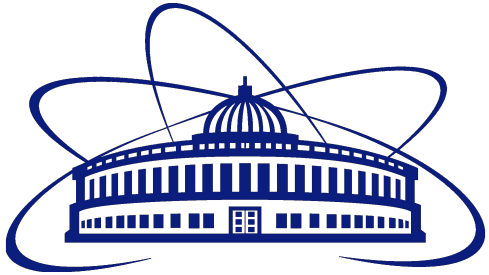


LINAC-200 control system status

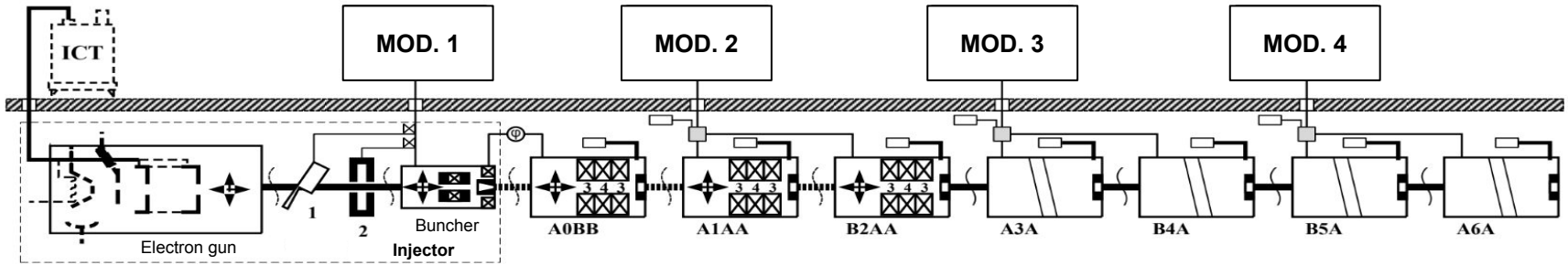
Aleksei Trifonov
engineer at the Beam Colliding Department DLNP JINR

JINR Young Scientists and Specialists Association Workshop “Alushta-2020”
26.09-03.10 2020

Control object

At the moment - 4 accelerating stations, energy 200 MeV

In the future - 13 accelerating stations, energy 800 MeV



LINAC-200 subsystems

- Electron gun
- Synchronization system
- Magnetic elements for focusing and correcting the beam position
- RF system (master oscillator, preamplifier, klystron modulators, phase shifters, attenuators)
- Vacuum equipment
- Thermal stabilization system
- Radiation monitoring system
- Beam extraction channels

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Goal of the work

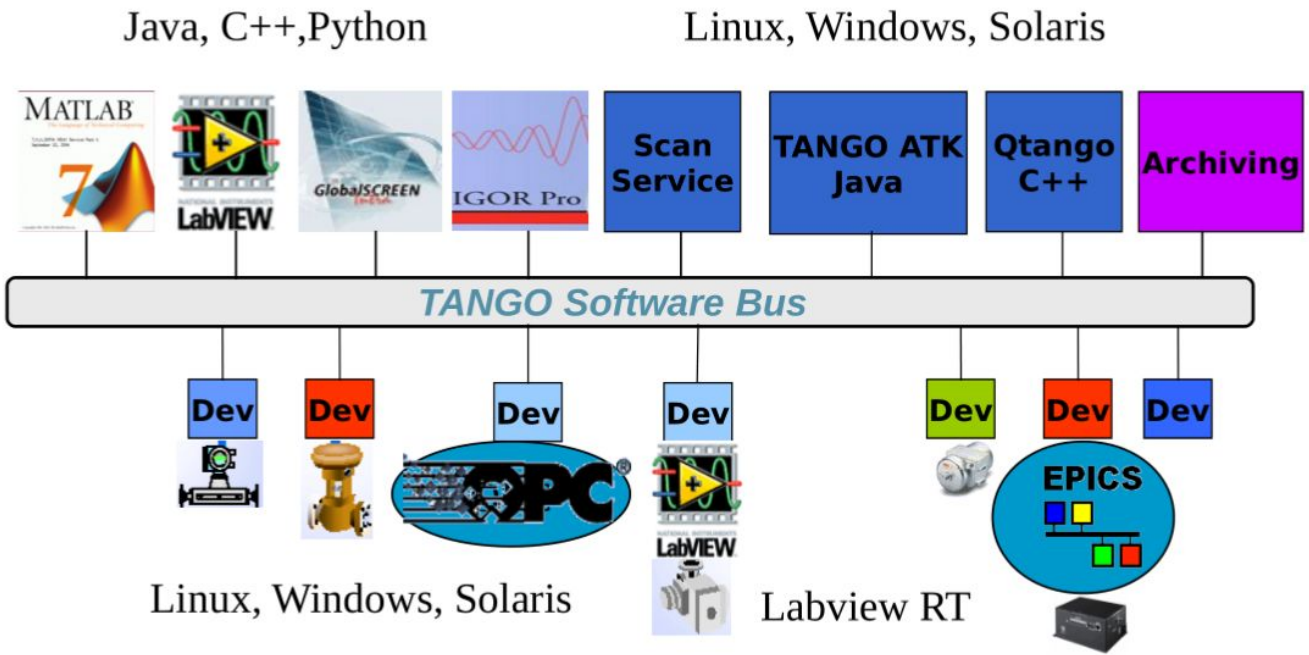
The goal of the work is to develop a new control system that provides automated control of the LINAC-200 accelerator equipment, as well as monitoring the parameters characterizing its state.

Main requirements for the control system:

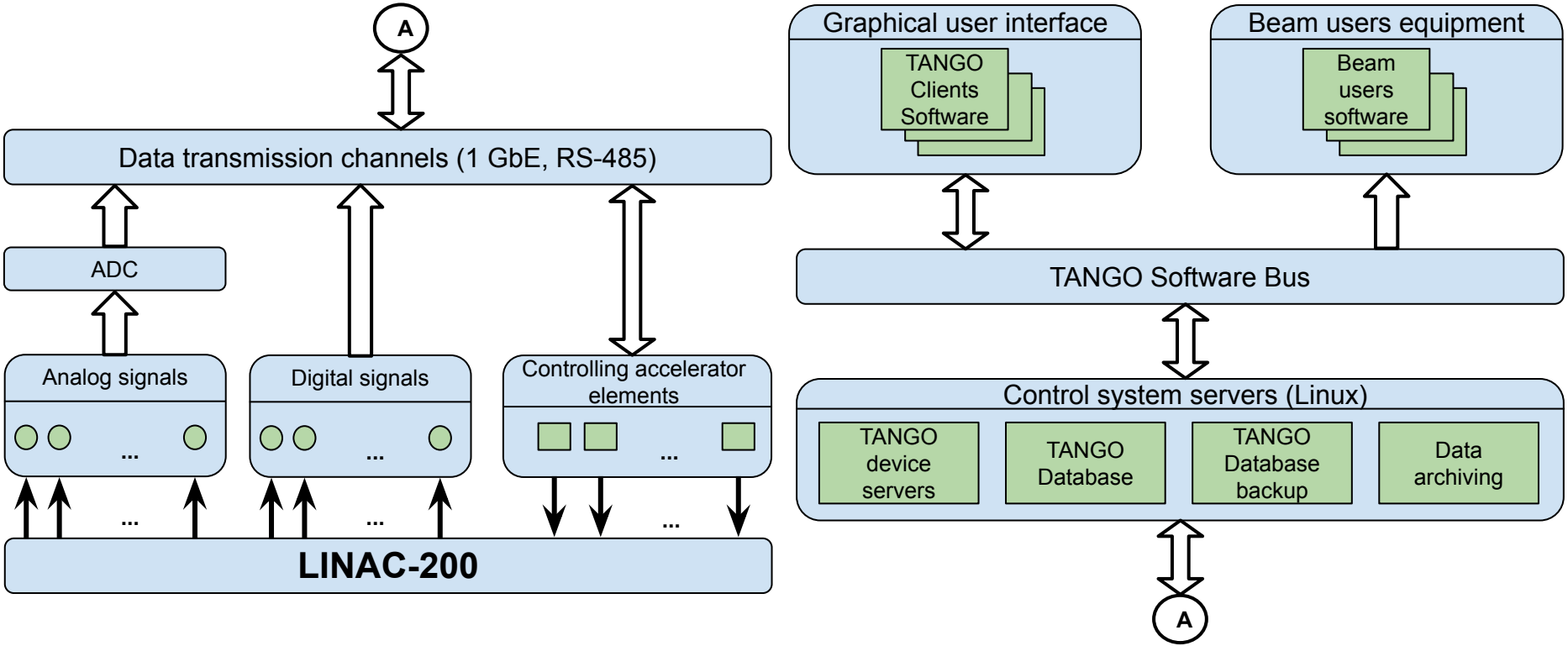
- high reliability
- serviceability
- using standard interfaces for communication between components
- possibility of future modifications and extensions

TANGO-based control system

Official website: https://www.tango-controls.org/



Control system block diagram



Software development for TANGO-based control system

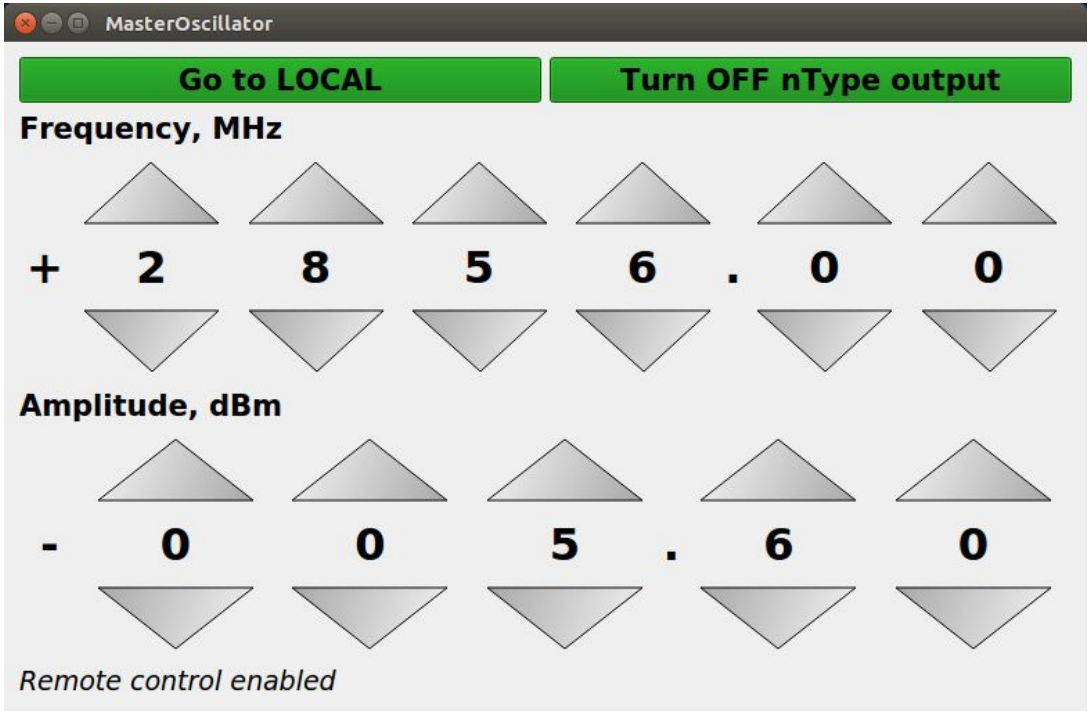
Technology stack:

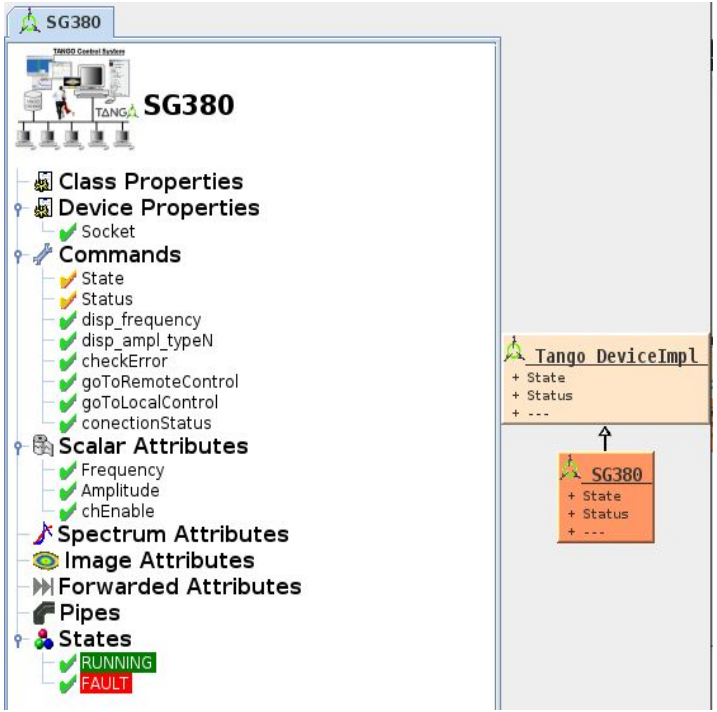
TANGO version - 9.2.5; Linux Debian/Ubuntu; C++, Python; QTango framework

The server and client software for the following equipment is at the stage of development and testing:

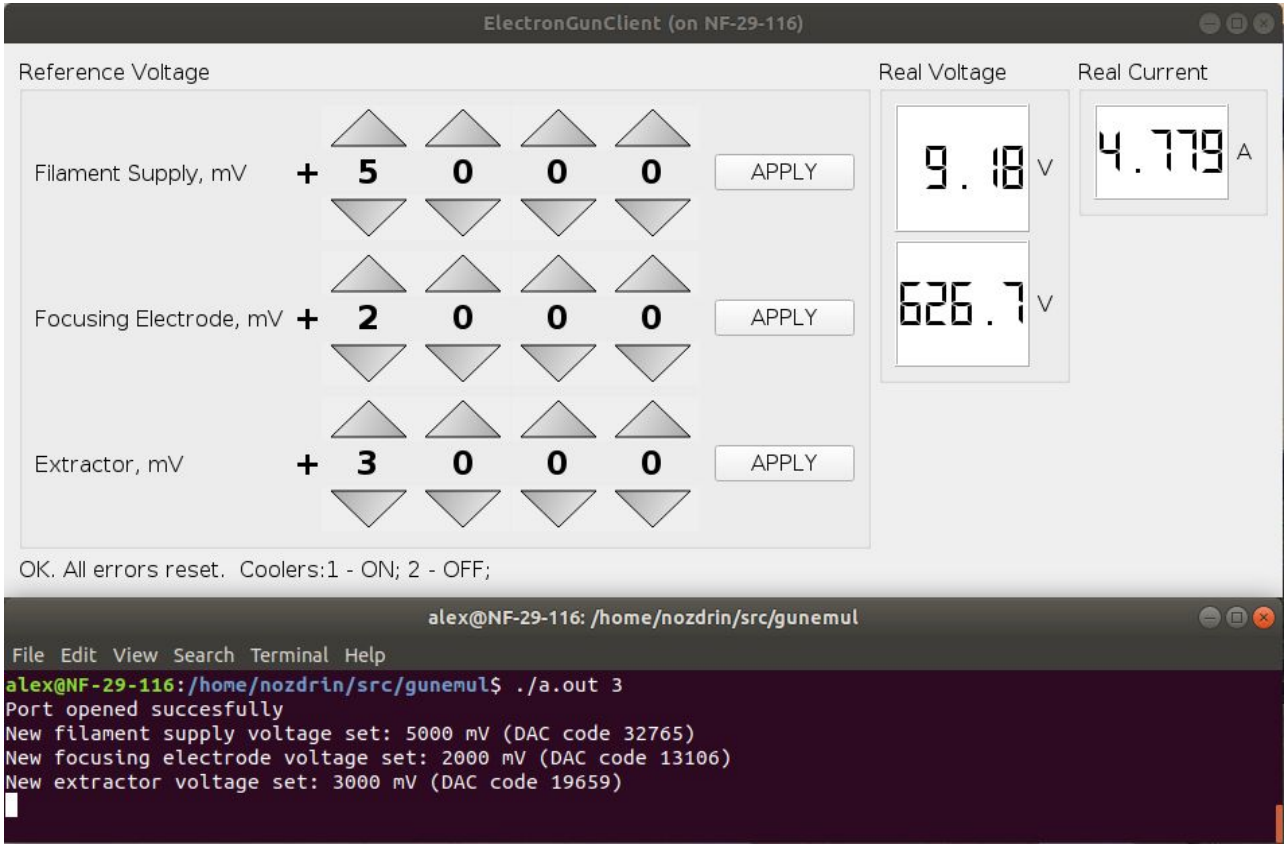
- Master oscillator AKIP-7SG384
- Klystron modulator control unit
- Magnetic system (power supplies for solenoidal and quadrupole lenses and correcting magnets)
- Electron gun

Master oscillator AKIP-7SG384





Electron gun

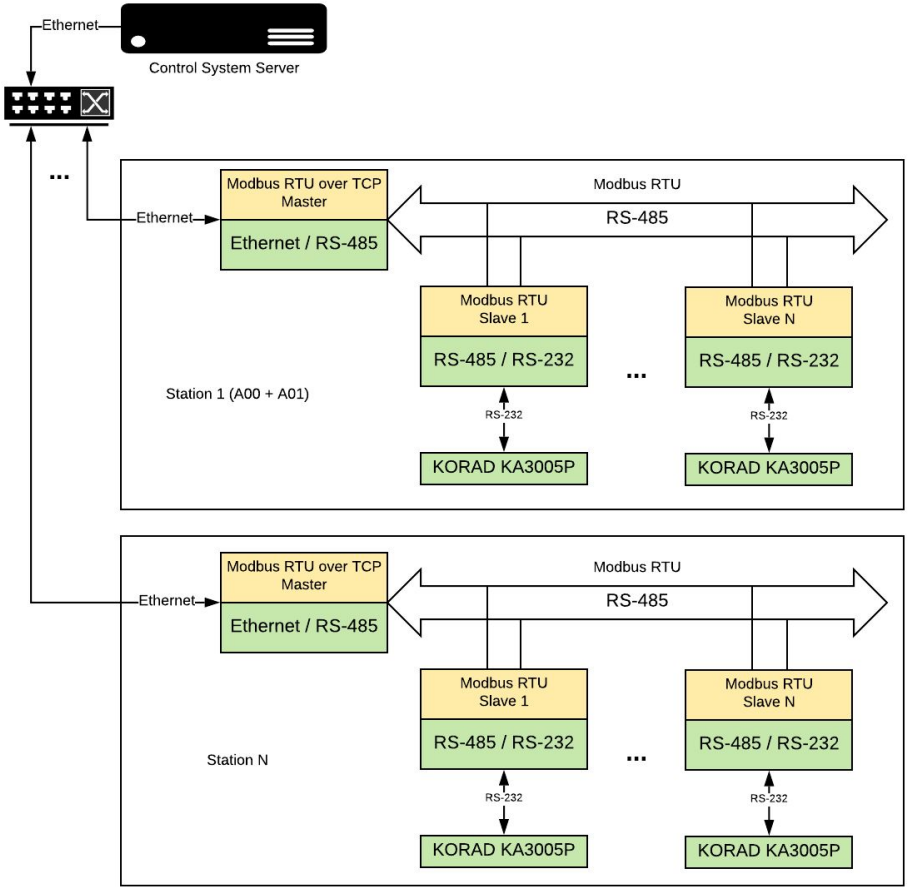


Magnetic system

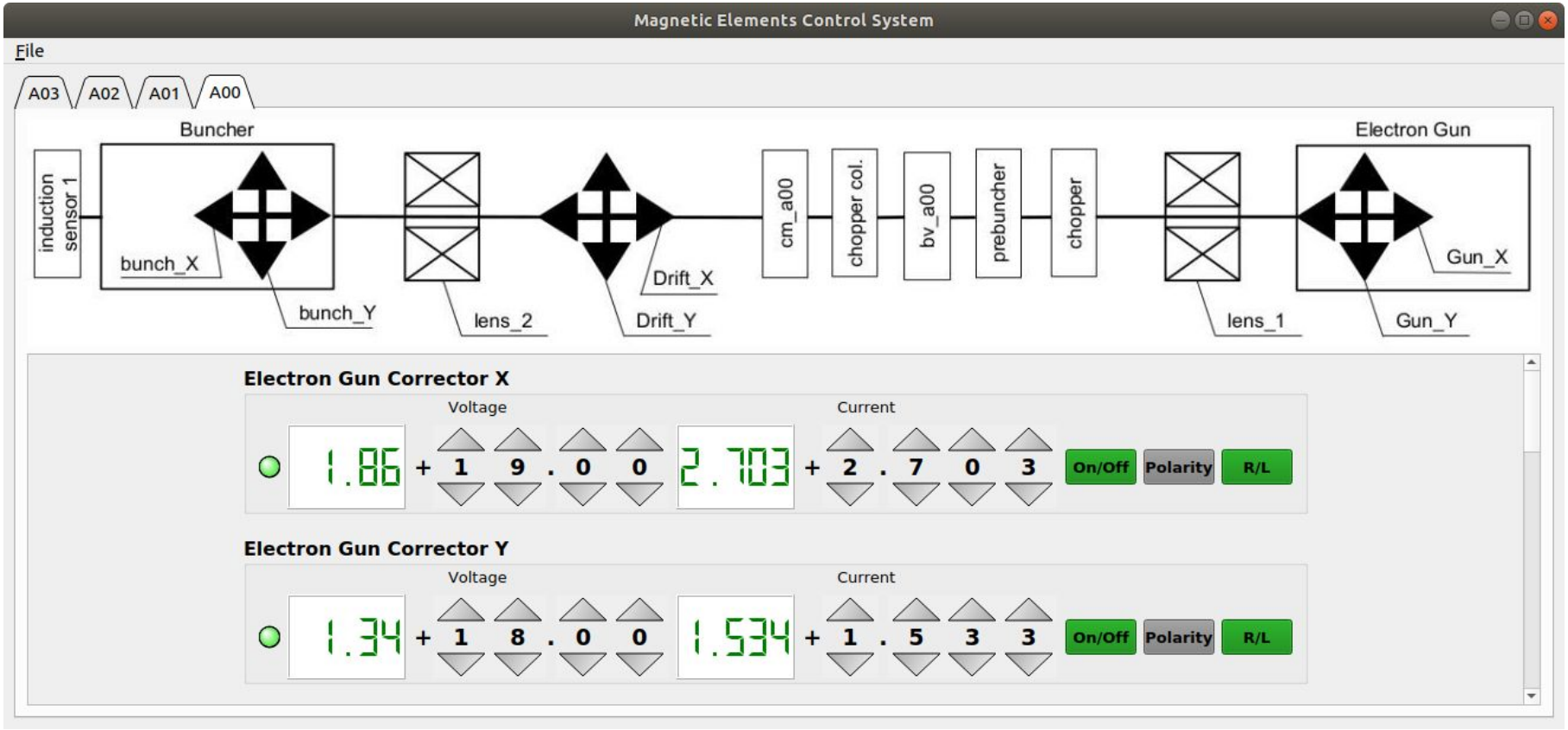
20 power supplies KORAD
30 V, 5 A / 60 V, 3A

Ethernet to RS485 converter

Modules for communication with power supplies



Magnetic system

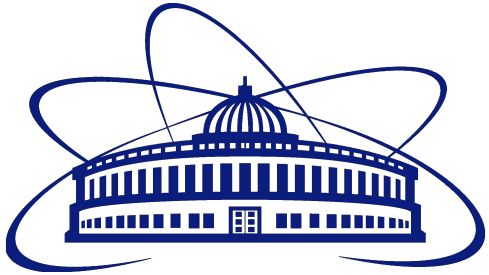


Conclusion

At the moment, the general concept of the control system has been designed. TANGO-based software has been developed for individual subsystems of the LINAC-200.

The accelerator building is undergoing major repairs. It's planned to integrate TANGO based software when the accelerator is launched after the first phase of repair.

The next stage in the development of control system is the automation of a number of other LINAC-200 subsystems (synchronization, vacuum, diagnostics, thermal stabilization, new channels for beam extraction from the accelerator).



LINAC-200 control system status

Aleksei Trifonov
engineer at the Beam Colliding Department DLNP JINR
e-mail: trifonov@jinr.ru

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