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Confinement of strongly magnetized ultracold plasmas J.-H. CHOI, X. ZHANG, A. P. POVILUS, G. RAITHEL, Physics Department, University of Michigan — We report on the trapping and evolution dynamics of strongly magnetized quasi-neutral ultracold plasmas. By applying a quadrupole electric field in addition to a Penning trap field (B=2.9T), both ion and electron components of the plasmas have been confined over several milliseconds in a nested trapping configuration. An ultracold plasma is first created by photoionizing a cloud of laser-cooled ^{85}Rb atoms. After a variable time delay, an electric-field ramp is applied to extract electrons from the trap. The measurements allow us to determine the depth of the potential well in which the electron component of the plasma is trapped. We observe a periodic modulation of the electron trap depth, caused by a breathing-mode oscillation of the ionic component in the trap. In addition, evaporative cooling leads to a decrease of the electron gas temperature over several milliseconds. The long-term loss of particles from the trap is mostly due to a slow $\mathbf{E} \times \mathbf{B}$ drift motion. In the future, simultaneous confinement of ion and electron components might be important in studying strongly coupled neutral plasmas.

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