

Abstract Submitted
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Towards Building an Open-access Trapped Ion Quantum Information Processor for the Research Community¹ NIKOLAY VIDENOV, NOAH GREENBERG, RICHARD RADEMACHER, MATTHEW DAY, CRYSTAL SENKO, RAJIBUL ISLAM, IQC and Dept. of Physics and Astronomy, University of Waterloo — Trapped ions are a leading platform for quantum information processing with pristine qubits, fully connected interaction graphs, and long coherence times. Trapped ion NISQ processors have enabled an immense variety of research in academic and private sector groups, and are highly oversubscribed. A shared open-access processor would facilitate many research programs, particularly those requiring fine control over low-level hardware. In this poster, we present the progress towards developing QuantumIon - an open-access trapped-ion quantum information processor at University of Waterloo. We present innovative approaches to the optical, mechanical, and control challenges. A guided-light platform which combines state-of-the-art glass micro-machining technologies will provide fully controllable individual addressing for up to 16 Ba⁺ ions. The control system will use a distributed configuration of fast commercial FPGAs capable of providing real time branching decision logic. Using established networking protocols pulled from a variety of industries this control system straightforwardly scales to increasing numbers of qubits and even increasing numbers of networked traps.

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