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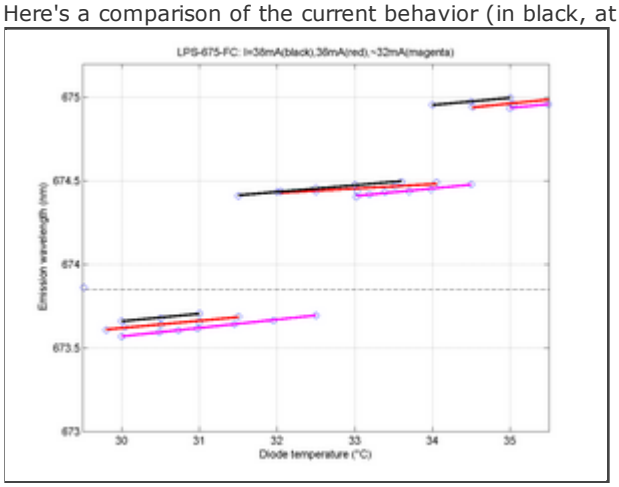
October 18, 2010

Red fiber laser (5)

Let me try scanning wavelength vs. temp of the red laser in its new position. (I believe that it is different after the move.) I will also scan the second pigtailed laser (from BEC2) that I have.

Third time scanning the temp wavelength characteristics of this diode, and the first time after mounting to the optics table. Here's a comparison of the current behavior (in black, at I=38mA) with respect to previous scans:



My impression is that this diode is pretty adamant about not tuning to a particular wavelength (namely the one that we want). So, I'm going to try scanning a different diode. This also lets me corroborate this diode's behavior with respect to another one.

Transferred new diode into the mount safely. Let me try a tuning -- fingers crossed!

Seeing pretty similar dynamics, but the operating temperature seems like it's going to be different.

Boy, do these things ever really emit single longitudinal mode?!?

Perhaps I am going about this the wrong way; maybe I need the injection current or some external element to help the diode decide which which longitudinal mode to select. In the vicinity of 25C, the current diode seems to multimode with one of the longitudinal lines in the vicinity of the frequency that is needed.

Whoa, by tuning the paddle waveplates, I find that the modes are doing a super wild dance, in kind of the way that I have noticed with the purposely bad feedback case. Perhaps this is feedback induced instability? This is very interesting. At any given time, it is the best single mode operation that I've seen, but it is very sensitive to current, and hops to a different single mode operation when I touch the current just slightly.

The fiber paddle has a huge influence on the spectral characteristics -- very perplexing to me. I can get the laser single mode at the desired color, but it is so sensitive with respect to current that I think this operation would be unwise! Yes, the lasing frequency is very unstable, and now I find that it's sensitive to the fiber paddle positioning, and also how I stress the output facet of the fiber. However, it is insensitive to the orientation of the ND filter at the output of the fiber. This implies to me that, if it is indeed a "feedback" effect, then it's coming from before the nd filter; so the fiber output facet, the collimator, etc.

I've actually got the laser pretty close to color, according to the wavemeter 673.853nm (measured fiber laser) vs. target of 673.850nm (measured version of monolaser). Current operating point is (T=21.66C, I=45.65mA). However, the lasing mode is super sensitive to current, on the order of 10s of uA. But as long as I don't touch it, it seems okay. Perhaps I will continue now trying to send the monolaser 674 through the isolator.

Posted by kimt at October 18, 2010 03:41 PM

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