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Procedures: change PSL power mode

T1200025-v1

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This procedure should be used for switching the PSL from high to low power mode and vice versa. ONLY FOR TRAINED PERSONAL.

Contents

1 How to switch from high-power mode to low-power mode

1. before entering the LAE connect spare cables (PMC HV, PMC PDL DC) at the PSL racks

2. turn off ISS loop including the autolock in the ISS medm screen, turn off digital support loop

3. turn off FSS loop in the FSS medm screen, (autolock off, temp. ramp to manual, analog loop off, temp loop off)

4. turn off PMC loop and the temploop in the PMC medm screen

5. deactivate the watchdogs for the HPO and the FE in the Beckhoff screen by pressing the WATCH buttons next to the amplifier and the oscillator schemes within the main screen

6. close external laser shutter

7. turn off high power stage (for detailed instructions see laser manual)
   - close frontend shutter
   - turn off LRA
   - turn off injection locking
   - turn off ramp
   - turn oscillator off
   - close internal shutter

8. open frontend shutter

9. check frontend power on Beckhoff screen

10. open external laser shutter

11. connect the ramp signal (PMC HV spare cable) to an oscilloscope inside the enclosure

12. connect PDA.DC of ISS Box to the same oscilloscope, you should see a typical modescan on the oscilloscope

Step 13. and 14. should be done only by a trained person since a high power beam will be aligned and mistakes can damage the PMC!

13. Only trained personal: use M06 and M07 to correct the alignment to the PMC

14. Only trained personal: use L02 and L03 to correct the modematching to the PMC, only if TEM02/20 mode is larger than 10%, you have to iterate step 13. and 14.

15. rotate low-power-attenuator (TFP03) in front of PMC locking PD (PD02) to adjust the DC signal of PD02 to maximize it (about 1.4V) (see PMC PDL DC), use M20 to align the beam to the middle of the photo diode. This has to be done in iteration (rotation, alignment).

16. change the phase of the PMC-LO by 180deg using the delay line (or signal generator for time being), check the error signal

17. change the reference level in the PMC medm screen to about 80% of trigger level

18. lock the PMC and switch on the temploop

19. check if PMC loop is oscillating (scope on PMC PDL DC spare cable), adjust the PMC loop gain in case

20. rotate ISS WP01 until the DC signal of ISS PDA is 10V +- 0.2V, (keep in mind that by this the calibration of the EPICS power display downstream of the PMC is invalidated and has to be redone at some stage)

21. make sure PDA.DC of the ISS Box is connected to the original cable

22. turn on the ISS digital loop, adjust refsignal such that about 2%..3% is diffracted by the AOM.

23. turn on ISS autolock

24. rotate WP04 until the DC signal of PD03 is 460mV (or maximize if below 460mV) (see RFPD DC in the FSS medm screen)

25. turn on autolock in the FSS medm

26. in general it might be necessary to optimize the loop gains of PMC, ISS, FSS

27. turn fe watchdog on

28. disconnect spare cables at PSL racks

2 How to switch from low-power mode to high-power mode

1. before entering the LAE connect spare cables (PMC HV, PMC PDL DC) at the PSL racks

2. turn off ISS loop including the Autolock in the ISS medm screen, turn off digital support loop

3. turn off FSS loop in the FSS medm screen, (autolock off, temp. ramp to manual, analog loop off, temp loop off)

4. rotate ISS WP01 (inside ISS-Box) to reduce the DC signal of ISS PDA (measure directly at the ISS-Box) to 0V

5. rotate WP04 to minimize the power downstream of PBS4 (use a detector card to verify)

6. turn off PMC loop and the temploop in the PMC medm screen

7. rotate low-power-attenuator (TFP03) in front of PMC locking PD (PD02) to minimize the power at PD02 (use a detector card to verify)

8. deactivate the watchdogs for the HPO and the FE in the Beckhoff screen by pressing the WATCH buttons next to the amplifier and the oscillator schemes within the main screen

9. close external shutter, close FE shutter

10. start the high power laser (e.g. follow quick start procedure)

11. open external laser shutter

12. connect the ramp signal (PMC HV spare cable) to an oscilloscope inside the enclosure

13. connect PDA DC signal of the ISS box to a scope

14. rotate ISS WP01 (inside ISS-Box) until peak voltage of ISS PDA DC is at 1V

Step 15. and 16. should be done only by a trained person since the high power beam will be aligned and mistakes can damage the PMC!

15. Only trained personal: use M06 and M07 to correct the alignment to the PMC

16. Only trained personal: use L02 and L03 to correct the modematching to the PMC, only if TEM02/20 mode is larger than 10%, you have to iterate step 15. and 16.

17. rotate low-power-attenuator (TFP03) in front of PMC locking PD (PD02) to adjust the DC signal of PD02 to about 1.5V (see PMC PDL DC), use M20 to align the beam to the middle of the photo diode. This has to be done in iteration (rotation, alignment).

18. change the phase of the PMC-LO by 180deg using the delay line (or signal generator for the time being), check the error signal

19. change the reference level in the PMC medm screen to about 80% of the trigger level

20. lock the PMC and switch on the temploop

21. check if PMC loop is oscillating (scope on PMC PDL DC spare cable), adjust the PMC loop gain in case

22. rotate ISS WP01 until the DC signal of ISS PDA is 10V +- 0.2V, (keep in mind that by this the calibration of the EPICS power display downstream of the PMC is invalidated and has to be redone at some stage)

23. Make sure PDA.DC of the ISS Box is connected to the original cable

24. turn on the ISS digital support loop, adjust refsignal such that about 5%..6% is diffracted by the AOM.

25. turn on ISS autolock

26. rotate WP04 until the DC signal of PD03 is 0.460V+-0.02V (see RFPD DC in the FSS medm screen)

27. turn on autolock in FSS medm screen

28. in general it might be necessary to optimize the loop gains of PMC, ISS, FSS

29. turn on laser watchdogs

30. turn on LRA (approx. after several hours)

31. disconnect spare cables at PSL racks