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Temperature dependence of decoherence in ion traps JAROSLAW LABAZIEWICZ, YUFEI GE, SHANNON X. WANG, RUTH SHEWMON, ISAAC L. CHUANG, Center for Ultracold Atoms, MIT — Dense arrays of trapped ions provide one way of scaling up ion trap quantum information processing. However, miniaturization of ion traps is currently limited by sharply increasing motional state decoherence at sub-100 μm ion-electrode distances. This decoherence has been demonstrated to be thermally driven, providing a plausible route to reduce it. In our experiment, we measure the heating rate out of the motional ground state of a single Sr^+ ion in a cryogenic surface electrode ion trap. We present our results on the temperature dependence of the heating rates as a function of electrode temperature in 10-100 K range. Heating rates at 6 K are observed to be as low as two quanta per second, but increase rapidly with temperature.

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