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Optical trapping of ultra-cold 87Rb with a 1550nm laser PING WANG, ABRAHAM OLSON, QIANLI MA, SOURAV DUTTA, YONG P. CHEN, Department of Physics, Purdue University, West Lafayette, IN 47907 USA — We have optically trapped ultra-cold ^{87}Rb atoms in a crossed optical dipole trap (ODT) with an IPG 50W, 1550nm single frequency erbium fiber laser and investigated various schemes to directly load the ODT from a magneto optical trap (MOT). After we initially collect 2×10^8 atoms in the MOT and cool them to $\sim$20 μK by polarization gradient cooling, two crossed 1550nm laser beams are applied to the cloud and transfer $\sim$60% of the atoms to the ODT. The alignment of the optical trapping beams with MOT is greatly facilitated by a large (several hundred MHz) AC stark shift of ^{87}Rb $5P^{3/2}$ excited states due to the 1550nm laser which is close to the 1529nm transition from $5P^{3/2}$ to $4D^{3/2}$[1]. The cooling and repumping laser (780nm) of MOT become off resonant when dipole trapping lasers are aligned with MOT, "buring" a hole in what otherwise would be a bright MOT. After successful loading of the ODT, we have investigated various schemes of forced evaporative cooling in ODT. Our continued research will focus on Bose Einstein condensation and two dimensional atomic gas with this apparatus.

[1] J. P. Brantut, *et al.*, Phys. Rev. A **78**, 031401(R) (2008).

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