

## QUANTUM LIMITS TO THE SECOND LAW OF THERMODYNAMICS? A VIEW OF QUANTUM INFORMATION

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Thermodynamics has been considered to be Queen of Sciences. The Second Law is then the cornerstone of thermodynamics. The paper will critically review the present paradoxical situation when two roads approach to this fundamental problem is coined. On the one side there have been many attempts to bring and describe quantum limits to the Second Law connected especially with a “violation of Second Law in quantum microworld and isothermal Maxwell demon” (See, e.g., Quantum Limits to the Second Law, AIP Conf. Proceeds, #643, AIP, Melville, NY 2002). But it seems such attempts are physically false. On the other side a creation of new Quantum Information Science which is progressing rapidly has touched this problem only in rather formal technical way, so far.

The paper will try to bring new ideas in direction to lay down grounds for quantum thermodynamics as part of Quantum Information Science. To undertake this the role of quantum entanglement will be described. Then a new formulation of quantum mechanical version of the Second Law will be indicated.

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