A thermodynamically consistent Markovian master equation beyond the secular approximation

ID 4635324
Author(s) Potts, Patrick P.; Kalaee, Alex Arash Sand; Wacker, Andreas
Author(s) at UniBasel Potts, Patrick ;
Year 2021
Title A thermodynamically consistent Markovian master equation beyond the secular approximation
Journal New journal of physics
Volume 23
Number 12
Pages / **Article-Number** 123013
Keywords Markovian master equation; quantum thermodynamics; heat engine
Markovian master equations provide a versatile tool for describing open quantum systems when memory effects of the environment may be neglected. As these equations are of an approximate nature, they often do not respect the laws of thermodynamics when no secular approximation is performed in their derivation. Here we introduce a Markovian master equation that is thermodynamically consistent and provides an accurate description whenever memory effects can be neglected. The thermodynamic consistency is obtained through a rescaled Hamiltonian for the thermodynamic bookkeeping, exploiting the fact that a Markovian description implies a limited resolution for heat. Our results enable a thermodynamically consistent description of a variety of systems where the secular approximation breaks down.
Publisher IOP Publishing
ISSN/ISBN 1367-2630

Digital Object Identifier DOI 10.1088/1367-2630/ac3b2f
ISI-Number 000728082000001
Document type (ISI) Article