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Poisson-Boltzmann equilibrium solutions for electron plasma trapped in a high field Penning-Malmberg trap PATRICK STEINBRUNNER, MATTHEW STONEKING, MARTIN SINGER, Max Planck Institute for Plasma Physics, STEPHAN KOENIG, University Greifswald, Germany, ADAM DELLER, THOMAS PEDERSEN, Max Planck Institute for Plasma Physics, APEX COLLABORATION — Thermal equilibrium for a non-neutral plasma in a finite-length Penning-Malmberg trap is governed by Poissons equation and the Boltzmann relation. We describe numerical solutions for such equilibria that are applicable to the PAX (Positron Accumulation eXperiment) high-field (3.1 T) trapped plasma. The PAX Experiment has the goal to accumulate positrons coming from the NEPOMUC source in Garching in order to provide the pair plasma experiment APEX with enough particles to observe collective plasma behavior. The experiment is currently being conducted with electrons in Greifswald to develop the key techniques needed for deployment at NEPOMUC. The equilibrium solution can be found numerically using an iterative finite-difference method for a given temperature (0.05 eV to 10 eV) and number of particles (10^8-10^{11}). For a unique solution it is also necessary to provide a fixed mean-squared radius of the plasma distribution. Alternatively the radial profile, which can be measured by dumping the plasma onto a phosphor screen, can be used. With such a profile a solution was found after 300 iterations that agrees with theoretical expectations.

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