

Abstract Submitted
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Quantum information theory of the Bell-state quantum eraser

JENNIFER GLICK, CHRISTOPH ADAMI, Michigan State University — Wave-particle duality has long been recognized as a phenomenon that is unique to quantum systems and one that is prominently manifested in the quantum eraser experiment. The Bell-state quantum eraser brings this duality to the forefront, as one can retroactively choose to observe particle-like or wave-like properties, or anything in between. We present a unitary information-theoretic description of the Bell-state quantum eraser and show that a relationship between the coherence of the quantum state, and the classical information obtained from it, naturally emerges. The trade-off that we derive between coherence and path information does not rely on any chosen measure of coherence, as it simply follows from the chain rule for quantum entropies. We conclude that a full information-theoretic analysis of the quantum eraser and other quantum protocols can offer new insights into the origins of complementarity.

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