

Preface 1st Edition

This monograph views thermodynamics as an *incomplete description* of many freedom quantum systems. Left unaccounted for may be an environment with which the system of interest interacts; closed systems can be described incompletely by focussing on any subsystem with fewer particles and declaring the remainder as the environment. Any interaction with the environment brings the open system to a mixed quantum state, even if the closed compound state is pure. Moreover, observables (and sometimes even the density operator) of an open system may relax to equilibrium values while the closed compound state keeps evolving unitarily á la Schrödinger forever.

The view thus taken can hardly be controversial for our generation of physicists. And yet, the authors offer surprises. Approach to equilibrium, with equilibrium characterized by maximum ignorance about the open system of interest, does not require excessively many particles: some dozens suffice! Moreover, the precise way of partitioning which might reflect subjective choices is immaterial for the salient features of equilibrium and equilibration. And what is nicest, quantum effects are at work in bringing about universal thermodynamic behavior of modest size open systems. von Neumann's concept of entropy thus appears as much more widely useful than sometimes feared, way beyond truly macroscopic systems in equilibrium.

The authors have written numerous papers on their quantum view of thermodynamics, and this monograph is a most welcome coherent review.

Essen,
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