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Sympathetic Heating Spectroscopy with Ca^+ Isotopes CRAIG CLARK, YATIS DODIA, JAMES GEODERS, GRAHAME VITTORINI, RICARDO VITERI, KENNETH BROWN, Georgia Insititute of Technology — Sympathetic heating spectroscopy is a promising technique to obtain ultrahigh-resolution spectra of molecular ions. The basis for this technique is to monitor the evolution of the fluorescence of a two-body Coulomb crystal in a Paul linear trap as one of the ions is excited. This crystal consists of an atomic ion which can be trapped and laser cooled (control ion), and a sympathetically cooled molecular or atomic ion (spectroscopy ion). We use isotopes of Ca^+ for the development of sympathetic heating spectroscopy because excitation schemes are well understood. We use $^{40}Ca^+$ for the control ion and $^{44}Ca^+$ for the spectroscopy ion. Heating of the $^{40}Ca^+$ is-achieved by driving the $S_{1\backslash 2}$-$P_{1\backslash 2}$ transition, detuned to the blue. We characterize the sympathetic heating spectroscopy for a variety of detunings, laser intensities, and for both open and closed optical transitions.

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