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The Optimal Cloner for Mixed States as a Quantum Operation JOHN G. GARDINER, JEAN-FRANCOIS S. VAN HUELE, Brigham Young University — The no-cloning theorem in quantum information says that it is impossible to produce two copies of an arbitrary quantum state. This precludes the possibility of a perfect universal quantum cloner, a process that could copy any quantum state perfectly. It is possible, however, to find optimal approximations of such a cloner. Using the formalism of quantum operations we obtain the optimal quantum cloner for arbitrary mixed states of a given purity and find that it is equivalent to the Bužek-Hillery optimal cloner for pure states. We also find the fidelity of this cloner as a function of the chosen purity.

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