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**A model of Josephson junctions on boson systems – currents and entropy production rate.**

(English) [Zbl 1402.82012](#)

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Summary: Non-equilibrium steady states, in the sense of *D. Ruelle* [*Commun. Math. Phys.* 224, No. 1, 3–16 (2001; [Zbl 1051.82003](#))], of Boson systems with Bose-Einstein condensation are investigated with the aid of the  $C^*$ -algebraic method. The model consists of a quantum particle and several bosonic reservoirs. We show that the mean entropy production rate is strictly positive and independent of phase differences provided that the temperatures or the chemical potentials of reservoirs are different. Moreover, Josephson currents occur without entropy production, if the temperatures and the chemical potentials of reservoirs are identical.

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**MSC:**

- 82C10 Quantum dynamics and nonequilibrium statistical mechanics (general)
- 82C26 Dynamic and nonequilibrium phase transitions (general) in statistical mechanics
- 81R15 Operator algebra methods applied to problems in quantum theory
- 82C35 Irreversible thermodynamics, including Onsager-Machlup theory
- 94A17 Measures of information, entropy
- 46L06 Tensor products of  $C^*$ -algebras

**Full Text:** [DOI](#)

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