PHYS514 **Homework 6**
Fall 2013 **due 11/7**

1. Foot 10.1 *…realistic magnetic trap numbers*

2. Foot 10.2 *…loading a trap*

Part (a) should read "…is placed ***instantaneously*** in a spherically symmetric trapping potential."

3. Foot 10.4 *…evaporative cooling*

Let's make this problem more sensible by putting in the density of states for a trapped gas. We should have:

$$N_{total} = A\int_0^\infty g(E)e^{-\beta E}\,dE$$

and

$$E_{total} = A\int_0^\infty g(E)E\,e^{-\beta E}\,dE$$

where $g(E) = E^2 \,/\, 2(\hbar\bar{\omega})^3$, and $\bar{\omega}$ is the geometric mean of the trap frequencies. Calculate E_{total} and the mean energy $\bar{E}$ using this density of states. In part (d), take $R_{coll} = n_{dwd}v_{rel}\sigma = \frac{2}{\sqrt{\pi}}n_0\,\bar{v}\,\sigma$, where n_{dwd} is the density-weighted-density, v_{rel} is the mean relative speed, n_0 is the peak density in the trap, and $\bar{v}$ is the mean speed.

4. Foot 10.5 …T_c

5. Foot 10.8 *…expansion of a non-interacting BEC*