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Hybrid optical dipole trap for ultracold rubidium and potassium with magnetometry applications CHARLES FANCHER, MEGAN IVORY, AUSTIN ZILTZ, ANDREW PYLE, ELANA URBACH, SETH AUBIN, College of William and Mary — We present progress on the development of a hybrid magnetic-optical dipole trap for the rapid production of ultracold atomic samples of Rb and K. This optical trap adds single-chamber experimental capability to an existing dual-chamber atom chip apparatus. By using a magnetic trap to quickly load the dipole trap while simultaneously cooling the atoms via radio-frequency evaporative cooling we have produced samples of 10^7 ^{87}Rb atoms at the μK level with a phase space density of 10^{-3} and are working to further cool the atomic cloud. We intend to load ^{39}K into the dipole trap by sympathetic cooling with rubidium using microwave evaporation. This optical dipole trap approach enables research on cold collisional physics, as well as atomic clocks and gradient magnetometry. A Larmor precession method that uses magnetically sensitive atomic states can be used to measure magnetic fields. Two spatially separated magnetometers, loaded into one or two dipole traps, can then be used to measure magnetic field gradients.

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