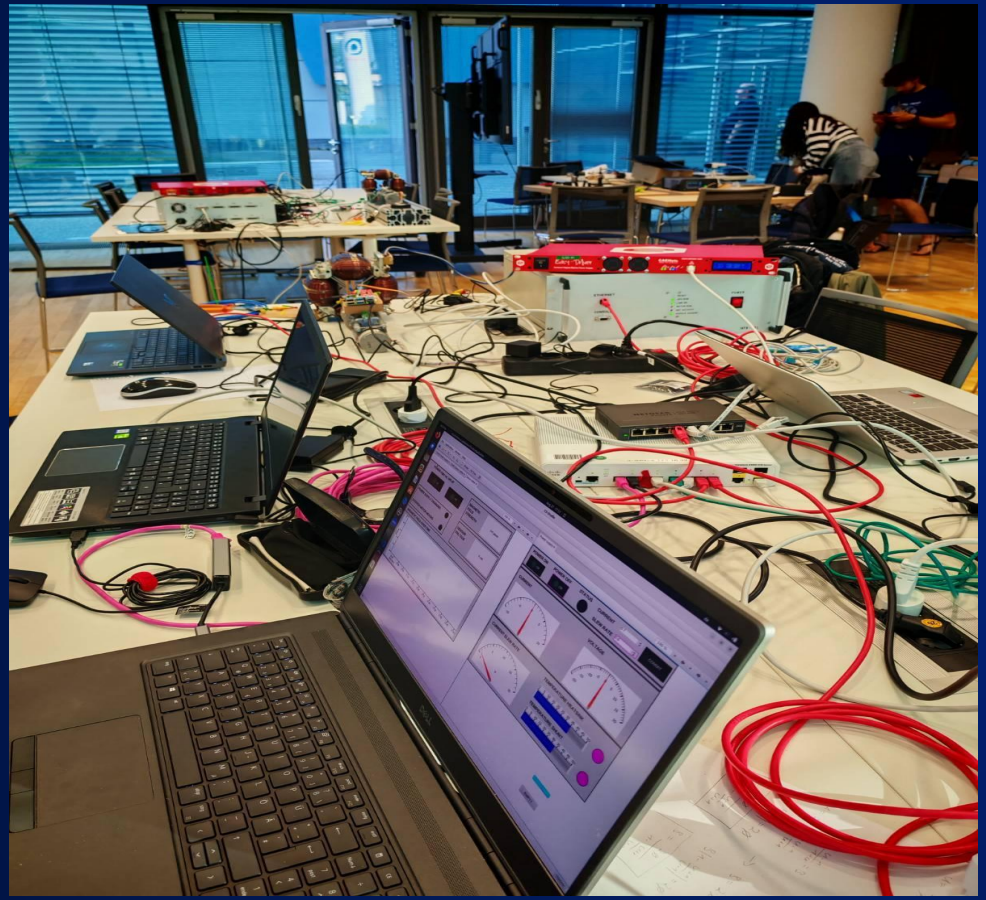
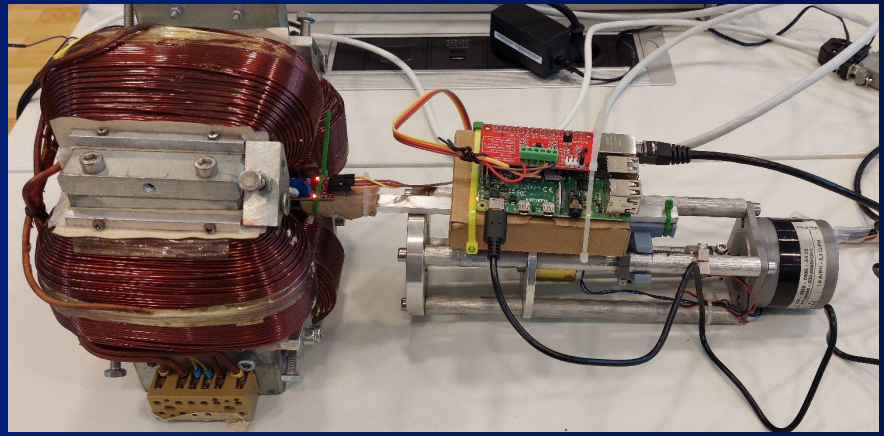
EPIC Magnets 84





01
Description of the project

02
Equipment for the experiment (Hardware)

03
Experiment scheme

04
Software

05
Results

of the project

- connect hardware
- develop IOCs for each device
- create GUI for display and control
- invent bluesky-script (experiment recipe)

02

Equipment for the experiment (Hardware)

Equipment for the experiment

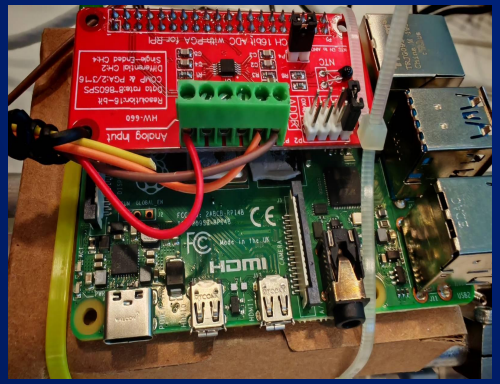
- **Power supply:**

Voltage: [-21, 21]

Currente:[-10, 10]

- **Gaussmeter & Raspberry Pi:**

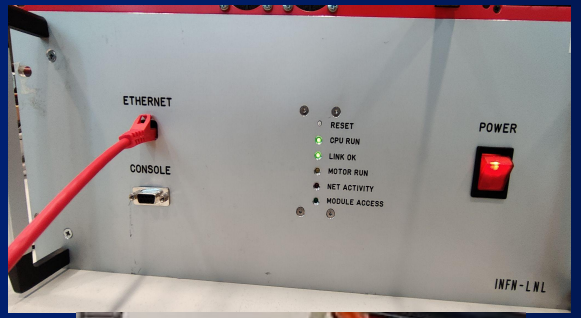
measure magnetic field via python-script



- **Motor & driver**

Step angle: 1.8 °; 360 ° = 1 mm

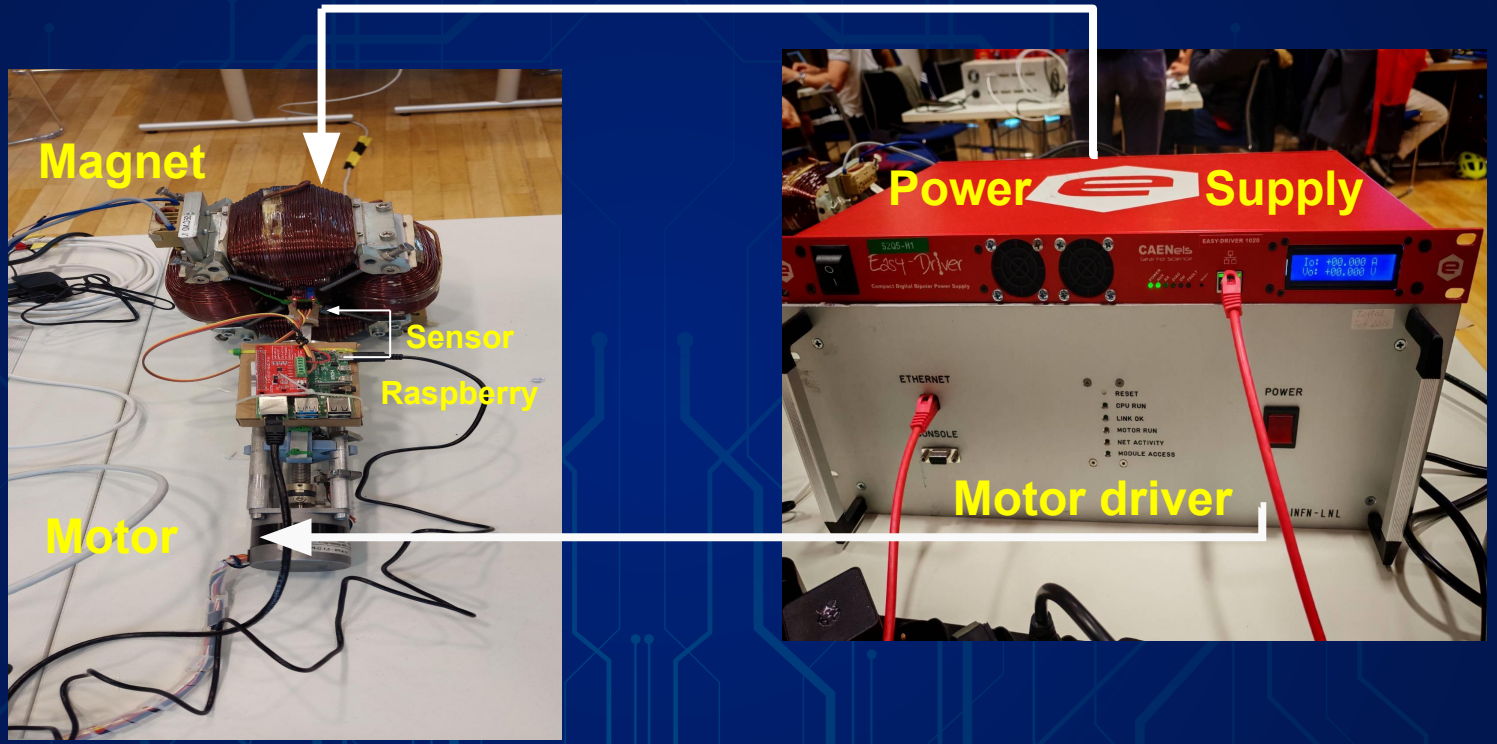
→ 200 steps = 1 mm

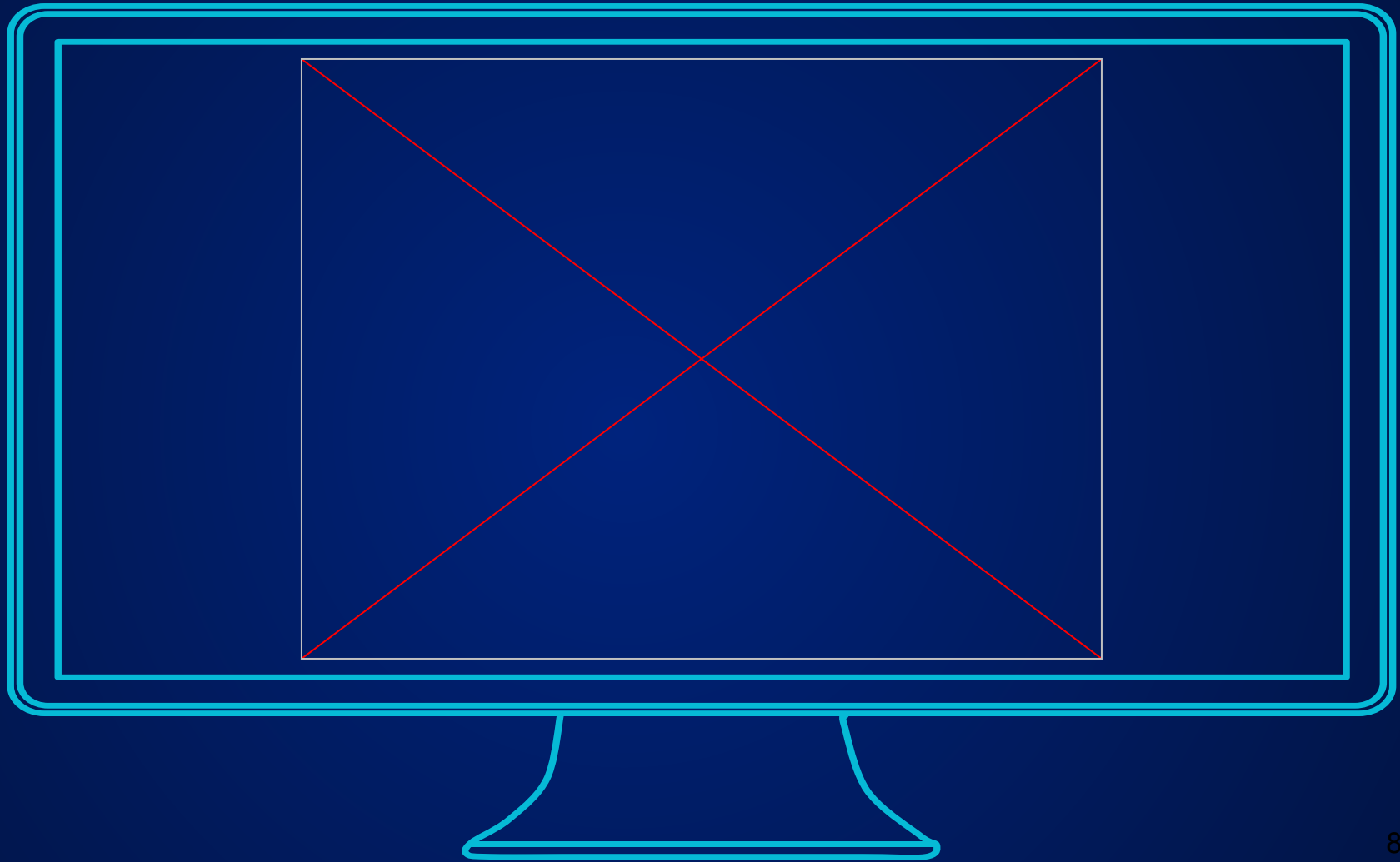


03

Experiment scheme

Experiment scheme



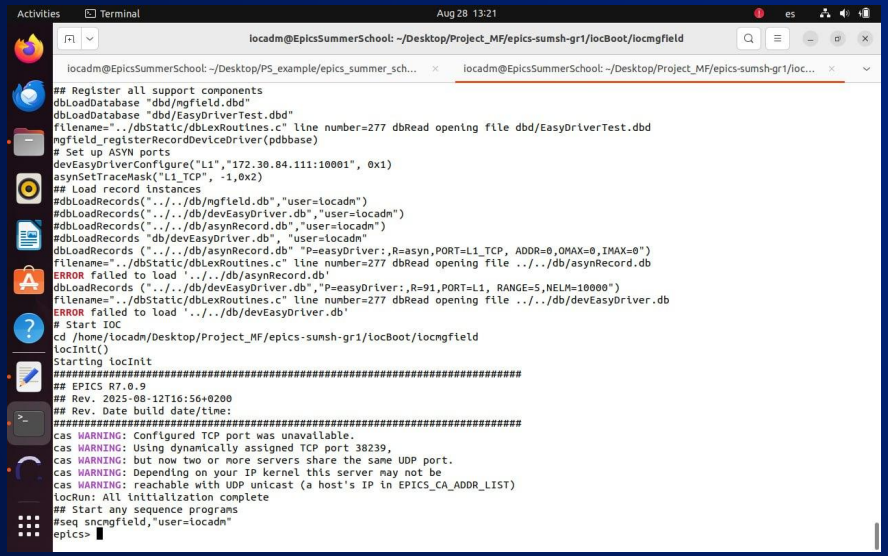


04

Software

IOC

Before



After

```
epics> dbl
PWRSPL:readI
PWRSPL:readslewrate
PWRSPL:temp1
PWRSPL:temp2
PWRSPL:readV
PWRSPL:DClink
PWRSPL:currentchange
PWRSPL:changecurrent
PWRSPL:putI
PWRSPL:set_slew
PWRSPL:change_slew
PWRSPL:confirm
PWRSPL:confirm_slew
PWRSPL:on
PWRSPL:off
PWRSPL:reset
PWRSPL:ID
PWRSPL:readreg
epics>
```

BlueSky

Before

Markdown | Notebook | Python 3 (ipykernel)

```
# Create and configure the RunEngine
RE = RunEngine()
#print("%f",mot.motor_rdist_mm)
gaussmtr.ton()
psu.set(5)
# Subscribe a LiveTable to show the current readback
RE.subscribe(LiveTable([motor.readback,psu.current_RB,gaussmtr.readback]))

# Perform a scan moving the PSU setpoint from 0 A to 7 A in 11 steps
RE(scan([psu.current_RB,gaussmtr.readback], motor, 0,20, 21))
```

```
CA.Client.Exception.............................................
    Warning: "Channel write request failed"
    Context: "op=1, channel=GSMTR:turnon, type=DBR_STRING, count=1, ctx="GSMTR:turnon""
    Source File: ../oldChannelNotify.cpp line 160
    Current Time: Thu Aug 28 2025 11:28:30.435978765
................................................................
------------------------------------------------------------------------
TimeoutError                              Traceback (most recent call last)
File /opt/tljh/user/lib/python3.12/site-packages/ophyd/signal.py:1413, in EpicsSignalBase._get_with_timeout(self, pv, timeout, connection_timeout, count, as_string, form, use_monitor)
   1412 try:
-> 1413     self.wait_for_connection(timeout=connection_timeout)
   1414 except TimeoutError as err:

File /opt/tljh/user/lib/python3.12/site-packages/ophyd/signal.py:1355, in EpicsSignalBase.wait_for_connection(self, timeout)
```

After

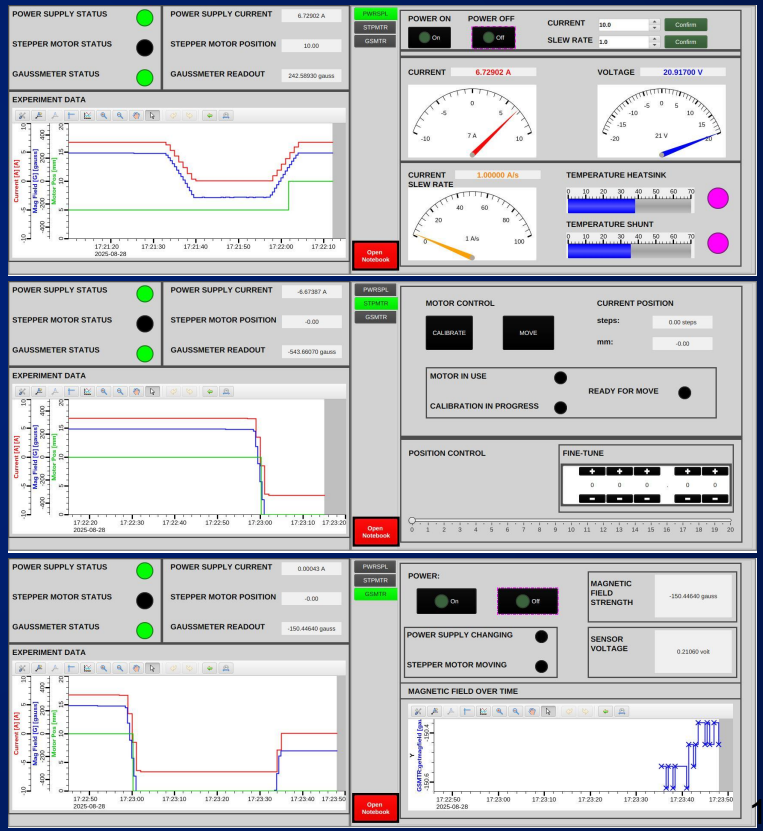
seq_num	time	motor_readback	psu_current_RB	gaussmtr_readback
1	12:03:10.7	-0	5	153
2	12:03:13.1	1	5	152
3	12:03:15.5	2	5	152
4	12:03:17.9	3	5	152
5	12:03:20.3	4	5	153
6	12:03:22.7	5	5	153
7	12:03:25.1	6	5	154
8	12:03:27.5	7	5	153
9	12:03:29.9	8	5	154
10	12:03:32.3	9	5	154
11	12:03:34.7	10	5	155
12	12:03:37.1	11	5	154
13	12:03:39.5	12	5	155
14	12:03:41.9	13	5	154
15	12:03:44.3	14	5	155
16	12:03:46.7	15	5	155
17	12:03:49.1	16	5	156
18	12:03:51.5	17	5	155
19	12:03:53.9	18	5	156
20	12:03:56.3	19	5	155
21	12:03:58.7	20	5	156

generator scan ['a9a87448'] (scan num: 1)

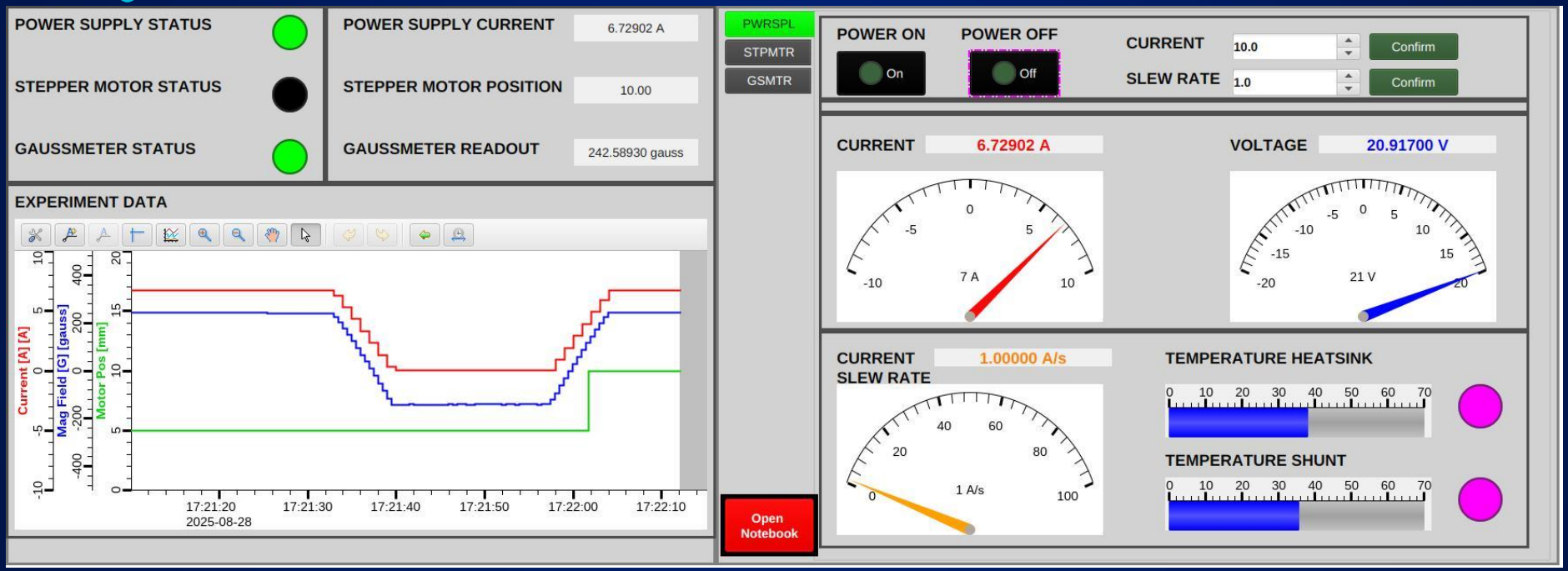
Phoebus

Before

After



Phoebus


POWER SUPPLY STATUS
POWER SUPPLY CURRENT
6.72902 A
STEPPER MOTOR STATUS
STEPPER MOTOR POSITION
10.00
GAUSSMETER STATUS
GAUSSMETER READOUT
242.58930 gauss
EXPERIMENT DATA
Current [A] [A]
Mag Field [G] [gauss]
Motor Pos [mm]
17:21:20
2025-08-28
17:21:30
17:21:40
17:21:50
17:22:00
17:22:10
PWRSPL
STPMTR
GSMTR
Open Notebook
POWER ON
On
POWER OFF
Off
CURRENT
10.0
Confirm
SLEW RATE
1.0
Confirm
CURRENT
6.72902 A
7 A
VOLTAGE
20.91700 V
21 V
CURRENT SLEW RATE
1.00000 A/s
1 A/s
TEMPERATURE HEATSINK
TEMPERATURE SHUNT

Phoebus

POWER SUPPLY STATUS

STEPPER MOTOR STATUS

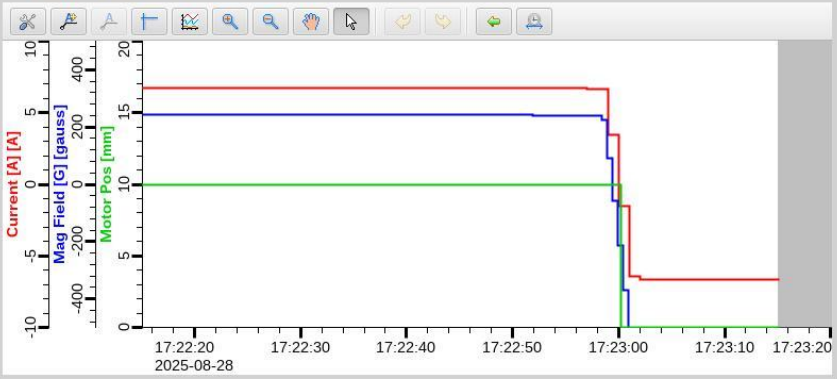
GAUSSMETER STATUS

POWER SUPPLY CURRENT -6.67387 A

STEPPER MOTOR POSITION -0.00

GAUSSMETER READOUT -543.66070 gauss

EXPERIMENT DATA



PWRSPL

STPMTR

GSMTR

Open Notebook

MOTOR CONTROL

CALIBRATE

MOVE

CURRENT POSITION

steps: 0.00 steps

mm: -0.00

MOTOR IN USE

READY FOR MOVE

CALIBRATION IN PROGRESS

POSITION CONTROL

FINE-TUNE

0 0 0 . 0 0

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Phoebus

POWER SUPPLY STATUS

STEPPER MOTOR STATUS

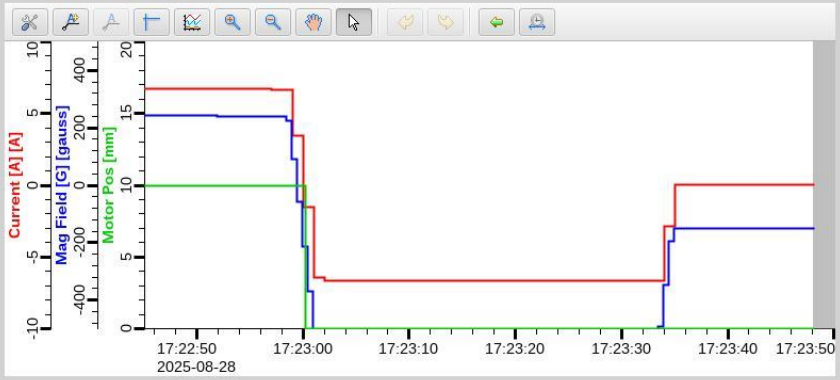
GAUSSMETER STATUS

POWER SUPPLY CURRENT 0.00043 A

STEPPER MOTOR POSITION -0.00

GAUSSMETER READOUT -150.44640 gauss

EXPERIMENT DATA



PWRSPL

STPMTR

GSMTR

Open Notebook

POWER:

On

Off

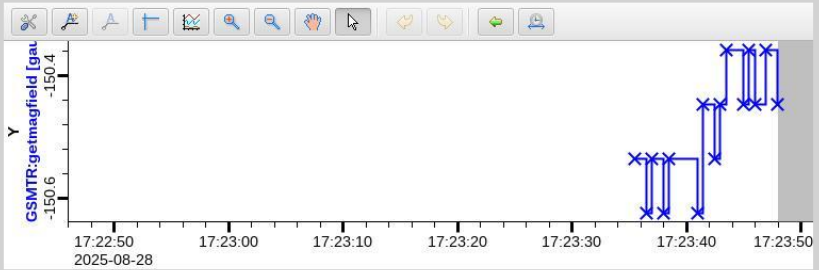
MAGNETIC FIELD STRENGTH -150.44640 gauss

POWER SUPPLY CHANGING

STEPPER MOTOR MOVING

SENSOR VOLTAGE 0.21060 volt

MAGNETIC FIELD OVER TIME



05

Results

Results

Different currents

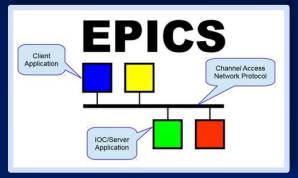
seq_num	time	motor_readback	psu_current_RB	gaussmtr_readback
1	12:07:18.4	20	-6	-539
onoff stat: 1				
2	12:07:19.4	20	-5	-517
onoff stat: 1				
3	12:07:20.4	20	-4	-469
onoff stat: 1				
4	12:07:21.4	20	-3	-419
onoff stat: 1				
5	12:07:22.4	20	-3	-367
onoff stat: 1				
6	12:07:23.4	20	-2	-315
onoff stat: 1				
7	12:07:24.4	20	-1	-261
onoff stat: 1				
8	12:07:25.4	20	-0	-207
onoff stat: 1				
9	12:07:26.4	20	1	-152
onoff stat: 1				
10	12:07:27.4	20	2	-100
onoff stat: 1				
11	12:07:28.4	20	3	-44
onoff stat: 1				
12	12:07:29.4	20	3	9
onoff stat: 1				
13	12:07:30.4	20	4	61
onoff stat: 1				
14	12:07:31.4	20	5	112
onoff stat: 1				
15	12:07:32.4	20	6	160

generator scan ['5b2b37a4'] (scan num: 1)

Different distances

seq_num	time	motor_readback	psu_current_RB	gaussmtr_readback
1	12:03:10.7	-0	5	153
2	12:03:13.1	1	5	152
3	12:03:15.5	2	5	152
4	12:03:17.9	3	5	152
5	12:03:20.3	4	5	153
6	12:03:22.7	5	5	153
7	12:03:25.1	6	5	154
8	12:03:27.5	7	5	153
9	12:03:29.9	8	5	154
10	12:03:32.3	9	5	154
11	12:03:34.7	10	5	155
12	12:03:37.1	11	5	154
13	12:03:39.5	12	5	155
14	12:03:41.9	13	5	154
15	12:03:44.3	14	5	155
16	12:03:46.7	15	5	155
17	12:03:49.1	16	5	156
18	12:03:51.5	17	5	155
19	12:03:53.9	18	5	156
20	12:03:56.3	19	5	155
21	12:03:58.7	20	5	156

generator scan ['a9a87448'] (scan num: 1)



Thanks for your attention