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Quantum Structures of a Model-Universe: An Inconsistency with Everett Interpretation of Quantum Mechanics

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Abstract We observe a Quantum Brownian Motion (QBM) Model Universe in conjunction with recently established Entanglement Relativity and Parallel Occurrence of Decoherence. The Parallel Occurrence of Decoherence establishes the simultaneous occurrence of decoherence for two mutually irreducible structures (decomposition into subsystems) of the total QBM model universe. First we find that Everett world branching for one structure excludes branching for the alternate structure and in order to reconcile this situation branching cannot be allowed for either of the structures considered. Second, we observe the non-existence of a third, "emergent structure", that could approximate both structures and also be allowed to branch. Ultimately we find unless world-branching requires additional criteria or conditions, or there is a privileged structure, that we provide a valid model that cannot be properly described by the Everett Interpretation of Quantum Mechanics.

Keywords Everett Interpretation · Entanglement Relativity · Quantum Brownian Motion · Quantum Decoherence

1 Introduction

"*Today, it is often said that in Everettian quantum theory the notion of parallel 'worlds' or 'universes' applies only to the macroscopic worlds defined (approximately) by decoherence. Formerly, it was common to assert the existence of many worlds at the microscopic level as well. Without entering into any controversy that*

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