

Abstract Submitted  
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**Cloud-Based**

**Trapped-Ion**

**Quantum Computing** MIKA CHMIELEWSKI, JASON AMINI, KAI HUDEK, JUNGSANG KIM, JONATHAN MIZRAHI, CHRISTOPHER MONROE, KENNETH WRIGHT, DAVID MOEHRING, IonQ, Inc — In this talk I will cover the progress made on developing a scalable system of trapped-ion qubits to perform arbitrary quantum algorithms. Trapped ions are fundamentally identical units with long coherence times, and thus ideally suited for scalable quantum computation. Our current system allows for loading and preparing long chains of  $^{171}\text{Yb}^+$  ions in a microfabricated chip trap. The hardware is linked to a cloud-based interface that allows users to build and request particular algorithms of their choosing. I will provide a review of this system, with a focus on hardware design for effective algorithm execution. Additionally, I will provide a glimpse into how lessons learned from the current system will lead us to more robust and scalable quantum information processors in the future.

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