

Abstract Submitted
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Towards multi-level quantum logic with trapped ions BRENDAN BRAMMAN, PEI JIANG LOW, RICHARD RADEMACHER, CRYSTAL SENKO, University of Waterloo — We report on progress developing tools to control d -dimensional quantum systems (qudits) encoded in the hyperfine structure of trapped atomic ions. The well-developed toolbox for manipulating ionic qubits can be modified to extend to coherent control of single- and two-qudit operations and measurement capabilities to obtain full information on the qudit state. Such a system could be useful either for quantum computing, offering potential scaling advantages, or for quantum simulations of higher-dimensional systems such as interacting integer spin chains.

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