EUROPEAN UNION

GOVERNMENT OF ROMANIA

Structural Instruments
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Implementation of the control system for VEGA

Pătrășcoiu Robert-Daniel

Engineer at GSD, ELI-NP

nuclear physics

IFIN-HH

Content:

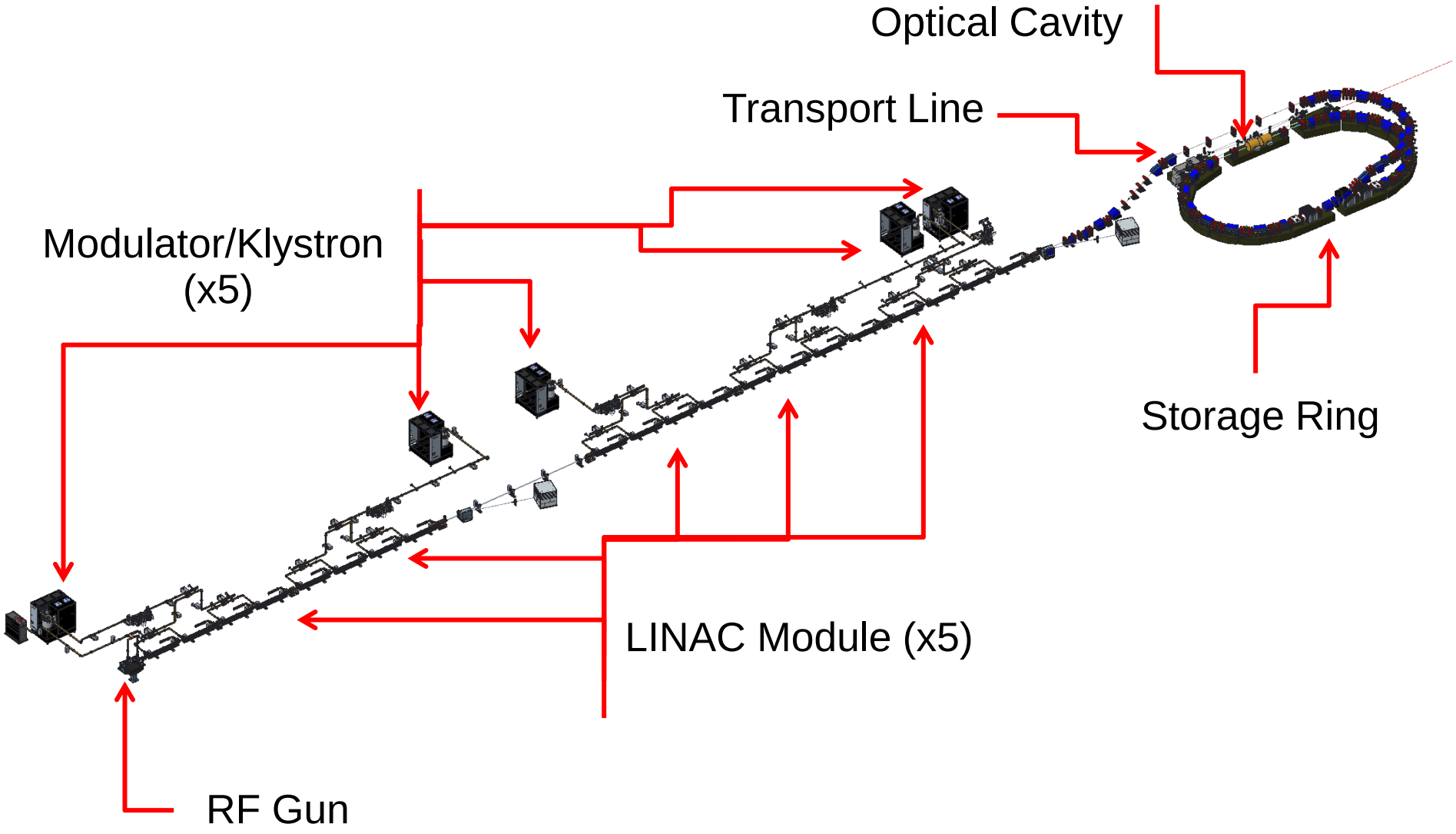
- Brief introduction to VEGA;
- Why and How;
- Control System;
- Personal contributions;
- Work in progress + future plans;

Introduction

VEGA Control functionalities:

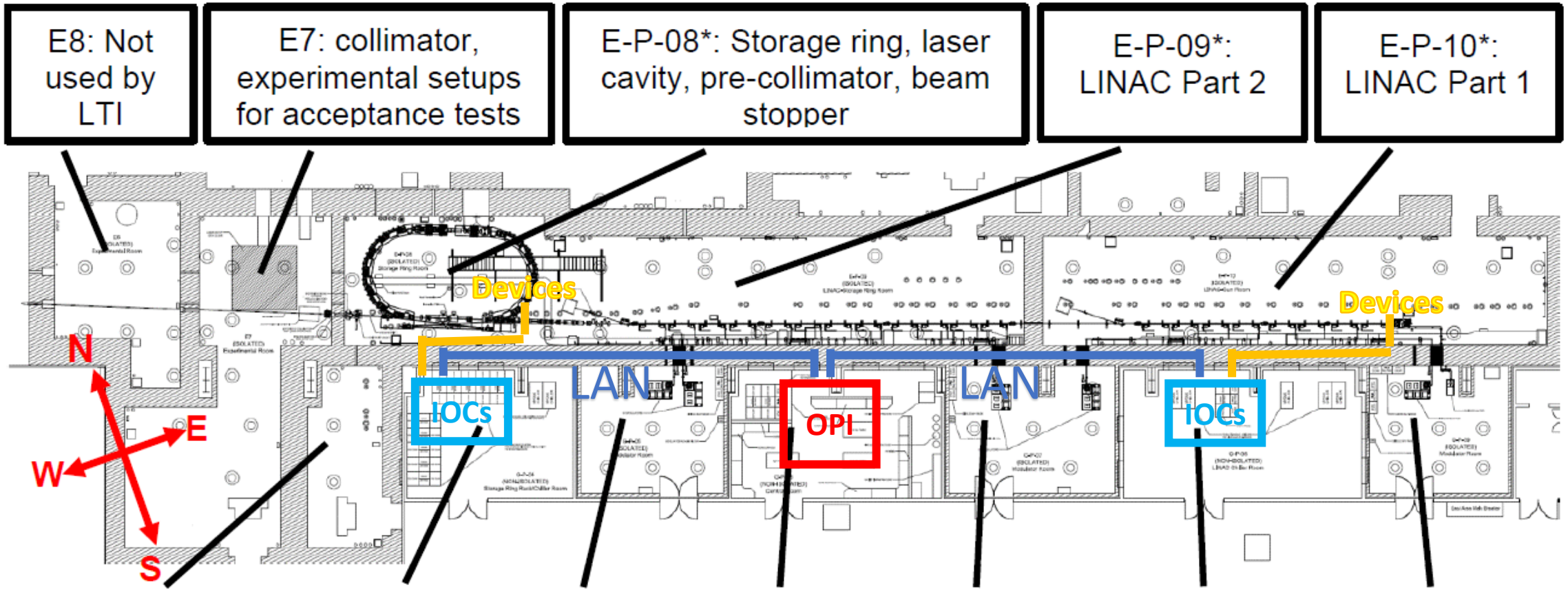
- Total remote control of the VEGA system;
- EPICS based implementation;
- Alarm system;
- Easy to use GUI;

VEGA System - overview



from VEGA TDR prepared by Lyncean Technologies

VEGA Layout in the building



from VEGA TDR prepared by Lyncean Technologies

The architecture of the Control System

- EPICS-based
- Sub-systems
  - Diagnostics (BPM, Profile, etc)
  - Cooling system
  - RF (modulator, LLRF)
  - Timing and Synchronization
  - Vacuum
  - Magnets Power supply
  - Laser
  - MPS & PPS (PLC-based)

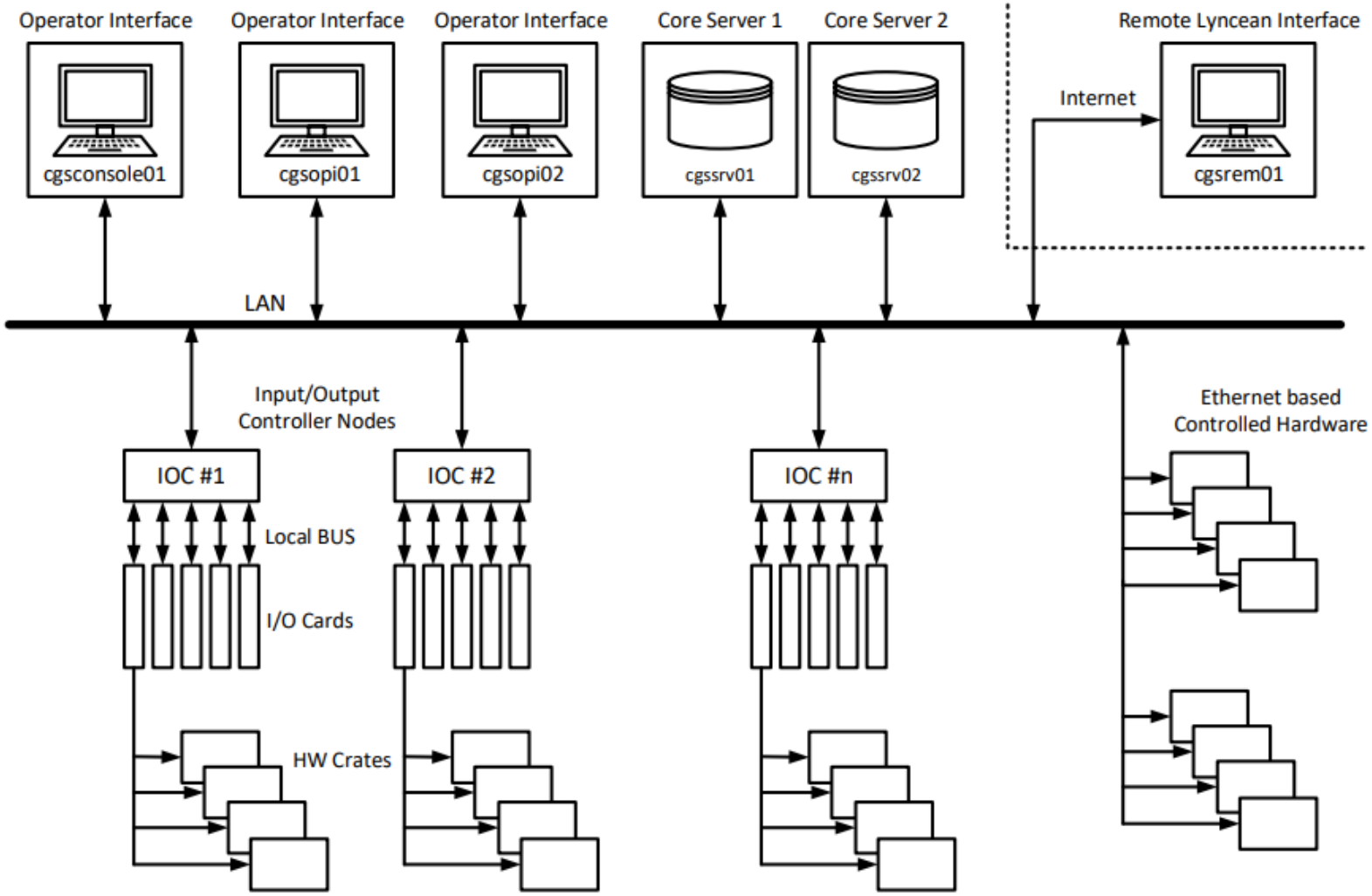
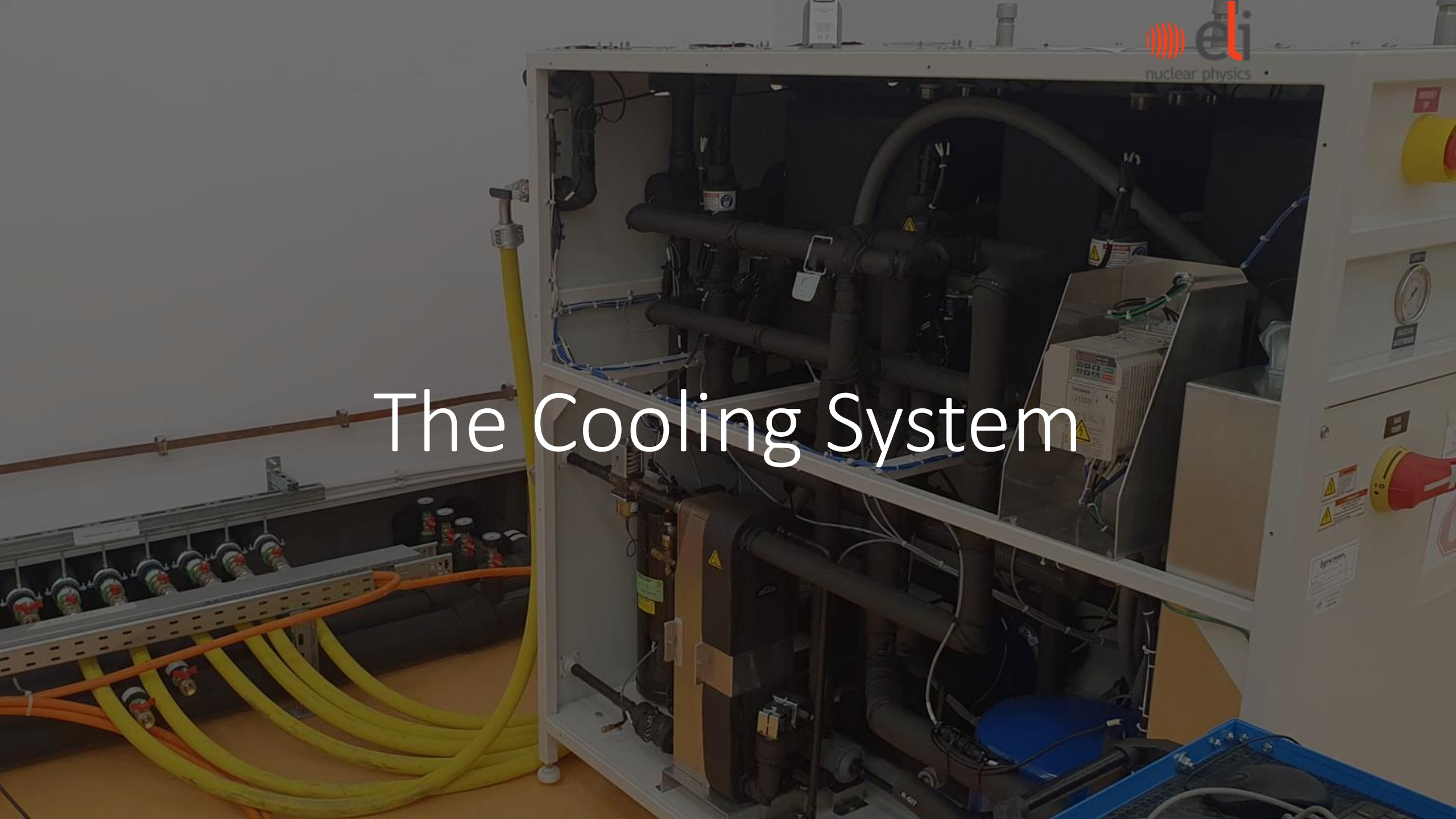


Figure 145: Software control system block diagram.

from VEGA TDR prepared by Lyncean Technologies

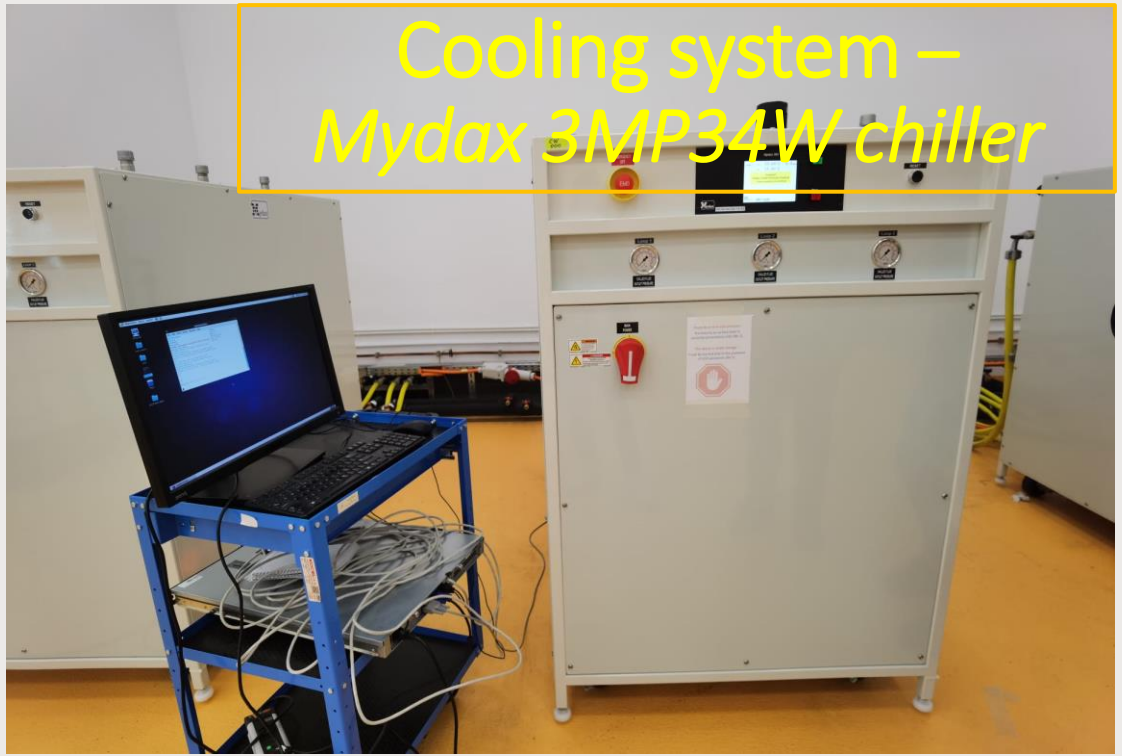


The Cooling System

The mobile server station(MSS):

-The server used for EPICS testing in every room where equipment needs to be integrated;

-Cable management still needs work;



Cooling system –
Mydax 3MP34W chiller

```
    self.CH3_Response1_edit.setText(str(value))
def onChanges_PSize4(self, pvname=None, value=None, char_value=None, **kw):
    #print('! ', pvname, value, time.ctime())
    self.CH4_Response1_edit.setText(str(value))


def setPressureFactor1(self):
    PF1 = self.CH1_SetPressureFactor_edit.text()
    self.pv_setPF_1.put(PF1)
    time.sleep(0.005)
    PF1_new = pv_setPF_1.get()
    self.CH1_Response_edit.setText(str(PF1_new))
def setPressureFactor2(self):
    PF2=self.CH2_SetPressureFactor_edit.text()
    self.pv_setPF_2.put(PF2)
    time.sleep(0.005)
    PF2_new = pv_setPF_2.get()
    self.CH2_Response_edit.setText(str(PF2_new))
def setPressureFactor3(self):
    PF3 = self.CH3_SetPressureFactor_edit.text()
    self.pv_setPF_3.put(PF3)
    time.sleep(0.005)
    PF3_new = pv_setPF_3.get()
    self.CH3_Response_edit.setText(str(PF3_new))
def setPressureFactor4(self):
    PF4 =self.CH4_SetPressureFactor_edit.text()
    self.pv_setPF_4.put(PF4)
    time.sleep(0.005)
    PF4_new = pv_setPF_4.get()
    self.CH4_Response_edit.setText(str(PF4_new))

def setSize1(self):
    Size1 = self.CH1_Size_edit.text()
    self.pv_setSize_1.put(Size1)
    time.sleep(0.005)
    Size1_new = pv_setSize_1.get()
    self.CH1_Response1_edit.setText(str(Size1_new))
def setSize2(self):
```

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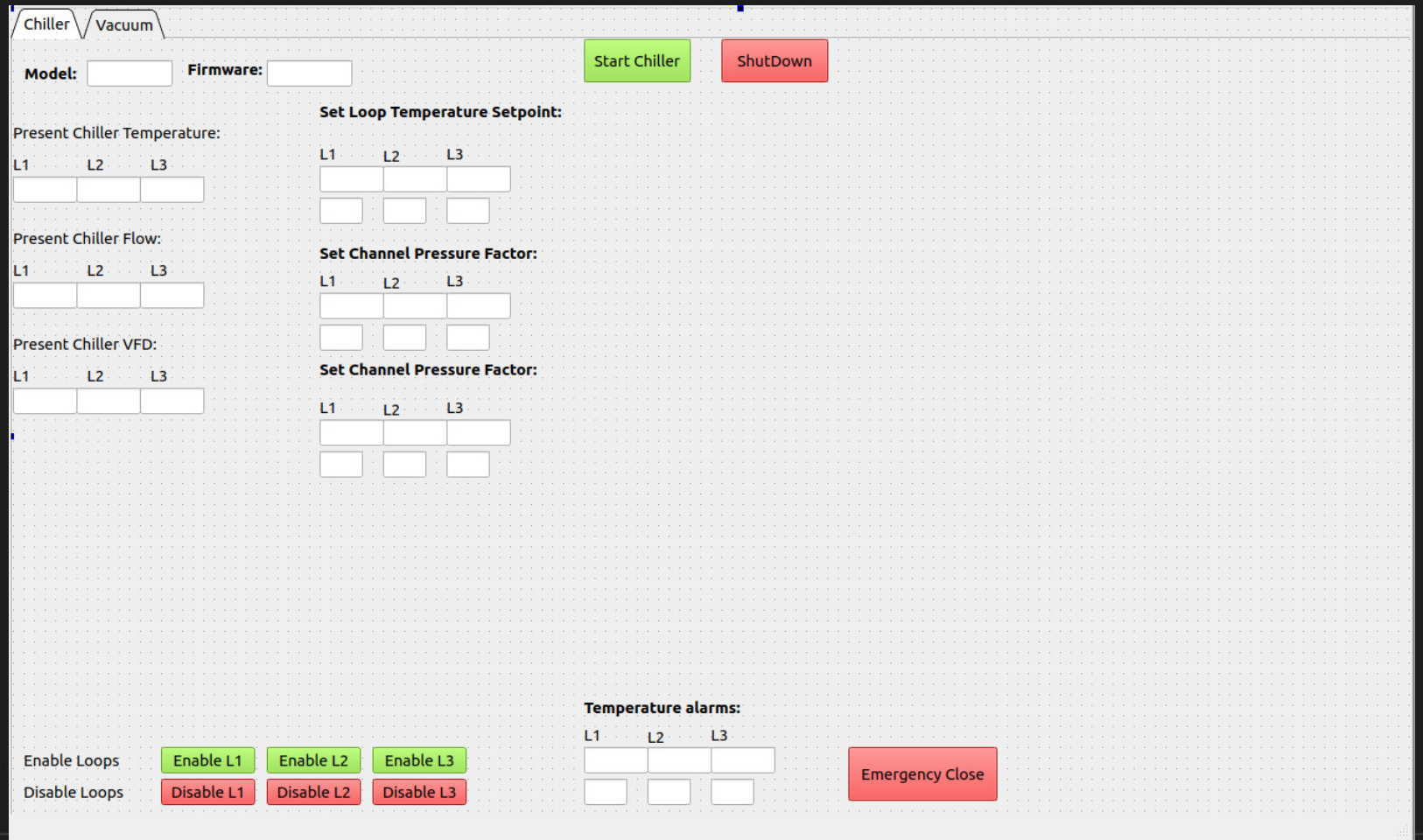
QtDesigner and PyEpics integration



GUI Functionalities

VEGA_Injector

Overview | Modulator | Timing | RF | LLRF | Profile | Power Supply | Vacuum | MPS

Ion pump 01

Model: QPC **Firmware:** 1.41

Set Pressure Unit (Torr/mBar/Pascal): T | Mbar | Pascal

Channel Current:

CH1	CH2	CH3	CH4
1.8e-10	1.3e-11	1.3e-11	1.3e-11

Set Channel Pressure Factor:

CH1	CH2	CH3	CH4

Channel Pressure:

CH1	CH2	CH3	CH4
1.3e-09	1.3e-09	1.3e-09	1.3e-09

Channel Voltage:

CH1	CH2	CH3	CH4
8.0	7.0	11.0	7.0

Set Channel Pump Size (L/S):

CH1	CH2	CH3	CH4
2	6	4	
OK	OK	OK	

Get Channel Status:

CH1	CH2	CH3	CH4
SAFE-CONN	SAFE-CONN	STANDBY	SAFE-CONN

Get Channel Pump Size (L/S):

CH1	CH2	CH3	CH4
2.0	6.0	4.0	4.0

Get Channel Pressure Factor:

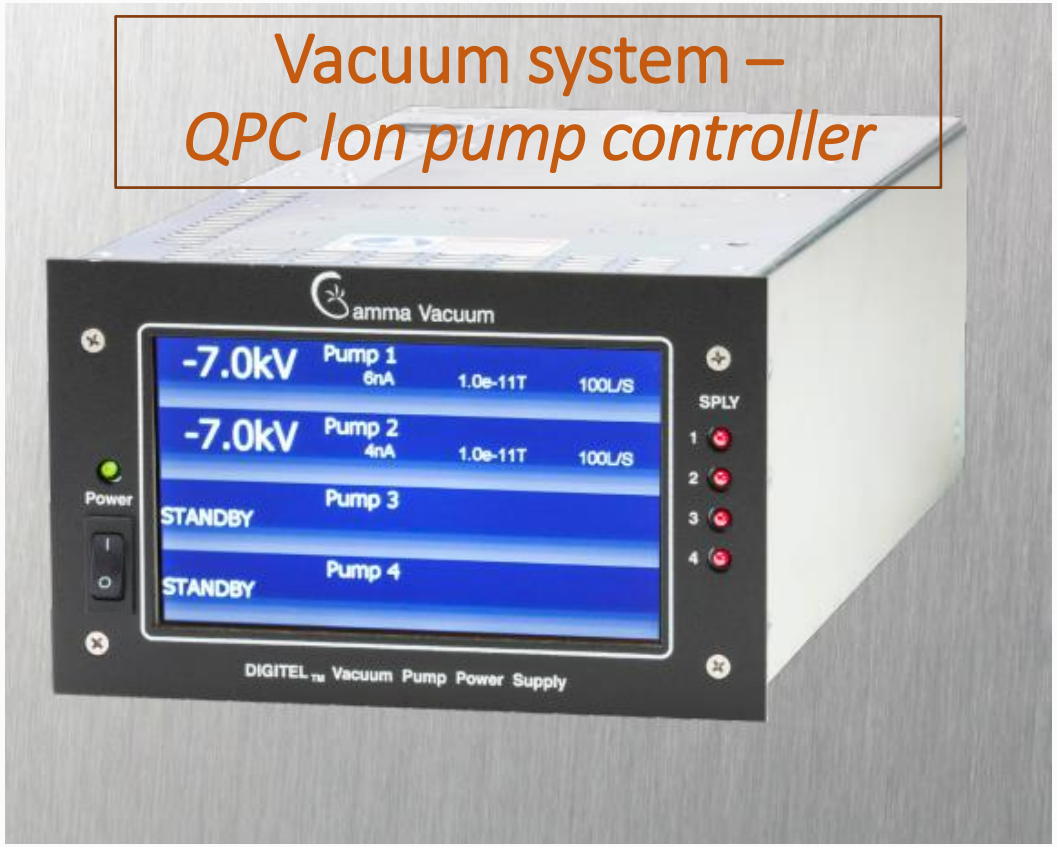
CH1	CH2	CH3	CH4
3.0	4.44	8.11	4.0

Enable Channels: Enable CN1 | Enable CN2 | Enable CN3 | Enable CN4

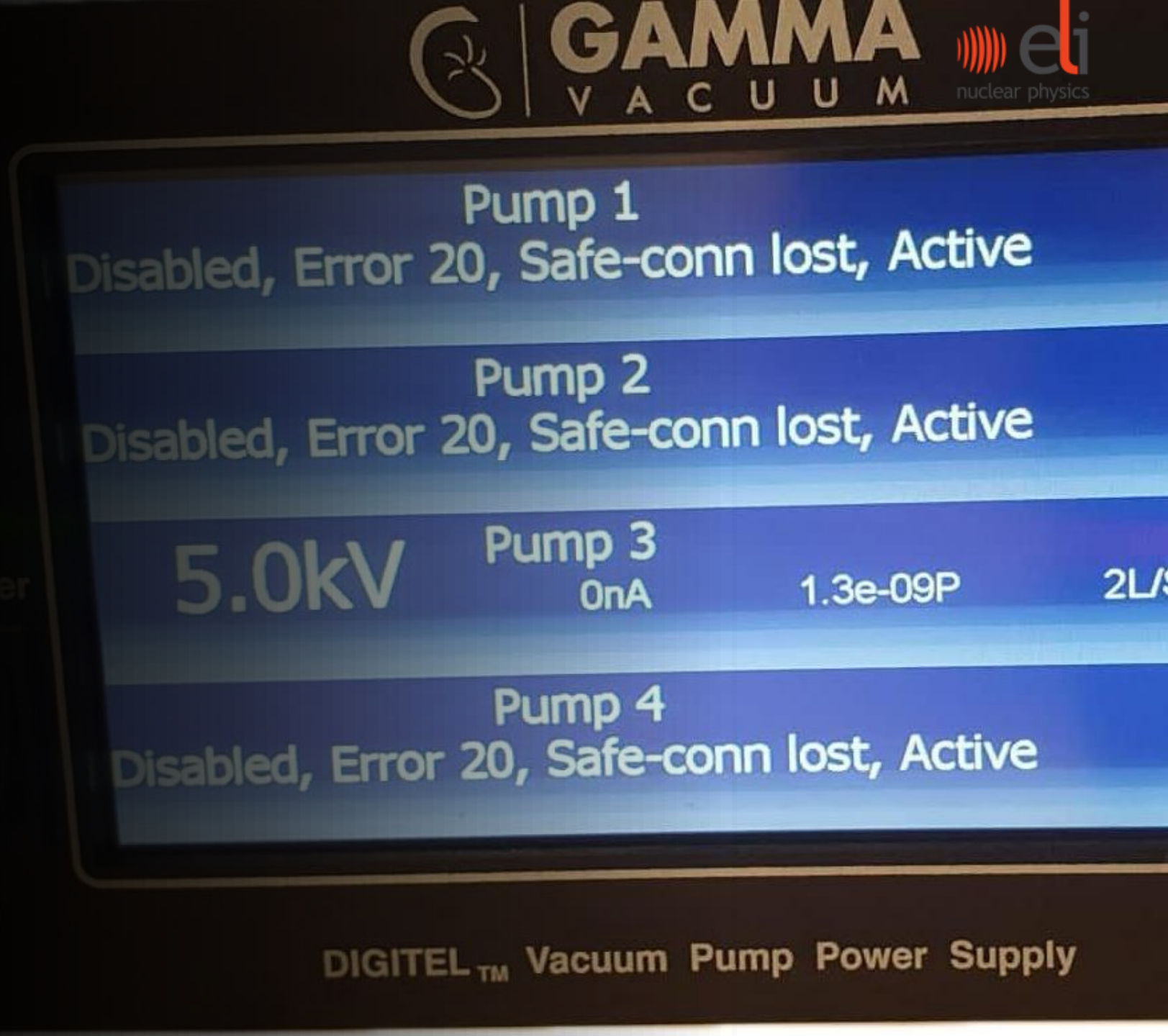
Disable Channels: Disable CN1 | Disable CN2 | Disable CN3 | Disable CN4

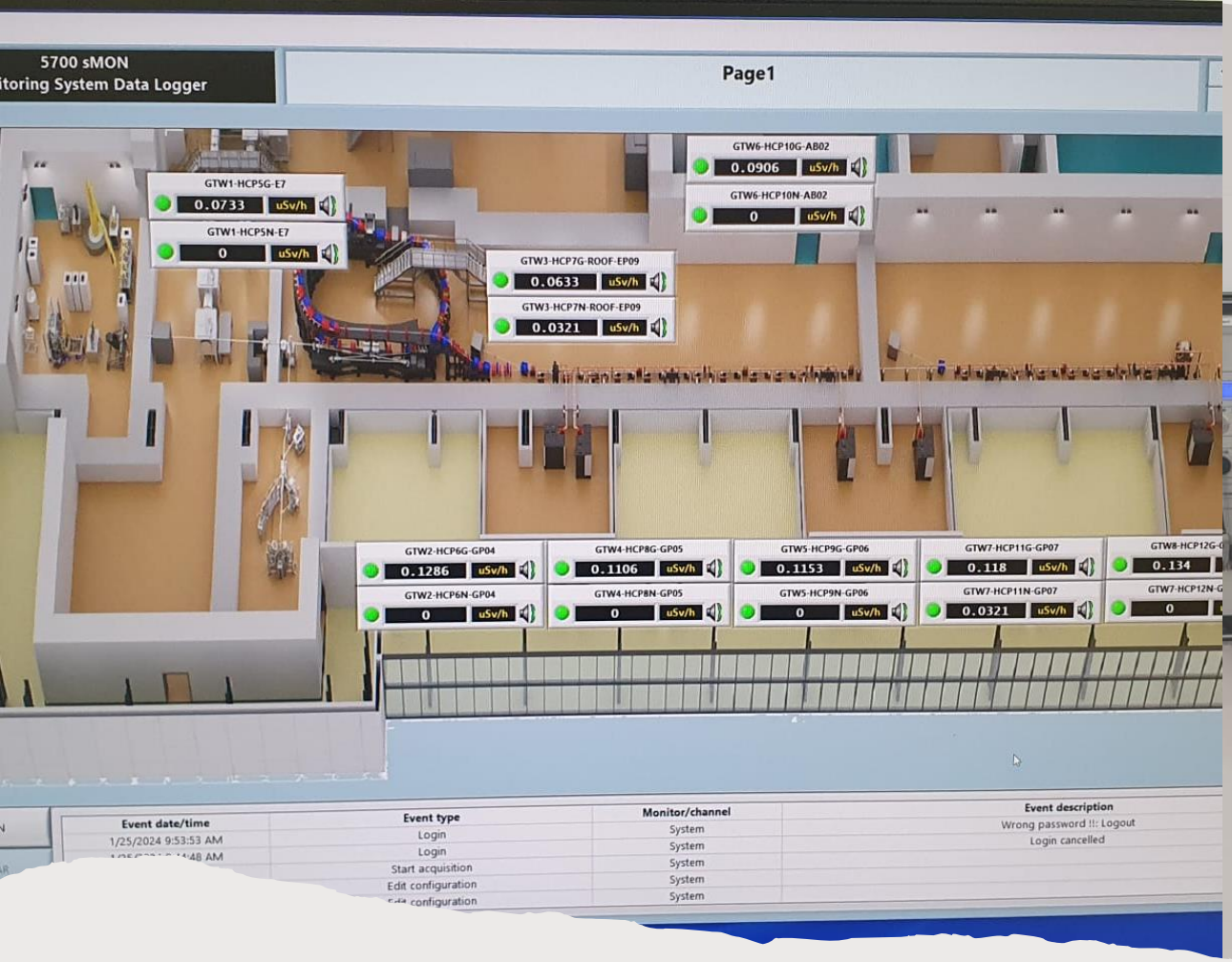
Restart System: Restart

Vacuum system – *QPC Ion pump controller*



What could be achieved through the interface locally is now accessed remotely for increased safety.





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Personal Protection System –

Radiation Detection through the building

Conclusion

Our control system has the following advantages:

- Any bad event can be dealt with in an efficient manner;
- Total remote control of the implemented components;

Future planned improvements:

- Designing more alarms;
- Improving the code efficiency because time is an essential concept in our case;
- Scaling the code for the other parts of the VEGA system;

Thank you!