

## June 21, 2006 CSFL Teleconference Notes

[http://www.oir.caltech.edu/twiki\\_oir/bin/view.cgi/Palomar/PalmLGS/ChicagoLaser](http://www.oir.caltech.edu/twiki_oir/bin/view.cgi/Palomar/PalmLGS/ChicagoLaser)  
A. Bouchez, 6/21/06

Caltech: Bouchez, Velur  
JPL: Shelton, Troy  
Chicago: Kibblewhite

### 1. Method of control

- Ed suggests we use temperature control:
  - $d\nu/dt = -\nu \cdot 7.6 \times 10^{-6} \text{ deg}^{-1}$
  - 1.06: 2.1 GHz/deg, 1.32: 1.7 GHz/deg for quartz.
- May need temperature control regardless of control scheme.
- If we need stability of 200 MHz, then have to control temp to 0.1K.
- Light Machinery sent quote: 1 GHz FWHM, 15 GHz FSR, available for \$2700/9wks.
- Temp. control probably cheaper, just need to work out time constant.
- Keck has active control on cavity length and finest etalon.

### 2. How many etalons?

- VV: Current etalon is quite wide. If we pump the laser harder, we'll make it wider.
- EK: Complex issue. Nd laser is *moderately* homogeneous.
- Right now on 1.06, FWHM for 1mm etalon is 10.7 GHz. Get 2.5-3.0 GHz final bandwidth.
- Viswa arguing for a 1 GHz etalon, which one fills by pumping harder.
- Ed does not agree. What's important is the curvature of the etalon at the peak.
- Need sufficient number of modes to preserve short pulses.
- We may have chirping which is reducing the effectiveness of the mode-locking.
- Viswa and Chris arguing that current FSR is not big enough. Strongest line only is 210 GHz wide. So we need an etalon with  $\text{FSR} > 200 \text{ GHz}$ .
- Chris on previous laser design: 2.2mm air-spaced etalon + 100 um micron temp-controlled silica etalon, both 70% reflective.
- Current etalons: 1mm/60% in 1.06, 2mm/40% in 1.32
- Would Thor PZT mounts be useful for dithering the whole package? Possibly.

### 3. Proposal

- Purchase several etalons of varying thickness, coated at a fixed reflectivity for each laser.
- Purchase several thin etalons for coarse control of 1.06 laser.
- Purchase temperature controller with >5 channels + 1 for S/W development.
- Purchase Melcor TE coolers, possibly annular in shape?
- Work assignments:
  - Ed will specify the etalons.
  - Chris will specify temperature control hardware.
  - Viswa will coordinate purchases, compute temperature control math (

Ed will be at Palomar 6-13 July.

Viswa will be at Palomar 5-12 July.