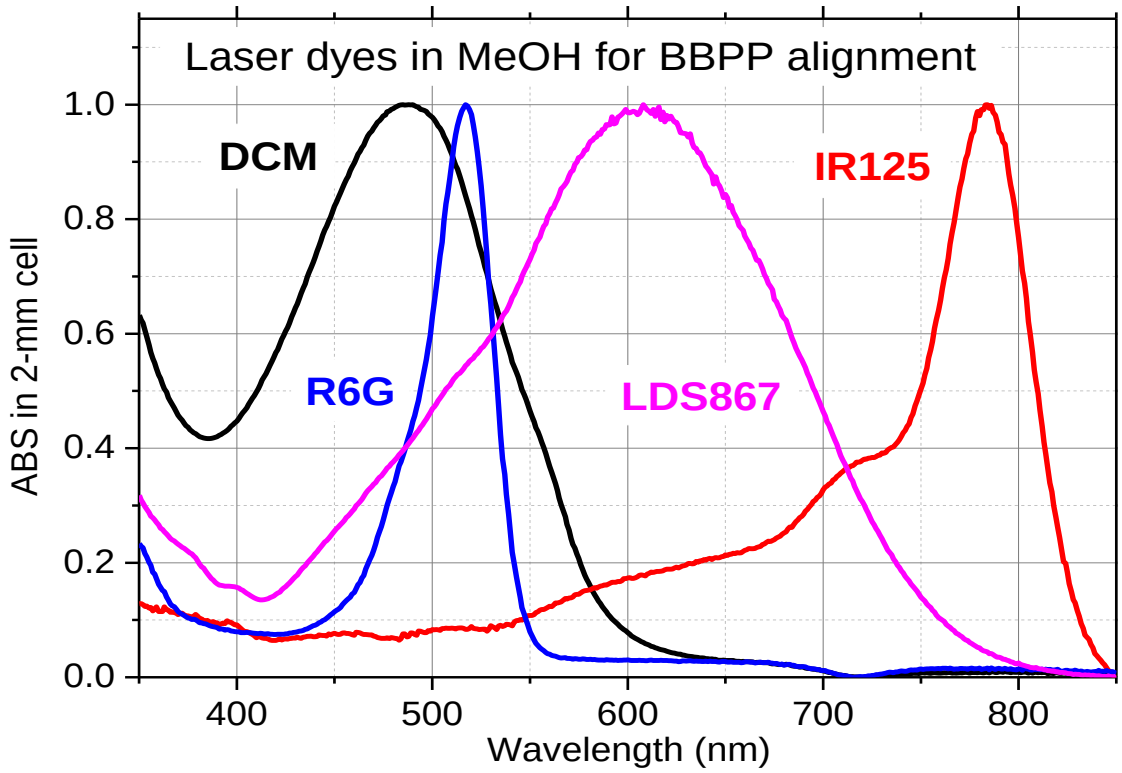
BBPP setup

Using the laser dyes listed below to find signal in related wavelength region

(samples are contained in 2-mm cuvette, no need to stir)

- τ (DCM in MeOH) ~ **300 ps (measured), ~ xx ps (ref)**
- τ (R6G in MeOH) ~ **xx ps (measured), ~ xx ps (ref)**
- τ (LDS867 in MeOH) ~ **300 ps (measured), ~ xx ps (ref)**
- τ (IR125 in MeOH) ~ **xx ps (measured), ~ xx ps (ref)**

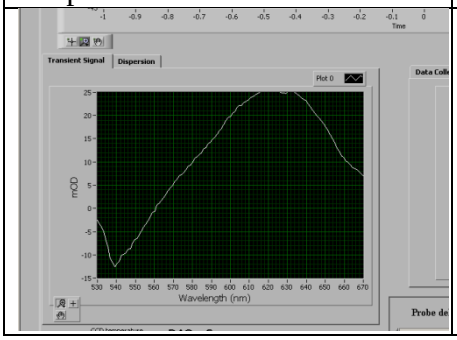
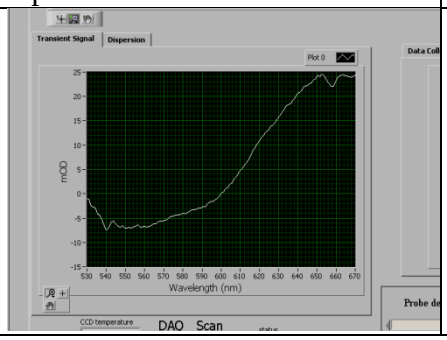
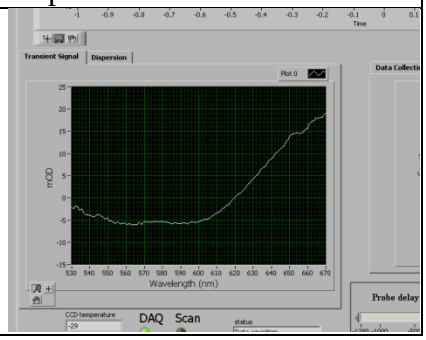


R:\Facility\ASU Setups\1_Setup-SPPP\BBPP Alignment, Setup, Instruction (updated 2012-12-20)\BBPP Exp Setup 2013-01-15\ABS of Laser Dyes for BBPP Alignment.opj

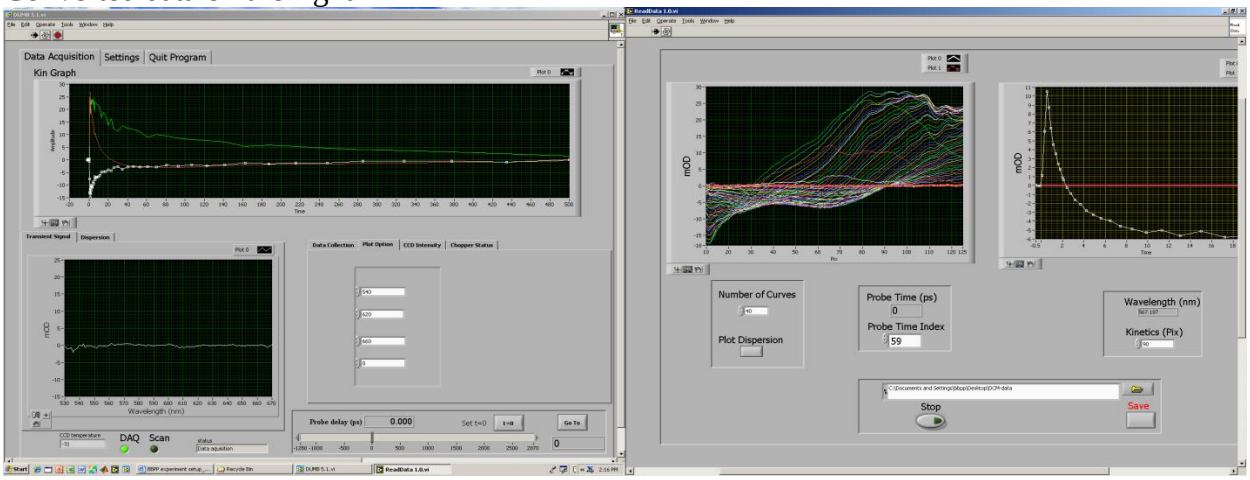
1. A quick way to find signal in the 500 – 650 nm region using 400-nm excitation

EX=400nm from OPA, make sure to block 800 beam using 3-mm BG40, for example.
DCM in MeOH, OD (400, 500) = 0.5, 1.0 in 2mm cell, not necessary to stir, lifetime ~ 300 ps.
G1, λc=600 nm (530-670 nm), no filters and polarizers in pump and probe beams

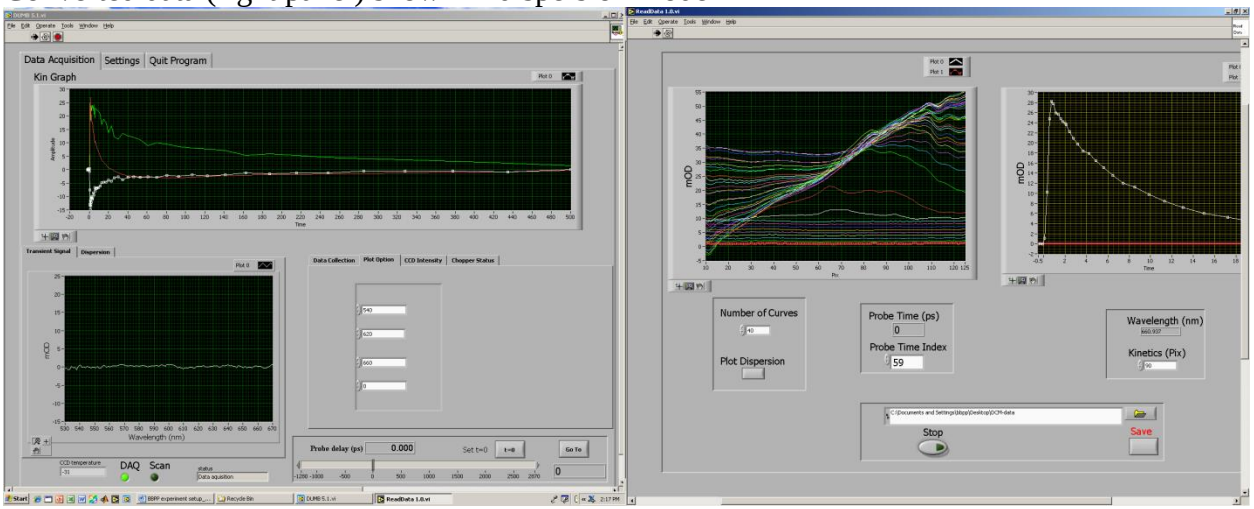
DOD spectrum looks like this

0.5 ps	5 ps	20 ps
		

Kinetic scan: -2 – 20 ps / 20pts + 22 – 500 ps /40 pts, 10 scans (DCM-Data)
Converted data on the right

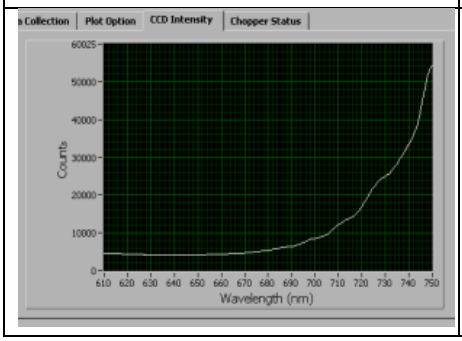
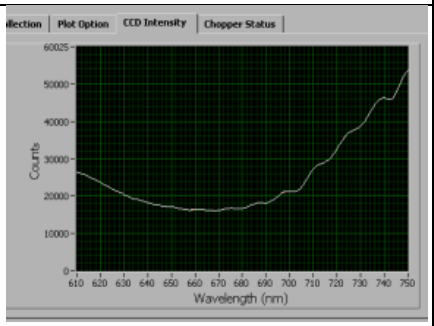
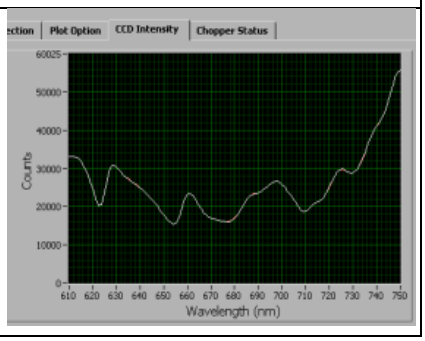


Converted data (right panel) shown in dispersion mode



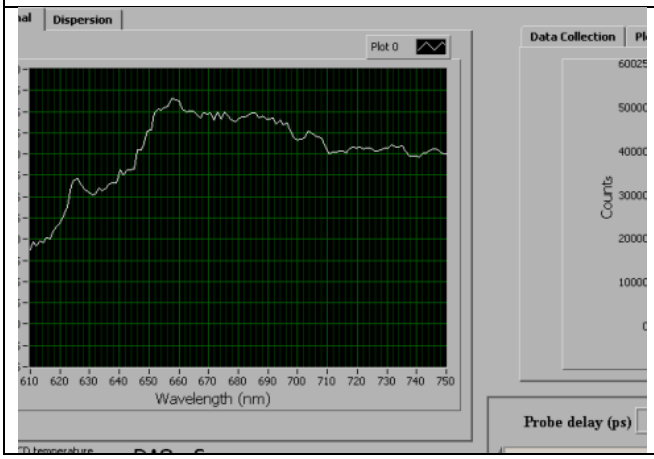
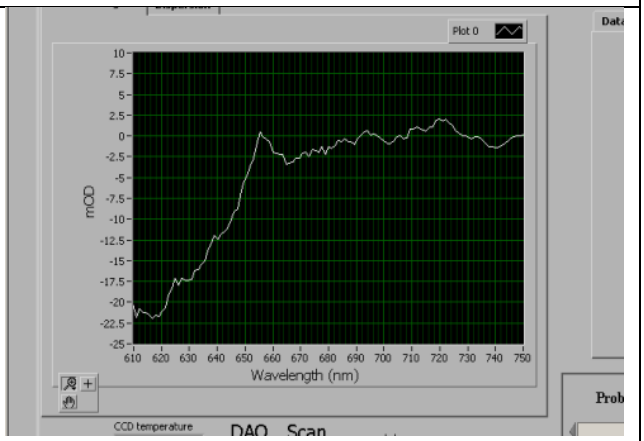
2. Using LDS867 in MeOH for 610 – 750 nm region

EX=650nm from OPA+IF650 (round 2"),
G1, λc=680 nm Probe spectra: tested quality with various optical components

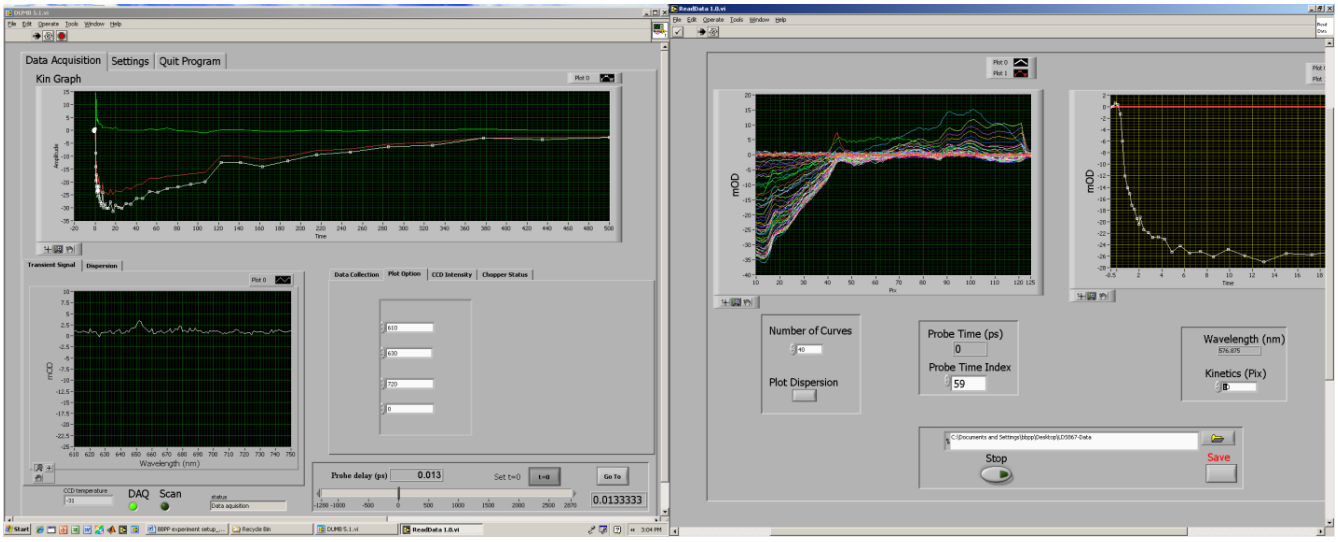
without KG3, polarizer, and sample, too high at longer wavelength end	add 3" KG3, without polarizer, and sample	with KG3 and 650-900 nm cubic polarizer at MA, without sample
		

** With polarizer at MA and without sample, probe spectra show uneven structure, same spectral problem with sheet polarizer, so the final setup is to rotate excitation to MA with a half-wave plate and a cubic polarizer, leave probe beam horizontal without polarizer

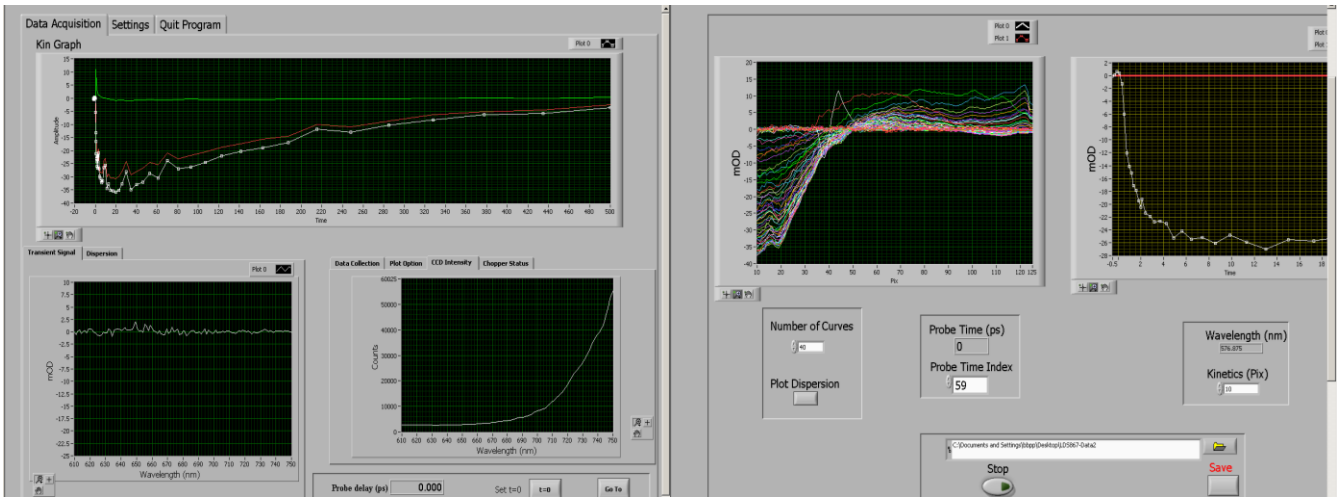
Signal of LDS867 with EX=650 nm

0.5 ps	5 ps
	

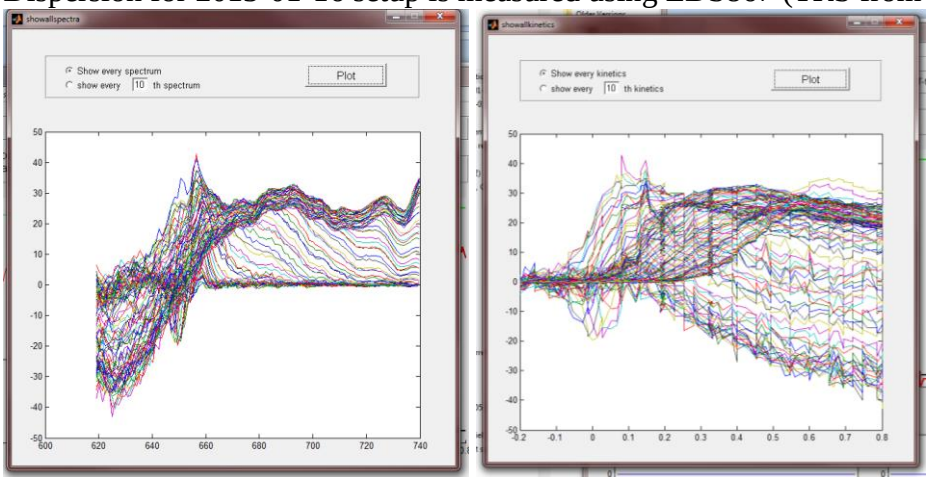
Kinetic scan: -2 – 20 ps / 20pts + 22 – 500 ps /40 pts, 10 scans (LDS867-Data), with cubic polarizer in the probe beam, excitation is horizontal, which is a question as the SHG in OPA rotates along the horizontal axis, could be the 2" IF filter? (need check to find out why)



Kinetic scan: -2 – 20 ps / 20pts + 22 – 500 ps /40 pts, 10 scans (LDS867-Data, and LDS867-Data2)
No cubic polarizer after sample, the polarization of probe light is horizontal
Placed a ½ plate and the cubic polarizer at MA in the excitation, caused 31 ps time delay



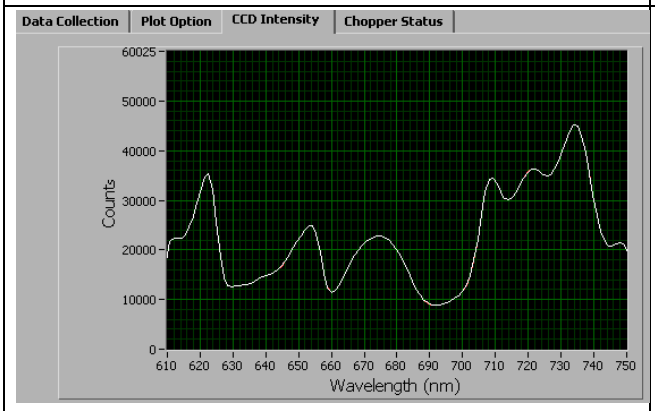
Dispersion for 2013-01-16 setup is measured using LDS867 (TRS from -0.2 – 0.8 ps)



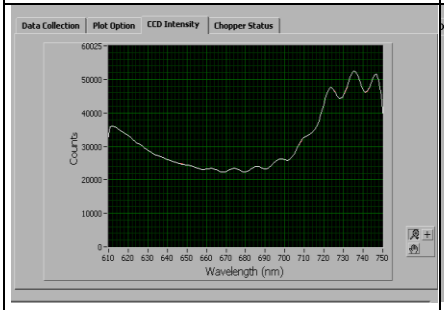
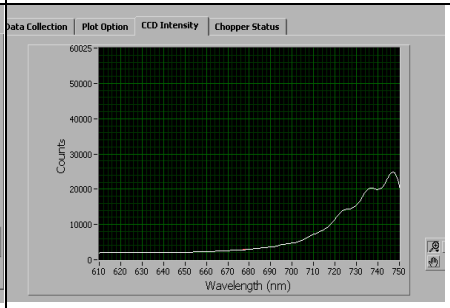
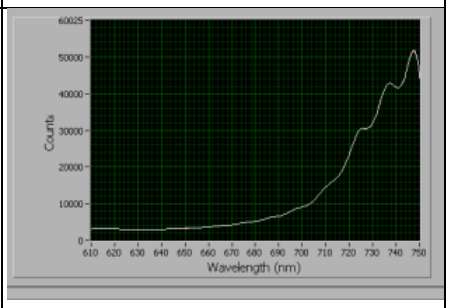
3. PSI exp

EX=680 – 695 nm: OPA doubled signal + IF700 (titled), WLG micrometer=13.5, SHG micrometer=3.5, polarization: horizontal (does not make sense: the OPA SHG crystal rotates around the horizontal axis, the 650 nm beam should be vertically polarized. But using 700-900nm cubic polarizer, can see the glue line to verify the polarization, it is shown the horizontal polarization. The sheet polarizer also verifies this polarization is horizontal. Could be using a special SHG crystal, or due to the 2" IF filter??, check it out using OPA polarizer)

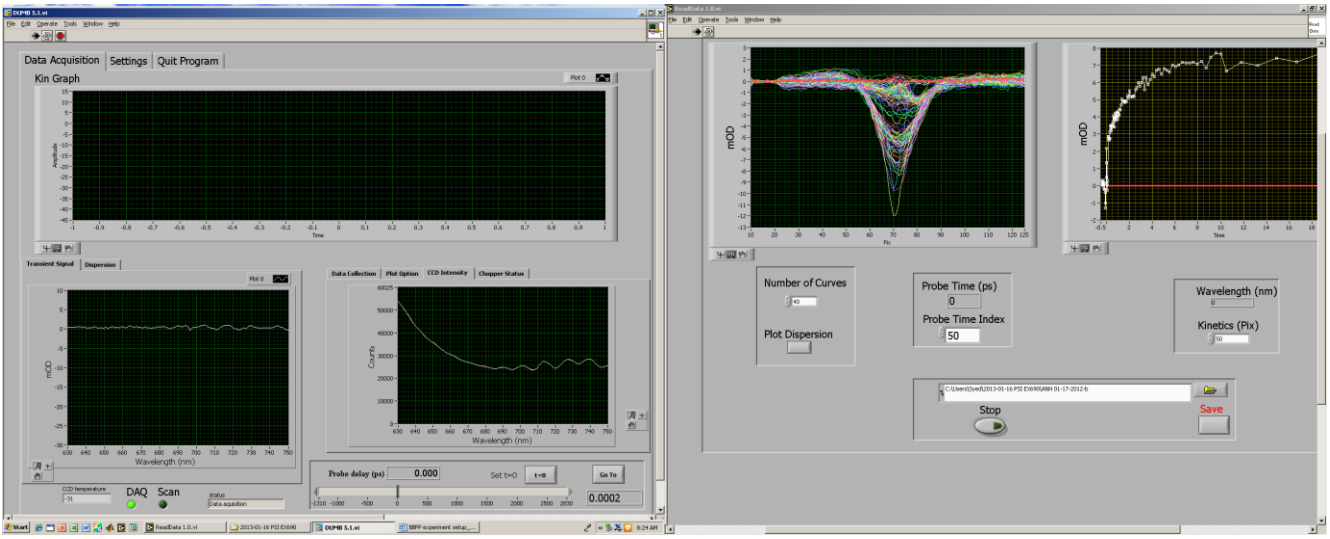
Probe: The probe beam is horizontally polarized. No color filter and polarizer after sample. Used a half-wave plate (400-700) and a cubic polarizer (650 – 900) in the excitation beam to set at the MA from horizontal. (This is because the polarizer (both cubic and sheet) change the probe spectral quality: though set cubic polarizer after sample can reduce some scattering from excitation.
G1, λc=680 nm (610-750) BG40 1mm filter before sample. Can't use polarizer after signal chopper as it reduces spectral quality (see below) for both sheet polarizer (400-700, left) and cubic polarizer (650 – 900, right)).

sheet polarizer after sample	cubic polarizer after sample
	

Test sample: LDS867/MeOH, OD1.1, good for = 450-700 nm
without post-sample polarizer, kept NG unchanged (left), and adjusted (right). Although scattering at 650 nm can be reduced dramatically using a post-sample polarizer (at least 80%)

No LDS867 in probe beam	Insert LDS867, and kept NG unchanged	Insert LDS867, and reduced NG intensity
		

Probe spectra without PSI sample (with 1mm BG40)

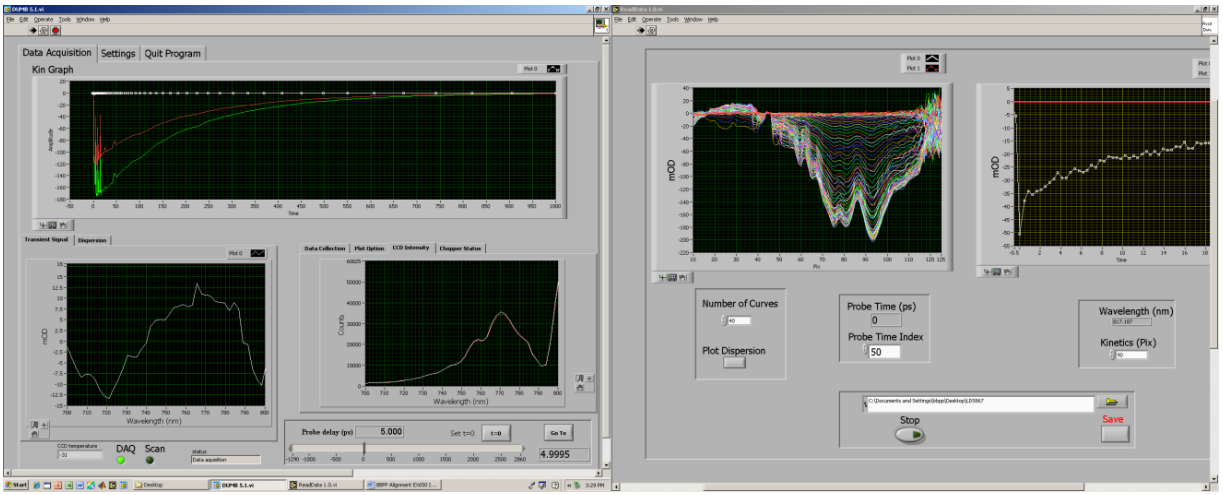


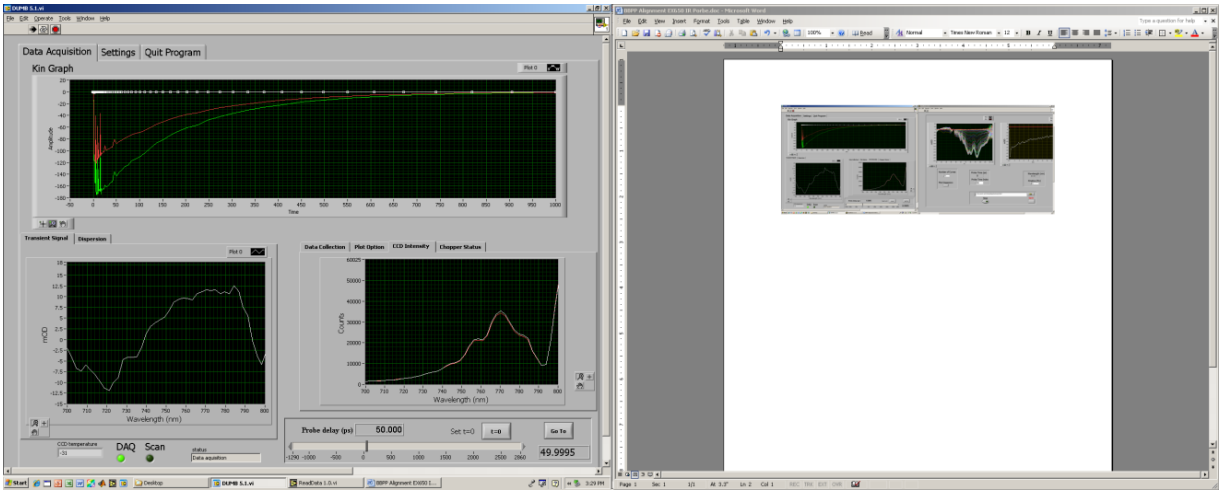
Time scale used for excitation equilibrium, trapping, and P+:

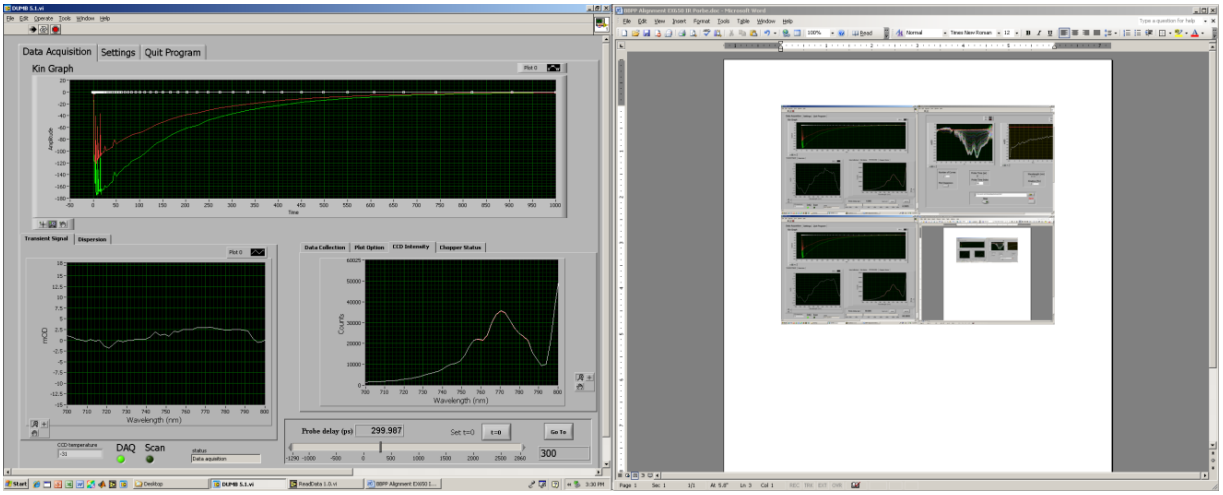
-1 – 5 ps/60pts + 5.1 – 100 ps/40pts + 101 – 2000 ps/20 pts

4. Purple RC

BBPP alignment using 650nm Excitation, IR probe (2012-12-20) for Palash's Dye-RC-deQed exp

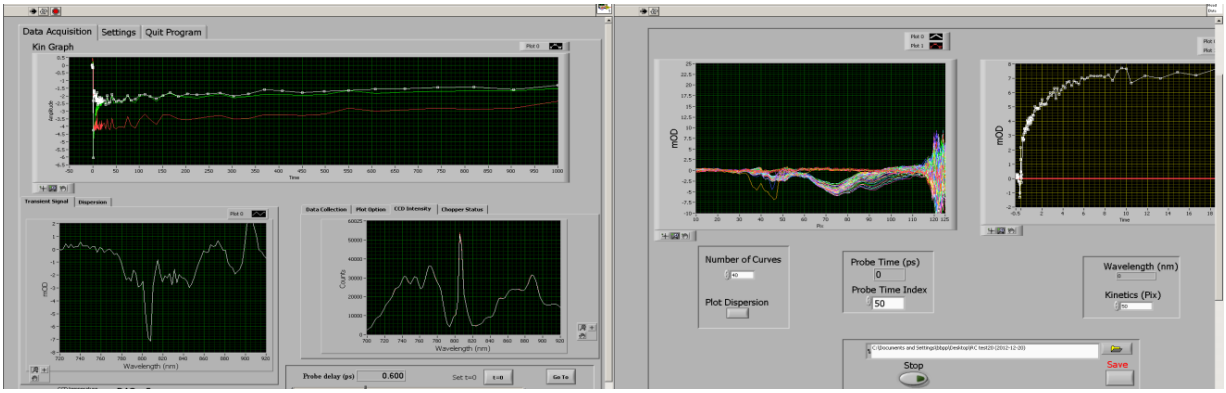




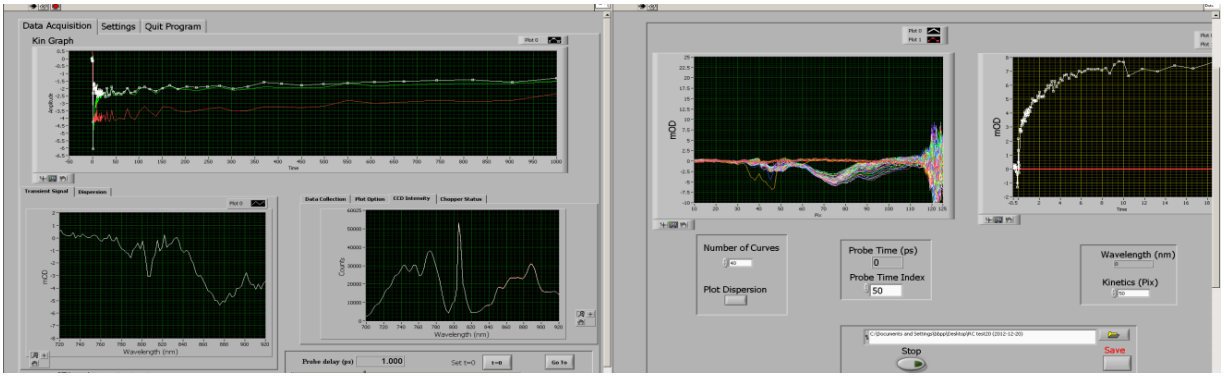


BBPP alignment with EX=650nm, IR probe, using RC with Quinone, stirred

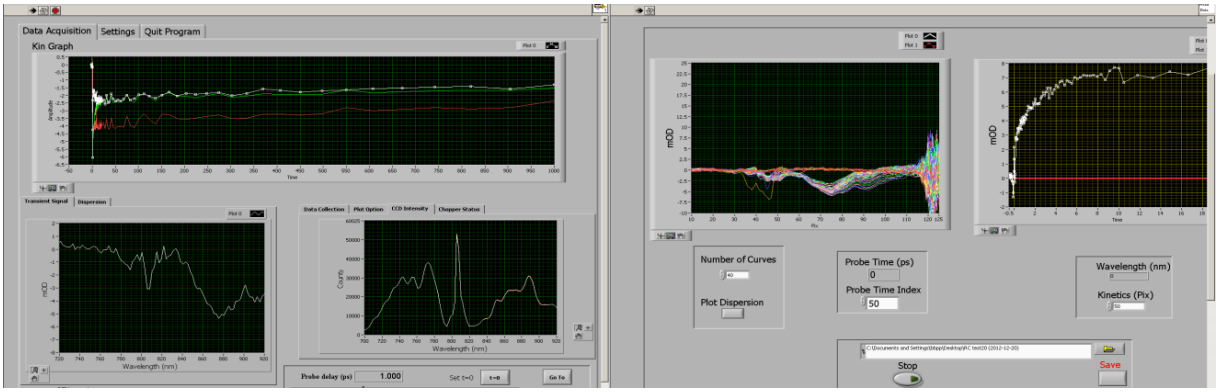
0.5ps



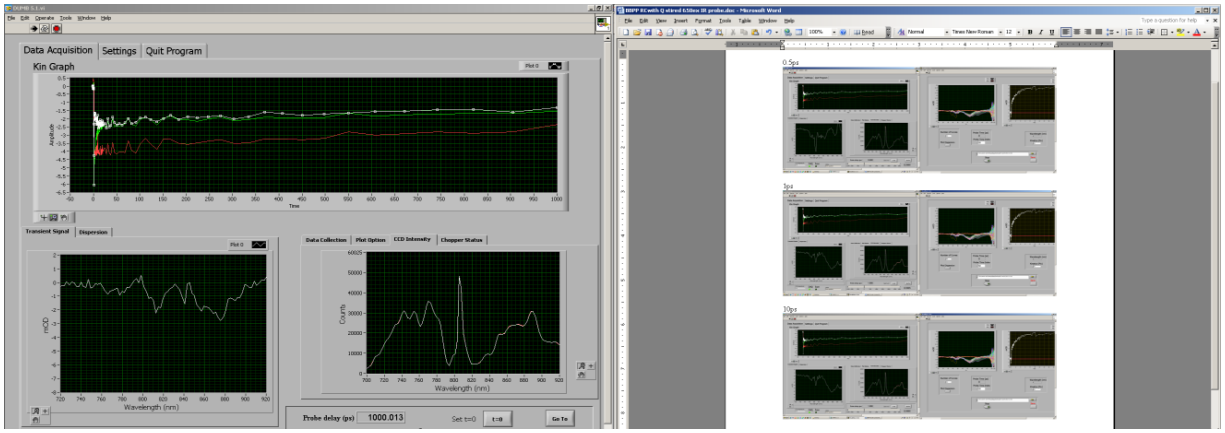
1ps



10ps

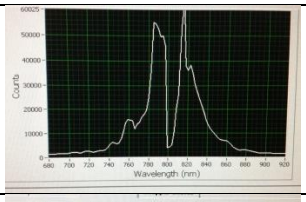
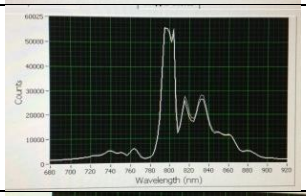
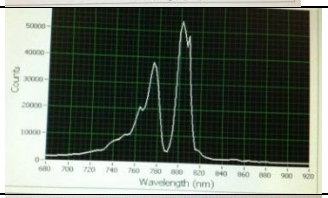
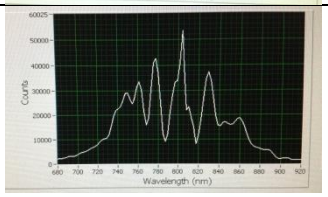
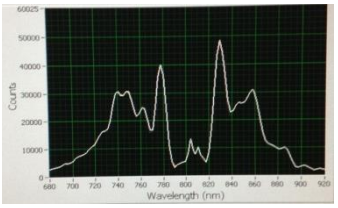
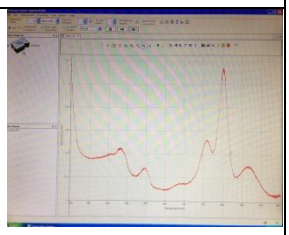


1 ns

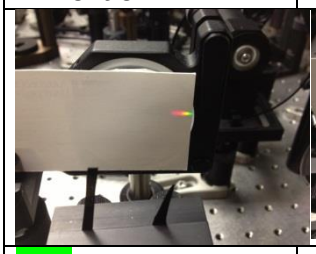
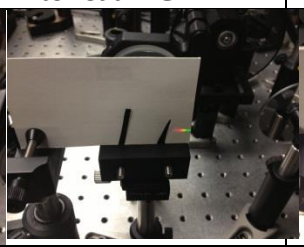
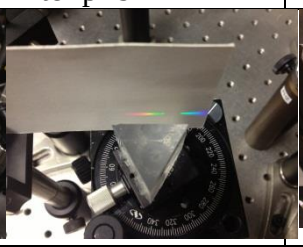
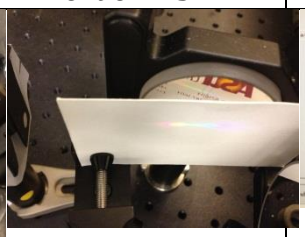
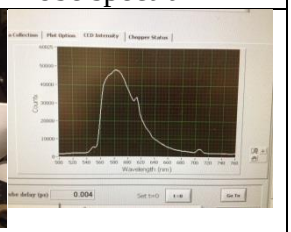
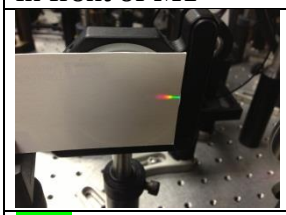
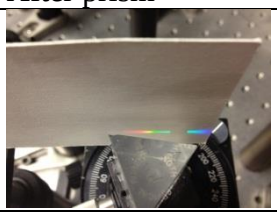
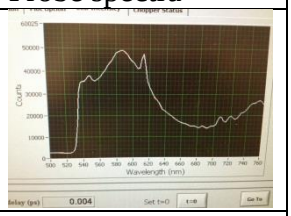
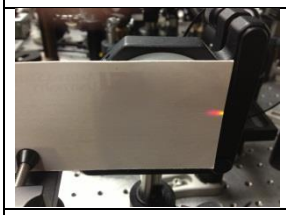
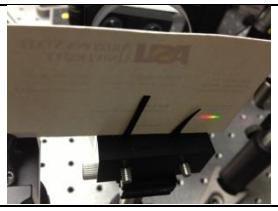
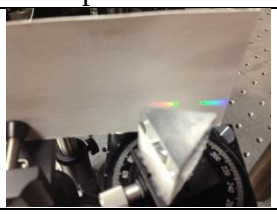
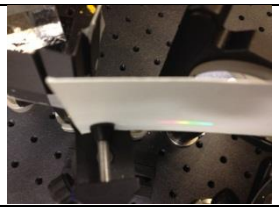
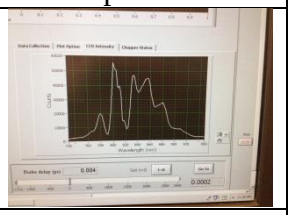


5. AF660-RC

To compensate both AF660 and RC signal regions, used
EX=650 nm
G3, λc=820 nm (680-950 nm) without any color filters
LDS867 to find signal

With no filter in probe beam With no cut-NG filter to block 800-nm	
The cut-NG filter blocking too much short wavelength light (to much to the center of the optical table direction)	
The cut-NG filter blocking too much long wavelength light	
The cut-NG filter position is about right, at this position, move the cut-NG filter up-and-down to adjust the width of the wavelength coverage However, the probe structure has too many bands, resulting in structures in the signal	
With RC in 2-mm cell, OD(800) > 1	 

Switch between PSI and purple RC setups using only 2 mirrors (the notes are in BBPP notebook page 40

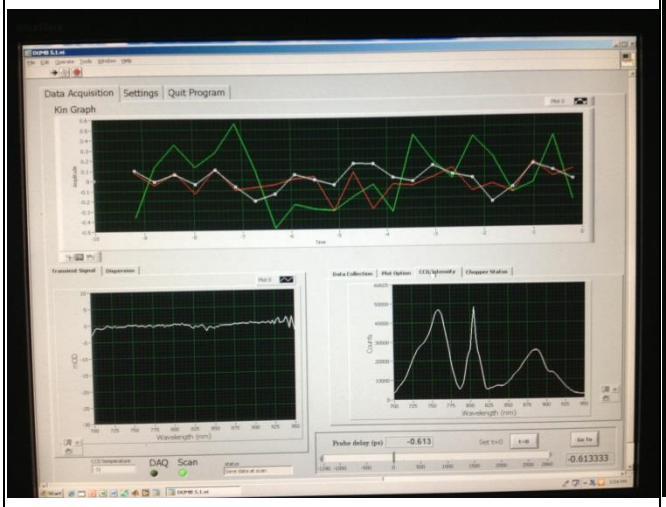
G1, 680	Pink labels up (M1, M2)			
in front of M1	After cut-NG	After prism	In front of M3	Probe spectra
				
G3, 620	Orange labels up	With 1mm BG40		
in front of M1	After cut-NG	After prism	In front of M3	Probe spectra
				
G3, 850	Orange labels up	With 1mm Rg780?		
in front of M1	After cut-NG	After prism	In front of M3	Probe spectra
				

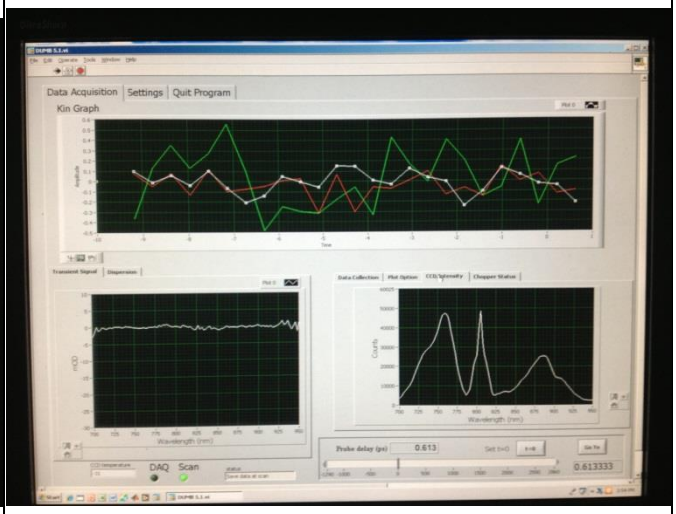
More experiences for RC QY region alignment (2013-4 and 5)

The probe spectral quality is crucial for getting ΔOD without distortions. The artifacts are most likely from 1) regions with very low CCD intensity, 2) 'cross talk' of the probe spectrum, 3) waggles in the probe spectra. To make sure there is no cross talk, use a card to block the probe spectrum after the prism therefore should see a gradual blocked spectral part corresponding to the card movement.

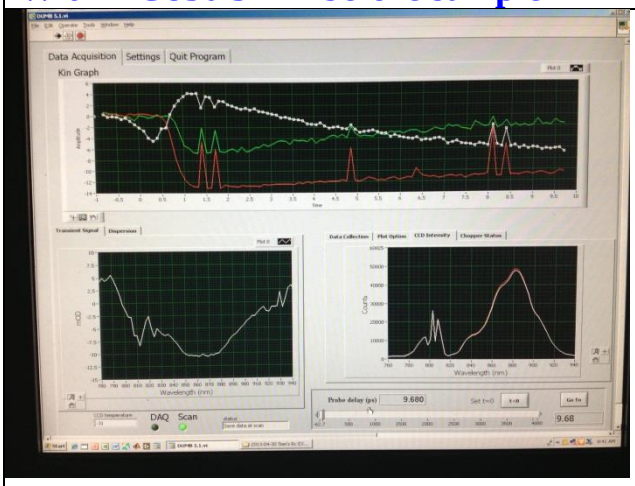
Below are CCD intensity with G3, λc=850 for RC QY

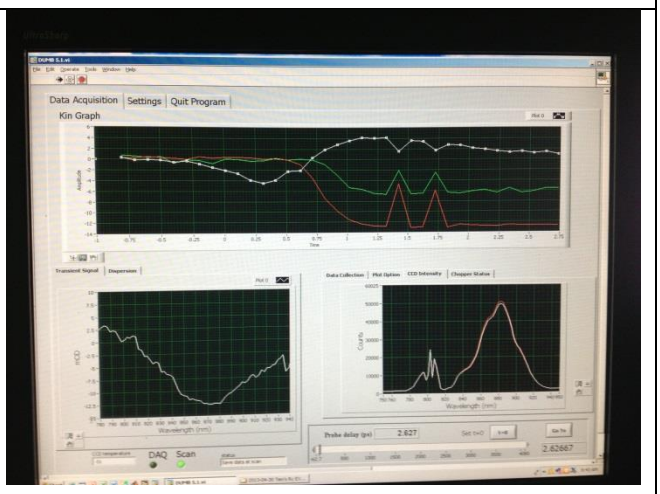
Likely without any color filters in probe beam





With RG830 3mm before sample

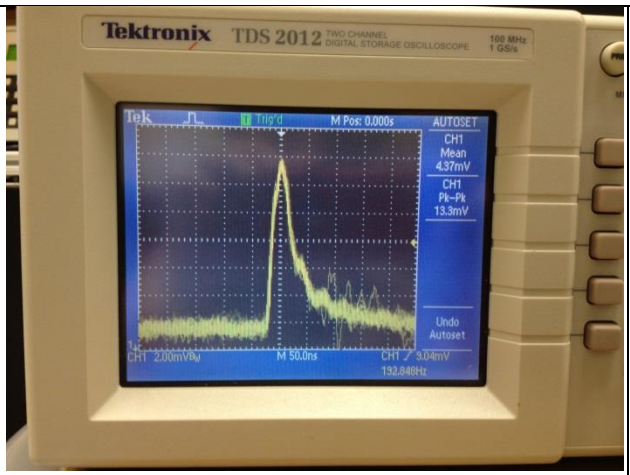
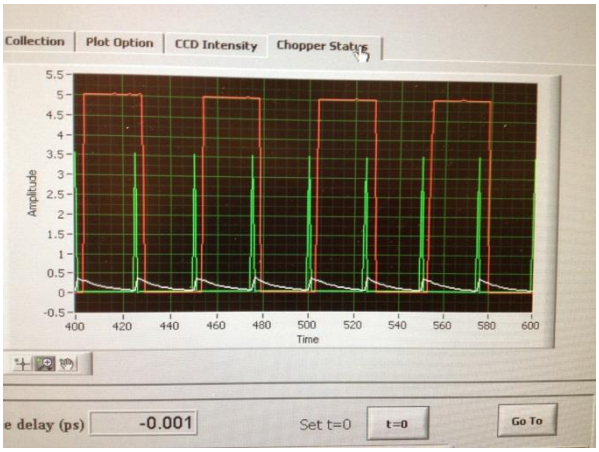


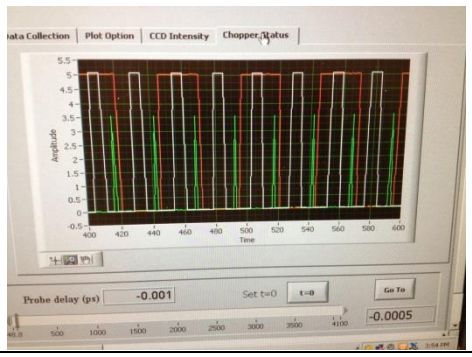


Trouble shooting list

1. BBPP wouldn't open the shutter: first make sure to follow the turn-on list
    - PC on, power strip on the NBPP side on, power strip on the BBPP side on,
    - (It used to have a reminder at the lower-right corner of the PC to show find NI board as the program checked the first function 'xxx at start up', but I unchecked this option during trouble shooting and don't know how to get it back, 2013-05-05)
    - After switching on the power strip on the BBPP side, should see CCD fan briefly on for few seconds, and the NI board green light on constantly, the yellow light (active) is on constantly until the 100Hz chopper frequency stabilized, then the yellow light will keep blinking, this is a sign showing there is a good connection between the NI board and the PC.
    - If the NI yellow light is not blinking, there must be a bad connection either from NI board to PC, or somewhere else. In this case, there is no signal from CCD Fire, and when BBPP is on, no pulse trains will be observed in the 'chopper status' panel (only which line of noise will be seen).

    So first, check the NI board to PC connection, then other electronic connections to/from CCD. All the other signals can be easily checked using a scope. Make sure to use 50Ω adaptor and the Y-scale not x10!

	
The CCD Fire signal is incorrect, should be square wave to NI Board. Likely due to bad connections (or CCD problem?).	In this case, the curves in the 'Chopper Status' window either not synced (red-pump chopper and green-probe chopper), and the CCD Fire (white) is low.


Plot Option
CCD Intensity
Chopper Status
Amplitude
Time
Probe delay (ps)
-0.001
Set t=0
t=0
Go To
-0.0005

2. BBPP