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Understanding Quantum Theory as Engineering Thermodynamics

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ABSTRACT

Feynman insisted 'no one understands quantum theory'. Yet, experimentalists tell us quantum theory is the most successful theory in history. Quantum theory cannot be understood as a classical mechanical theory since it arose through the 'interpolation' of two highly successful but complementary classical mechanics: Newtonian particle mechanics and Maxwellian wave mechanics. Just as particles and waves are complementary, these two mechanics are complementary. Consequently, as illustrated by the two-slit experiment, what is experienced depends on one's <u>choice</u> of experimental setup.

My thesis is that quantum theory can only be properly understood within the more general framework of engineering thermodynamics.

In Part One I point to four essential characteristics of quantum theory that cannot possibly be understood in any classical framework defined by the presuppositions of symmetry and conservation. These four characteristics are: (1) the participatory (2) the complementary (3) the indeterminate (uncertainty) and (4) the new non-commutative mathematics (AB≠BA).

In Part Two, following Atkins, I note there are two histories and two current formulations of thermodynamics: the Carnots' engineering thermodynamics and the 'rational mechanical' tradition of Clausius and Boltzmann. I will show that the four essential characteristics of quantum theory are natural characteristics of engineering thermodynamics.

Keywords: quantum theory, engineering thermodynamics, participatory, complementary, indeterminate, non-commutative, Leibniz, Statics to Dynamics, Lazare Carnot

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