Analysis performed on the Michelsons in June 2006

1- detune sequences in sunlight and Calmode

Jesper, John, and Rock took several detune sequences in Calmode with sunlight at different days.
The analysis is done with a code that uses these data and fits (least-squares fit) for the phases of the tunable elements (Lyot E1, NB, WB) and also for the relative solar continuum intensity, solar linewidth, and solar linedepth (the solar line is assumed to have a Gaussian profile).
With the data of the first suntest in February, the average linewidth was 0.071 A in Calmode. The theoretical value in Obsmode is 0.0612 A (from Yang Liu). In Calmode, we expect to have a linewidth larger than in Obsmode (I believe Phil said by about 15% the other day). So in Feb. the linewidth returned by the sunlight code was in agreement with the theoretical value.
With the data of June, the linewidth varies across the maps from about 0.08 A to about 0.14 A, which is clearly too large. The code is still working with the data of February. This code is based on certain assumptions (an average blocker filter + front window transmission profile is used, the contrasts are assumed to be 0.98 for the non-tunable elements, the measured FSRs of the elements are used...): these assumptions were modified, the initial guess for the fit was changed, the "boundary conditions" were relaxed (I force the returned parameters to be within certain boundaries), but the code always returns too large a linewidth.
The reconstruction of the detune sequence is also very poor compared to February (using the fitted parameters we try to reproduce the variation of intensity along the detune sequence): the errors between actual detune sequence and reconstructed one reach about 10% in June compared to 1.5% in February.

2- detune sequences with the laser (Obsmode and Calmode)

They are analyzed with a code that uses the mathematical property of the detune sequence (0, 120 degrees, 240 degrees) to analytically calculate the phases and contrasts of the tunable elements. There is no fit involved, just an equation to solve. When all the detune sequences taken by Jesper, John, and Rock are analyzed, we always find the same result: the contrast of the narrow-band Michelson is, on average, about 0.9. This is much lower than in February, and is unexpected because the phase map is better than in February (less gradient across the Michelson). Jesper also has a code and obtains similar results.
All the detune sequences give phase maps that are roughly consistent with each others (within about 10 degrees) if we assume that the laser wavelength was off.

3- cotune sequences in sunlight and Obsmode

Using the phase maps returned by the sunlight code in Calmode (with the

problem of linewidth), we produced a co-tune table that allows us to sample the solar line. All the 20-position co-tune sequences taken show the same problem: a weird variation in intensity across the sequence.
The minimum intensity is at the 11th position, where it is expected, but the intensity profile is not symmetrical around this position, as it should be (and as it was in February).
To produce such a large asymmetry, the phases of the tunable elements have to be very wrong: this could be possible because the sunlight code returns wrong linewidths, meaning that the phases can't be completely correct. On the other hand, the average phases obtained for the tunable elements with the sunlight code and the laser code are roughly consistent (again within 10 degrees).
The phases with the sunlight code were obtained by removing the last 9 positions of the detune sequences from the analysis (it turns out that, for an unknown reason, the linewidth is closer to 0.071 when the last 9 positions are missing).