Relational Blockworld: Radically Archimedean Physics

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Abstract

We introduce a new radically Archimedean geometric (acausal and adynamical) interpretation of non-relativistic quantum mechanics (NRQM) called Relational Blockworld (RBW). We motivate the interpretation by outlining two results. First, the canonical commutation relations for position and momentum can be obtained from boost and translation operators, respectively, in a spacetime where the relativity of simultaneity holds. Second, the NRQM density operator can be obtained from the spacetime symmetry group of the experimental configuration exclusively. We show how NRQM, obtained from relativistic quantum field theory (RQFT) per RBW, explains the twin-slit experiment and suggests the need for a principle fundamental to NRQM and RQFT that explicates the process of trans-temporal identification. We show that when it comes to interpreting some experimental set-ups such as quantum-liar, RBW has an explanatory advantage over more modest Archimedean models such as time-symmetric or backwards causal accounts of NRQM. We conclude by resolving the standard conceptual problems of NRQM, i.e., the measurement problem, entanglement and non-locality.

Keywords:	blockworld, non-relativistic quantum mechanics, measurement problem, entanglement, non-locality, twin-slit experiment, quantum-liar experiment
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