Magnet control system in ALPHA-g

Veronika Batianova

V.N. Karazin Kharkiv National University

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Supervisor: Dr. William Alan Bertsche
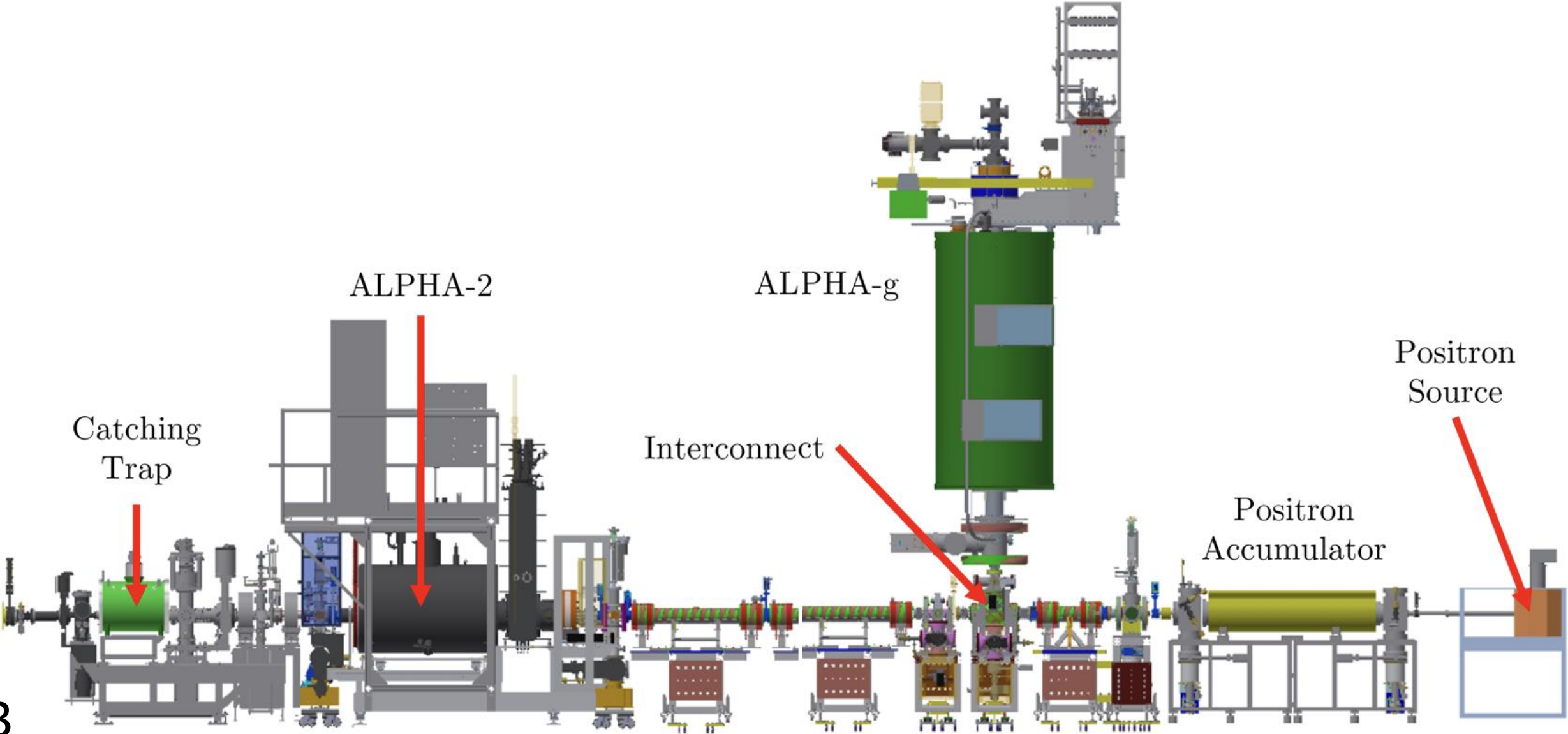
Agenda:

- The ALPHA apparatus
- The ALPHA-g magnet system
- Magnet control system
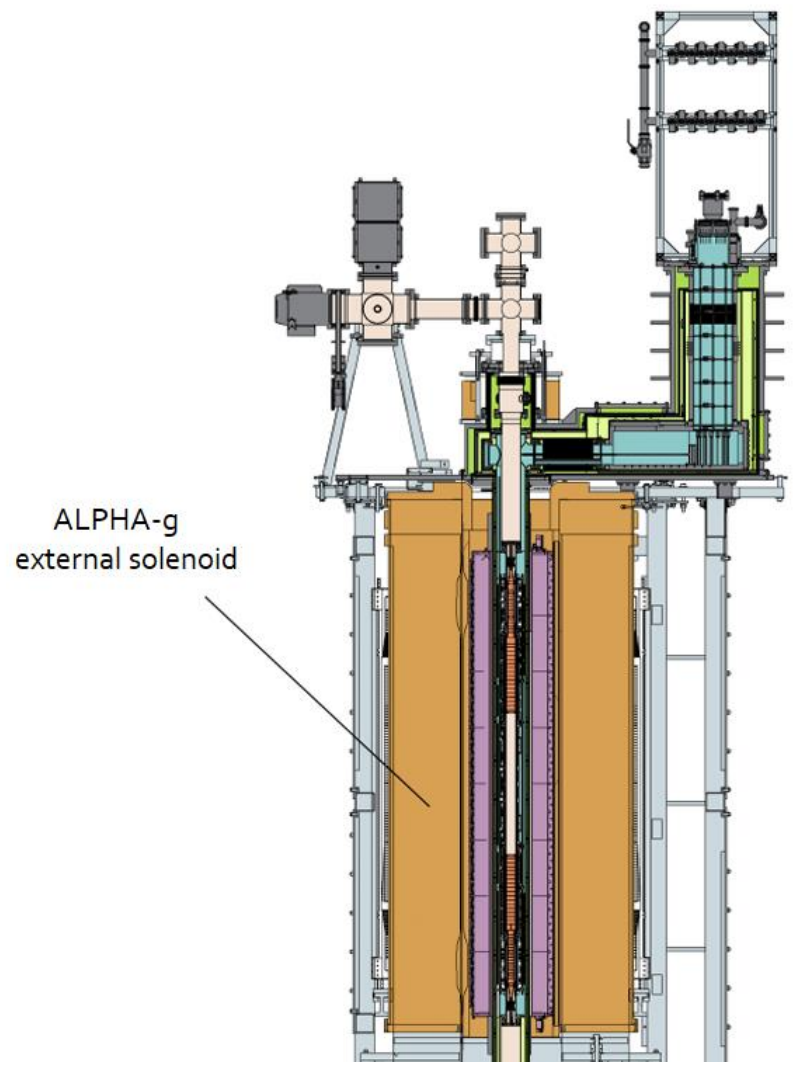- Power supplies
- Using of an Arduino

2

The ALPHA apparatus

3

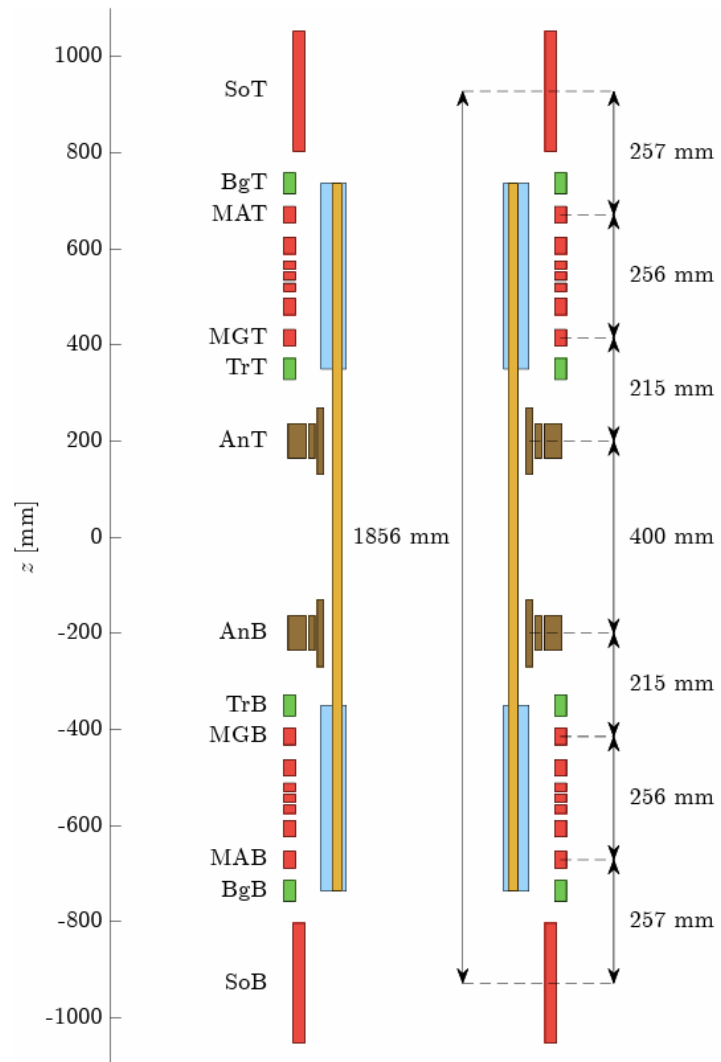# ALPHA-g magnets
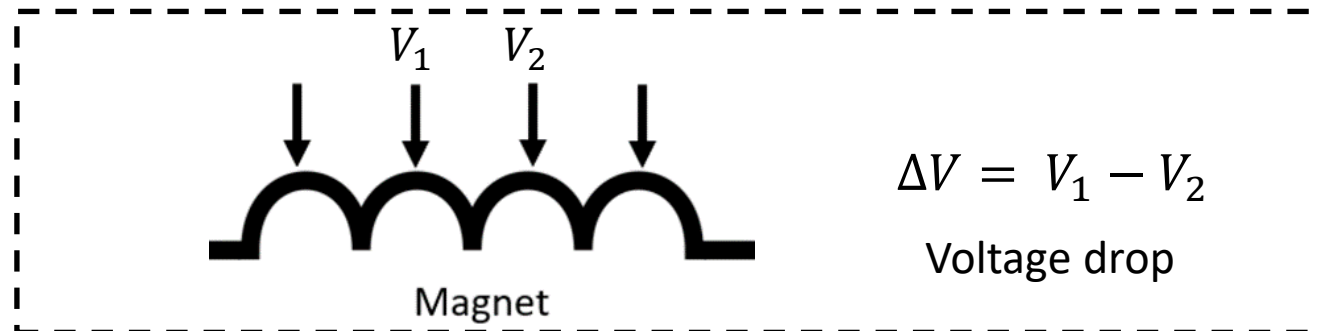
ALPHA-g external solenoid

Babcock magnet
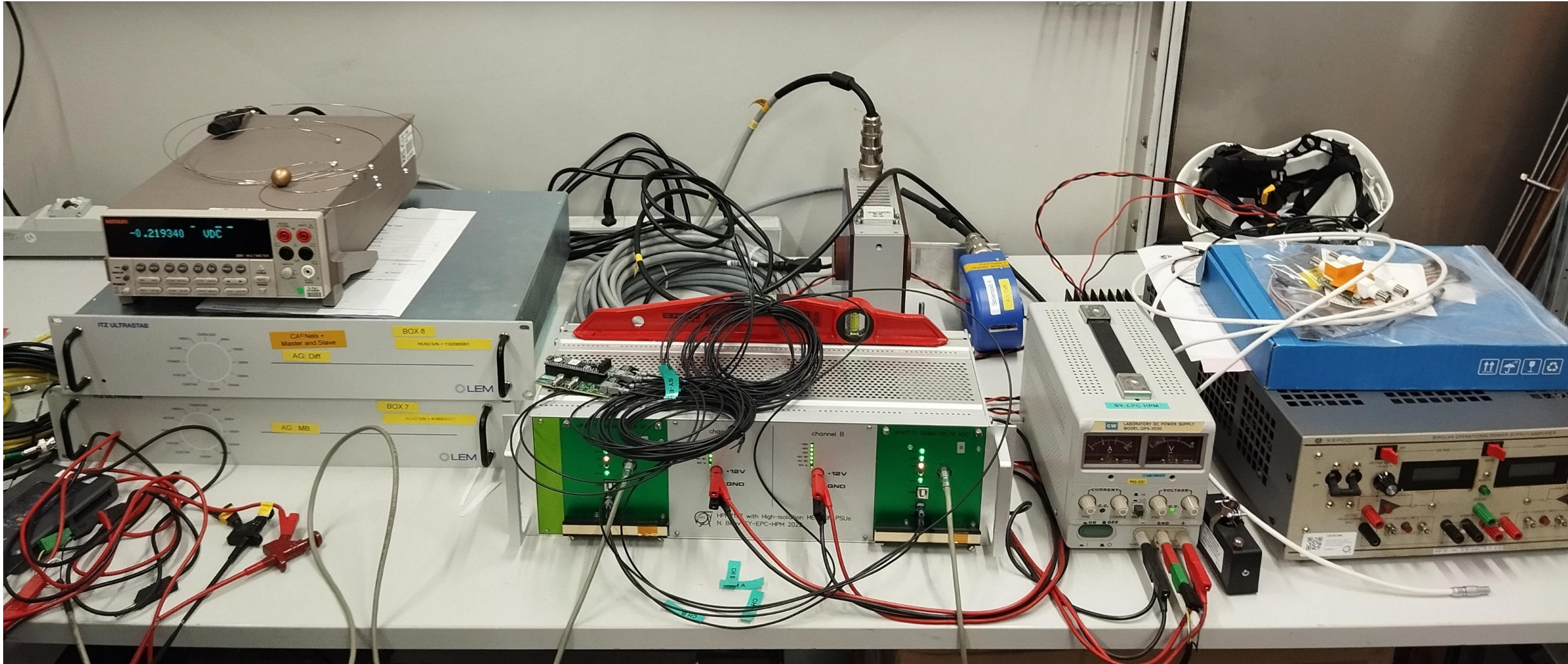
BNL Magnets

4
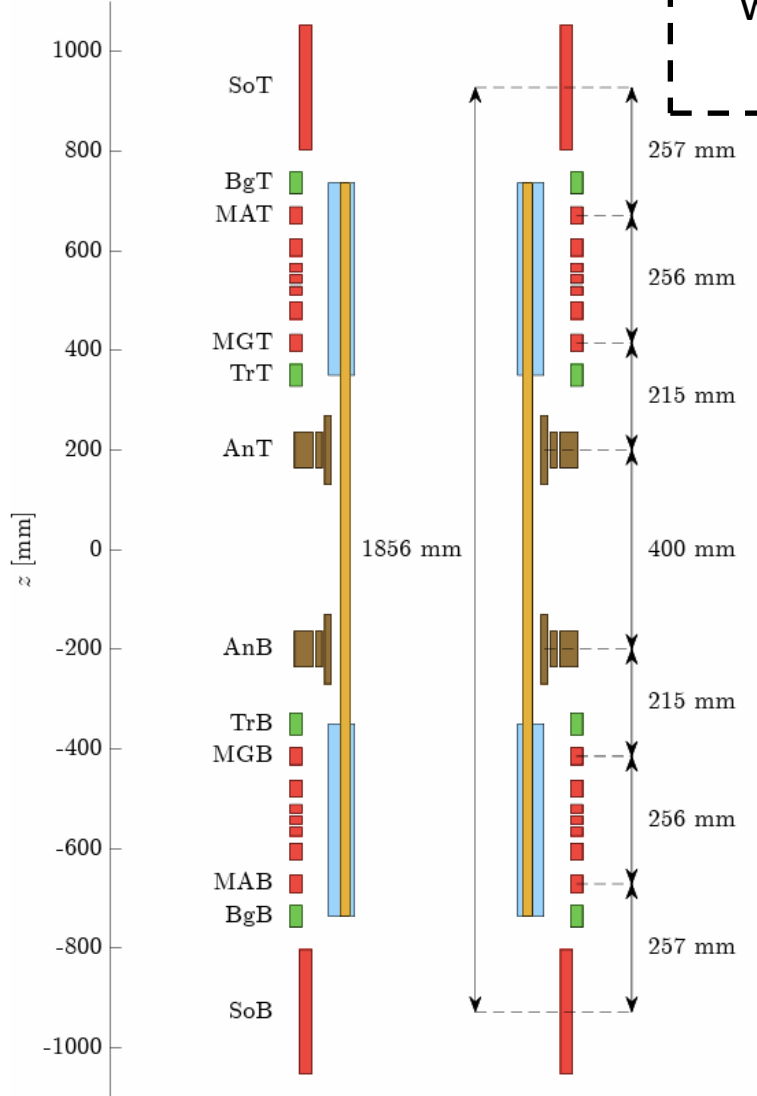
Power supplies
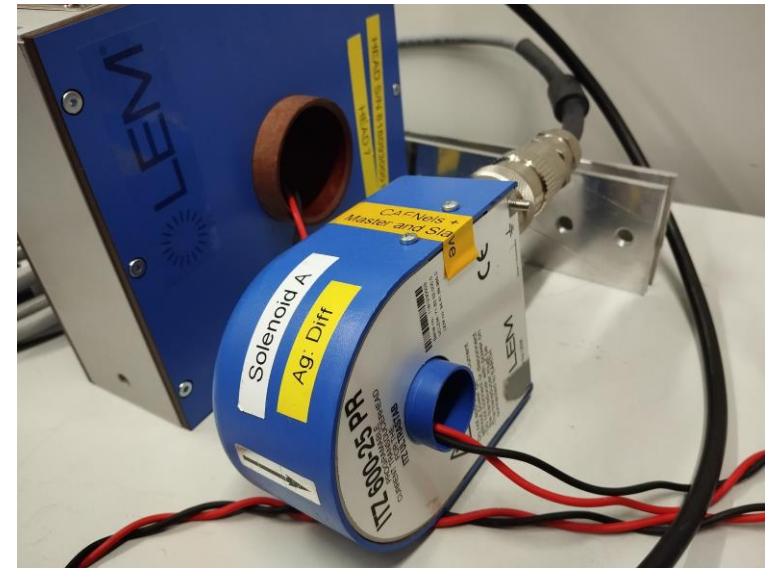

Magnets

Power supplies

5

Magnet control system

$$\Delta V = V_1 - V_2$$

Voltage drop

6
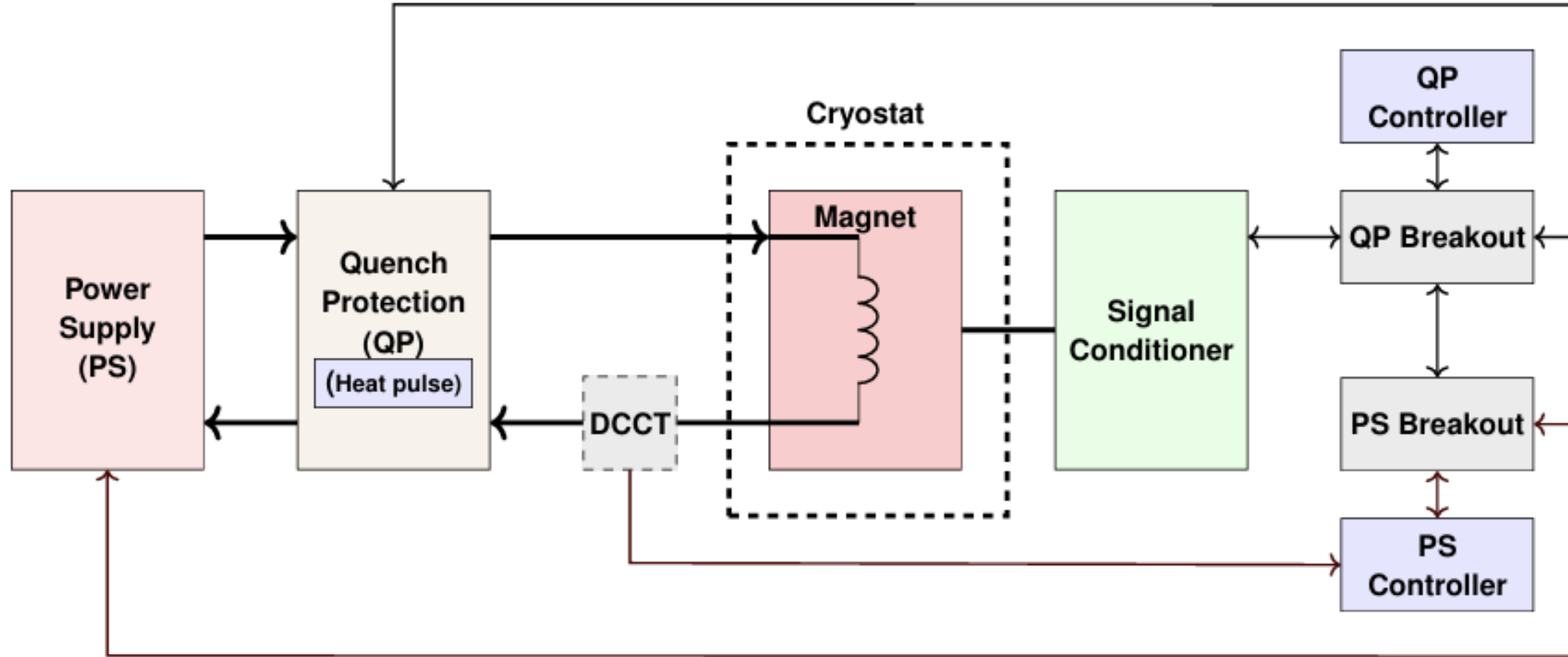
Magnet control system

Magnet control system

8
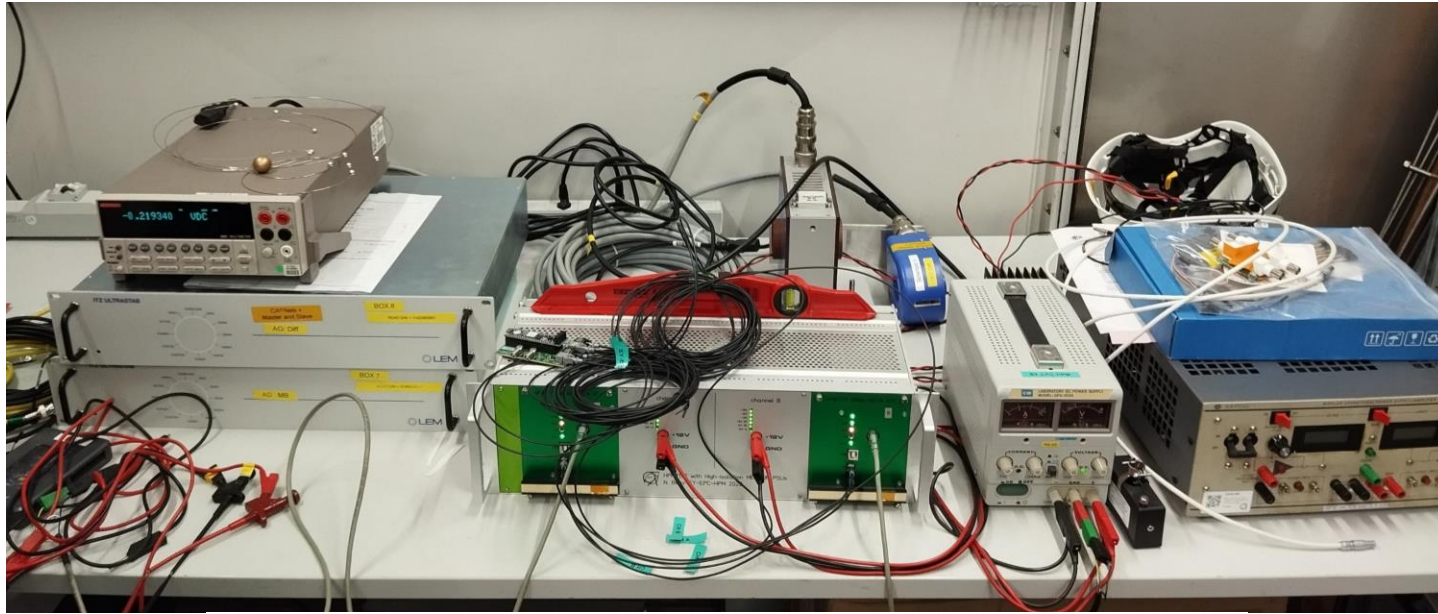
DCCT

ADC

PS setup

PS setup

NS ←→ A ←→ PC

Ethernet

USB

SFP

PS

CERN's
network

NS – Network Switch
A – Arduino board
PC – computer
PS – Power supply

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PS setup

Arduino

Arduino Ethernet Shield 2

Arduino UNO R4 Minima
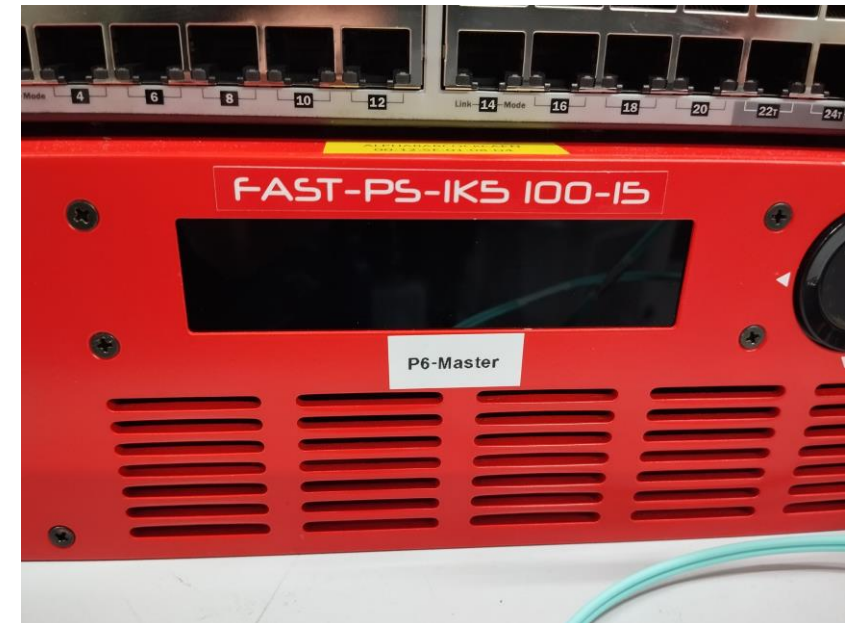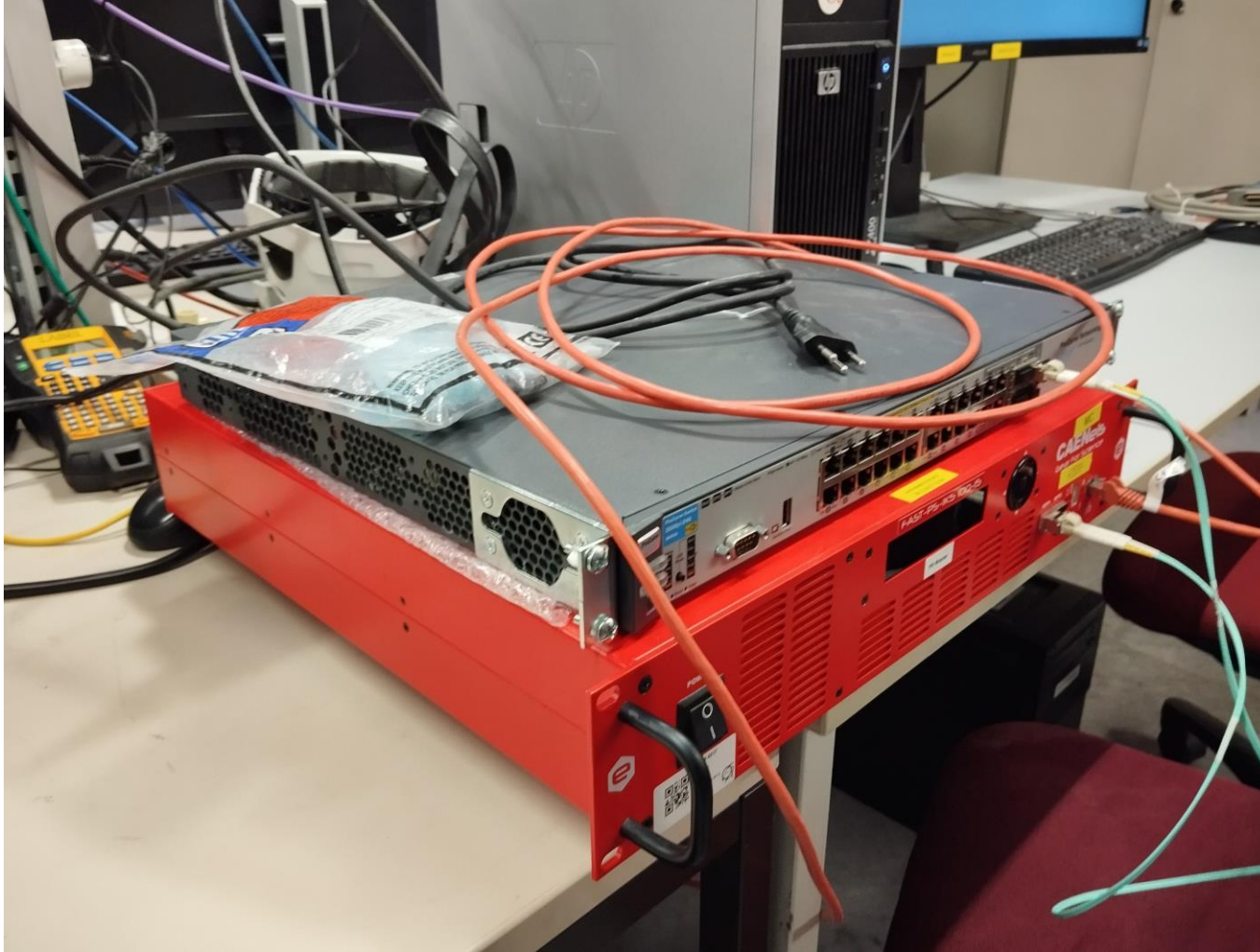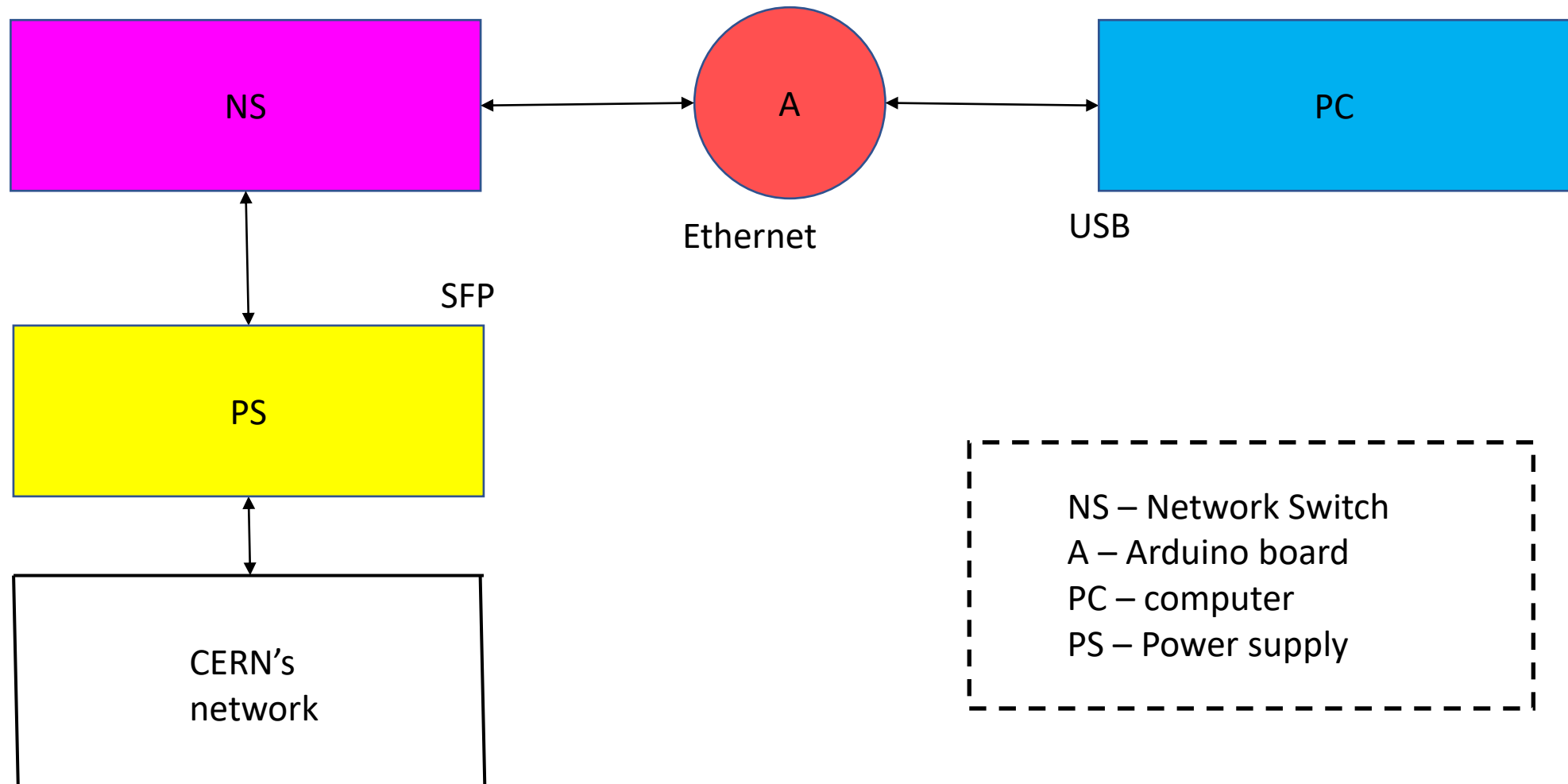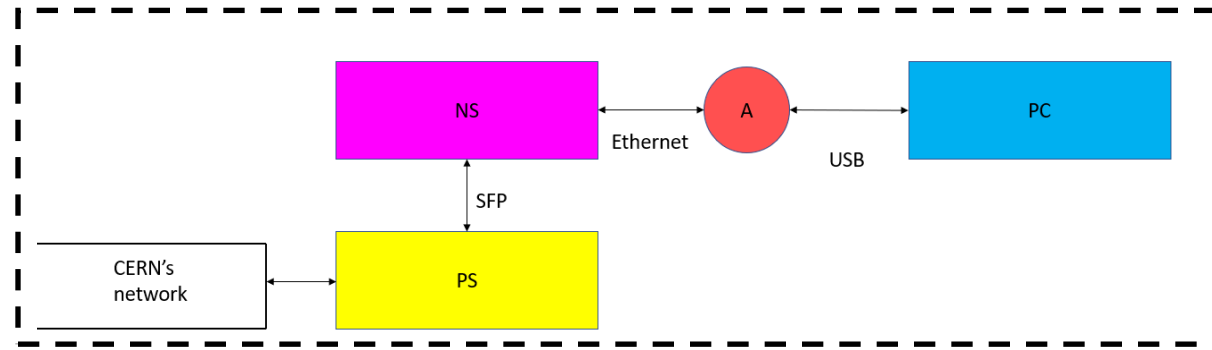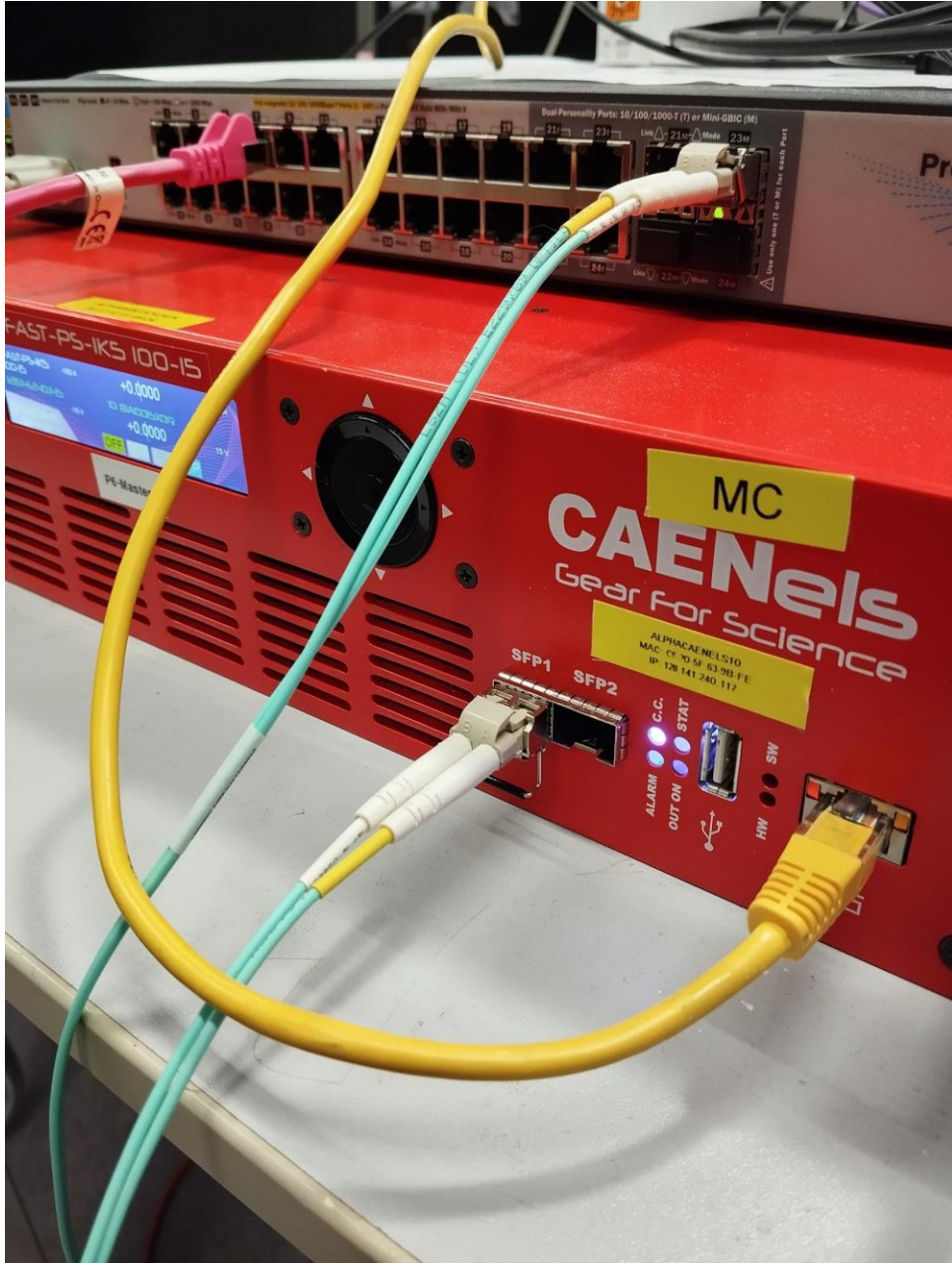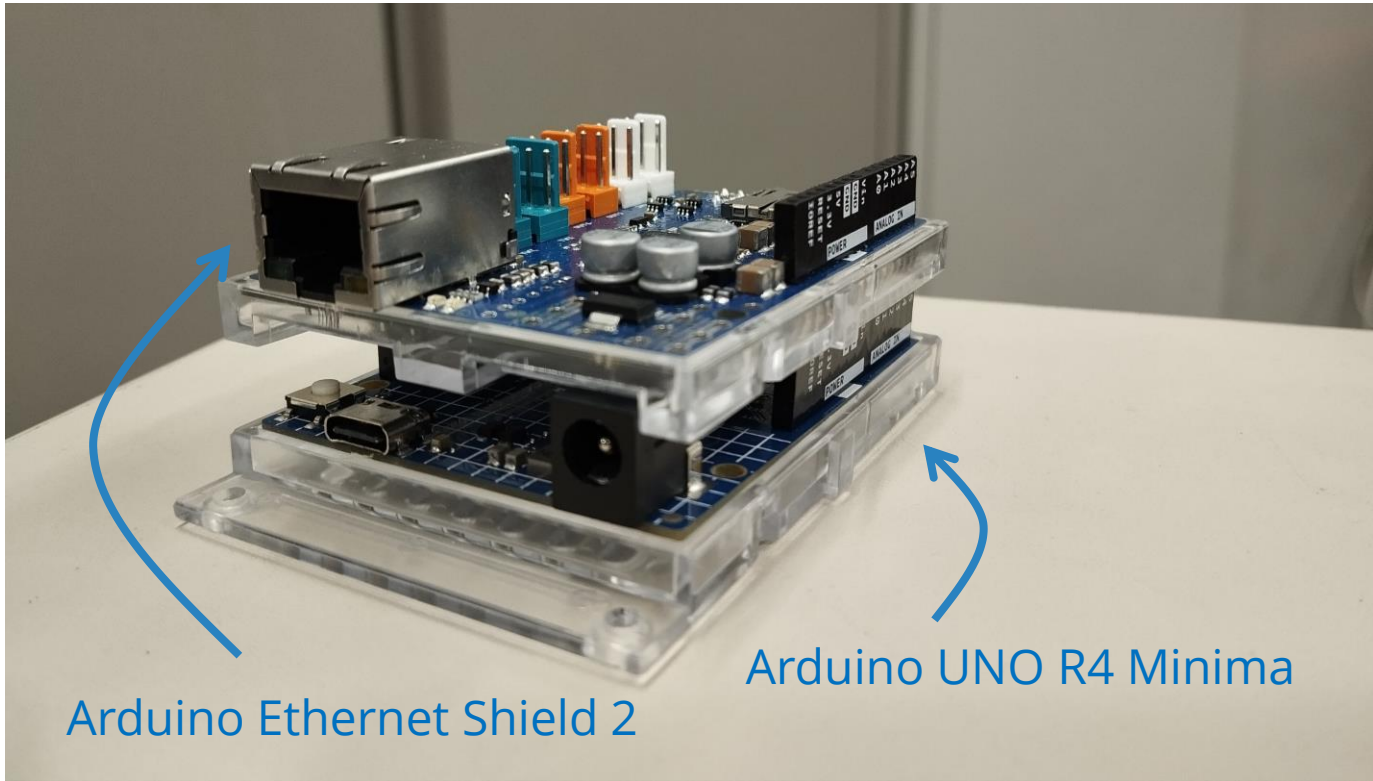
Current work


```
# Parameters:
# ------------------------------------------
HOST_IP = '10.0.0.50'
HOST_PORT = 28685
DEST_IP = '10.0.0.3'

#DEVICE_IP = '192.168.0.10'
#DEVICE_IP = '255.255.255.255'
DEVICE_PORT = 30721
#RESP_TIMEOUT = 0.4

FAST_PROTOCOL_ID = 0x7631
COMMAND = 0x0
NONCE = 0x111122223333AAAA # this can be read from the slow interface in order to verify that the
  # packet was correctly recived from the power unit

FAST_ADDR = 3 # FAST-Address, which is used in order to exctract the correct setpoint from the power unit
SET_POINT = 0

DUMMY_ADDR = 0xAACB
DUMMY_SET_POINT = 5.0

BROADCAST = True # It is possible to send the packet in unicast or multicast
```
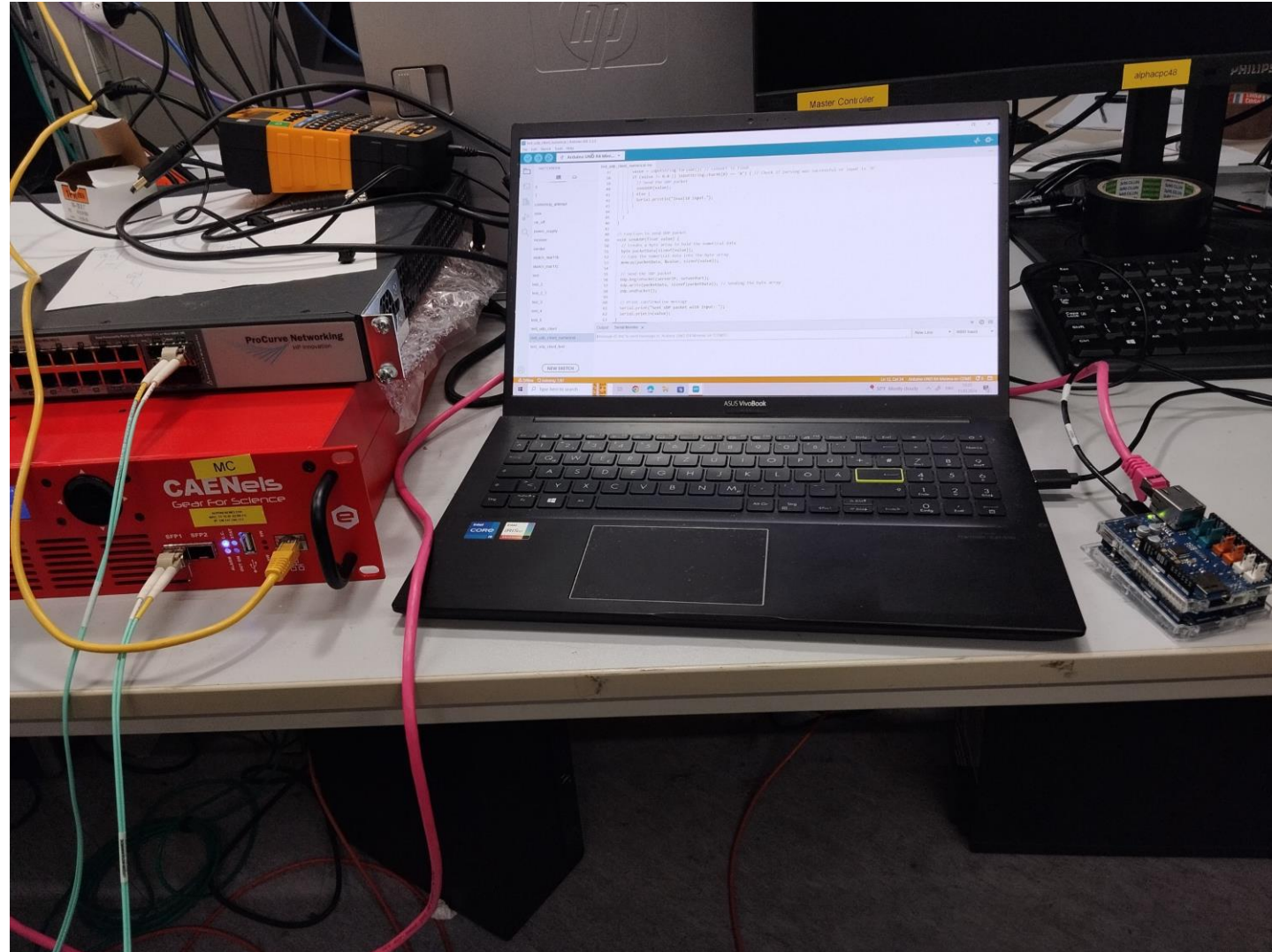
```
52    uint16_t FAST_PROTOCOL_ID = 0x7631;
53    uint16_t COMMAND = 0x0;
54    uint64_t NONCE = 0x111122223333AAAA;
55    uint16_t DUMMY_ADDR = 0xAACB;
56    float DUMMY_SET_POINT = 5.0;
57    uint16_t FAST_ADDR = 3;
58
59    // Packet data:
60    byte data[42]; // 2 bytes for each short, 8 bytes for the long long, 4 bytes for the float
61    byte* ptr = data;
62
63    // Packet Header:
64    // Convert to big-endian manually
65    *(ptr++) = (FAST_PROTOCOL_ID >> 8) & 0xFF;
66    *(ptr++) = FAST_PROTOCOL_ID & 0xFF;
```

Output   Serial Monitor ✕

Message (Enter to send message to 'Arduino UNO R4 Minima' on 'COM5')

Sent UDP packet with set point: 5.00

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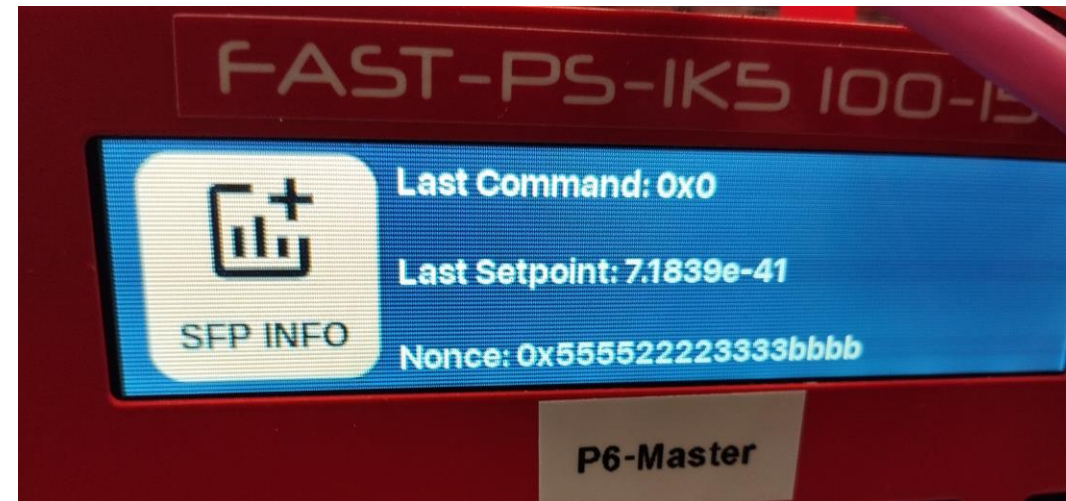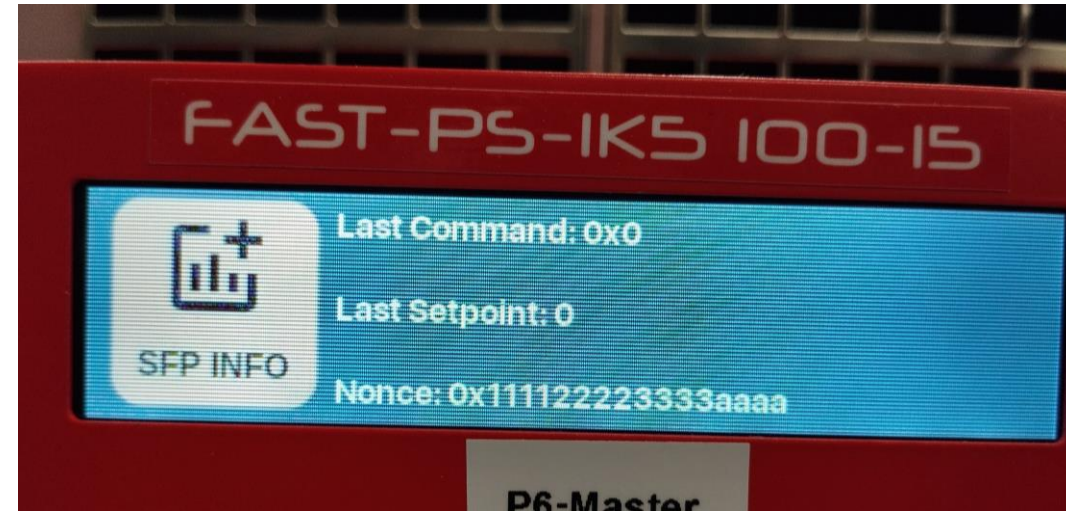
BREAKING NEWS

Today (15.03.2024) it worked!

The issue lied in the conversion of float data to bytes in the Arduino code.

Thanks for your attention :)