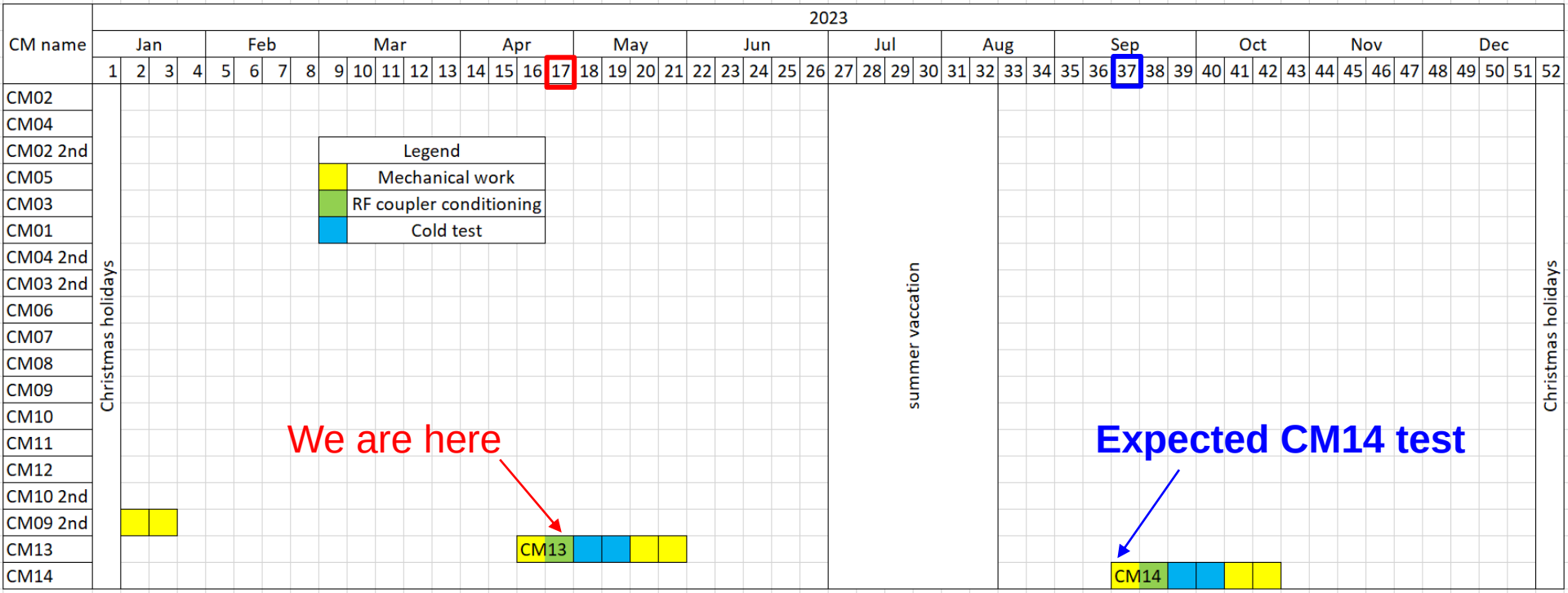
UPPSALA
UNIVERSITET

# ESS weekly meeting (2023 W17)

M. Zhovner et al

# Global planning




- CM13 is in Uppsala, Almost ready for warm conditioning.
- CM14 expected delivery time is middle of September 2023.

# Local planning

| week | | W16 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| date | | MON | | TUE | | WED | | THU | | FRI | | SAT | SUN | | |
| | | 17-Apr | | 18-Apr | | 19-Apr | | 20-Apr | | 21-Apr | | 22-Apr | 23-Apr | | |
| | | m | a | m | a | m | a | m | a | m | a | | | | |
| next CM | **CM13** | **departure from IJCLab** | | | | flat tire! --> 1 day delay | | | | **arrival at FREIA** | reception test | | | | |
| last CM | **CM14** | | | | | | | | | | | | | | |

| week | | W17 We are here | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| | | 24-Apr | | 25-Apr | | 26-Apr | | 27-Apr | | 28-Apr | | 29-Apr | 30-Apr | | |
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| next CM | **CM13** | doorknobs connection | Another connections outside of bunker | | Move to the bunker | cryogenic connection | vacuum connection | vacuum pumping | | coupler warm conditioning + Valborg | | | | | |
| last CM | **CM14** | | | | | | | | | | | | | | |

| week | | W18 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| date | | MON | | TUE | | WED | | THU | | FRI | | SAT | SUN | | |
| | | 1-May | | 2-May | | 3-May | | 4-May | | 5-May | | 6-May | 7-May | | |
| | | m | a | m | a | m | a | m | a | m | a | | | | |
| next CM | **CM13** | holiday | | start N2 cooling | | LHe cooling | 4K filling | | 2K pumping | MP conditioning | | | | | |
| last CM | **CM14** | | | | | | | | | | | | | | |

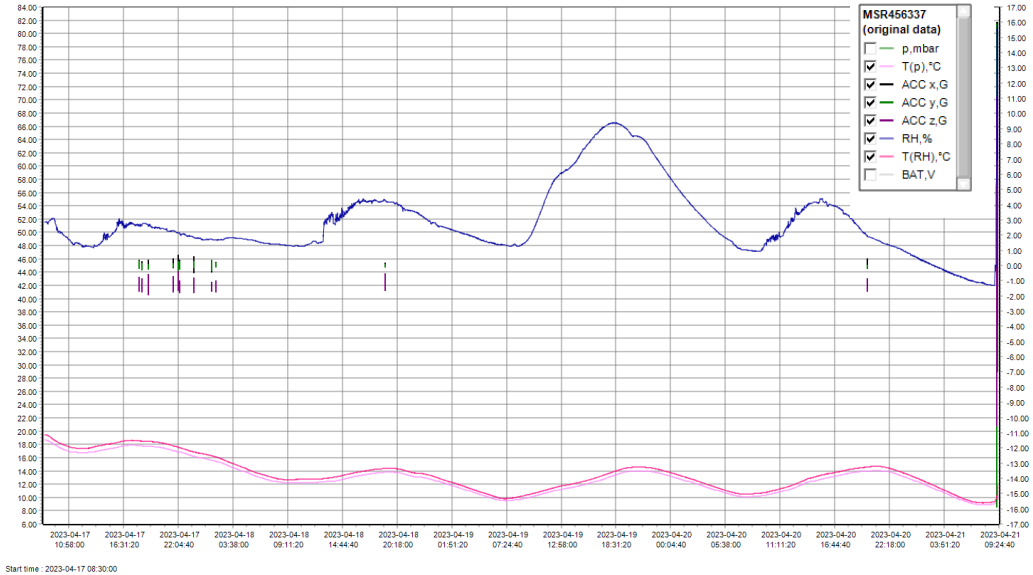
| week | | W19 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| date | | MON | | TUE | | WED | | THU | | FRI | | SAT | SUN | | |
| | | 8-May | | 9-May | | 10-May | | 11-May | | 12-May | | 13-May | 14-May | | |
| | | m | a | m | a | m | a | m | a | m | a | | | | |
| next CM | **CM13** | CTS tests | | heat load measurement | | | | warming up | | | | | | | |
| last CM | **CM14** | | | | | | | | | | | | | | |

Possible interesting day for Cecilia? High risk to be postponed to May 8th.
Akira will be in Uppsala from May 2nd to May 10th

# CM13 delivery to FREIA

- CM13 was arrived to FREIA April 21 at the morning.
- Box was open for Visual inspection and further thermalization.
- Continuity of temperature sensors was checked (LC01 connector).

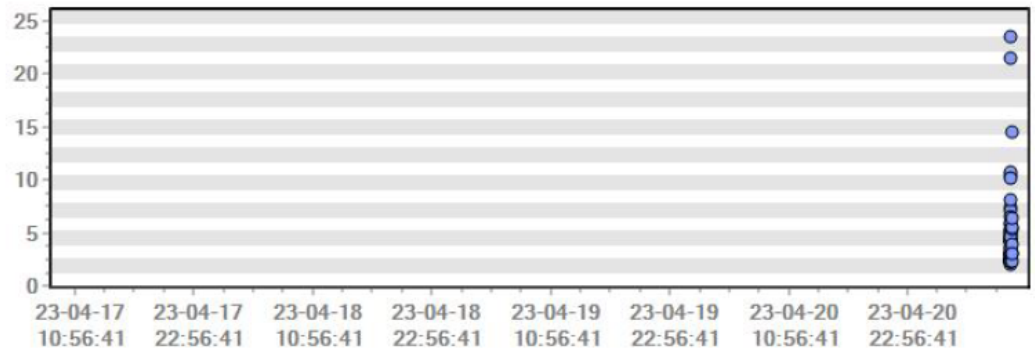
# CM13 shock loggers data

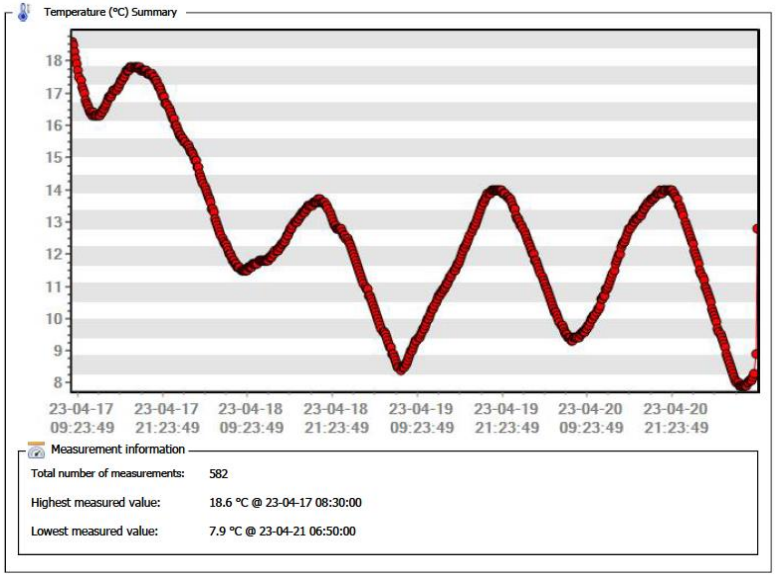




Measurement information

| | |
|---|---|
| Total number of measurements: | 582 |
| Valid measurements: | 557 |
| First coordinates: | 48.696911°, 2.174838° |
| Last coordinates: | 59.838066°, 17.646513° |




- MSR (CavIN) also detects some small shocks during the way.
- MSR175+ (CavOUT) detects wary short invents during unloading.

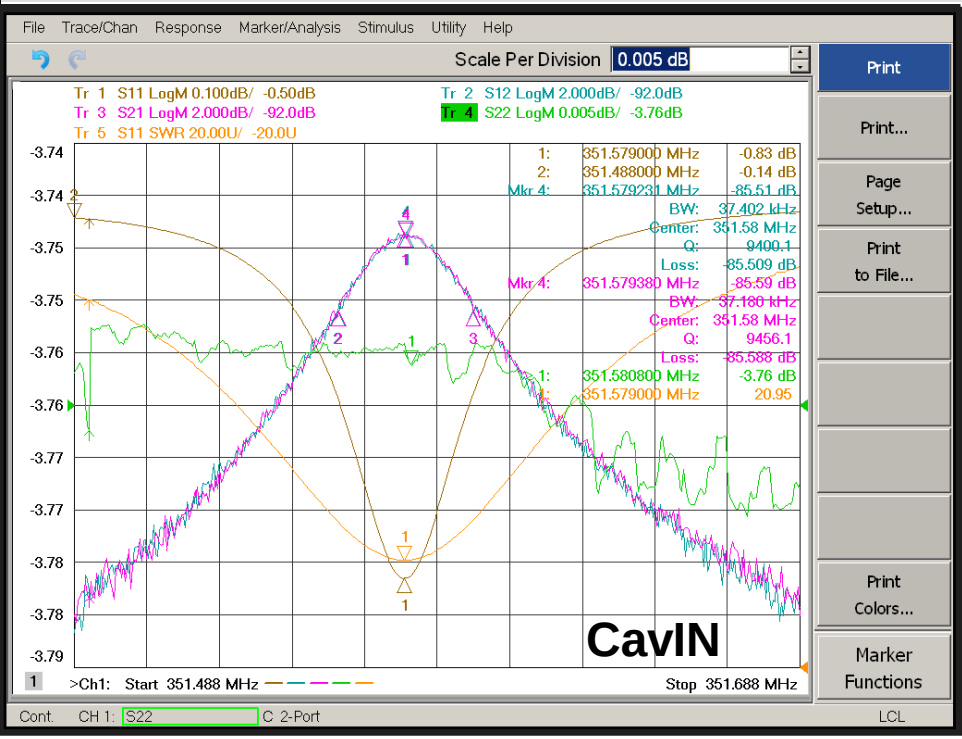
All RAW data is available

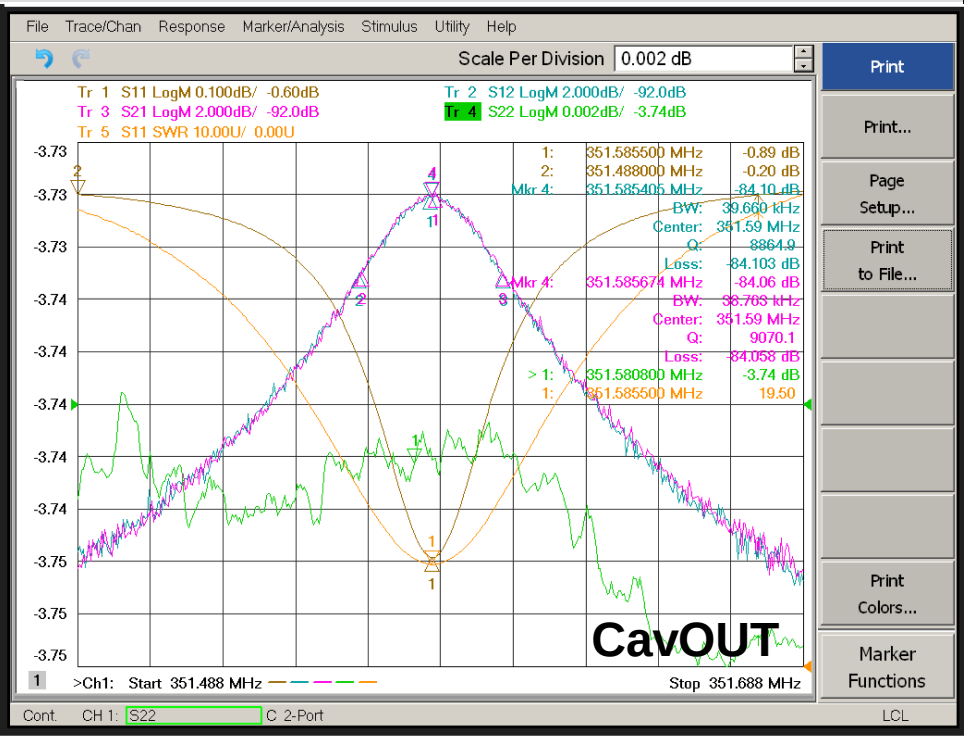
# CM13 Reception test. Instrumentation

| Cables verification CM13 at IJCLab | | | | | v1 |
|---|---|---|---|---|---|
| **Socket assembly** | | | | Verified by : M. Pierens | |
| ***Socket name*** | ***Sensor / Actuator type*** | ***PID name*** | ***Serial number*** | ***Electrical value (Ω) (before shipping)*** | ***C / NC*** |
| LC01 | Cernox | TT04 | X137013 | 67.28 | C |
| | Cernox | TT05 | X132660 | 60.19 | C |
| | Cernox | TT06 | X135471 | 66.39 | C |
| | Cernox | TT07 | X139085 | 60.56 | C |
| | Cernox | TT08 | X135472 | 65.94 | C |
| | Cernox | TT09 | X137012 | 74.34 | C |
| | PT100 | TT10 | PT38 | 107.3 | C |
| | PT100 | TT11 | PT40 | 107.38 | C |
| | Cernox | TT12 | X133108 | 54.44 | C |
| | PT100 | TT20 | PT01 | 107.27 | C |
| | PT100 | TT21 | PT50 | 107.35 | C |
| | Cernox | TT22 | X132661 | 59.04 | C |
| PT Coupler | PT100 | TT120 | PTC12 | 107 | C |
| | | TT220 | PTC18 | 107 | C |
| LC02 | Heaters | EH01 | EH28 | 85.18 | C |
| | | EH02 | EH30 | 85.39 | C |
| | | EH10 | | 83.39 | C |
| | | EH20 | | 84.43 | C |
| LC03 | Motor sensor | SM10 | | 2.44 / 2.47 | C |
| | a limit sensor | LS10 | | 2 | C |
| | Motor sensor | SM20 | | 2.52 / 2.51 | C |
| | a limit sensor | LS20 | | 2.06 | C |
| LC07 | Liquid Helium Level Sensor | LT01 | 7331 | 366.14 | C |
| | | LT02 | 7332 | 369.87 | C |
| ***Socket name*** | ***Sensor / Actuator type*** | ***PID name*** | ***Serial number*** | ***Electrical value (µF) (before shipment)*** | ***C / NC*** |
| LC04 | Actuators | PZ10 | | 13.19 | C |
| | | PZ11 | | 13.1 | C |
| | | PZ20 | | 12.75 | C |
| | | PZ21 | | 12.42 | C |

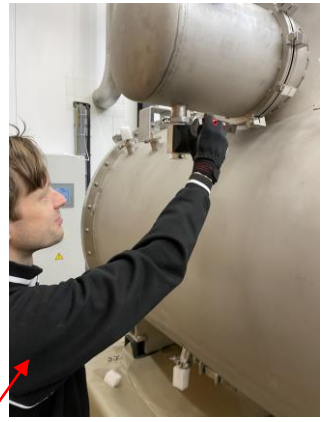
| Cables verification CM13 at UU | | | | | v1 |
|---|---|---|---|---|---|
| **Socket assembly** | | | | Verified by : | |
| ***Socket name*** | ***Sensor / Actuator type*** | ***PID name*** | ***Serial number*** | ***Electrical value (Ω) (before shipping)*** | ***C / NC*** |
| LC01 | Cernox | TT04 | | 68.1 | C |
| | Cernox | TT05 | | 60.85 | C |
| | Cernox | TT06 | | 67.1 | C |
| | Cernox | TT07 | | 61.25 | C |
| | Cernox | TT08 | | 66.5 | C |
| | Cernox | TT09 | | 74.9 | C |
| | PT100 | TT10 | | 105.7 | C |
| | PT100 | TT11 | | 106.3 | C |
| | Cernox | TT12 | | 55.05 | C |
| | PT100 | TT20 | | 105.7 | C |
| | PT100 | TT21 | | 106.2 | C |
| | Cernox | TT22 | | 59.75 | C |
| PT Coupler | PT100 | TT120 | | 108.1 | C |
| | | TT220 | | 108.1 | C |
| LC02 | Heaters | EH01 | | 85.3 | C |
| | | EH02 | | 85.6 | C |
| | | EH10 | | 83.6 | C |
| | | EH20 | | 84.5 | C |
| LC03 | Motor sensor | SM10 | | 2.6 / 2.6 | C |
| | a limit sensor | LS10 | | 2.1 | C |
| | Motor sensor | SM20 | | 2.6 / 2.6 | C |
| | a limit sensor | LS20 | | 2.1 | C |
| LC07 | Liquid Helium Level Sensor | LT01 | | 365.25 | C |
| | | LT02 | | 369.2 | C |
| ***Socket name*** | ***Sensor / Actuator type*** | ***PID name*** | ***Serial number*** | ***Electrical value (µF) (before shipment)*** | ***C / NC*** |
| LC04 | Actuators | PZ10 | | 13.8 | C |
| | | PZ11 | | 13.7 | C |
| | | PZ20 | | 13.6 | C |
| | | PZ21 | | 13.7 | C |

# CM13 Reception test. Cavities.



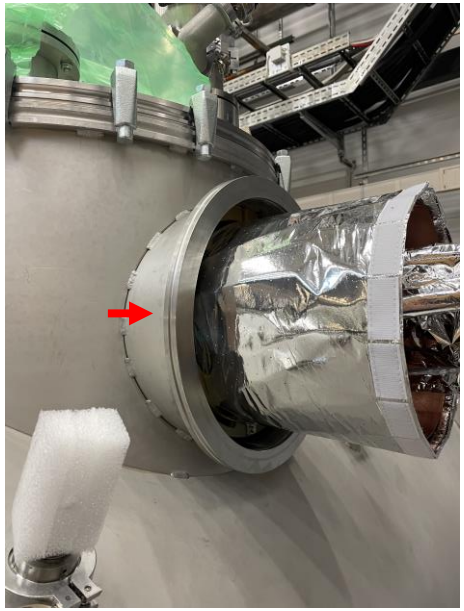



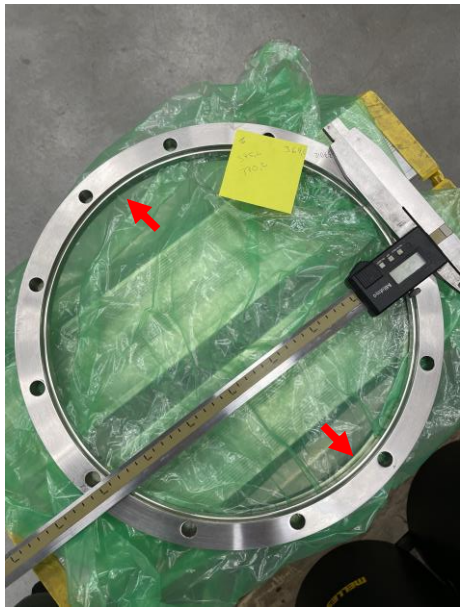

| | CavIN | CavOUT |
|---|---|---|
| $f_c$ “300K” FREIA [MHz] | 351.5790 | 351.5855 |
| $f_c$ “300K” IJC Lab [MHz] | 351.5790 | 351.5880 |
| S11 on/off resonance [dB] | -0.83 / -0.14 | -0.89 / -0.20 |
| S12/S21 Mag. [dB] | -85.51 / -85.59 | -84.10 / -84.06 |
| S22 [dB] | -3.76 | -3.74 |



Before VNA measurement we reduced pressure in insulation volume down to atmospheric

# CM13 Reception test. Installation.





- Ring from CM02 (which used for cryo-bellow connection) from CM side does not fit.
- Ring from CM13 also didn't fit.
- Ring (CM13) was machined in our workshop and removed 1 mm in radius. Now it fits good.

# CM13 Reception test. Installation

- Cooling water system restarted.
- Tetrode RF power stations ON.
- Insulation vacuum pumping ON.
- Beam vacuum connected and started pumping. Now at 2E-6 mbar.
- Coupler cooling lines are connected.
- CTS stepper motor test (at warm) is done.

## CTS1

Using Beckhoff driver. Go back by 10 turns at a time until Low limit indicator goes on (limit switch open) on MTR1. Then it is not possible to continue negative.
Use the offset variable ESSPMAC:MTR1.OFF to start at 0

Move negative

| Turns | Limit switch (1 = closed, 0 = open) |
|---|---|
| 0 | 1 |
| -10 | 1 |
| -20 | 1 |
| -30 | 1 Stops at -20.4 turns, -4080 steps but no limit switch indication. After a few tests back and forward, the limit indication blinks. |

Positive direction

| | |
|---|---|
| -20.4 | 0/1 only blinks and is on from start at -20.4, 4080 steps |
| -20 | 1 |
| -10 | 1 |
| 0 | 1 |

Test the Homing procedure: OK (limit blinks)
Put the offset to -25.6

## CTS2

Using Beckhoff driver. Go back by 10 turns at a time until Low limit goes on MTR2. Then it is not possible to continue negative.
Use the offset variable ESSPMAC:MTR2.OFF to start at 0

Move negative

| Turns | Limit switch (1 = closed, 0 = open) |
|---|---|
| 0 | 1 |
| -10 | 1 |
| -20 | 0 at -17.4 turns <=> -3480 steps |

Positive direction

| | |
|---|---|
| -17.4 | 0 |
| -10 | 1 on immediately at -17.4 turns <=> -3480 steps |
| 0 | 1 |

Test the Homing procedure OK
Put the offset to -25.6

# CM13 What is NEXT

- Today we are waiting for pumping of Beam vacuum to required level.
- Tomorrow we plan to start warm couplers conditioning in auto mode

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| next CM | **CM13** | **departure from IJCLab** | | | | flat tire! --> 1 day delay | | | | **arrival at FREIA** | reception test | | |
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| | | m | a | m | a | m | a | m | a | m | a | | |
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| last CM | **CM14** | | | | | | | | | | | | |

# Activity in ESS during the summer

Hello Maja,

Last week Mats told me to briefly highlight the foreseen activities at ESS starting from June to determine the possible need of the FREIA team joining locally.

It is still currently foreseen to start the Spoke installation in the tunnel starting in Mid July, after the second CDS cooldown.

Activities that lead to this are (among others):

- Completion of the refurbishing of 11 CM CTS systems (opening, removing collars and relocating PT100, closing)
  - While most of the mechanical operations will be in charge of the ESS engineering staff, the SRF team needs to provide support for the operations on the motor and the testing of the small tuning range with a dedicated setup under frequency contro
- Torque measurements at the tunnel point, with the equipment and method described by IJCLAB and performed in the past at Uppsala
- Operation and debugging of the SPK coupler conditioning procedure on the RFPS gallery systems. The conditioning procedure is prepared by the SRF Team and its deployment supported by ESS ICS, on the basis of the information received from IJCLAB and FREIA.
  - Still, we need expert RF operators for the debugging of the procedure on the real systems and the testing of proper response of all (simulated) interlock conditions.
- In June the CDS and CM will be cold and we will perform Elliptical and Spoke low power testing (with VNA) to validate previous cold values at ESS and FREIA, to test commissioning software and procedures (e.g. far tuning).
- TS2 is continuing its operation and is a relevant environment to familiarize with the ESS EPICS environment that will be used for the linac technical commissioning after the installation.

So, in conclusion, my team has more scope than people at the moment, and we will need presence in several locations: B02 Laboratories (spk motor exchange), Local Control Room (for TS2 ops), Main Control Room (for G02 RF system control), G02 Gallery (RF operation and RFDS access) and G01 Tunnel (torque measurements). Indeed we would profit a lot of reinforcing the team with Spoke experts, allowing to achieve the above program and be able to maintain the steady flow of modules ready for the installation stage.

More details could be provided, if needed,

Sincerely,

Paolo

Where FREIA team can participate?