Ti:Sapphire Laser Operating Procedure

Start-up:

- Step 1: Turn on water chillers using switch on back or side of each unit

- Step 2: Turn on pump laser using switch on back

- Step 3: Wait for the pump laser to warm up and temperature to reach equilibrium, at least 30 minutes

- Step 4: Put on laser goggles and turn on laser interlock

- Step 5: Turn on pump laser by turning key and opening shutter

- Step 6: Give Ti:Sapphire time to reach thermal equilibrium, at least 10 minutes

Optimization and Locking:

- Step 7: Optimize light from pump laser into Ti:S
    - Measure the power after the Ti:S with a power meter at the beam splitter
    - Adjust the x and y alignment at the beam alignment unit between the pump laser and the Ti:S (inside the red box) to maximize power

- Step 8: Check etalon error on oscilloscope
    - Select "Etalon Error" from monitor A dropdown box on computer
    - Run a continuous scan on the resonator
    - The signal should cross zero, if it does not, repeat Step 7

- Step 9: Apply etalon lock on computer

- Step 10: Check resonator error on oscilloscope
    - Select "Resonator Error" from dropdown box
    - Run a continuous scan on the resonator
    - Signal should cross zero and peaks should be evenly spaced, if peaks are not evenly spaced laser is not operating on a signal spatial mode, unlock and re-lock etalon

- Step 11: Apply reference cavity lock on computer

- Step 12: Optimize light from Ti:S into the ECD-X
    - Look at "ECD PD 1" on oscilloscope
    - Adjust the x and y alignment between Ti:S and ECD-X to maximize signal on oscilloscope
    - Look at ``ECD PD 2'' on oscilloscope and optimize, it should optimize at the same x and y alignment as PD 1

- o   Alternately look at laser output from the ECD-X and adjust x and y alignment to narrow beam in each direction
- Step 13: Check ECD error on oscilloscope A: Error should cross zero B: If error does not cross zero, open "ECD" box on the computer and adjust "PD 1 gain" and "PD 2 gain" until signal cross zero

- Step 14: Apply ECD lock on computer A: If ECD does not lock, try increasing "Aux PD gain" in ECD box B: If ECD still does not lock, unlock, re-optimize and re-lock etalon and reference cavity

- Step 15: Optimize light from ECD-X into ECD-X-Q
  - o   Switch to other control console on computer
  - o   Look at "ECD PD 1" on oscilloscope
  - o   Adjust the x and y alignment between ECD- X and ECD-X-Q to maximize signal on oscilloscope
  - o   Look at "ECD PD 2" on oscilloscope and optimize, it should optimize at the same x and y alignment as PD 1
  - o   Alternately, look at laser output from the ECD-X-Q and adjust x and y alignment to narrow beam in each direction

- Step 16: Apply ECD-X-Q lock

Shut-off:

- Step 17: Remove all locks

- Step 18: Turn pump laser key to standby and close shutter
  - o   If laser will be used soon leave in standby

- Step 19: Cool the pump laser for a couple of hours

- Step 20: Turn off pump laser

- Step 21: Turn off water chillers