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Electrostatic Potential Map for ALPHA's Penning-Malmberg Traps[1] L. DALILA ROBLEDO, University of California, Berkeley, CHUKMAN SO, TRIUMF, JOEL FAJANS, University of California, Berkeley — Composed of a positron and an antiproton bound together, antihydrogen is the antimatter counterpart of hydrogen. According to the charge, parity, and time reversal (CPT) symmetry theorem, hydrogen and antihydrogen must have the same energy levels, mass, and net charge. Finding CPT violation would be problematic for our current understanding of physics described by the Standard Model, but it would help explain the mysterious matter-antimatter asymmetry in the universe. Because of antihydrogen's neutrality and correspondence with the hydrogen atom, it is a useful system for investigation of possible CPT violation. In the ALPHA experiment, antihydrogen is produced by first confining antiproton and positron plasmas at cryogenic temperatures and then mixing them. The plasmas sit in the potential wells produced by stacks of hollow cylindrical electrodes also known as Penning-Malmberg traps. By changing the voltages applied to each electrode, we can move and tailor the plasmas. Precise modeling of the potential produced by the electrodes is crucial for manipulating such plasmas. This is achieved by numerically solving the Laplace equation for each of our trap geometries and displaying it in LabVIEW.

[1]NSF, DOE OFES, and SURF Rose Hills Experience

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