy supply. In the mentioned examples, it is a mode of plasma oscillations and the resulting charge oscillations are finally rectified to DC by a diode mechanism. The onset of self-oscillations is illustrated by a simple quantum Markovian model of a harmonic oscillator coupled to chemical reservoirs. The proper definition of work output is discussed in terms of ergotropy.

Primary author: ALICKI, Robert (University of Gdansk)

Presenter: ALICKI, Robert (University of Gdansk)

Session Classification: Session 5