

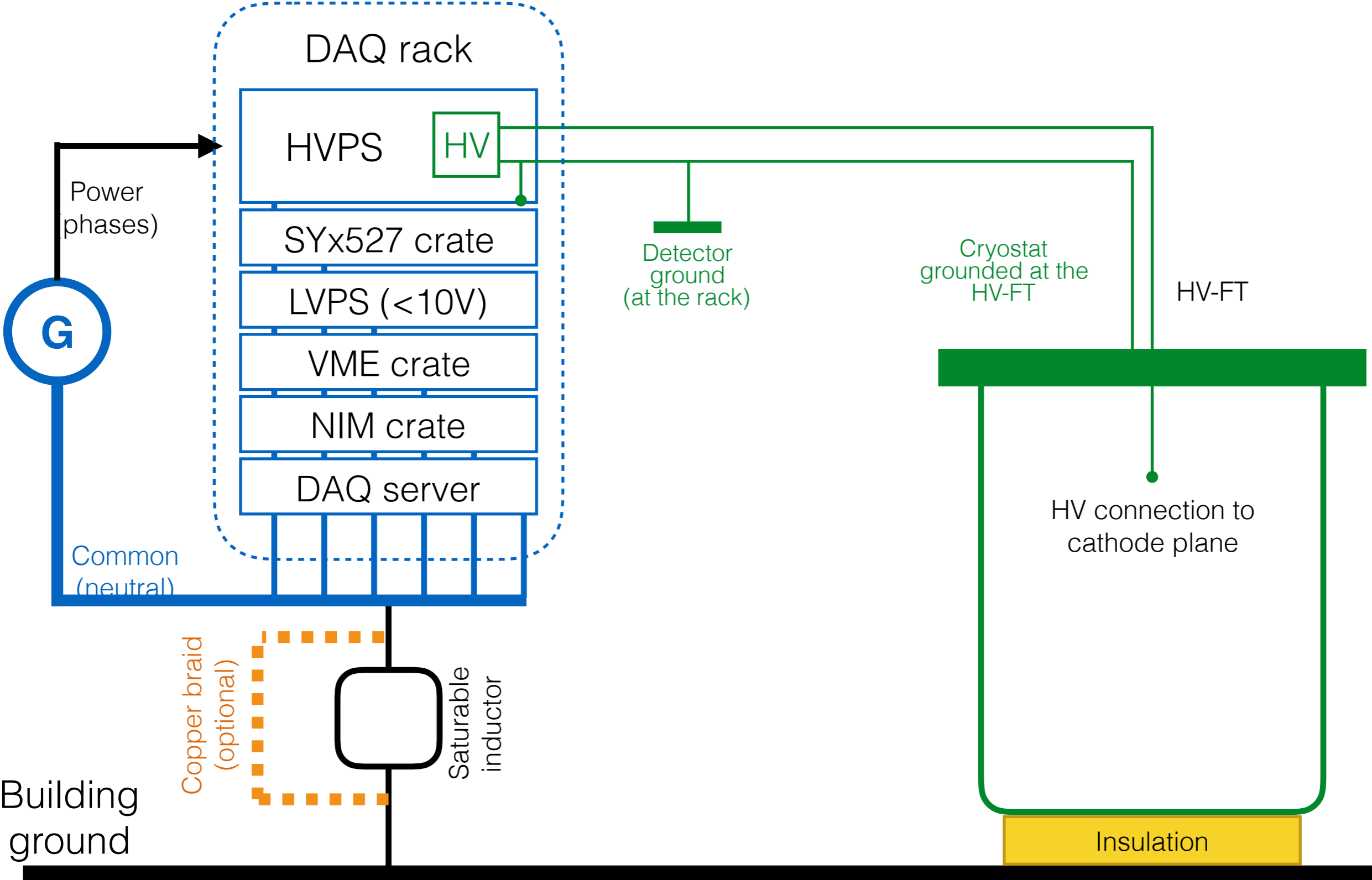
# ArgonCube 2x2

## Cabling and grounding

F. Piastra

31.10.2019

# Power connections/grounding



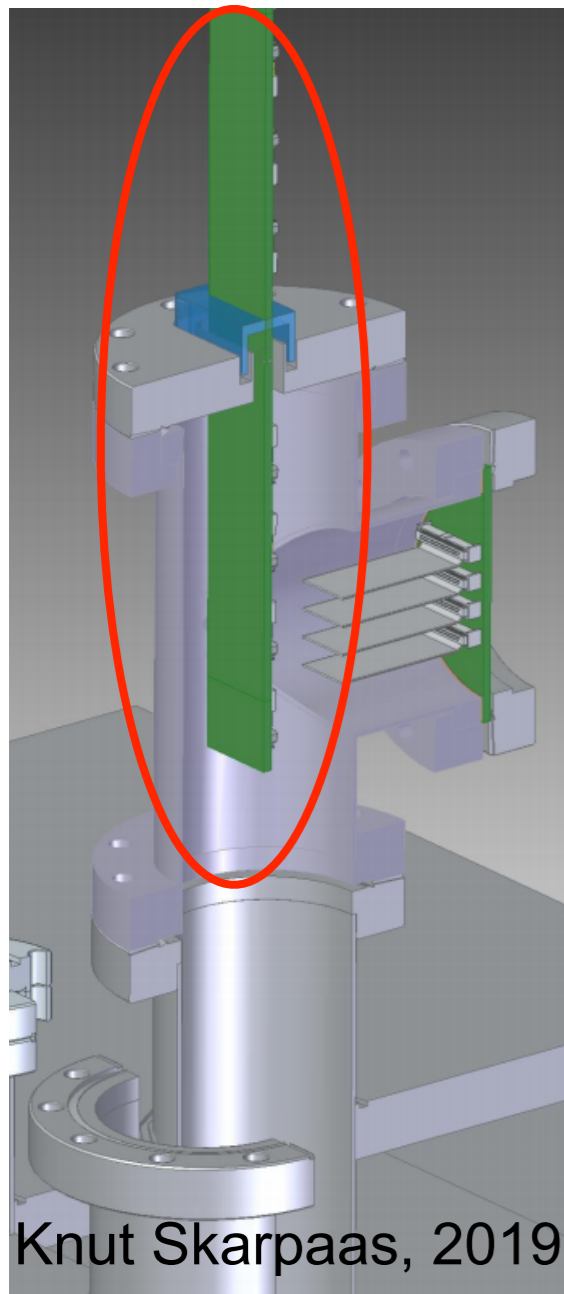
# Light readout chain

## Cold side:

- Potted feedthrough in CF-60 flange: 8 connectors serve 24 modules (12 ArCLight + 12 LCM).
- Micro-coax cables for SiPM biasing and signal readout.

## Warm side:

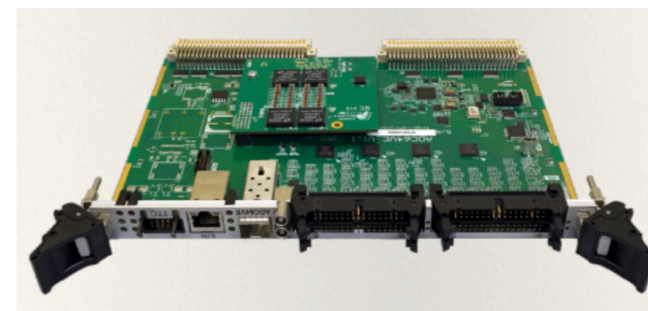
- CAEN A7040AN for SiPM biasing in SYx527 crate: 48 programmable HV channels, floating HV return.
- Driver amplifiers box for differential signal transmission on screened ribbon twisted pair cable.
- JINR-ADC in VME crate: 64 differential analog pairs inputs, ethernet interface to acquisition PC.



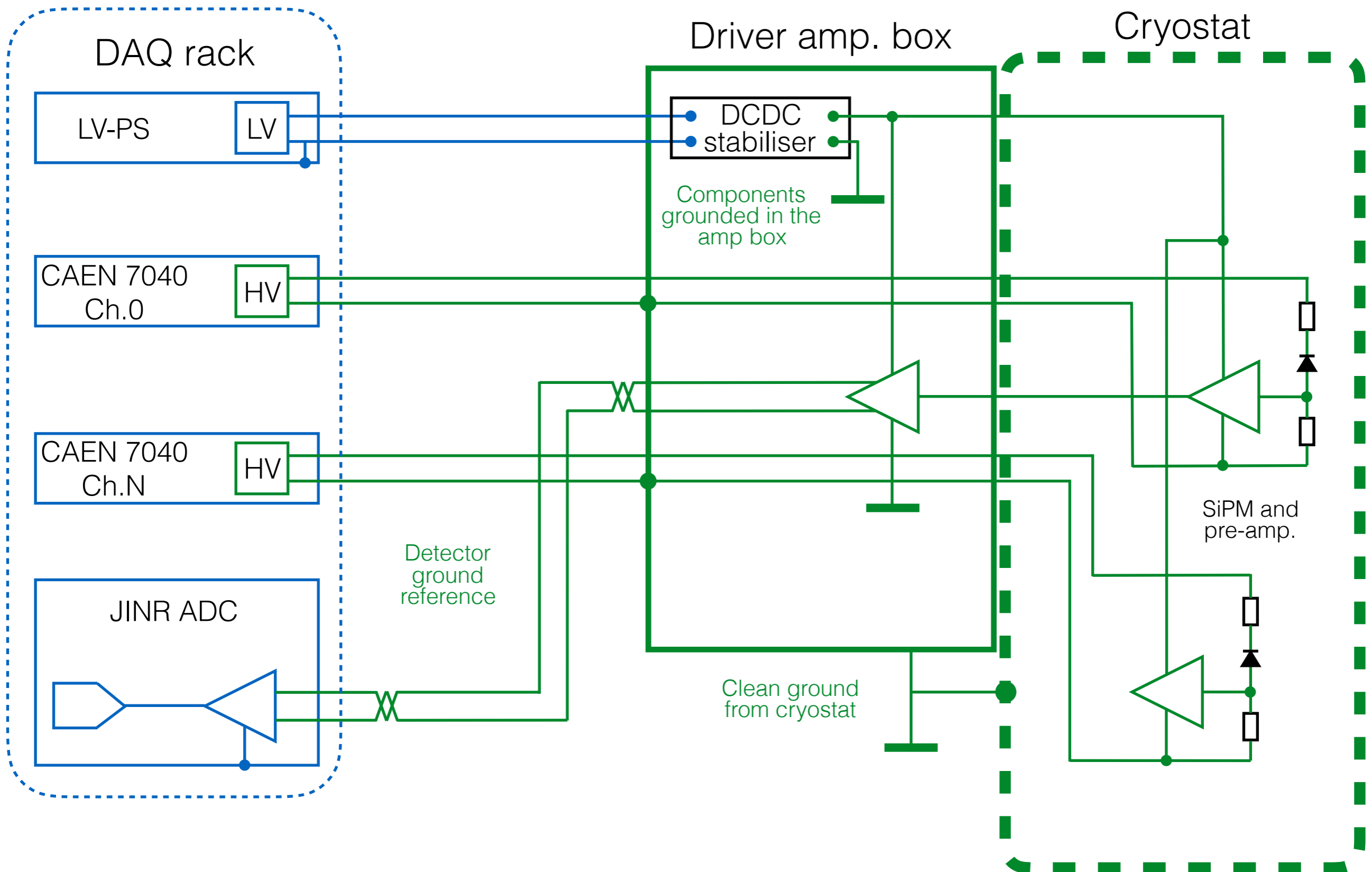
CAEN A7040



JINR-ADC



# Light readout chain



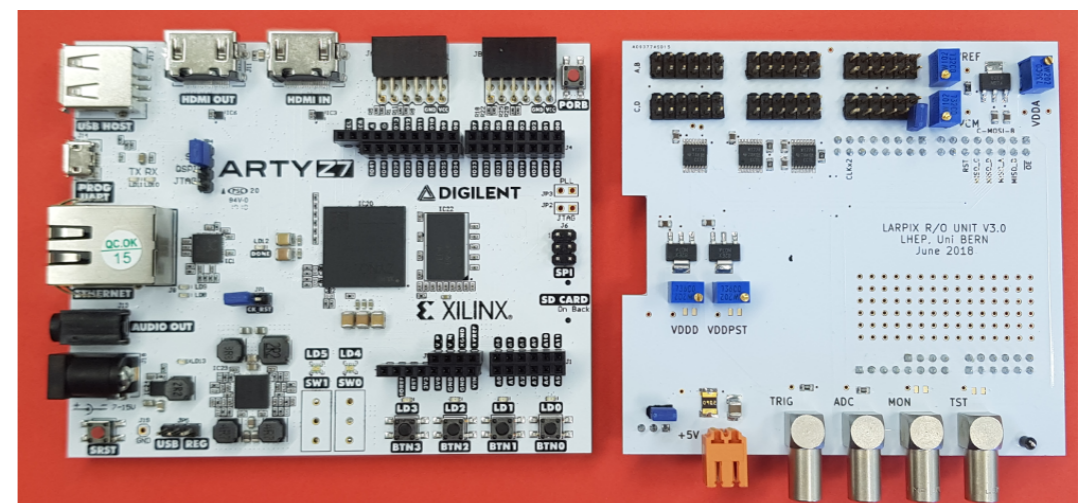
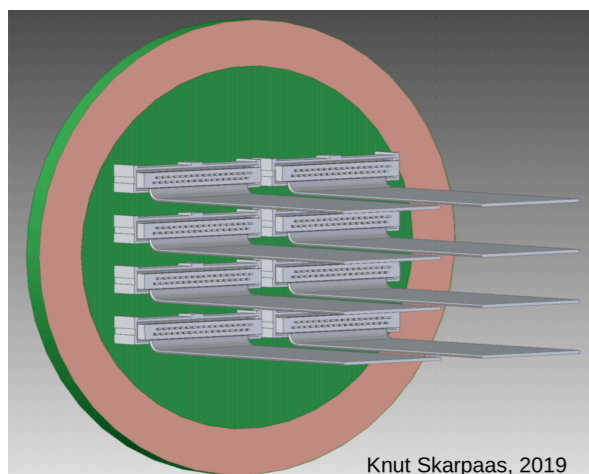
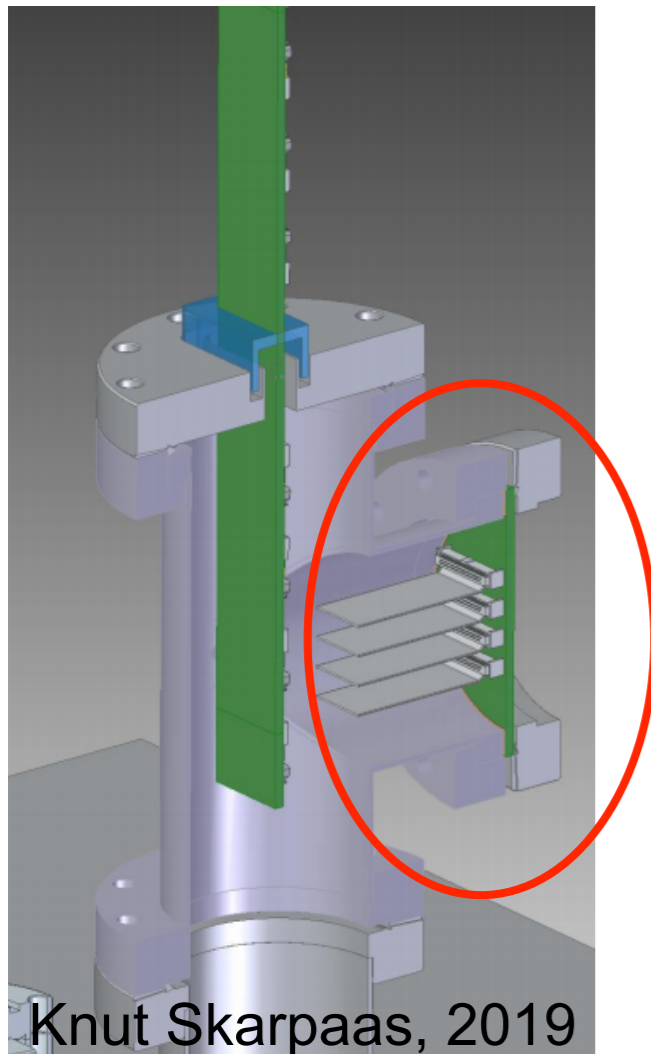
# Charge readout chain

## Cold side:

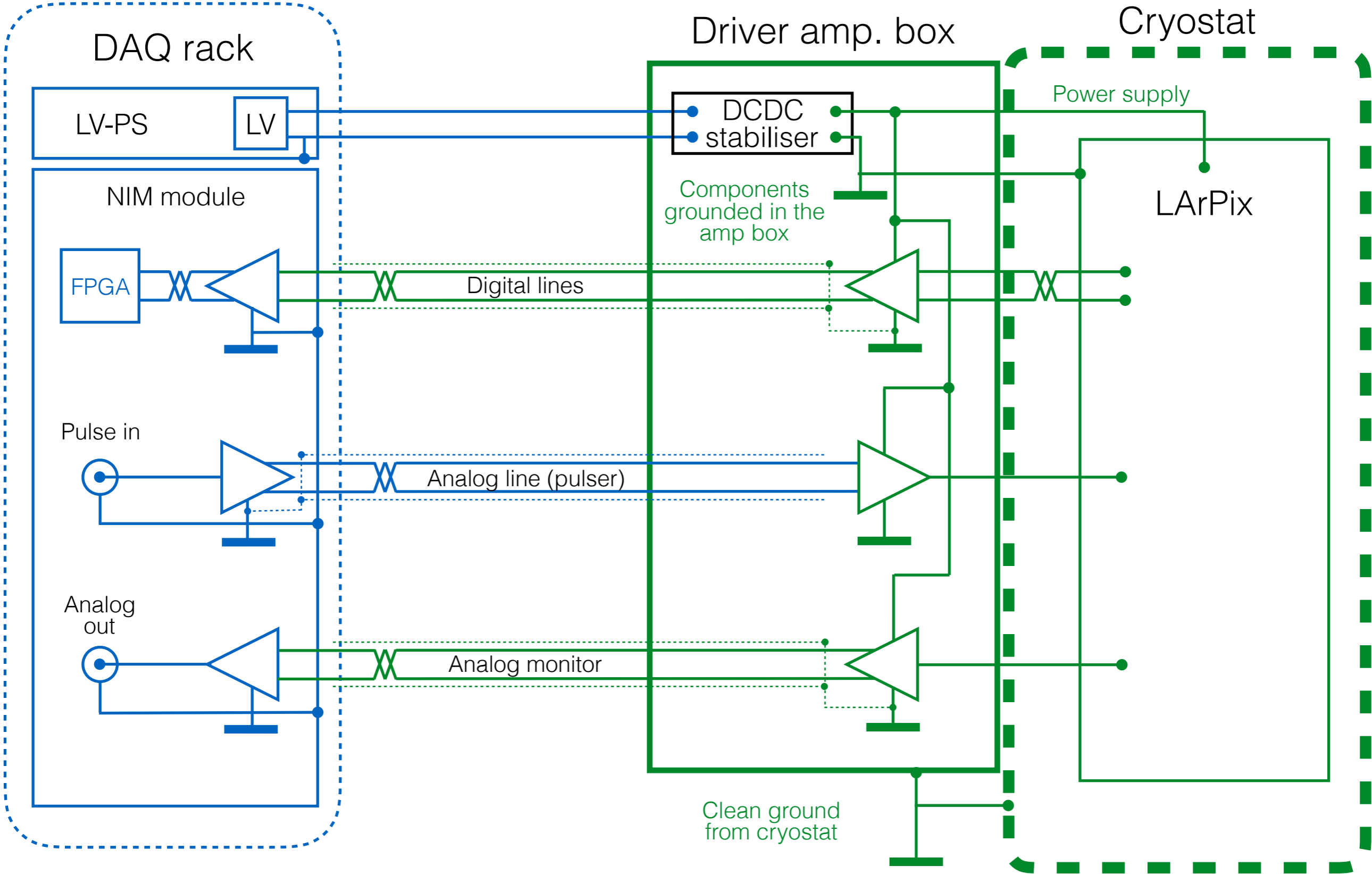
- Each LArPix board is served by a 34 wires ribbon cable from custom feedthrough.
- Feedthrough: round PCB with copper plating for CF-60 flange sealing, 8x 34-pin feedthroughs.

## Warm side:

- Read out board in NIM module: XILINX ArtyZ7 board, data transmission, analog monitor, ADC test, synchronisation tasks.
- Direct connection of 34-wire ribbon cables to read out electronics.
- 2x NIM modules per TPC: 4 pixel tiles each module

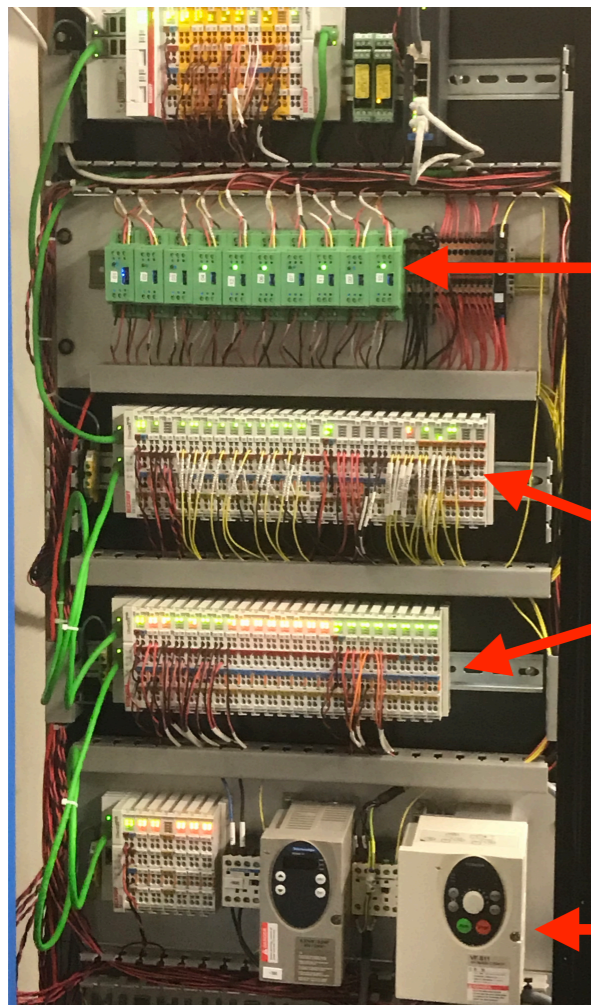


# Charge readout chain



# Slow monitor/control chain

SC rack



Valves control

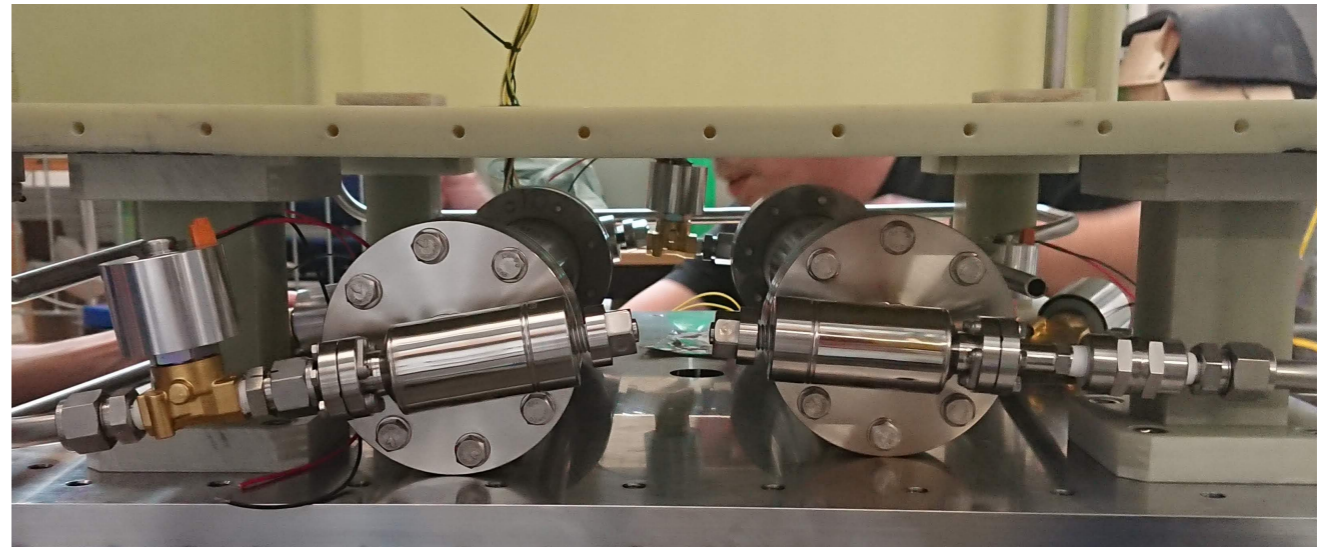
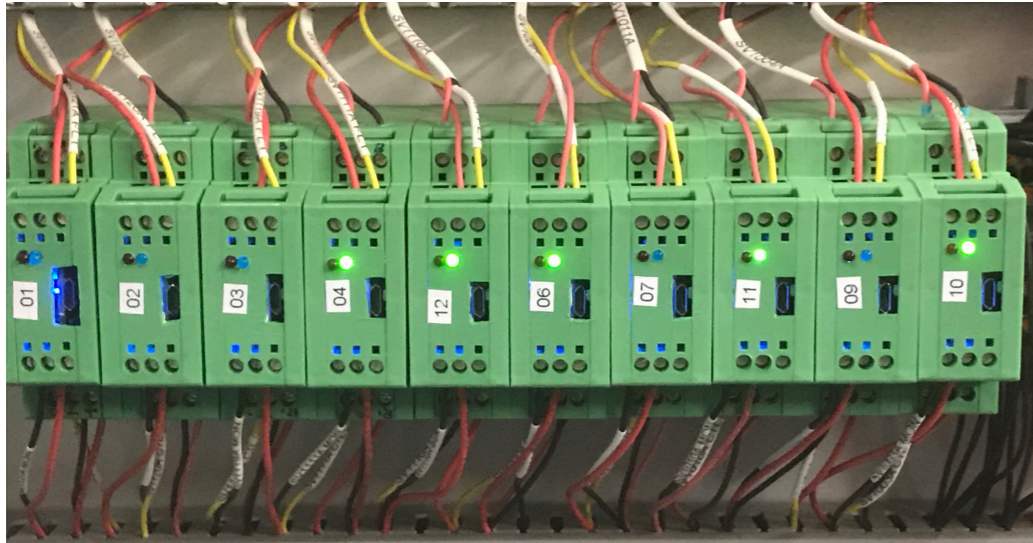
PLC

LAr pumps control (VFD drivers)

Building ground

- Pressure transmitters:
  - 4 - 20 mA current loops
  - No ground connection from PLC to sensors
- Temperature transmitters:
  - 4 - 20 mA current loops
  - No ground connection from PLC to sensors
- RaspberryPi reads levelmeter on detector ground, transmission over unshielded ethernet (UTP).
- Feedthroughs:
  - Commercial CF60 with D-sub pins for T sensors, valves control
  - Custom made potted FT for VFD line: 3 phases, 1 ground wire and shield not in connection with the detector GND
- TBD: Additional insulation from FT flanges and the module or cryostat

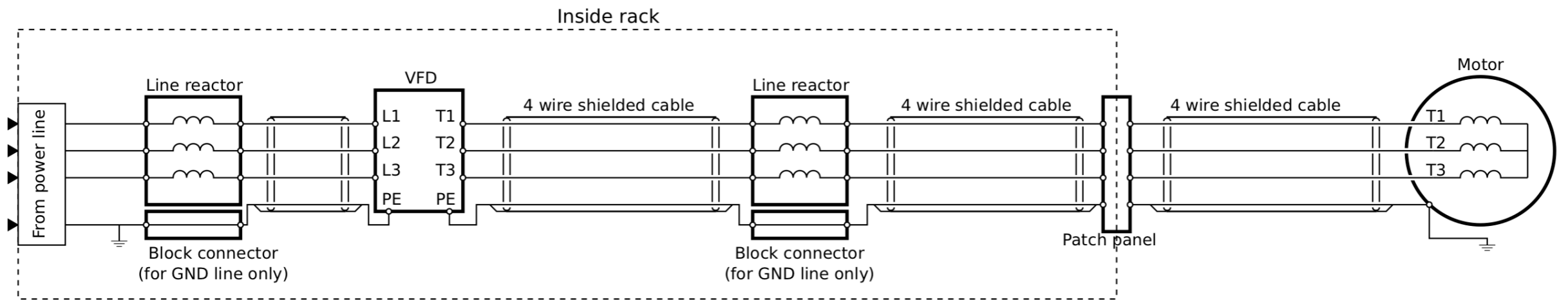
# Slow monitor/control chain



- Bistable valves: activated by current spikes, no ground connections.
- Feedthroughs are multi-pin sockets/plugs on standard stainless steel flanges (CF40 and CF60).
- Shielding of the cables are grounded at the rack side and floating at detector side

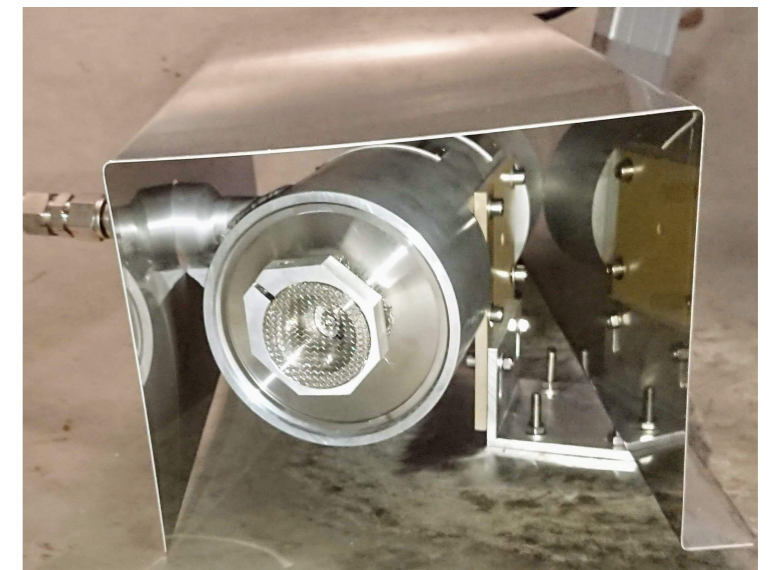


# Slow monitor/control chain



Potted FT for VFD line:

- Cable shield insulated from flanges and metal components
- Vacuum tested down to  $10^{-3}$  mbar



Motor pumps:

- Encasing grounded to the VFD line shield (building ground)
- Dielectric breakers to insulate pumps body from flanges, cryostat and pipes