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Tunable joint measurements in the dispersive regime of cavity QED KEVIN LALUMIÈRE, Département de Physique, Université de Sherbrooke, JAY GAMBETTA, Institute for Quantum Computing and Department of Physics and Astronomy, University of Waterloo, ALEXANDRE BLAIS, Département de Physique, Université de Sherbrooke — Joint measurements of multiple qubits have been shown to open new possibilities for quantum information processing. Here, we present an approach based on homodyne detection to realize such measurements in the dispersive regime of cavity QED. The readout can be tuned from extracting single-qubit to only multi-qubit properties like parity. We obtain a reduced stochastic master equation describing this measurement and its effect on the qubits. As an example, we present results for a parity measurement on two qubits that uses realistic parameters. In this situation, measurement of an initially unentangled state can yield a state of significant concurrence with probability approaching one.

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