



Contribution ID: 200

Type: **Invited Speaker**

## Quantum control and transport in a micro fabricated Penning trap.

*Thursday, 28 September 2023 11:15 (30 minutes)*

I will describe experimental work on the control of ions in a micro fabricated surface-electrode Penning trap. The work is motivated by the possibility to realise micro-trap arrays for quantum computing, sensing and simulation, without being restricted by the complications introduced by high-voltage RF fields for trapping. At a trapping height of 152 micron, we have trapped beryllium ions and cooled all motional modes to the ground state, observing heating rates as low as 0.1 quanta per second at 2.5 MHz trap frequency. Using in-sequence switching, we demonstrate the ability to trap ions while isolating the electrodes from all voltage sources. By translating the ion in 3-dimensions over >100 micron range, we use the ion as a field sensor for electric and magnetic fields in a flexible manner. Our work provides and characterizes a range of elements of a unit-cell for a Penning trap QCCD architecture for scalable quantum computing and simulation.

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