

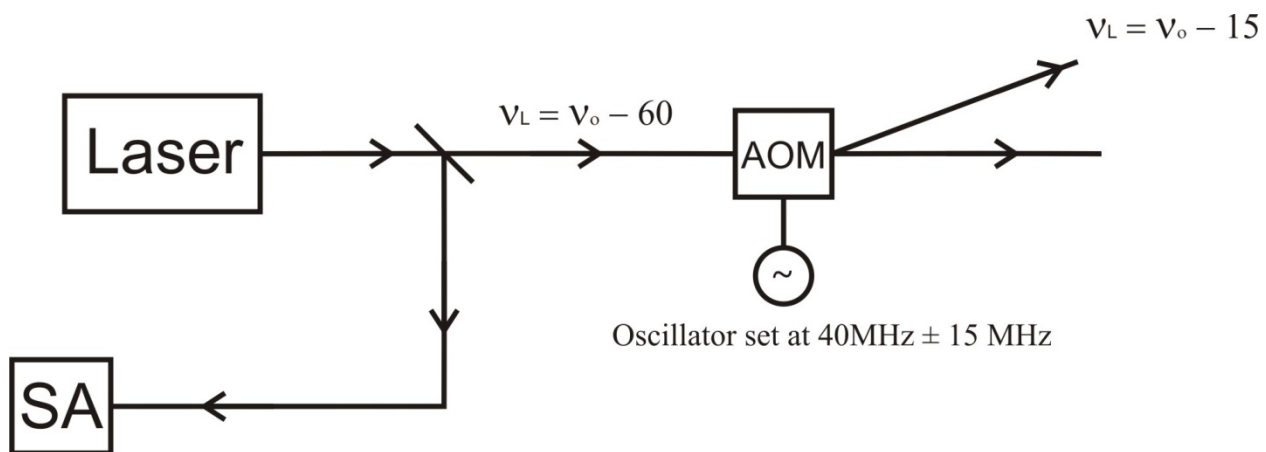
## Physics 4062/5062 – Tutorial One

1. Spectroscopy
  - a. Check that lasers are on resonance
  - b. Trap and repump transitions
2. AOM frequency chain to derive  $\nu_L$  of trap laser
3. Beam Alignment
4. Polarization Tests
5. Lock Lasers
6. Coils configuration and coil placement
7. Check Rb Fluorescence in trapping cell
8. Trap Atoms
9. Count atoms
10. Image atomic cloud
11. Series of short experiments

### Key Ideas for Experiments

1. Review Concepts associated with
  - Spectroscopy
  - Saturated Absorption
  - Doppler Free Resonance
  - Crossover transitions
2. Amplitude and Frequency Modulation using AOMs
  - Frequency Shift/Chain, Amplitude Modulate

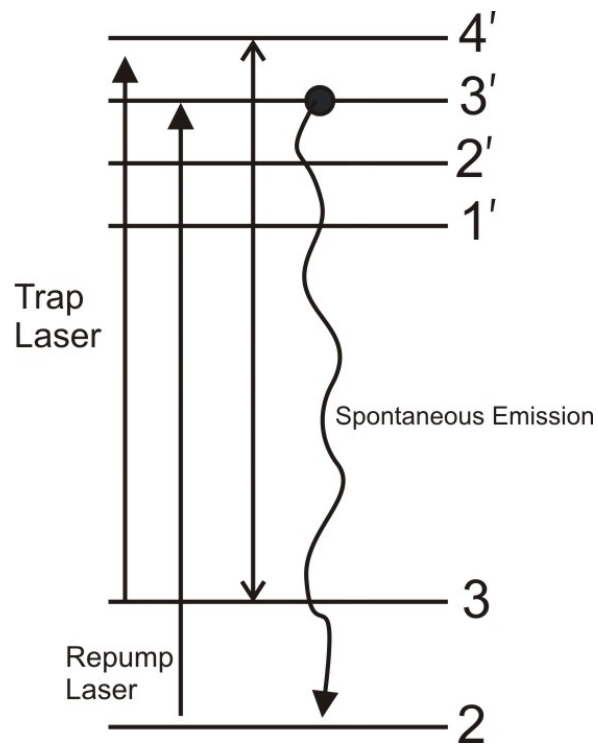
Diagram of AOM Setup  $^{85}\text{Rb}$



Need  $\nu_T = \nu_o - 2.5\Gamma_N$

1. Lock to 1<sup>st</sup> crossover
2. Drive AOM
3. Verify frequency upshift

### Need for Repump Laser in <sup>85</sup>Rb



Trap laser is tuned near resonance with 3-4' transition. Apart from transitions between the 3 and 4' off resonant transitions occur to 3' and 2'. So some of the atoms decay via spontaneous emission to the ground state 2 and stop interacting with the trap. A Repump laser resonant with the 2-3' transition is needed to pump these atoms back into the ground state 3 via the excited state 3'.