

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Entanglement measures and the quantum to classical mapping¹

JESKO SIRKER, TU Kaiserslautern — A quantum model can be mapped to a classical model in one higher dimension. Here we introduce a finite-temperature correlation measure based on a reduced density matrix $\bar{\rho}_{\bar{A}}$ obtained by cutting the classical system along the imaginary time (inverse temperature) axis. We show that the von-Neumann entropy \bar{S}_{ent} of $\bar{\rho}_{\bar{A}}$ shares many properties with the mutual information, yet is based on a simpler geometry and is thus easier to calculate. For one-dimensional quantum systems in the thermodynamic limit we prove that \bar{S}_{ent} is non-extensive for all temperatures T . For the integrable transverse Ising and XXZ models we demonstrate that the entanglement spectra of $\bar{\rho}_{\bar{A}}$ in the limit $T \rightarrow 0$ are described by free-fermion Hamiltonians and reduce to those of the regular reduced density matrix ρ_A —obtained by a spatial instead of an imaginary-time cut—up to degeneracies.

¹Support by the research centre OPTIMAS, the excellence graduate school MAINZ, and the collaborative research centre SFB/TR 49 is acknowledged.

Jesko Sirker
TU Kaiserslautern

Date submitted: 09 Nov 2012

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