

Abstract Submitted
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Information Processing Structure of Quantum Gravity¹ LASZLO GYONGYOSI, Budapest University of Technology and Economics, Hungarian Academy of Sciences, SANDOR IMRE, Budapest University of Technology and Economics — The theory of quantum gravity is aimed to fuse general relativity with quantum theory into a more fundamental framework. Quantum gravity provides both the non-fixed causality of general relativity and the quantum uncertainty of quantum mechanics. In a quantum gravity scenario, the causal structure is indefinite and the processes are causally non-separable. We provide a model for the information processing structure of quantum gravity. We show that the quantum gravity environment is an information resource-pool from which valuable information can be extracted. We analyze the structure of the quantum gravity space and the entanglement of the space-time geometry. We study the information transfer capabilities of quantum gravity space and define the quantum gravity channel. We characterize the information transfer of the gravity space and the correlation measure functions of the gravity channel. We investigate the process of stimulated storage for quantum gravity memories, a phenomenon that exploits the information resource-pool property of quantum gravity. The results confirm that the benefits of the quantum gravity space can be exploited in quantum computations, particularly in the development of quantum computers.

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