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Quantum Darwinism in hazy environments MICHAEL ZWOLAK[1], H.T. QUAN, WOJCIECH ZUREK, Los Alamos National Laboratory — Quantum Darwinism provides an information-theoretic framework for the emergence of the classical world from the quantum substrate. It recognizes that we - the observers - acquire our information about the "systems of interest" indirectly from their imprints on the environment. Objectivity, a key property of the classical world, arises via the proliferation of redundant information into the environment where many observers can then intercept it and independently determine the state of the system. After a general introduction to this framework, we demonstrate how non-ideal initial states of the environment (e.g., mixed states) affect its ability to act as a communication channel for information about the system. The environment's capacity for transmitting information is directly related to its ability to increase its entropy. Therefore, environments that remain nearly invariant under the Hamiltonian dynamics, such as very mixed states, have a diminished ability to transmit information. However, despite this, the environment almost always redundantly transmits information about the system.

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