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A Quantum-Classical Isomorphic Interpretation of Quantum Foundations Based on Density Functional Theory and Polymer Self-Consistent Field Theory

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The Feynman quantum-classical isomorphism between classical statistical mechanics in 3+1 dimensions and quantum statistical mechanics in 3 dimensions is used to relate classical polymer self-consistent field theory to quantum density functional theory. This allows the theorems of density functional theory, which connect single particle density descriptions of quantum systems to wave function descriptions, to relate non-relativistic quantum mechanics back to a classical statistical mechanical derivation of polymer self-consistent field theory for ring polymers. In turn, this allows for a quantum-classical isomorphic interpretation of quantum foundations which may require fewer postulates than standard approaches to quantum mechanics, while preserving all quantum predictions.

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