

Abstract Submitted
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The Density Matrix and the Interpretation of Quantum Theory

OWEN MARONEY, Perimeter Institute for Theoretical Physics — Can a density matrix be regarded as a description of the physically real properties of an individual system? If so, it may be possible to attribute the same objective significance to statistical mechanical properties, such as entropy or temperature, as to properties such as mass or energy. Non-linear modifications to unitary evolution can be proposed, based upon this idea, to account for thermodynamic irreversibility. Traditional approaches to interpreting quantum phenomena assume that an individual system is described by a pure state, with density matrices arising only through a statistical mixture or through tracing out entangled degrees of freedom. We discuss how treating the density matrix as fundamental can affect the viability of some of these interpretations, and how the thermodynamically motivated non-linearities do not, in themselves, help in solving the quantum measurement problem.

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