

Abstract Submitted
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Complementarity of information and the emergence of the classical world MICHAEL ZWOLAK, Oregon State University, WOJCIECH ZUREK, Los Alamos National Laboratory — We prove an anti-symmetry property relating accessible information about a system through some auxiliary system F and the quantum discord with respect to a complementary system F' . In Quantum Darwinism, where fragments of the environment relay information to observers – this relation allows us to understand some fundamental properties regarding correlations between a quantum system and its environment. First, it relies on a natural separation of accessible information and quantum information about a system. Under decoherence, this separation shows that accessible information is maximized for the quasi-classical pointer observable. Other observables are accessible only via correlations with the pointer observable. Second, It shows that objective information becomes accessible to many observers only when quantum information is relegated to correlations with the global environment, and, therefore, locally inaccessible. The resulting complementarity explains why, in a quantum Universe, we perceive objective classical reality, and supports Bohr's intuition that quantum phenomena acquire classical reality only when communicated.

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