

Virtual Distillation with Noise Dilution

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Virtual distillation is an error-mitigation technique for arbitrary noisy environments. Considering isolatable noise from peripherals of a quantum circuit, such as delay lines, we find that virtual distillation performance improves if the peripheral is uniformly distributed across the circuit. For multiqubit loss and Pauli noise channels of a fixed overall error rate, error-mitigated circuit-output states improve in quality monotonically as the peripheral is split (diluted) into more layers. We show that second-order distillation is sufficient for near-optimal mitigation. These results are applied to quantum-computing clusters, where detectors are limited and delay lines are necessary to queue output qubits from multiple circuits.