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Sympathetic Cooling and Reordering in Multiple Trapped Ion Species Chains JOHN WRIGHT, TOMASZ SAKREJDA, RICHARD GRAHAM, ZICHAO ZHOU, BORIS BLINOV, University of Washington — Using multiple ion species allows ion-based quantum computing projects to overcome limitations of addressability and cooling in long ion chains. Namely, a single ion species would be used for quantum operations, while the other would be devoted to cooling of the entire chain. The cooling species are interspersed among the qubit ions to enable more efficient cooling while making individual addressing of the qubit ions easier. We attempt to measure and explore the effect of ion species ordering on the efficiency of the resultant cooling. Initially, the energy of spontaneous ion reordering is approximated via classical simulations. Then, the axial temperature and heating rate can be determined by measuring the time required for different length chains to reorder. Initial, approximate heating rates and work towards measuring ion species reordering effects are presented.

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