



Magnet control system in ALPHA-g

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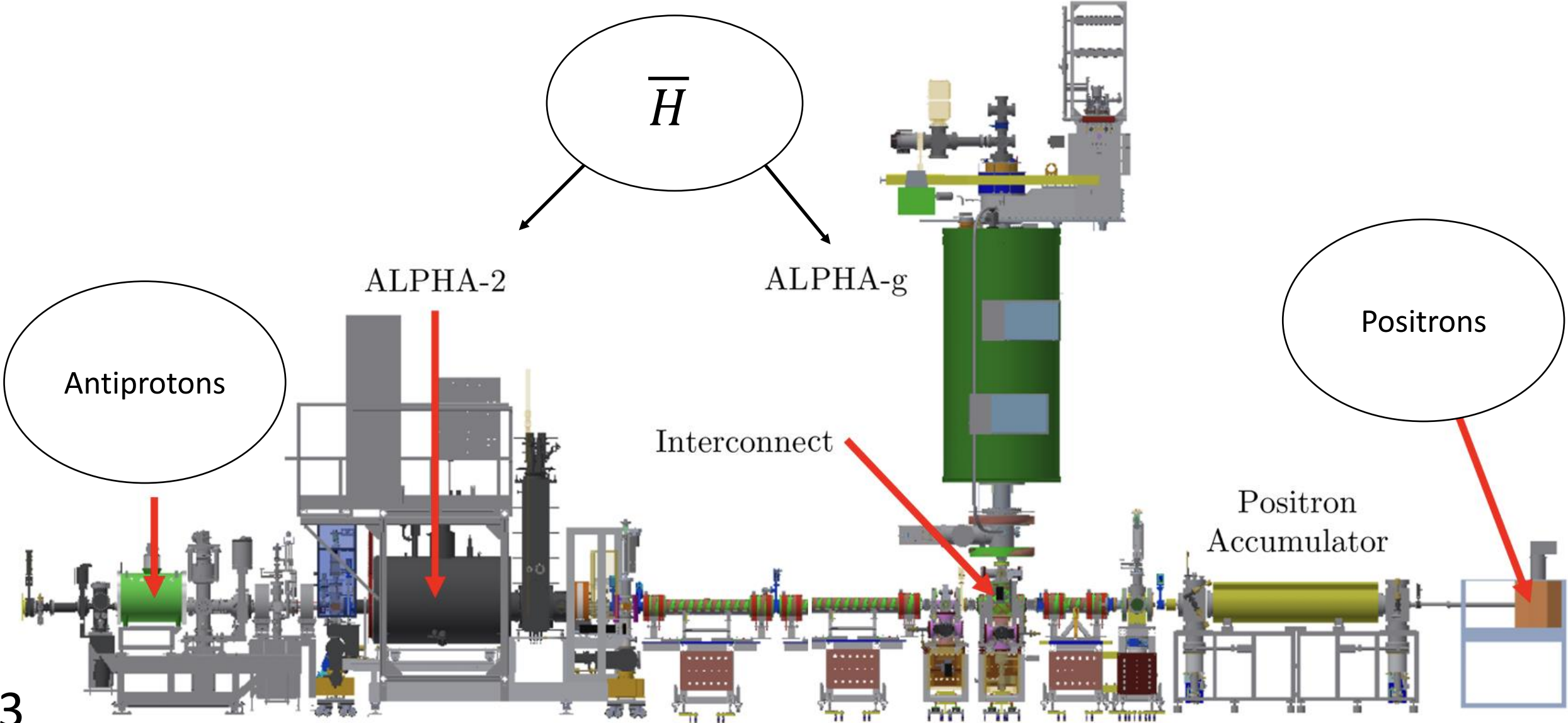
Supervisor: Dr. William Alan Bertsche

Agenda:



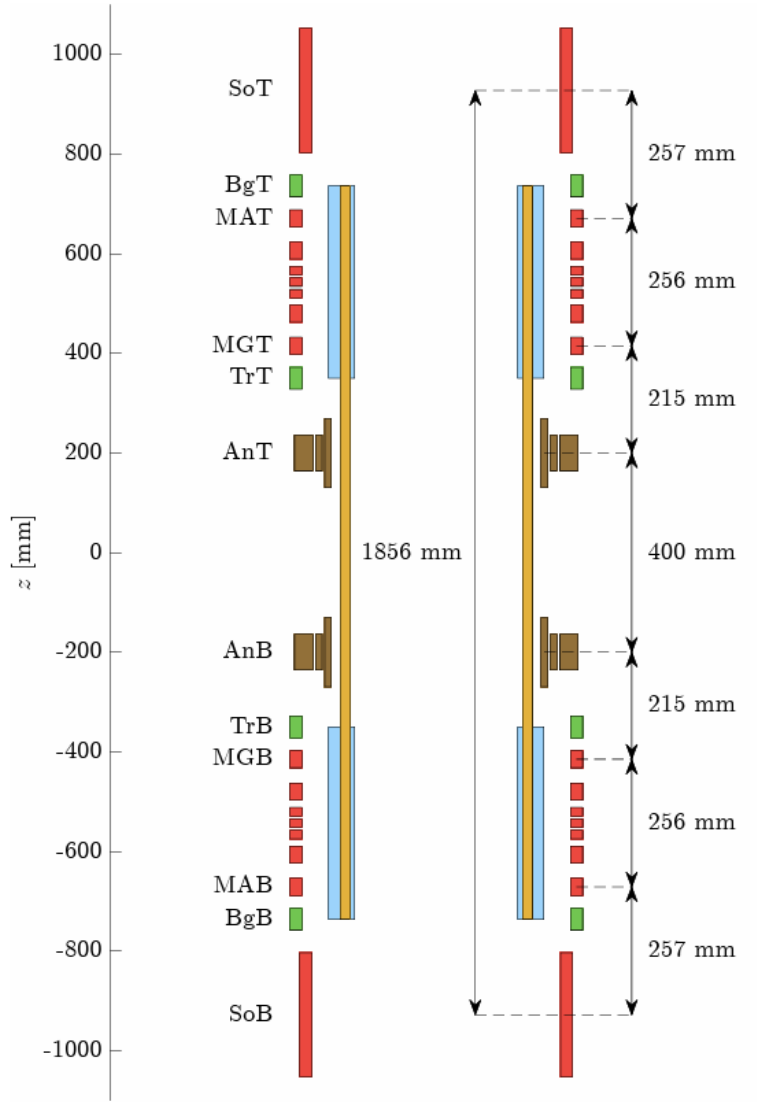
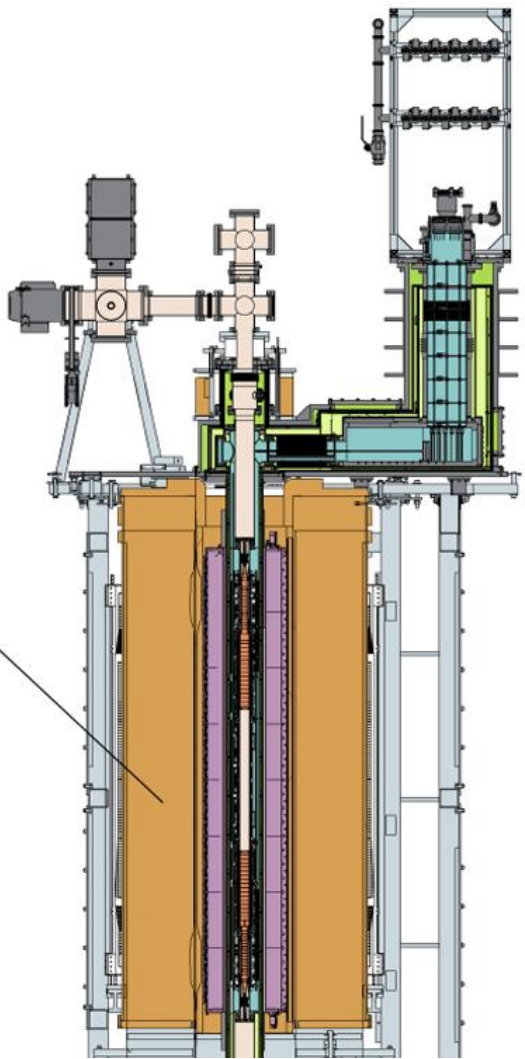
- The ALPHA apparatus
- The ALPHA-g magnet system
- Power supply control system

The ALPHA apparatus

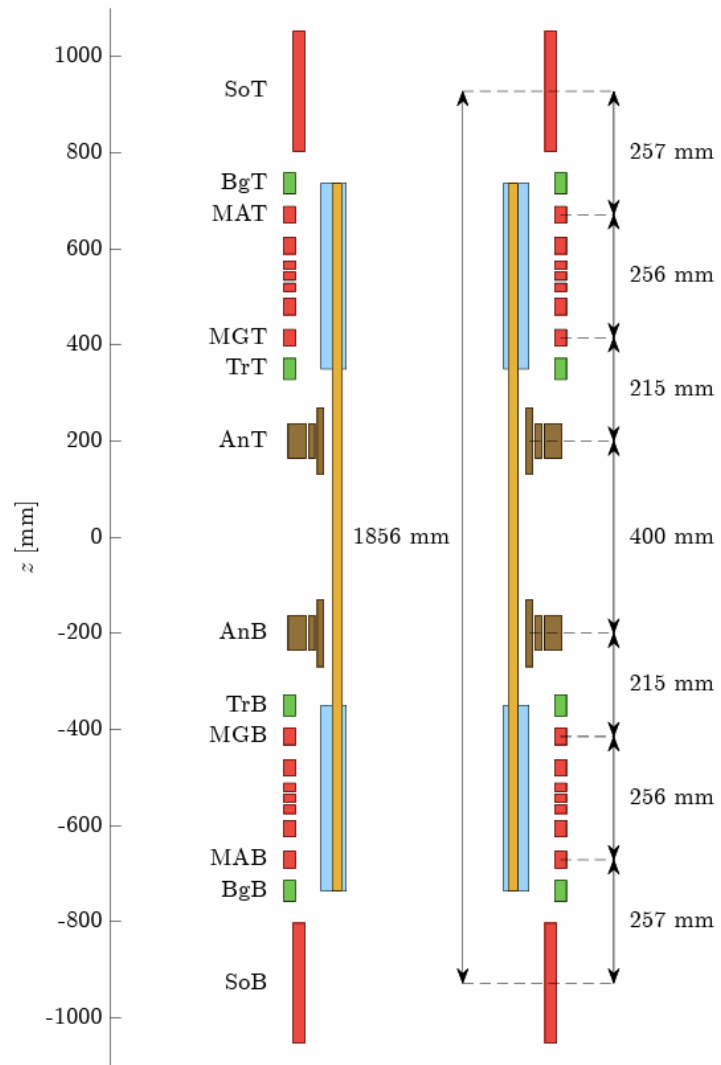


ALPHA-g magnets

ALPHA-g external solenoid



Power supplies



Magnets



Power supplies

The general scheme

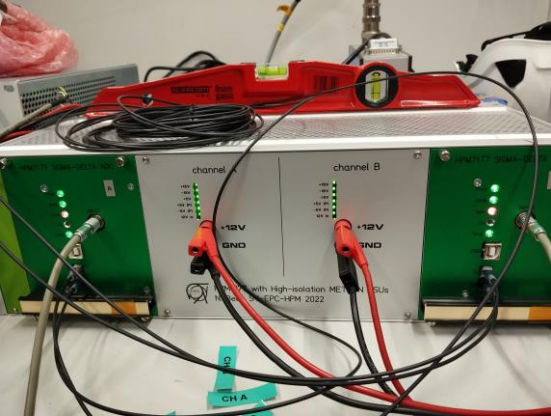
FPGA



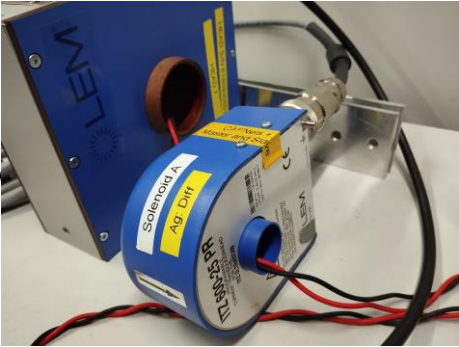
Arduino



PS



ADC

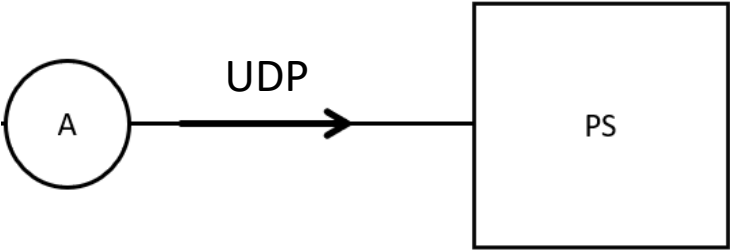
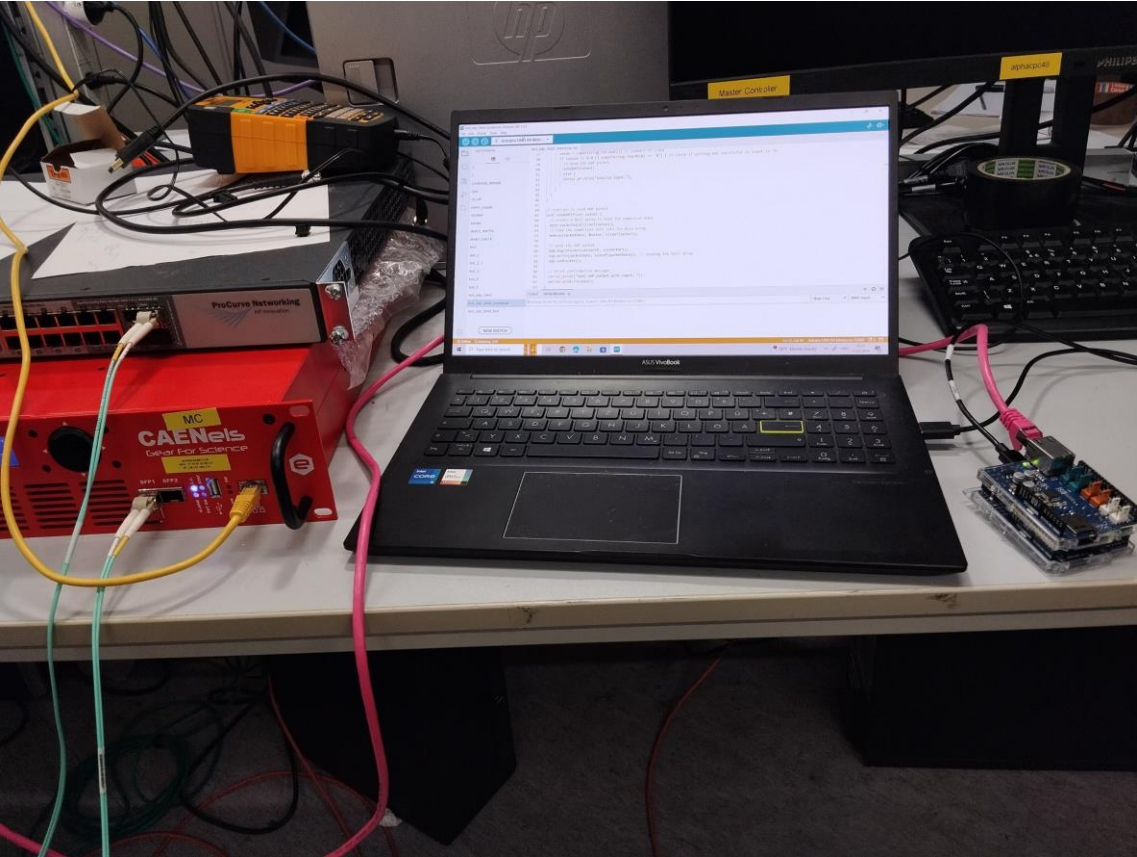


DCCT

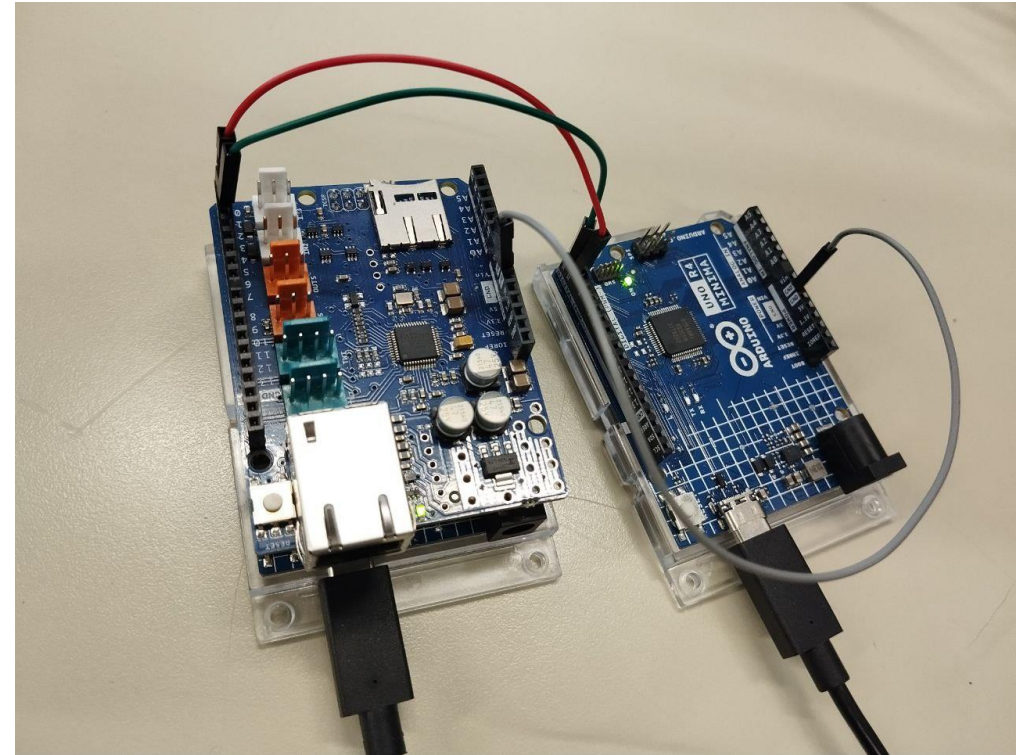
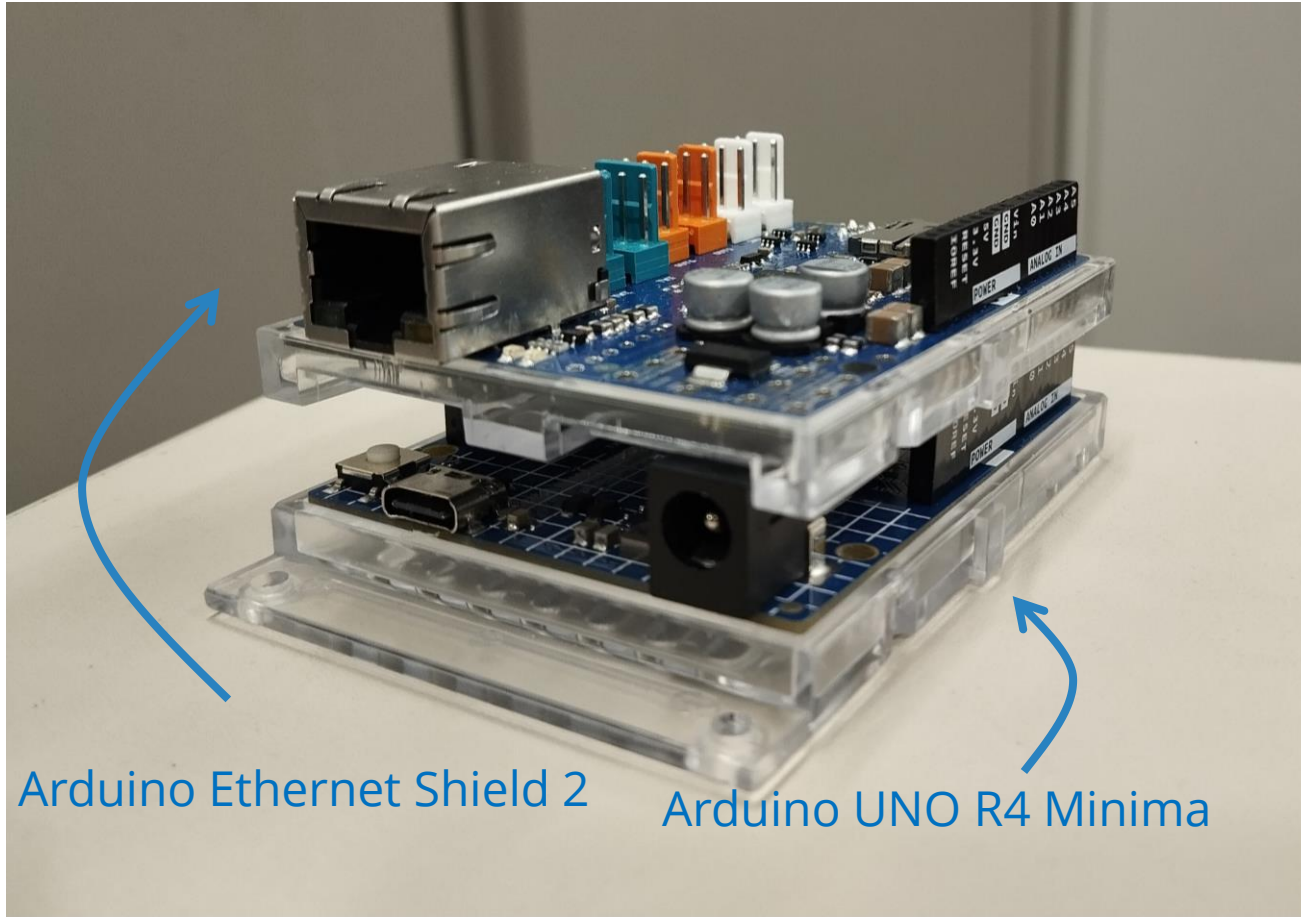


Magnet

Arduino – PS communication



Working with the Arduino



Arduino – Arduino communication

Working in the LabVIEW™

UART Demo

SGL In: 0
 Test U32: 0
 Boolean array: 4

Test U32 Out: 0
 U32 out: 0

byte 0: 0
 byte 1: 0
 byte 2: 0
 byte 3: 0

One Bit Clock Ticks from Baud: 40

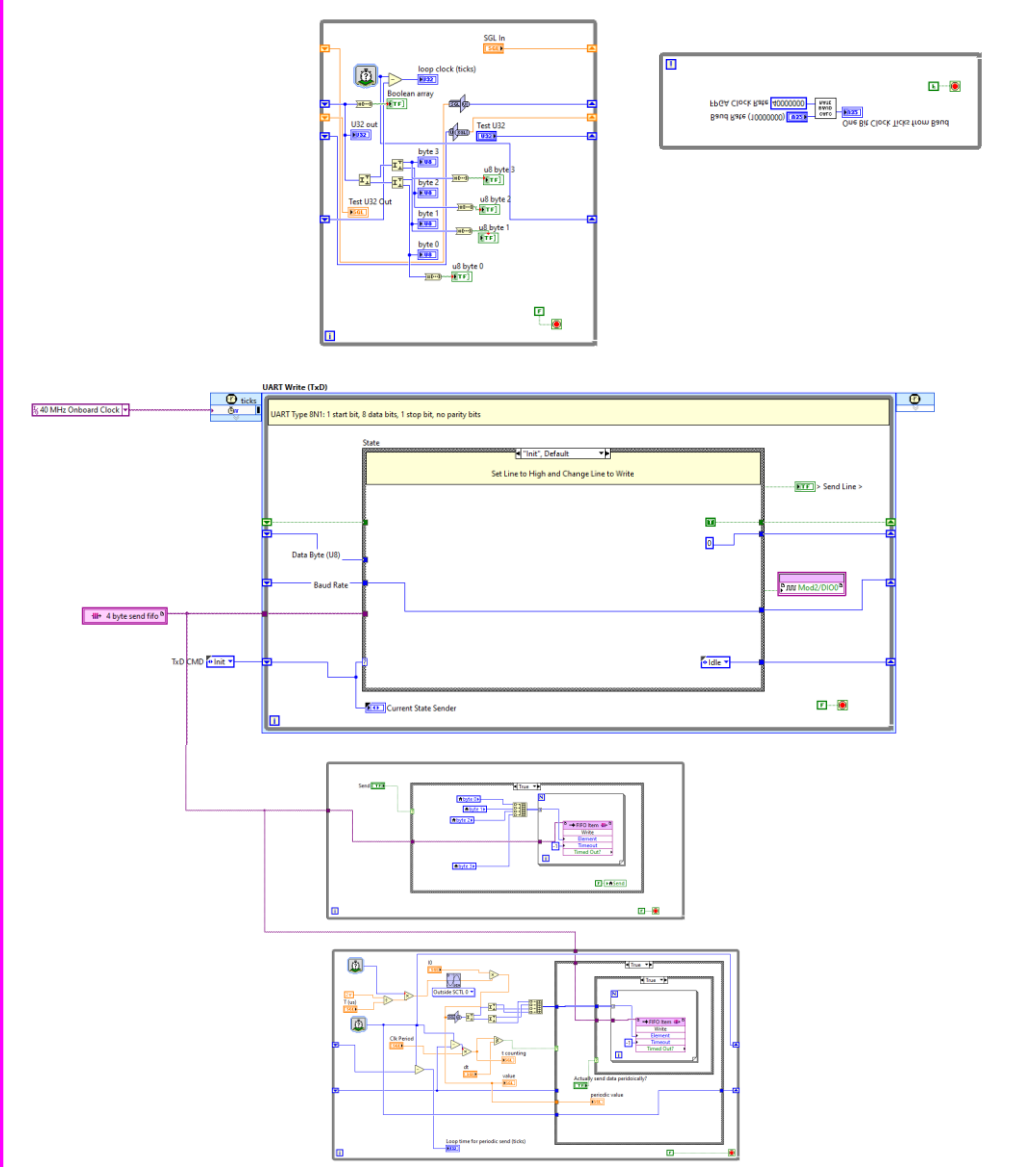
Send UART
 > Send Line >
 Send
 Baud Rate (10000000): 1M
 Current State Sender: Idle

u8 byte 0: 0
 u8 byte 1: 0
 u8 byte 2: 0
 u8 byte 3: 0

IO	Loop time for periodic send (ticks)
4	79
T (us)	loop clock (ticks)
400000	6
dt	value
0.02	1.336
t counting	periodic value
0.0195947	0.13496
Clk Period	
2.5E-8	

Actually send data periodically?


Interface



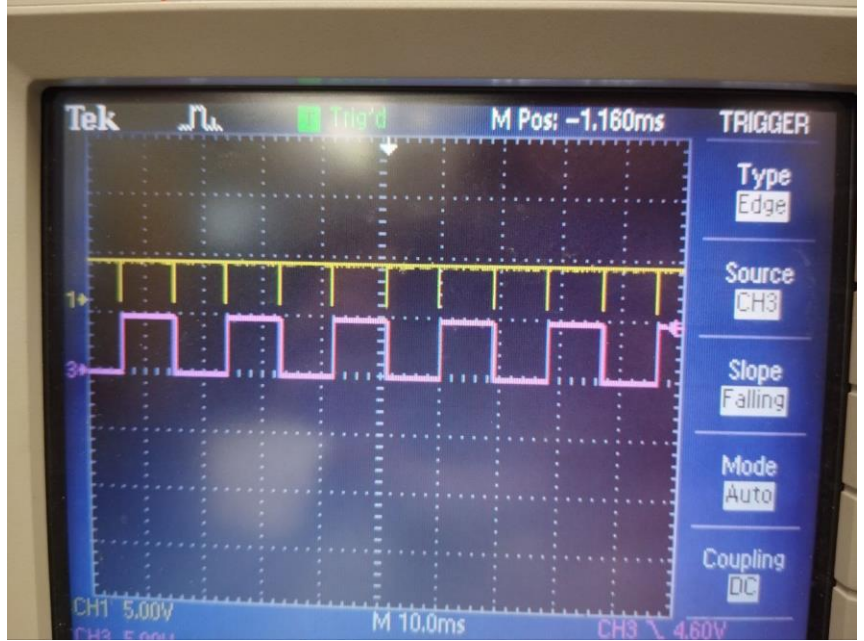
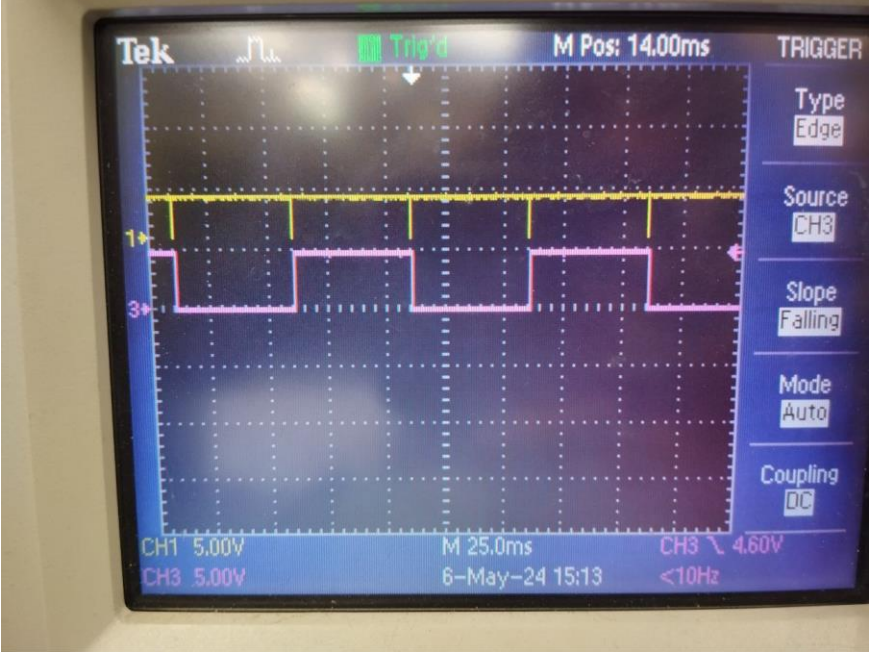
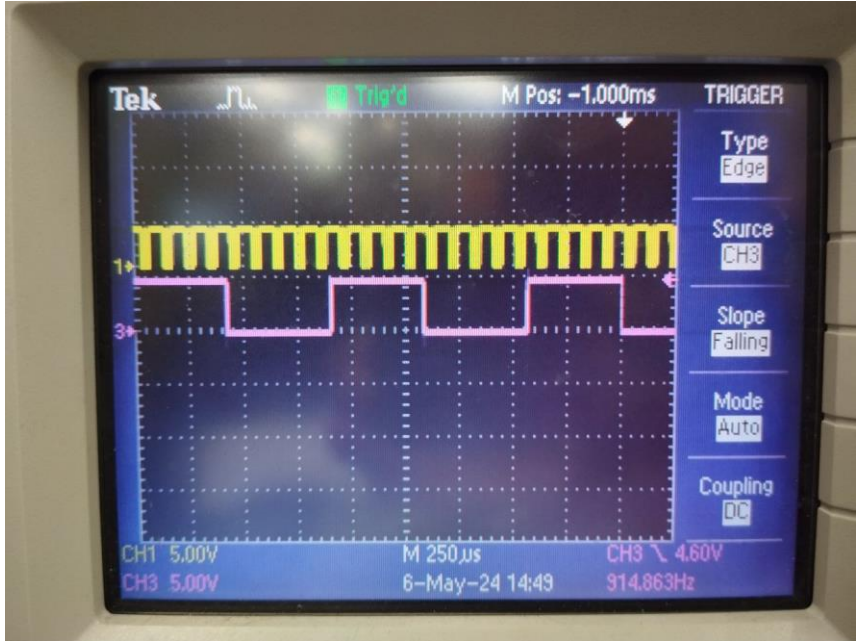
40 MHz Onboard Clock
 4 byte send file
 UART Write (Tx0)
 UART Type (BNT): 1 start bit, 8 data bits, 1 stop bit, no parity bits
 State: "Test", Default
 Set Line to High and Change Line to Write
 Send Line >
 Data Byte (u8)
 Baud Rate
 200 Modulo/DIGIT
 Idle
 Current State Sender
 Loop time for periodic send (ticks)
 Actually send data periodically?
 periodic value

Actual code

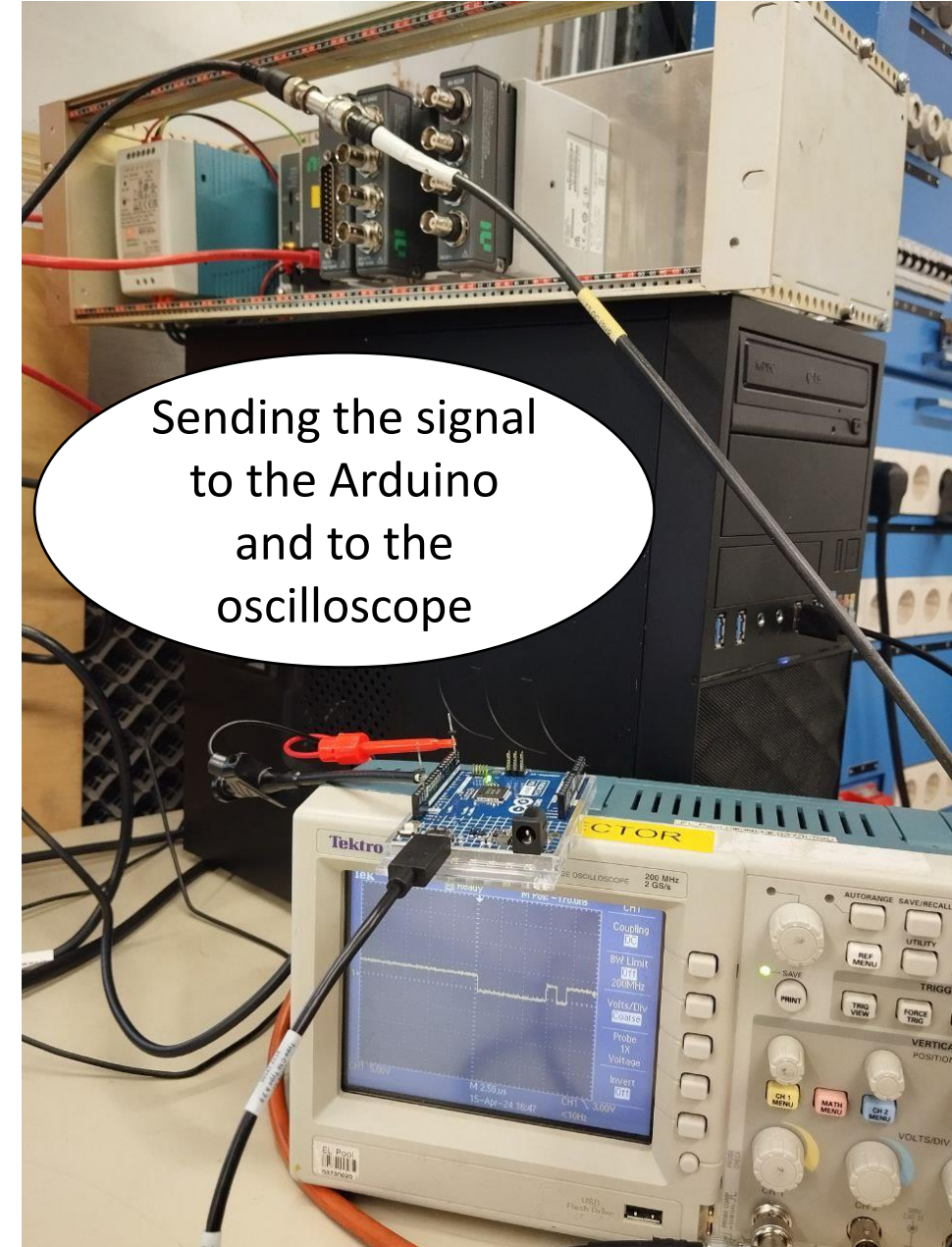
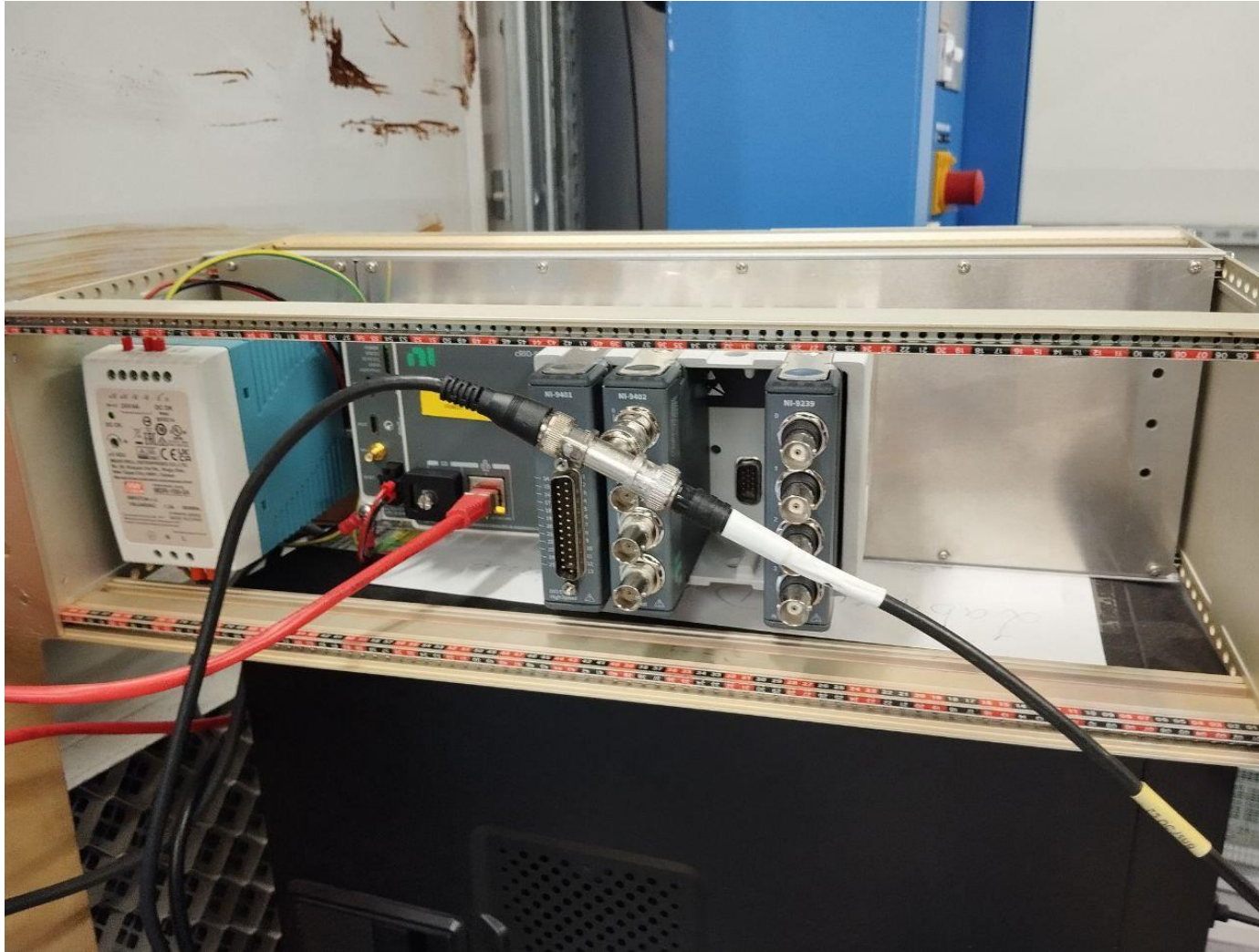
Actual signals

 - FPGA

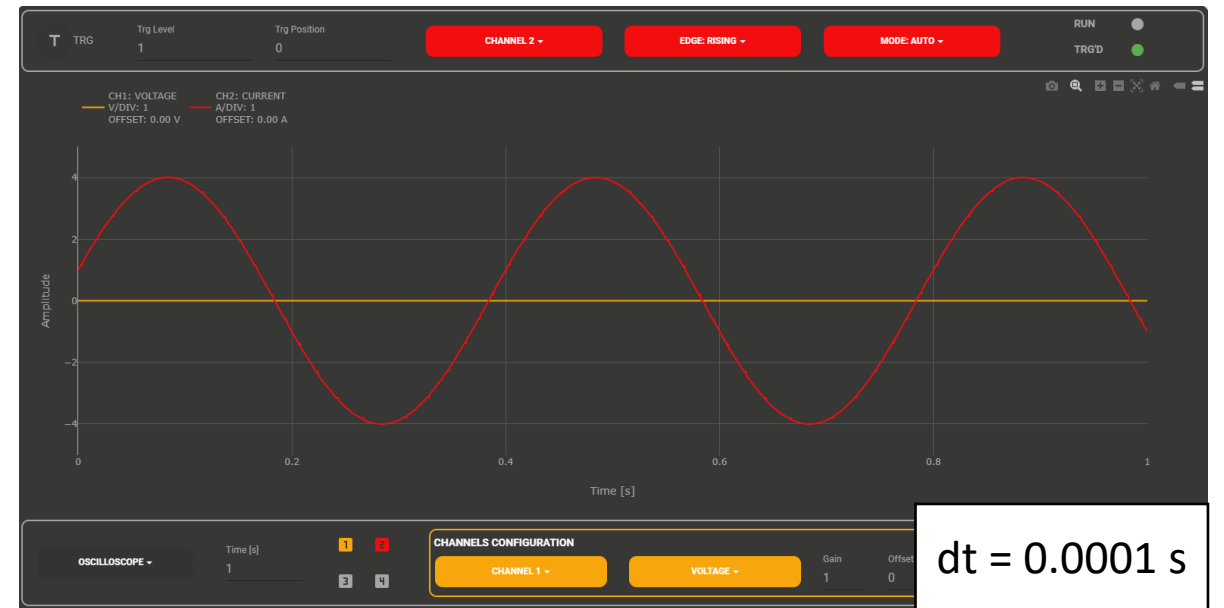
 - Arduino



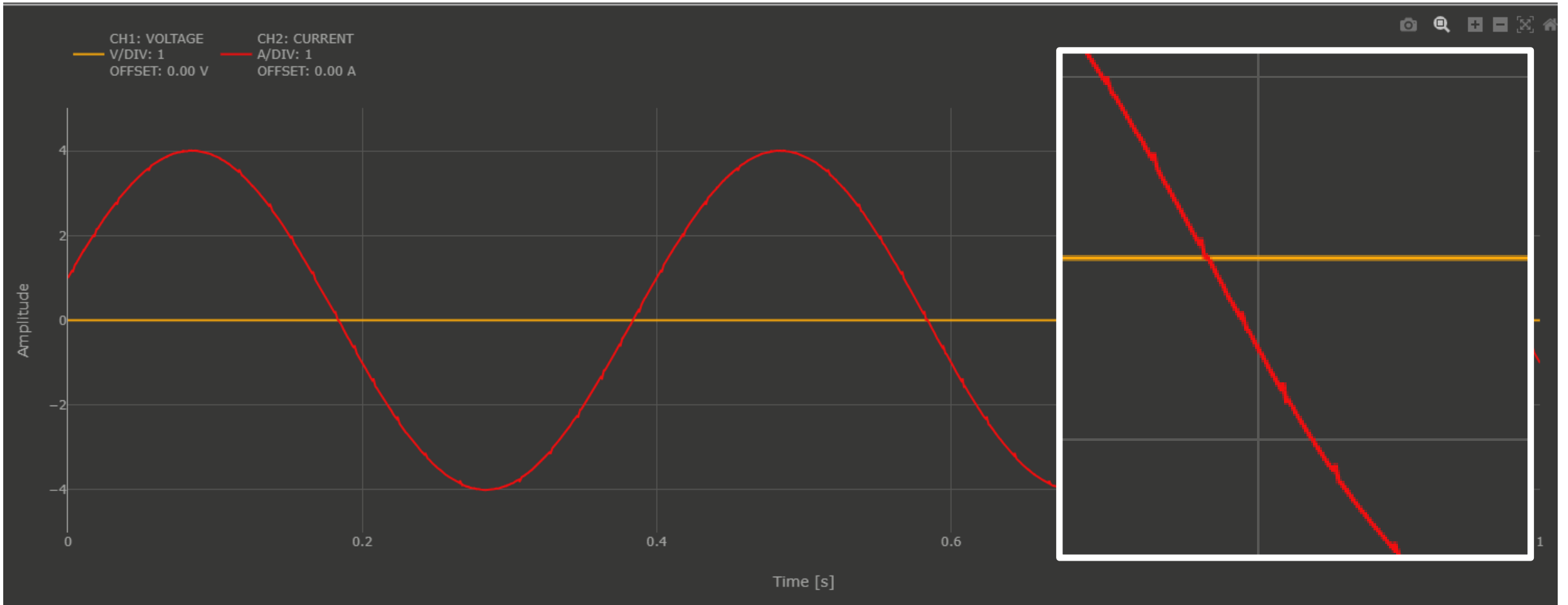
Working with the FPGA



Obtained waveform



Obtained waveform



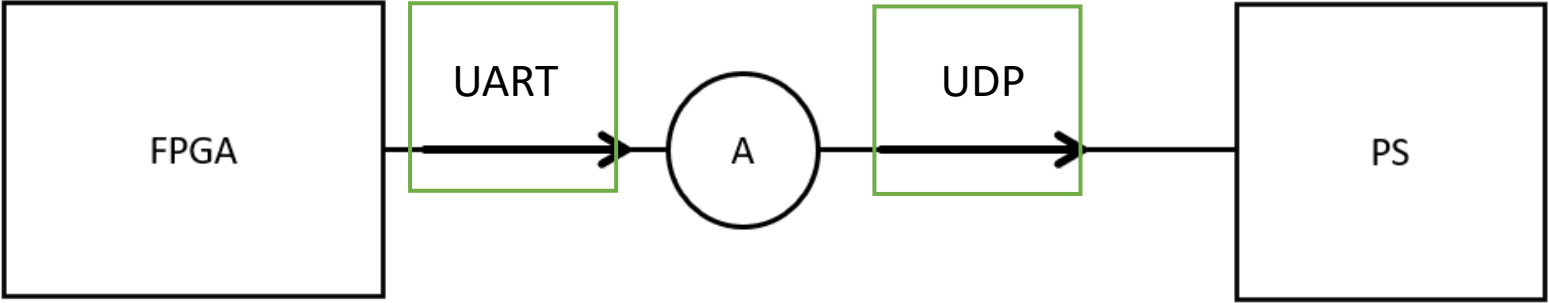
Result!

But we have some glitches....

State of a project

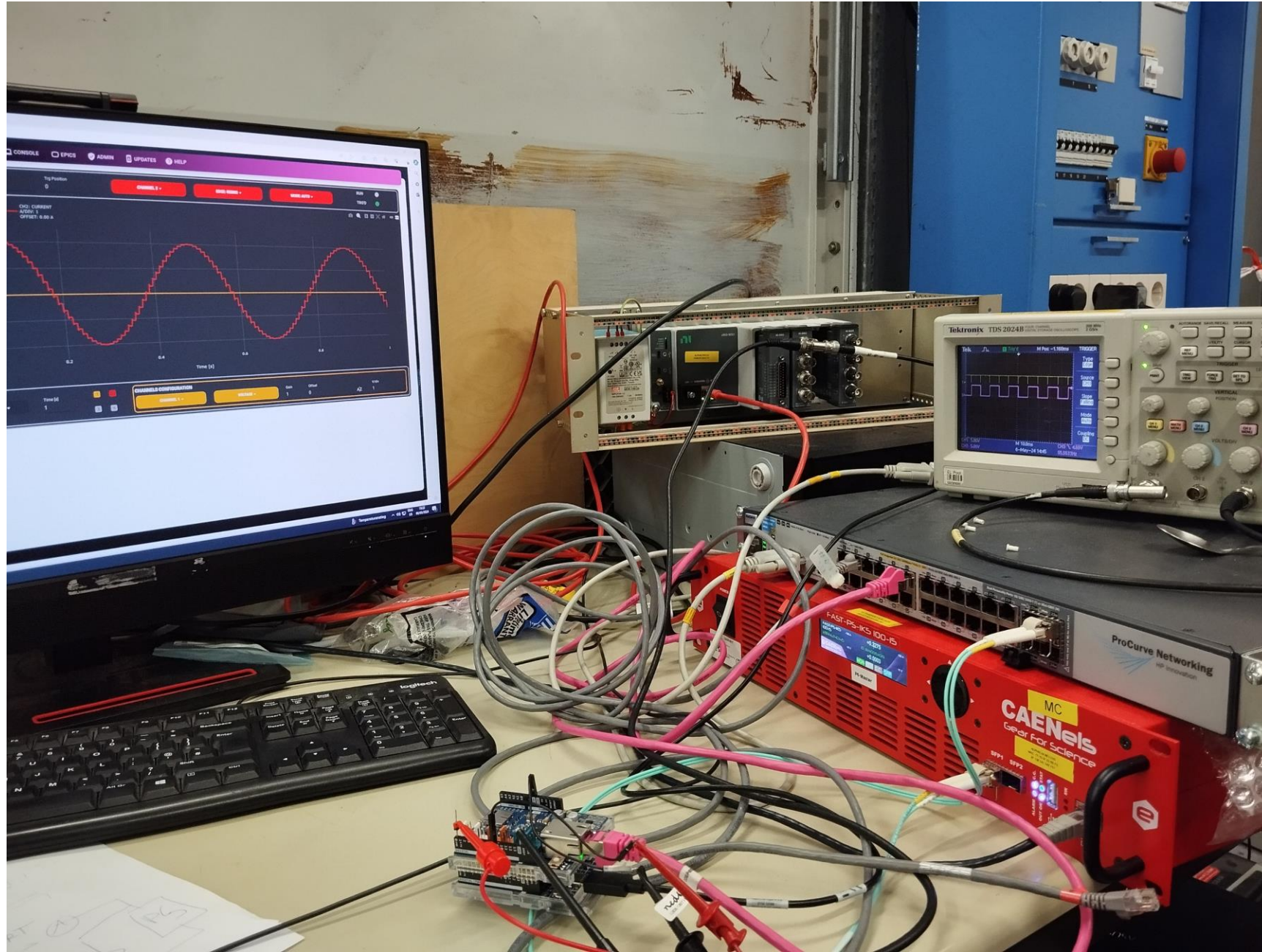
Done:

Arduino – Power supply UDP communication	UART message receiver for Arduino
UART message generator in Labview	UDP package creator (receives a setpoint from the FPGA and constructs a UDP package)



More to do: Glitch fixing Code optimization
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Final setup





Thanks for your attention :)