Physics 4062/5062 – Tutorial Five – Master List of Cold Atom Experiments

Required:

1) Estimate atom number N, by calibrating photo detector

2) Estimate trap density by calibrating CCD camera

3) Investigation of basic scaling laws (pick the ones that give the best results)

(a) N vs. dB/dz - change in position of cloud center with dB/dz

(b) Cloud size R versus dB/dz

(c) N versus intensity/intensity imbalance,

(d) change in position of center with intensity imbalance

(e) N versus R (N varied by changing I trap)

(f) N vs. repump beam intensity

(g) N versus R at two extremes of repump intensity

(h) N vs. detuning of trapping beam

(i) Measure atom number versus trap beam diameter

4) Investigation of loading rate:

(a) Measure loading rate by turning on trap laser. Vary background density and estimate pressure from loading curves.

b) With the trap fully loaded turn of trap and or repump and measure the optical pumping time constant.

Optional:

1) Investigation of molasses decay time

2) Measure trap temperature (ballistic expansion or release and recapture)

3) Identify scheme for trapping Rb 87.

The motivation for each of these experiments, and expected trends will be discussed in tutorials 5 through 8.