



# Linac-200: a new electron test beam facility

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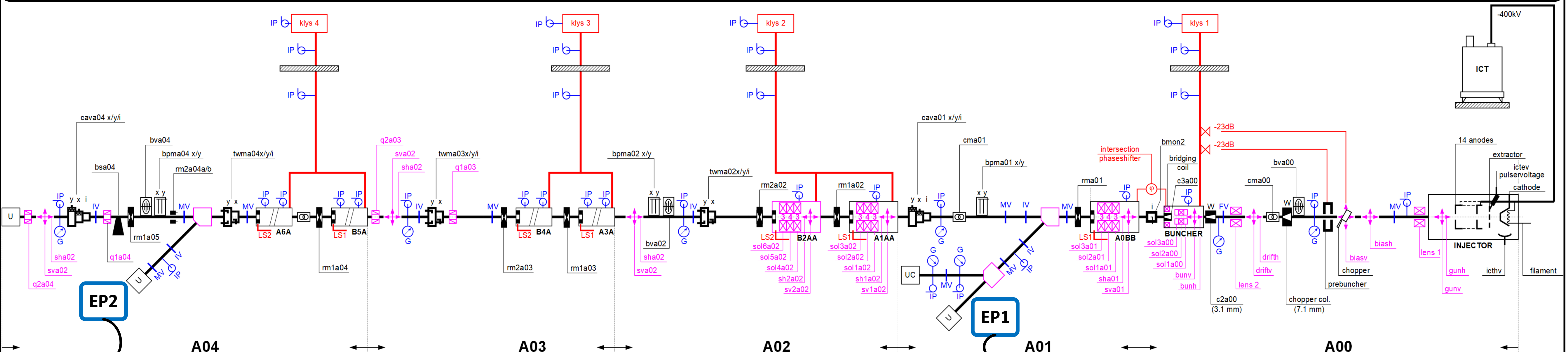
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## Abstract

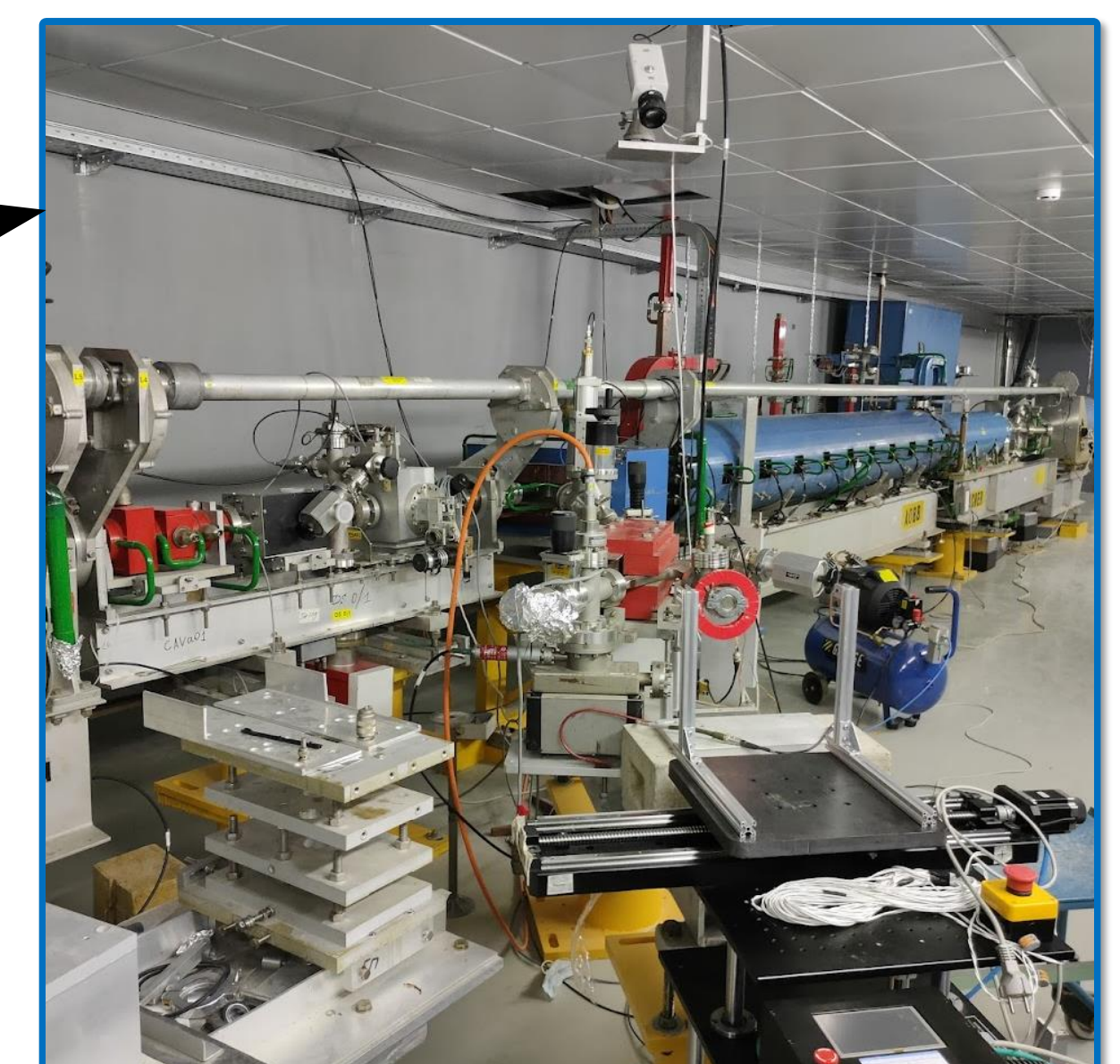
The linear accelerator Linac-200 at JINR is a new facility constructed to provide electron test beams to carry out particle detectors R&D, to perform studies of advanced methods of electron beam diagnostics, and for applied research. The core of the facility is a refurbished MEA accelerator from NIKHEF. The key accelerator subsystems including controls, vacuum, precise temperature regulation were completely redesigned or deeply modernized. Two test beam channels are available for users: the first one with electron energy in range 5–25 MeV and maximum pulse current 60 mA, and the second one with electron energy in range 40–200 MeV and maximum pulse current 40 mA. The pulse current varies smoothly from the maximum value down to almost zero (single electrons in a pulse). This report presents the status and operation parameters of the facility.

## Accelerator layout



Beam extraction point №2 (EP2)

Parameter	Beam extraction point	
	EP1	EP2
Electron energy, MeV	5—25	40—200
Pulse duration, $\mu$ s	0,2—3,5	
Max. pulse current, mA	60	40
Pulse repetition rate, Hz	1—50	1—25



Beam extraction point №1 (EP1)

Testzone for particle detectors R&D

Education and training

Research program at the Linac-200 facility in the near future

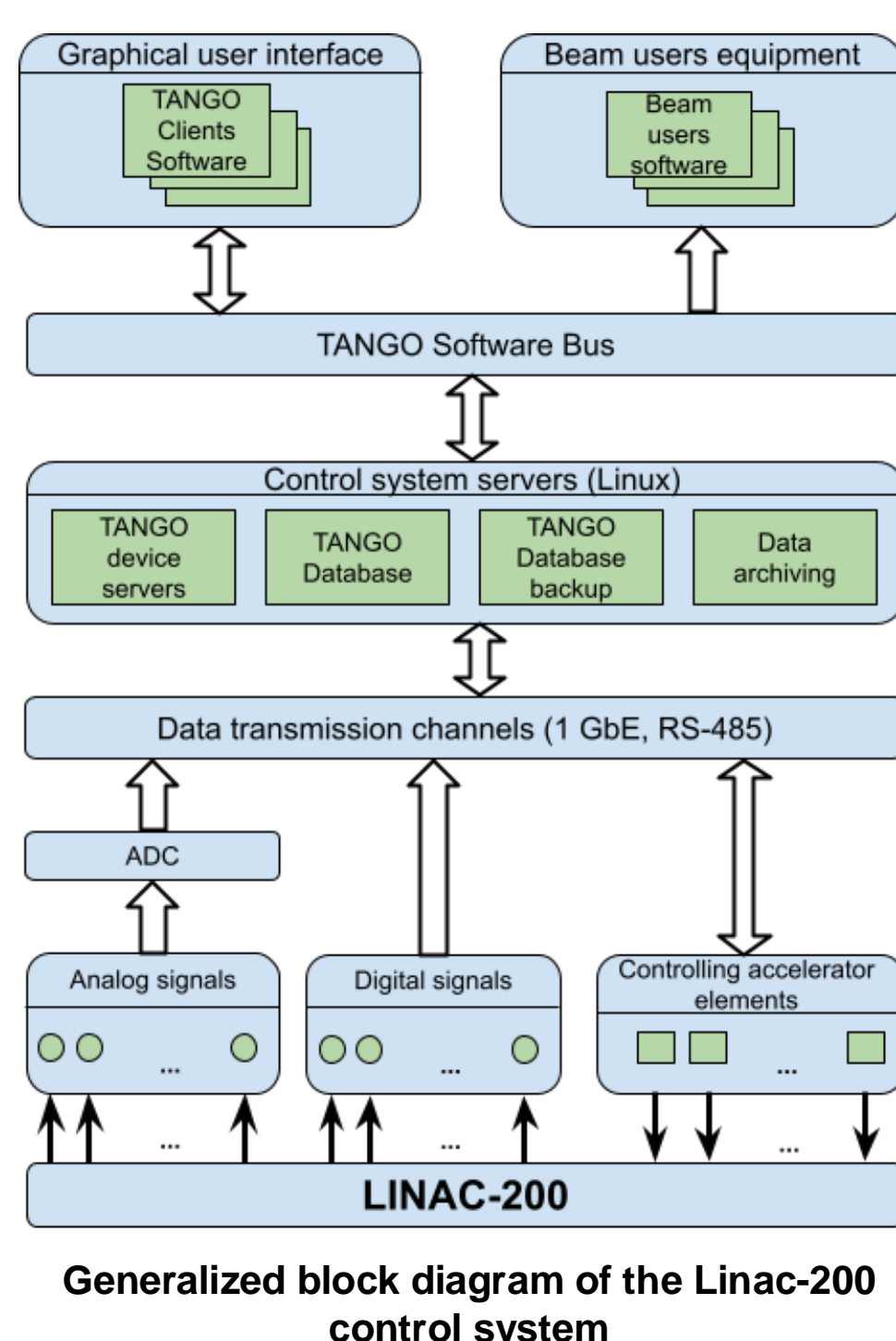
Terahertz radiation source and beam diagnostics R&D

Radiobiological studies

Material irradiation

## New Tango-based global control system

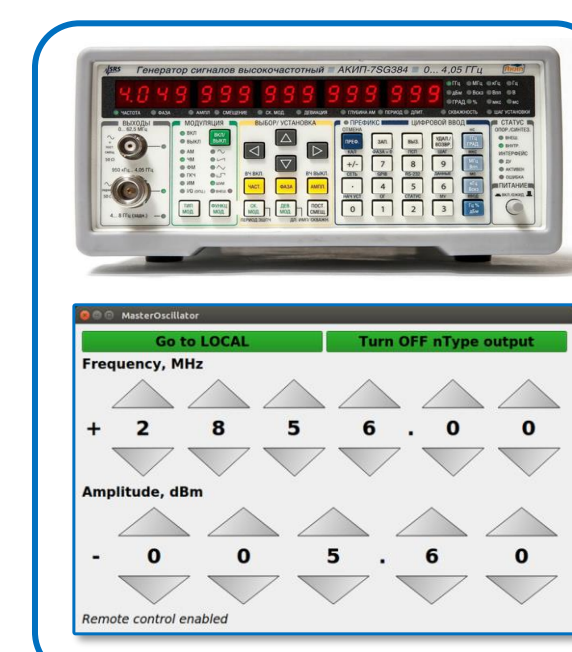
- Main requirements for the control system**
- high reliability
  - serviceability
  - using standard interfaces for communication between components
  - possibility of future modifications and extensions



Linac-200 new control room

## Acceleration & RF

Linac-200 key RF & acceleration parameters	
Total linac length, m	55
Number of short (3.7 m) sections	3
Number of long (7.3 m) sections	4
Frequency, MHz	2856
Wave type	TW
Field mode	$2\pi/3$
Filling time, $\mu$ s	1.3
$v/c$ range	0.0093–0.0389
Shunt impedance, $M\Omega/m$	56.5–48
Iris aperture: diameter, mm	32–17
thickness, mm	5.84
Number of klystrons	4
RF power: peak, MW	10
mean, kW	20



Master oscillator appearance and GUI

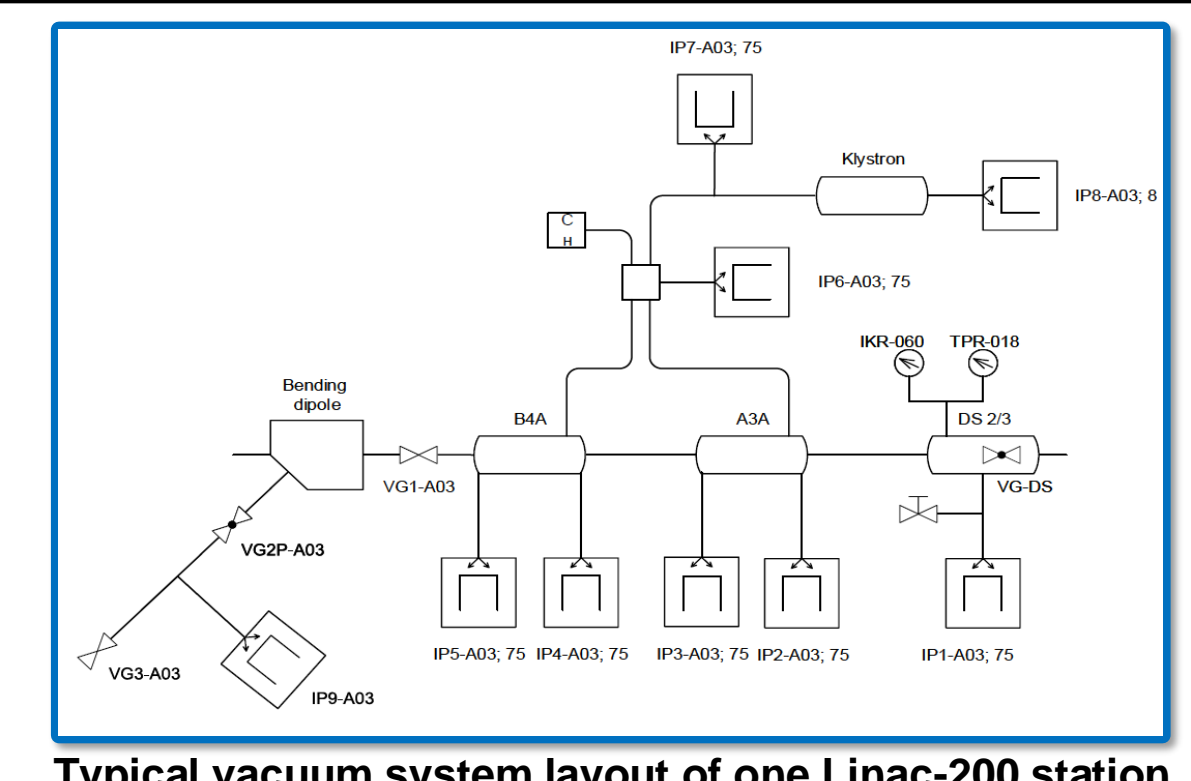


Linac-200 modulators hall

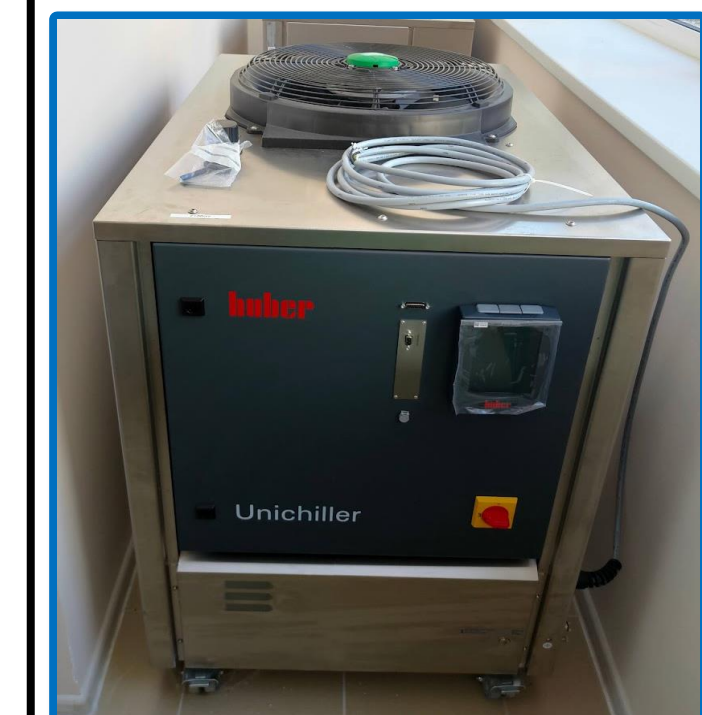


Modulator control unit appearance and GUI

## Vacuum & Cooling



Typical vacuum system layout of one Linac-200 station



Unichiller 100-H circulator

Main parameters of the Unichiller 100-H	
Temperature range	-20...100 °C
Temperature stability	$\pm 0,2$ °C
Control unit	Pilot ONE
Heating power	2 kW
Cooling capacity	20 0 -10 -20 °C 10 8,6 6 3,9 kW

## Conclusion

New Linac-200 electron test beam facility at the Joint Institute for Nuclear Research is nearing completion. Two beam extraction points are available. The test beam facility is open for particle detectors and beam diagnostics R&D, material irradiation, radiobiological and other studies.