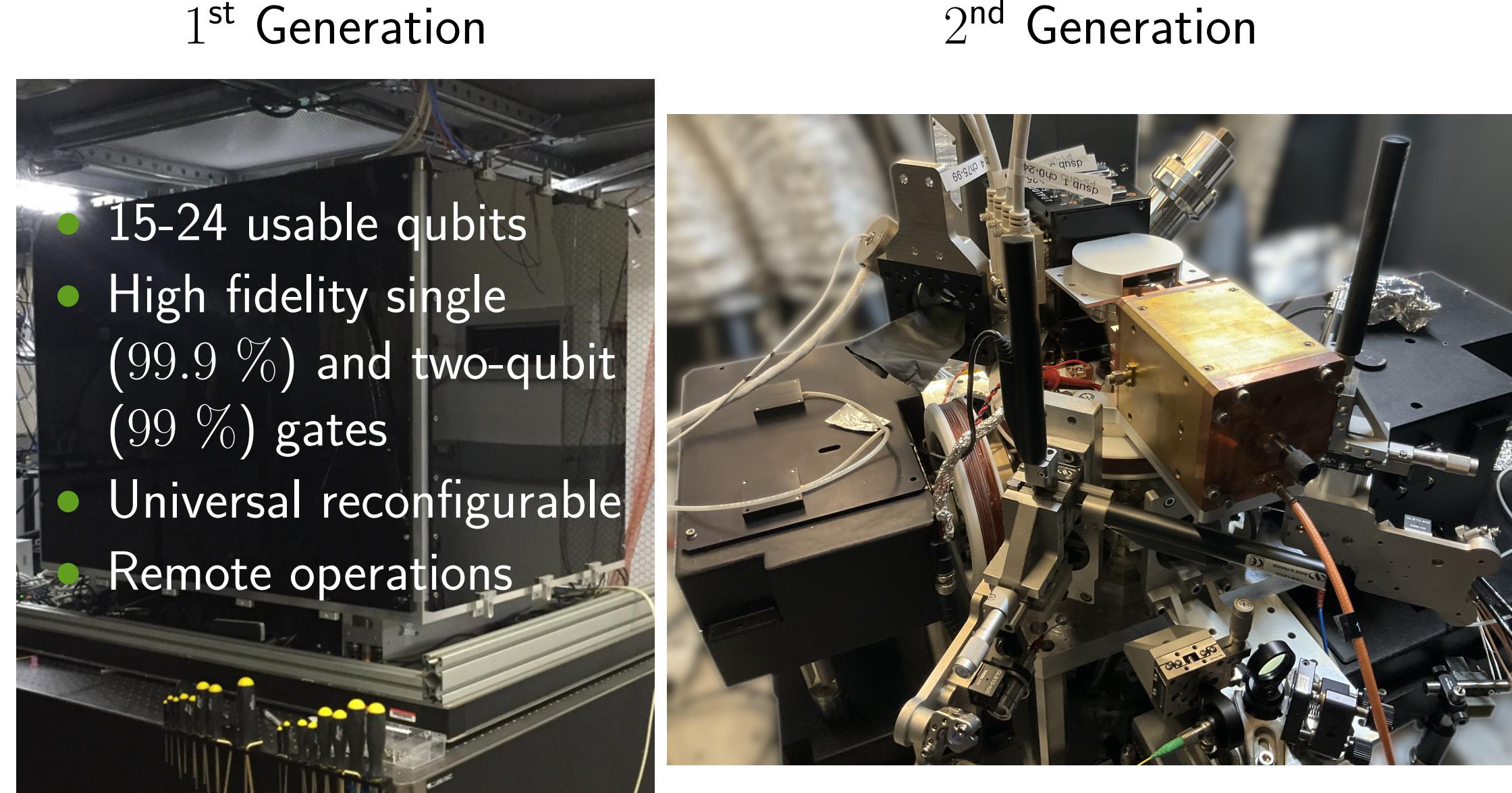


A next-generation trapped ion quantum computing system - a.k.a. "brassboard"

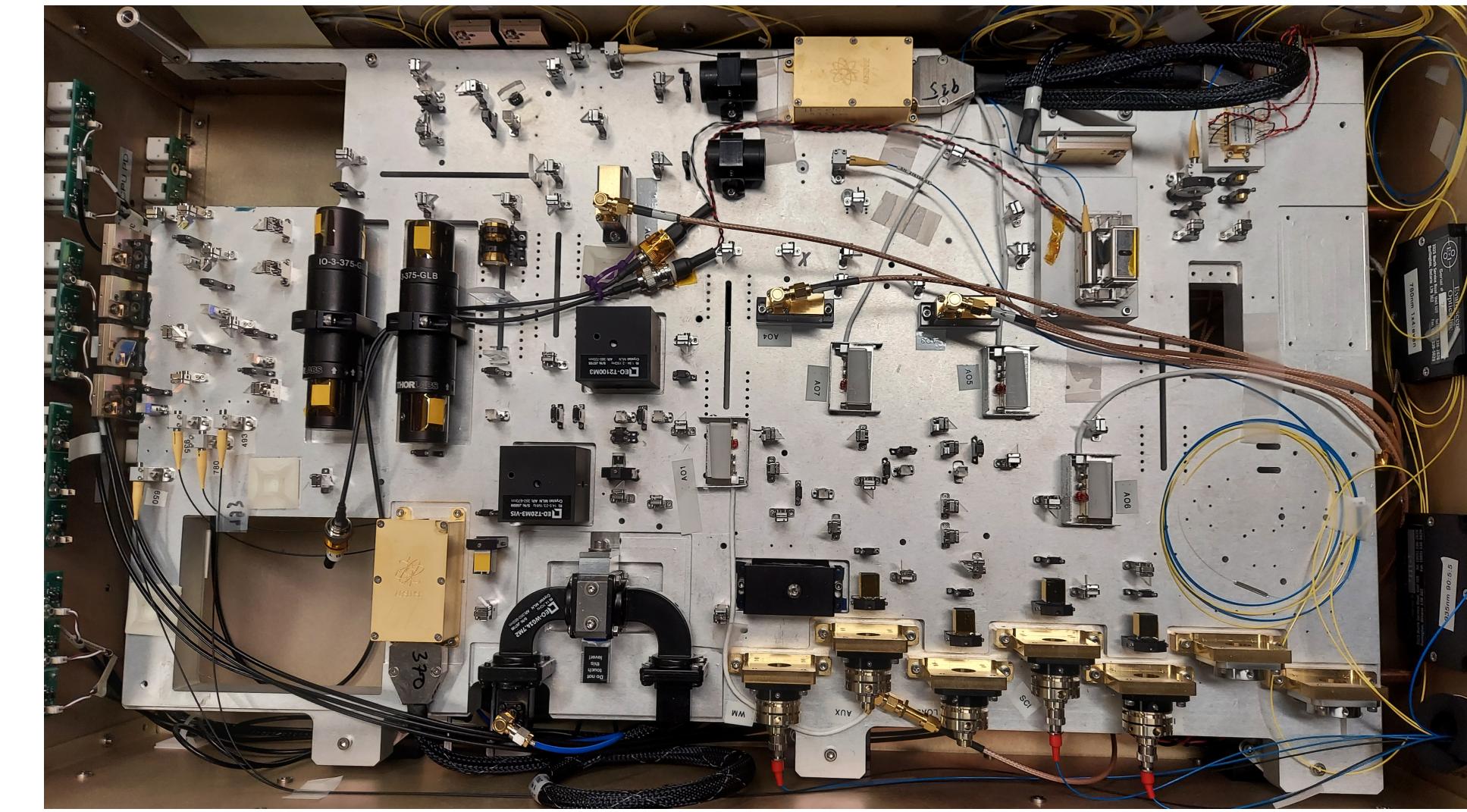
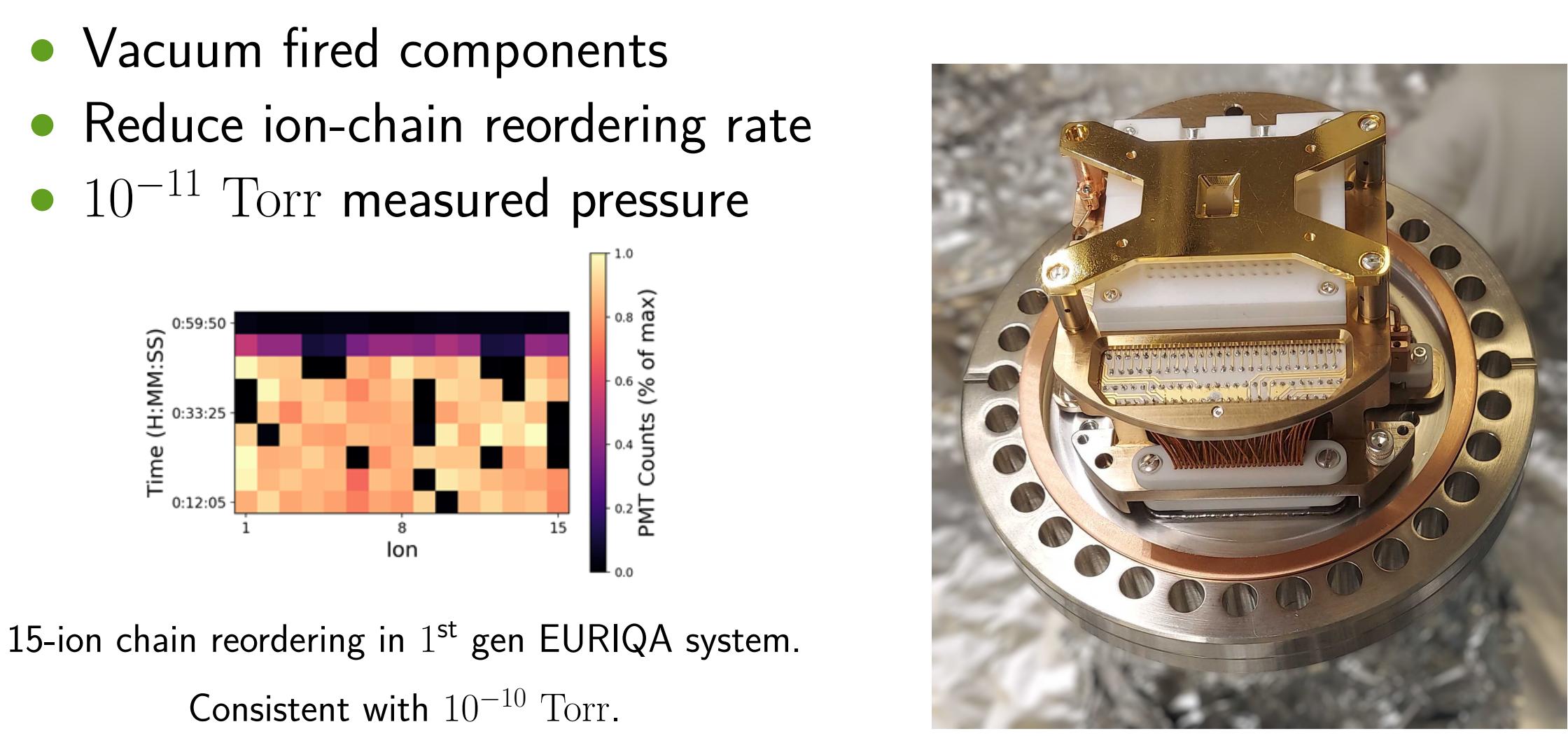
Yichao Yu ¹, Liudmila Zhukas ¹, Lei Feng ^{1,2}, Marko Cetina ^{1,2}, Crystal Noel ^{1,2},
Debopriyo Biswas ^{1,2}, Andrew Risinger ², Alexander Kozhanov ¹, Christopher R Monroe ^{1,2,3}

¹Duke Quantum Center, Duke University ²Joint Quantum Institute, University of Maryland ³IonQ, Inc.

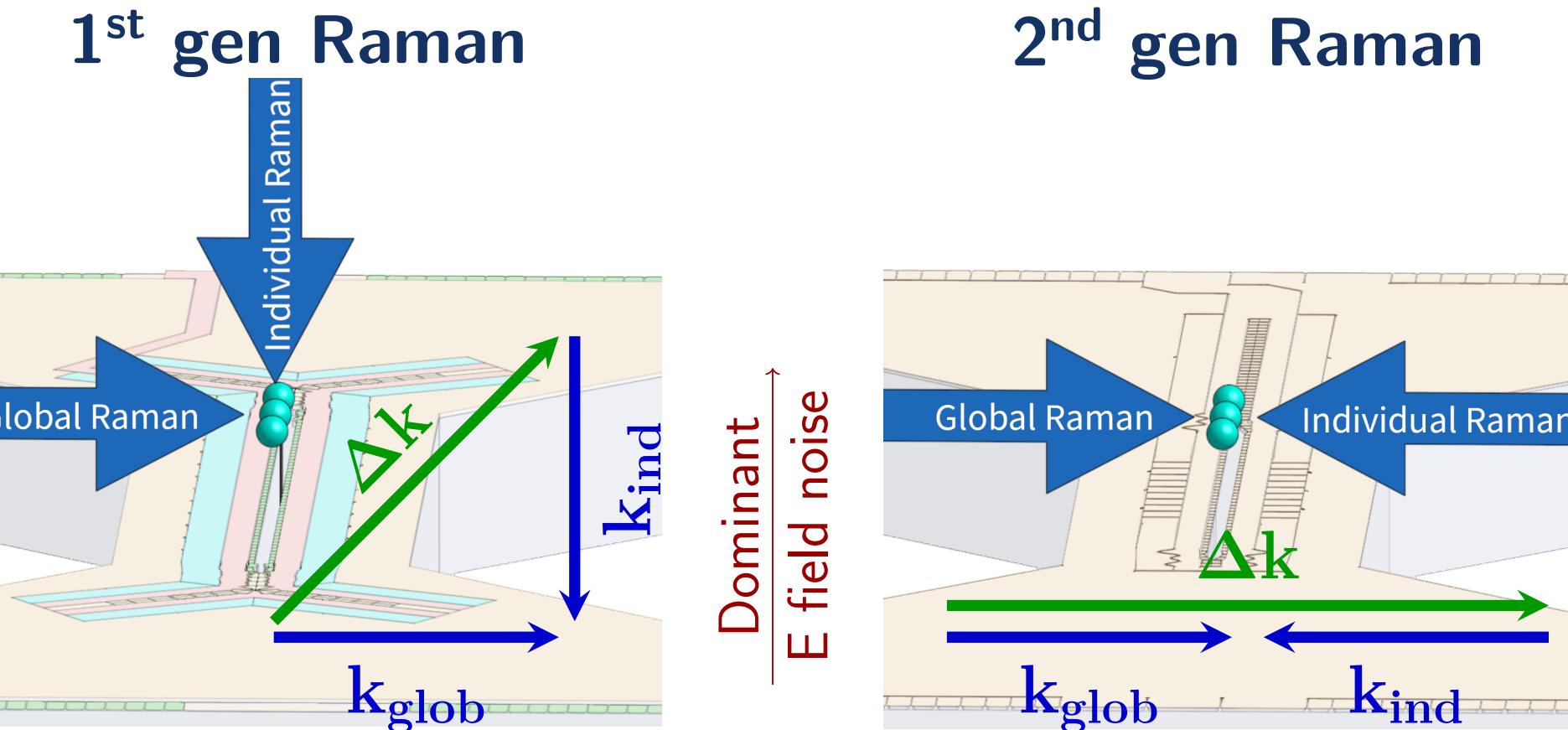
Error-corrected Universal Reconfigurable Ion-trap Quantum Archetype



Vacuum System



Raman System

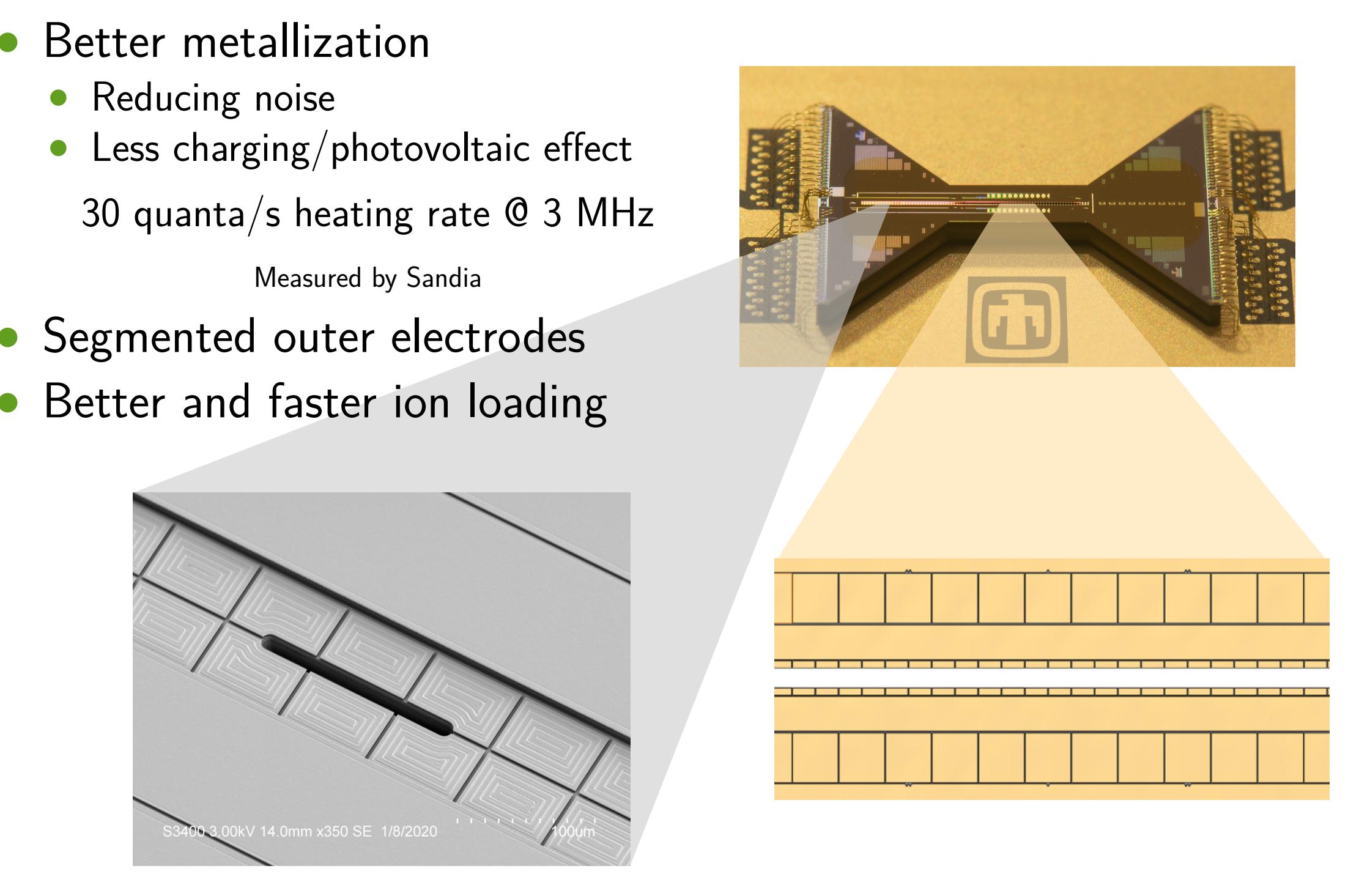


Miniaturized 369/399/780/935nm Beam Path

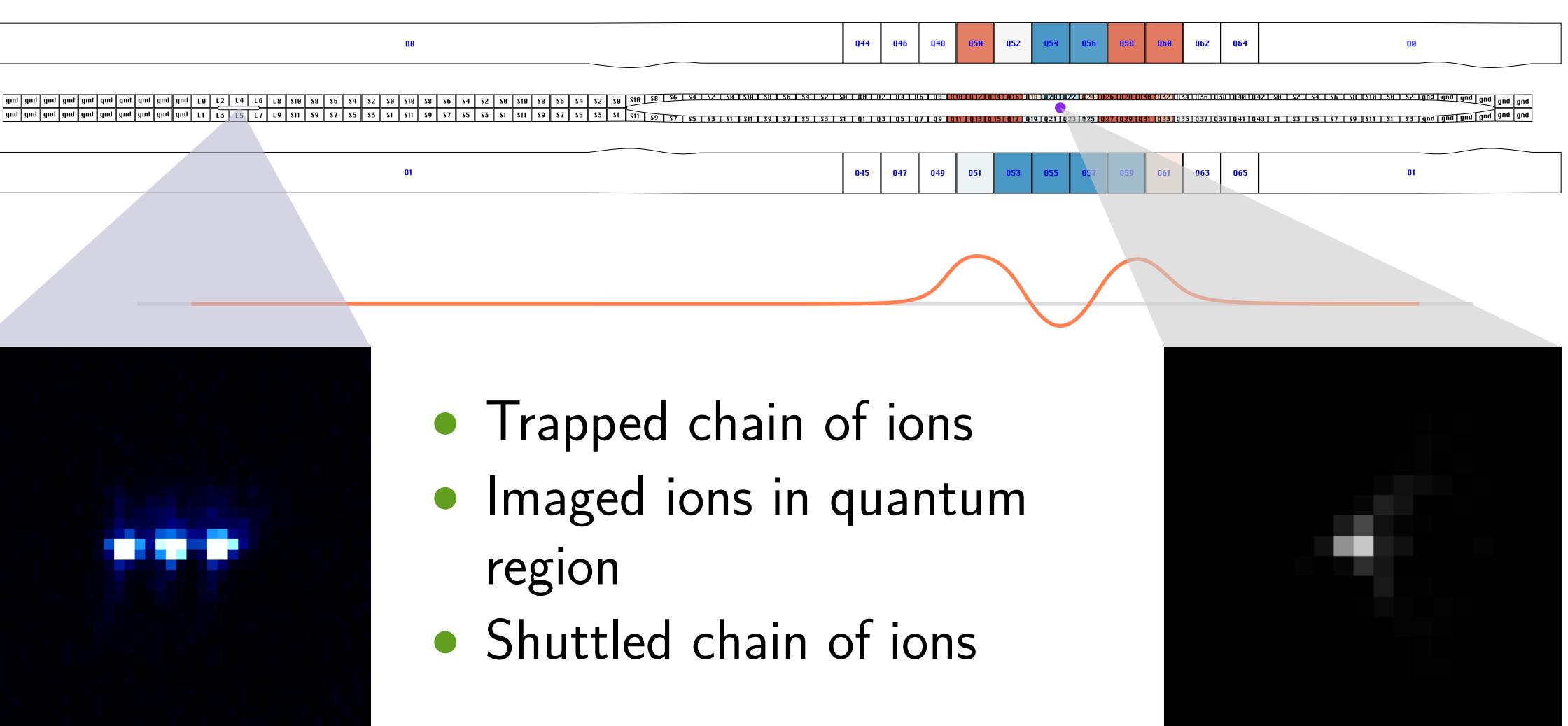
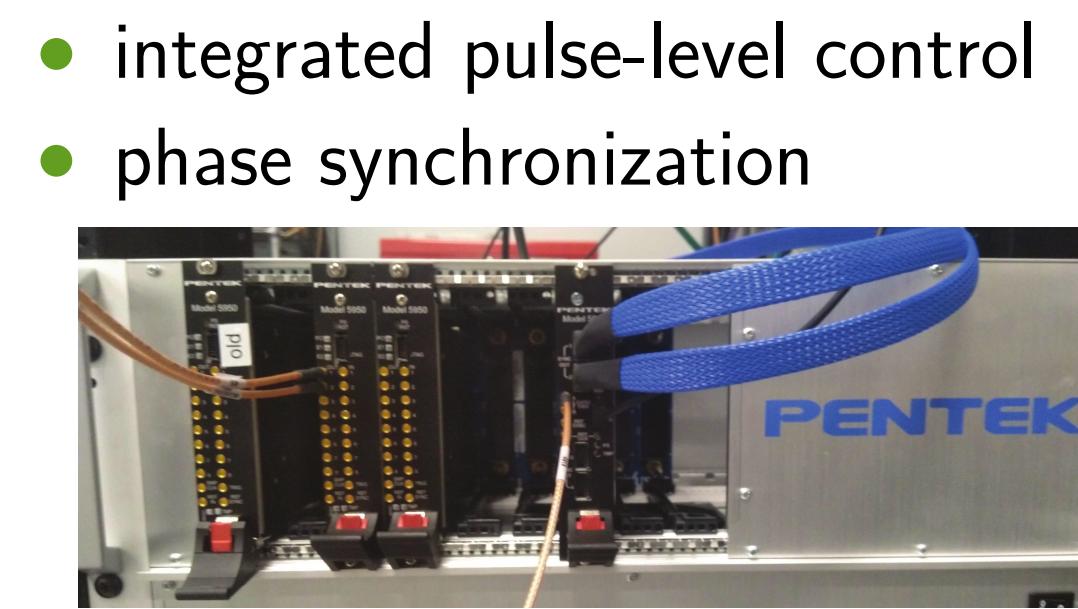


Imaging System

Phoenix Surface Trap



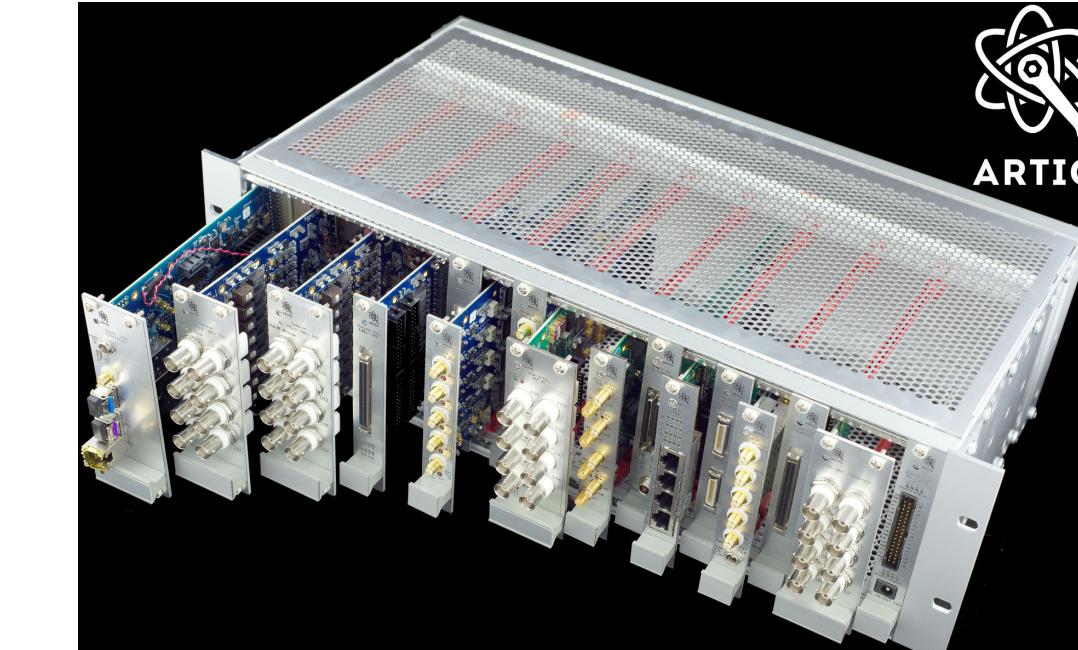
RFSoC/Pentek



Control System

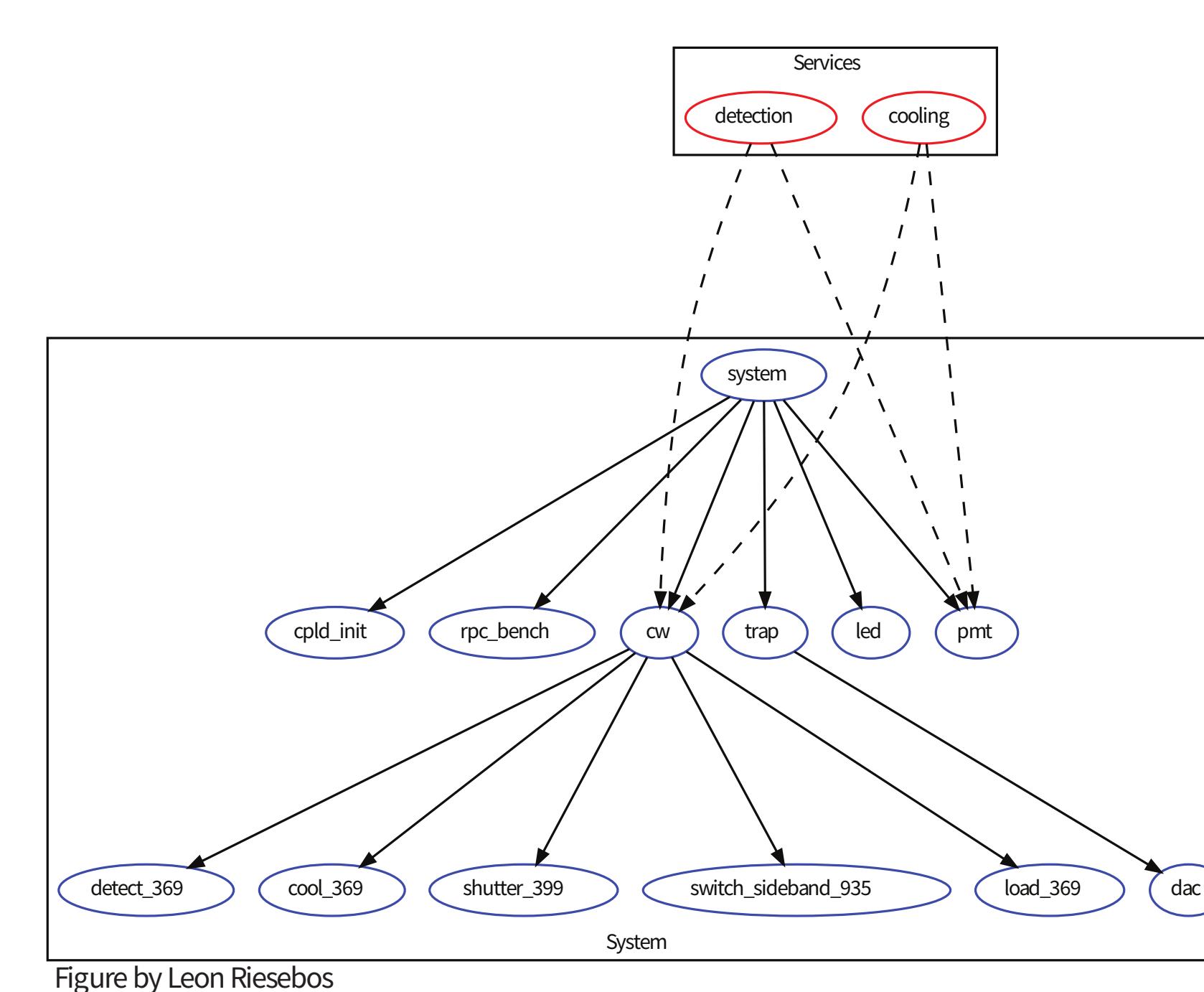
ARTIQ

- Artiq software
- Sinara hardware



Duke Artiq Extensions

- modular control software
- system code organization



Applications

- Universal Quantum Computer
- 20+ qubits and high fidelity
- Quantum simulations of many body physics
- Quantum chemistry
- Quantum gravity
- Nuclear theory
- Quantum Error Correction

