Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Apparatus improvements for experiments on ultracold neutral plasmas[1] DUNCAN TATE, JAKUB BYSTRICKY, RYAN COLE[2], CHANGLING LI, YIN LI[3], Colby College — This poster will describe recent improvements in our apparatus for experimental investigations of ultracold neutral plasmas (UNPs). Specifically, we have implemented a new technique for observing the UNP expansion by stripping the electrons with a fast rise-time electric field pulse ($\sim$ 10 ns rise-time, $\sim$ 10 V/cm amplitude) and projecting the ions towards our micro-channel plate detector (MCP). By careful calibration of the ion time-of-flight signal, the spatial profile of the UNP can be recovered. By observing how this changes as a function of delay between the plasma creation time and the application of the fast pulse, the UNP expansion velocity can be obtained. Additionally, we have installed a tapered amplifier (TPA) on our vapor-cell MOT cooling and repumper laser beams to increase the cold atom density. Finally, we have installed a Pockels cell switch to switch off the MOT cooling and repumper beams in $\sim$ 10 ns. This will be used in conjunction with a narrow bandwidth 780 nm laser pulse applied after the MOT laser beams have been switched off to suppress the thermal atom background in experiments on cold Rydberg plasmas.

[1]Research supported by Colby College
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Date submitted: 24 Jan 2020 Electronic form version 1.4