Abstract Submitted
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**Rf excitation of an ultra-cold plasma**[1] SCOTT GALICA, DUNCAN TATE, Colby College — In this presentation we will be discussing the results of our recent experiments exploring the effects of charge imbalance on radio-frequency (rf) absorption in ultra-cold neutral plasmas (UNPs). The UNP is created by photoionization of 100 $\mu$K Rb atoms in a MOT. The maximum electron density is $\sim 10^9$ cm$^{-3}$, and the unperturbed plasma lifetime is approximately 150 $\mu$s. We have observed the change in electron evaporation rate when the UNP is excited with rf radiation in the range 10-270 MHz. We are analyzing our results using the theoretical approach proposed in a recent paper (Lyunbonko *et al.*, arXiv:1011.5937v1 [physics.plasm-ph]). Specifically, the theory addresses the response on a UNP with a gaussian density distribution as the rf frequency is changed, and considers the effect of the changing degree of charge imbalance as the UNP evolves. This issue is critical for understanding the experimental data, particularly since the maximum plasma resonant frequency also falls as the plasma expands. These factors result in a complex time-behavior of the electron evaporation rate. We are investigating the relationship between the charge imbalance and maximum plasma resonant frequency as functions of time, with the goal of obtaining information such as the electron density and plasma expansion velocity.

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