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Direct Characterization of Quantum Dynamics with Noisy Ancilla¹ EUGENE DUMITRESCU, TRAVIS HUMBLE, Oak Ridge National Laboratory, University of Tennessee — We present methods for the direct characterization of quantum dynamics (DCQD) in which both the principal and ancilla systems undergo noisy processes. Using a concatenated error detection code, we discriminate between located and unlocated errors on the principal system in what amounts to filtering of ancilla noise. The example of composite noise involving amplitude damping and depolarizing channels is used to demonstrate the method, while we find the rate of noise filtering is more generally dependent on code distance. Our results indicate the accuracy of quantum process characterization can be greatly improved while remaining within reach of current experimental capabilities.

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