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Motional Ion Heating Rate Measurements over a Range of Trap Frequencies and Temperatures COLIN BRUZEWICZ, ROBERT MCCONNELL, JEREMY SAGE, JOHN CHIAVERINI, MIT Lincoln Lab — Anomalous motional heating limits high-fidelity two-qubit gate operations in large-scale trapped-ion quantum computation. To examine the possible mechanisms driving this process, we present detailed measurements of the heating rate of a single trapped ion over a range of trap frequencies and temperatures. We compare these results to predictions given by available theoretical electric-field noise models and constrain a subset of these models based on the observed trap frequency and temperature scaling interdependence. Additionally, we report on recent efforts to mitigate motional state heating with electrode surface treatments, such as *in situ* local trap chip baking and plasma cleaning.

Colin Bruzewicz
MIT Lincoln Lab

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