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Confining an ion in a surface electrode ion trap PAIGE ROBICHAUD, Williams College — Trapped ions are a promising platform for quantum information science, as they are easily manipulated using laser and microwave fields and well isolated from their environment. At Williams College, I have worked with Prof. Charlie Doret to begin installing the High Optical Access (HOA) Ion Trap 2.0 from Sandia Laboratories. The lab ultimately hopes to use the HOA trap to study mesoscopic heat transfer in chains of calcium ions. A deeper understanding of heat transfer on this scale could provide insights to the thermal regulation of nanoscale materials and microelectronics. We developed a MATLAB script that, given a target electric potential, calculates an optimal solution of voltages to apply to the HOA trap's DC electrodes that will match the target potential. This DC voltage solution, along with an AC field from radio frequency electrodes, will allow the lab to confine an ion in the HOA trap. The program has been further extended to calculate voltage solutions for the DC electrodes in order to trap chains of ions and to shuttle ions around in the trap. These calculations will be essential for efficiently running a future experiment with long chains of calcium ions.

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