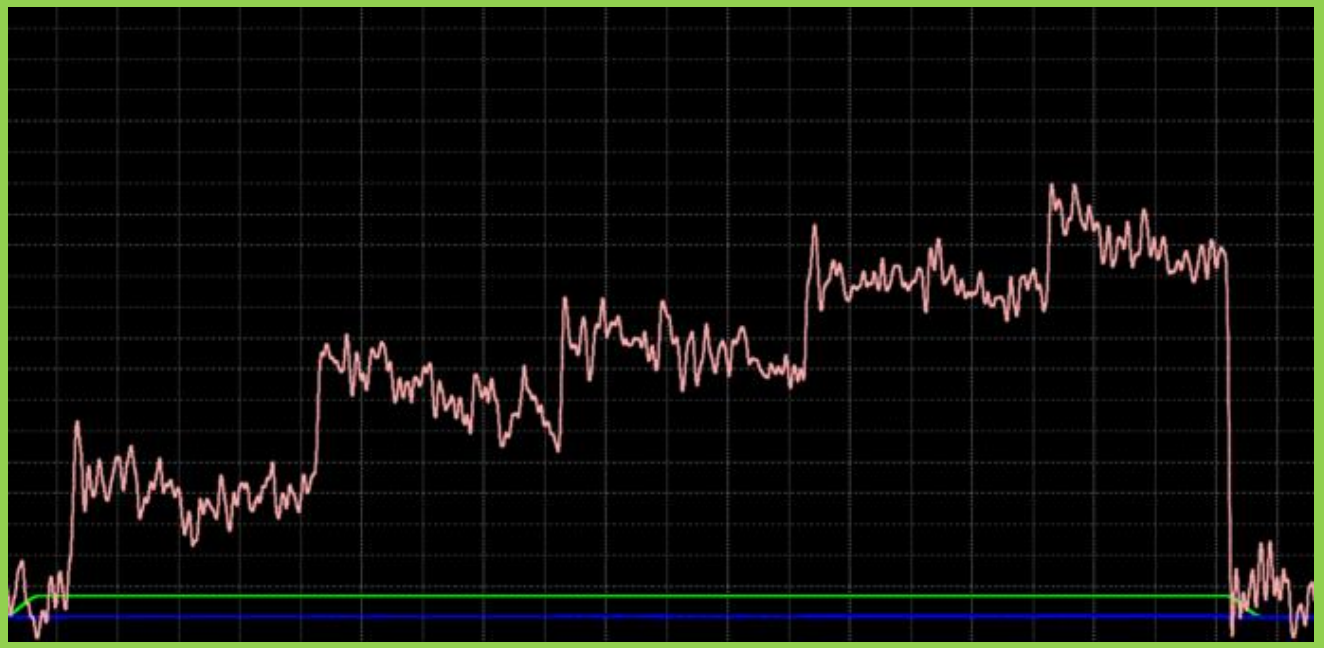
Realization of the Nuclotron-NICA Project



A.Sidorin, on behalf of the NICA team

PP PAC, JINR, Dubna, 23 Jun 2025

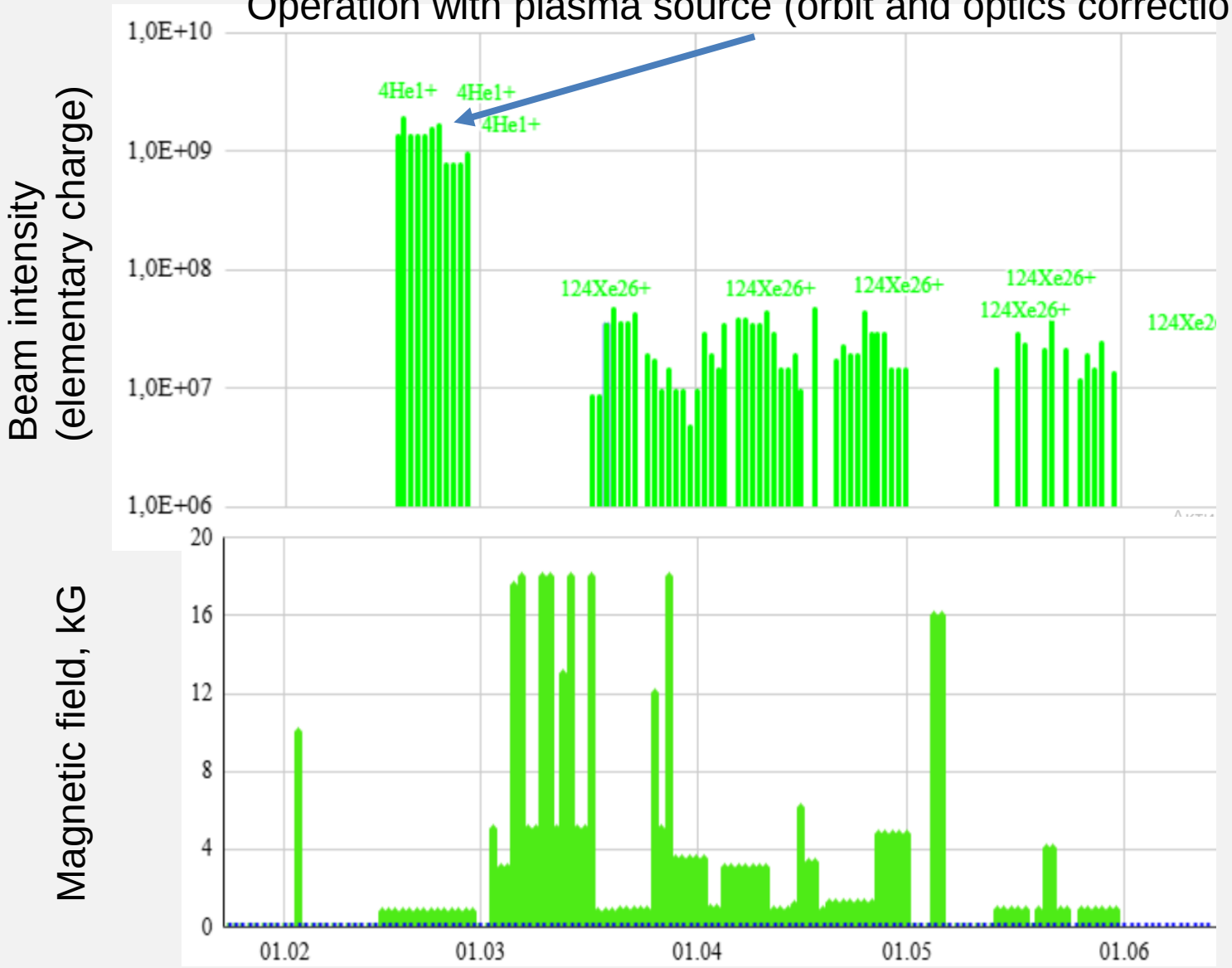
Contents

Run #5

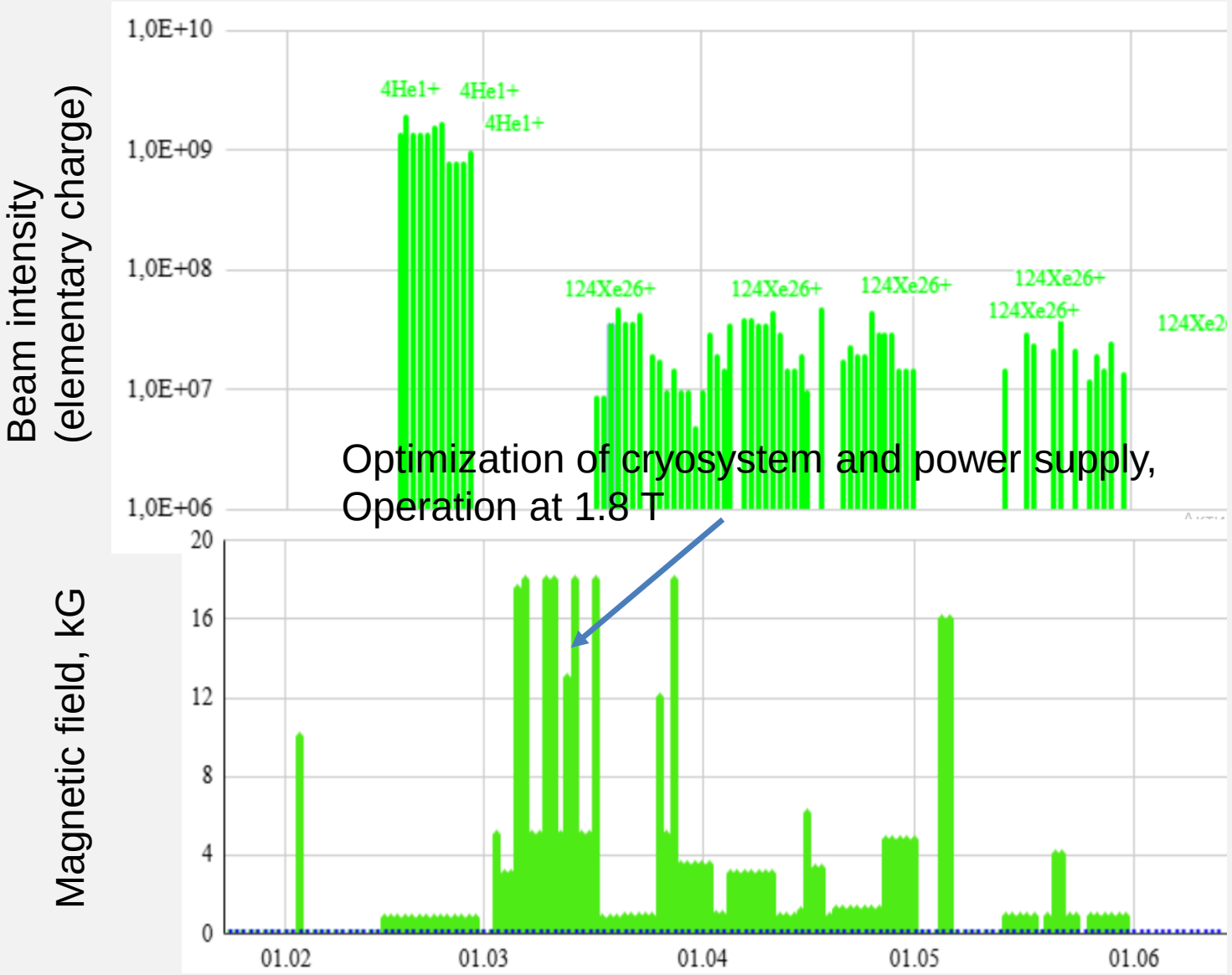
Operation with beam has been started at 18.02.25

V.Lebedev,
E.Syresin

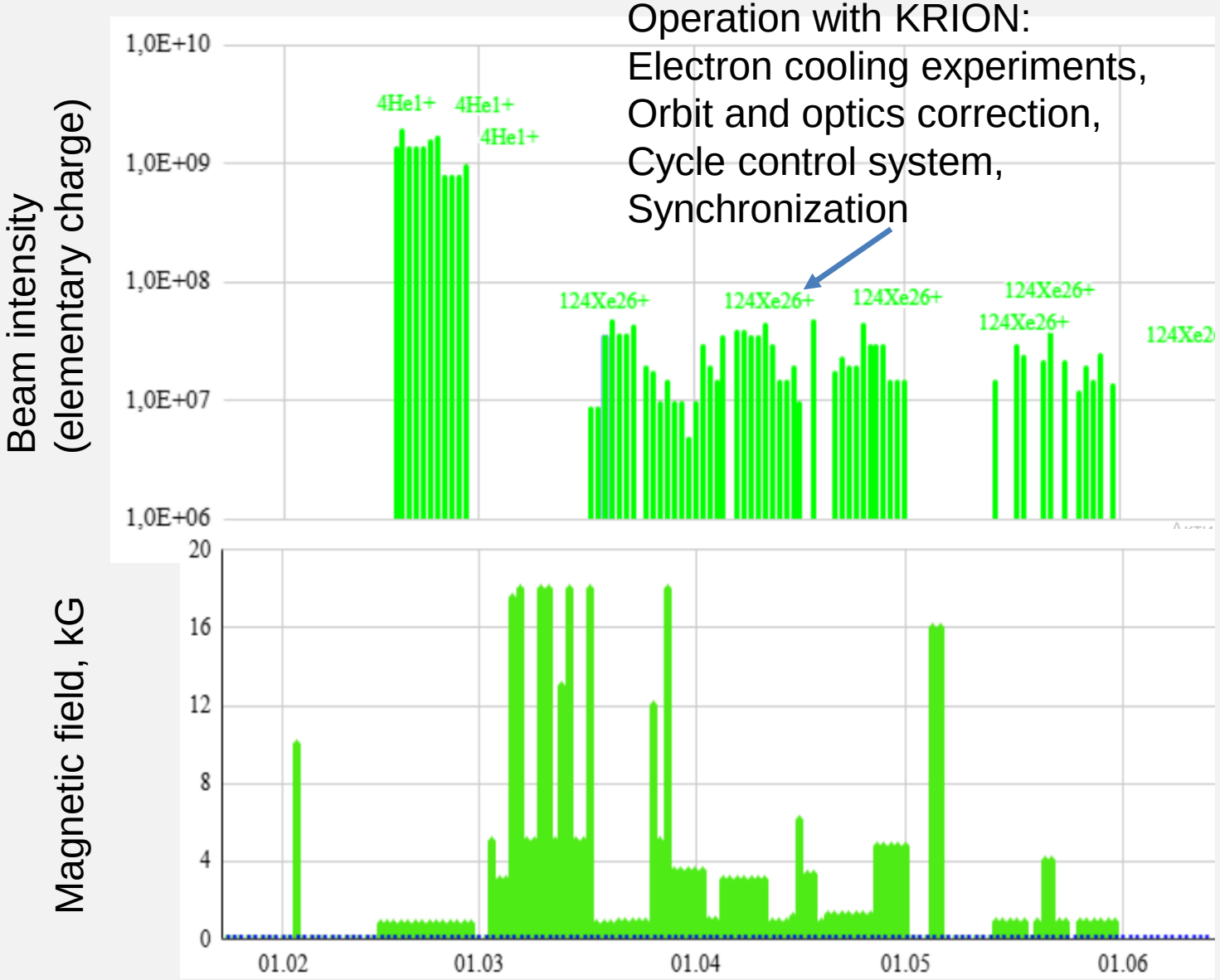
Operation with plasma source (orbit and optics correction)



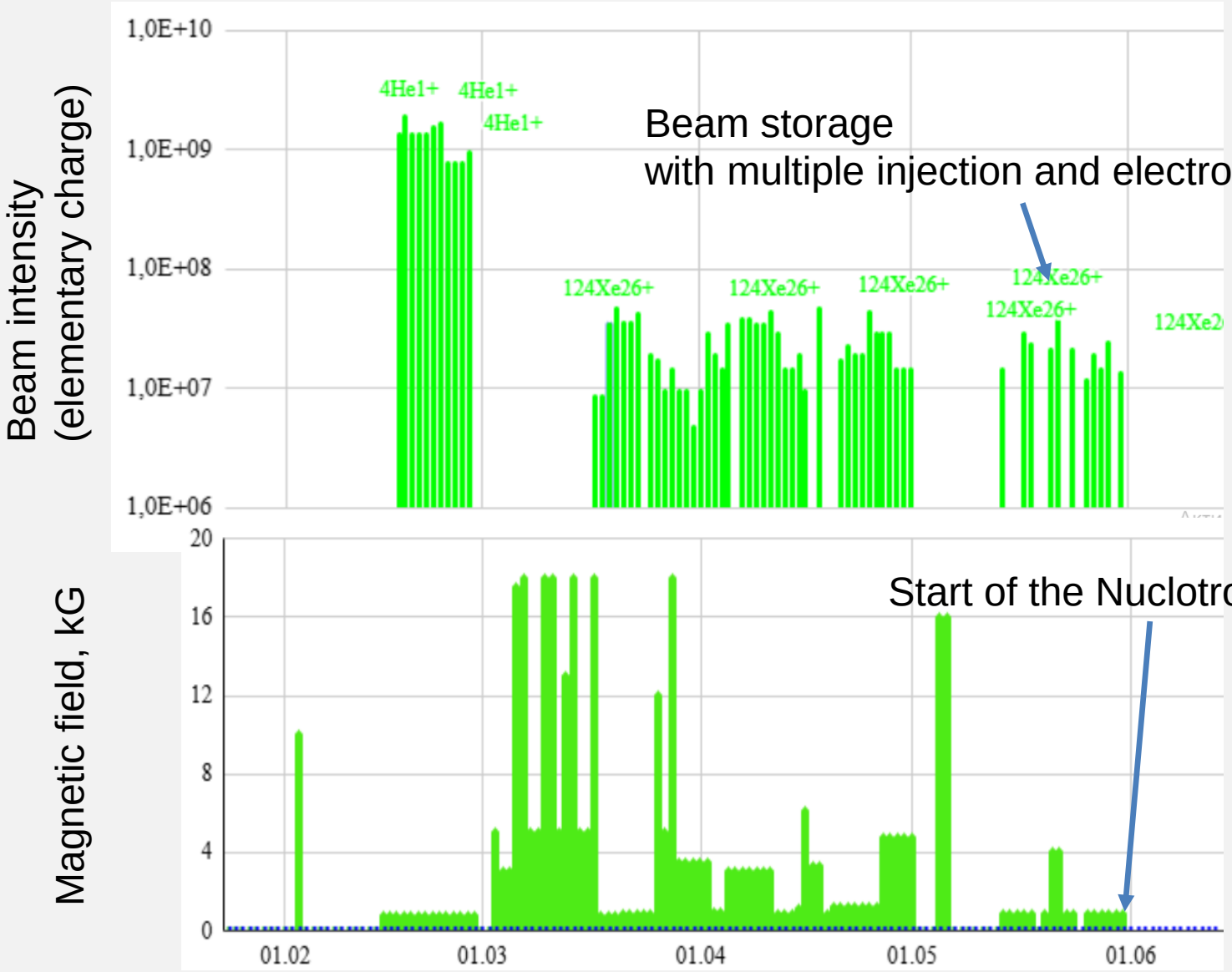
Run #5


Beam intensity
(elementary charge)
1,0E+10
1,0E+09
1,0E+08
1,0E+07
1,0E+06
4He1+
4He1+
4He1+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
Optimization of cryosystem and power supply,
Operation at 1.8 T
Magnetic field, kG
20
16
12
8
4
0
01.02
01.03
01.04
01.05
01.06

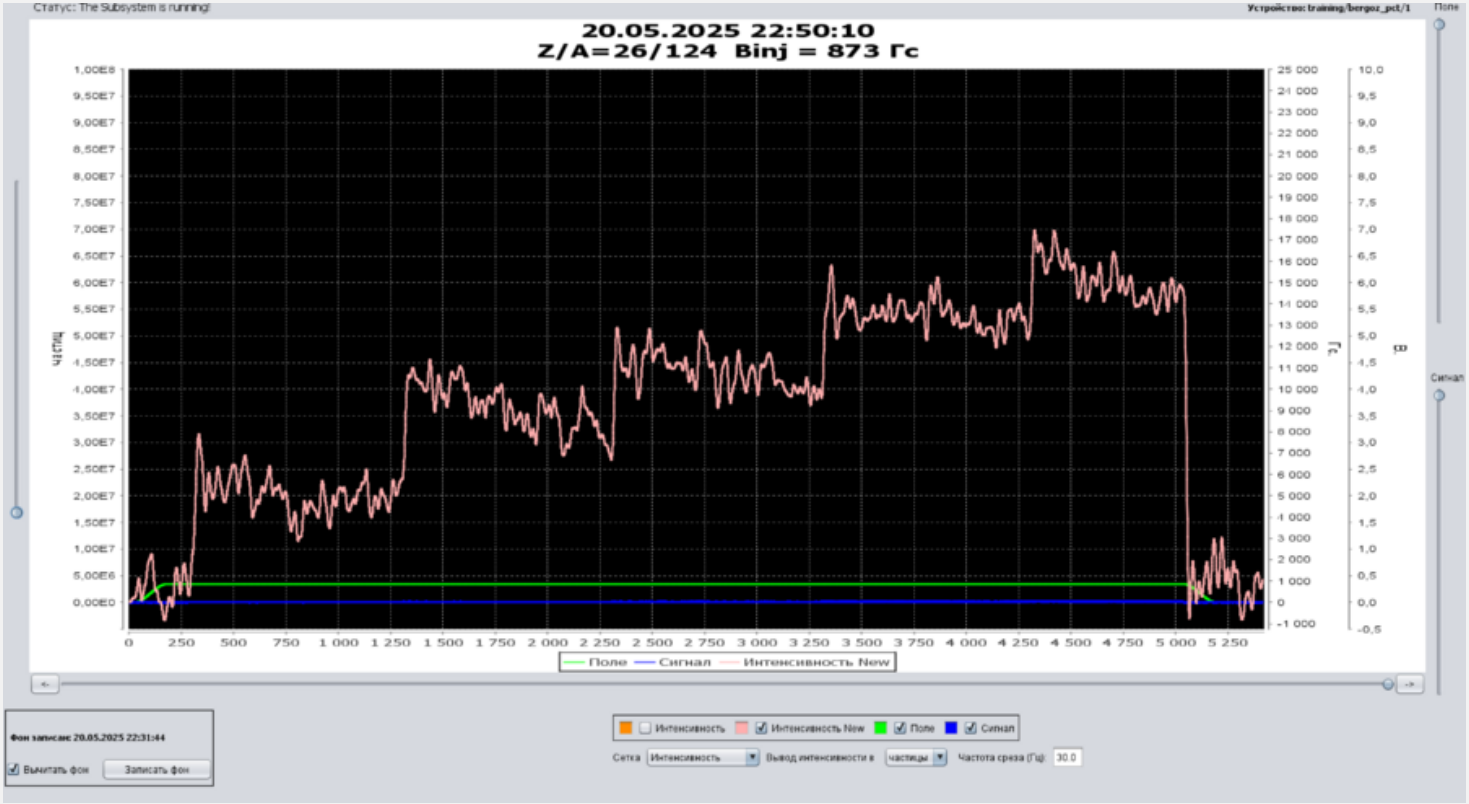
Run #5


Operation with KRION:
Electron cooling experiments,
Orbit and optics correction,
Cycle control system,
Synchronization
Beam intensity
(elementary charge)
1,0E+10
1,0E+09
1,0E+08
1,0E+07
1,0E+06
4He1+
4He1+
4He1+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
Magnetic field, kG
20
16
12
8
4
0
01.02
01.03
01.04
01.05
01.06

Run #5


Beam intensity
(elementary charge)
1,0E+10
1,0E+09
1,0E+08
1,0E+07
1,0E+06
4He1+
4He1+
4He1+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
124Xe26+
Beam storage
with multiple injection and electron cooling
Magnetic field, kG
20
16
12
8
4
0
01.02
01.03
01.04
01.05
01.06
Start of the Nuclotron cooling

Since the year beginning, the Booster commissioning has been aimed on the demonstration of ion accumulation with help of electron cooling.



Accumulation of $7 \cdot 10^7$ Xe ions from 5 pulses with intensity of $2 \cdot 10^7$ each one.

Intermediate results

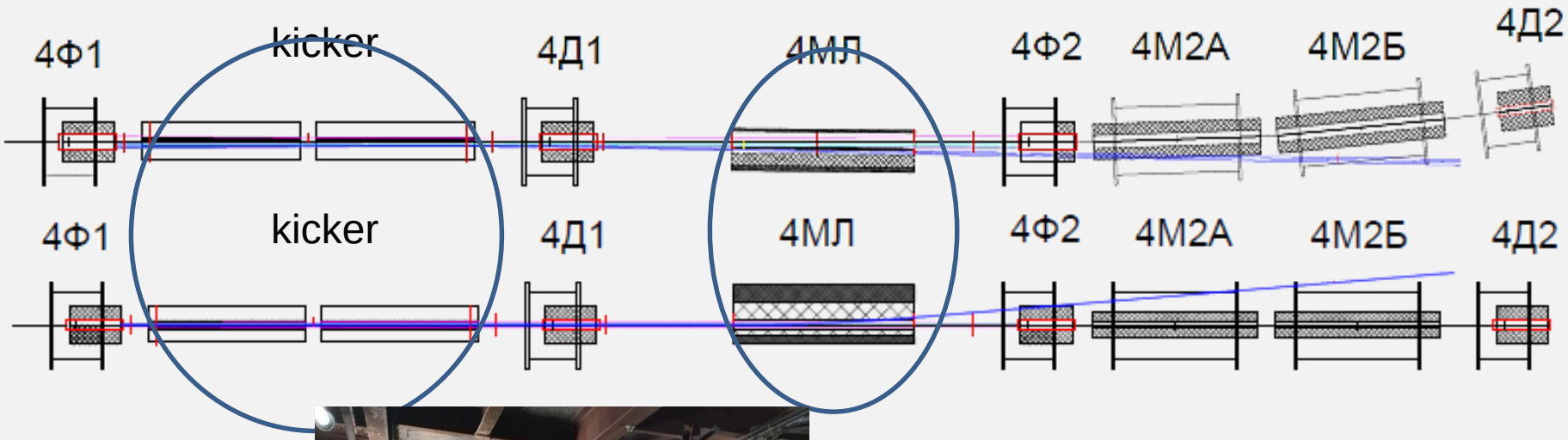
- the stable cryo-magnetic system operation
and beam acceleration up to design rigidity,
- electron cooling at injection and intermediate energy,
measurements of the friction force,
- the software for orbit correction in Booster
and achieved stable operation of dipole correctors.
- Performed optics measurements and optimized the optics
of the Linac-to-Booster transfer line.
- operational improvement of the ionization profile monitor.
- good tuning of HILAC and its debuncher.
- the beam injection synchronized to the Booster RF.
- an upgrade of KRION.
- software which optimizes the rate of Booster magnetic field
so that to avoid the beam loss at the acceleration start.

A.Konstantinov
D.Nikiforov
V.Karpinsky
I.Meshkov
A.Sergeev
V.Smirnov
I.Nikolaichuk
E.Gorbachev
K.Levterov
B.Golovensky
P.Khariuzov
I.Shirikov
D.Donets
E.Donets
O.Brovko
A.Volodin

After cooling of the Nuclotron cryo-magnetic system the He leak was detected,
all the Nuclotron systems were tested at superconducting load.
Now the Nuclotron has room temperature – the required works have been started.

Nuclotron fast extraction system

A.Tuzikov



The straight section before assembly

Nuclotron fast extraction system

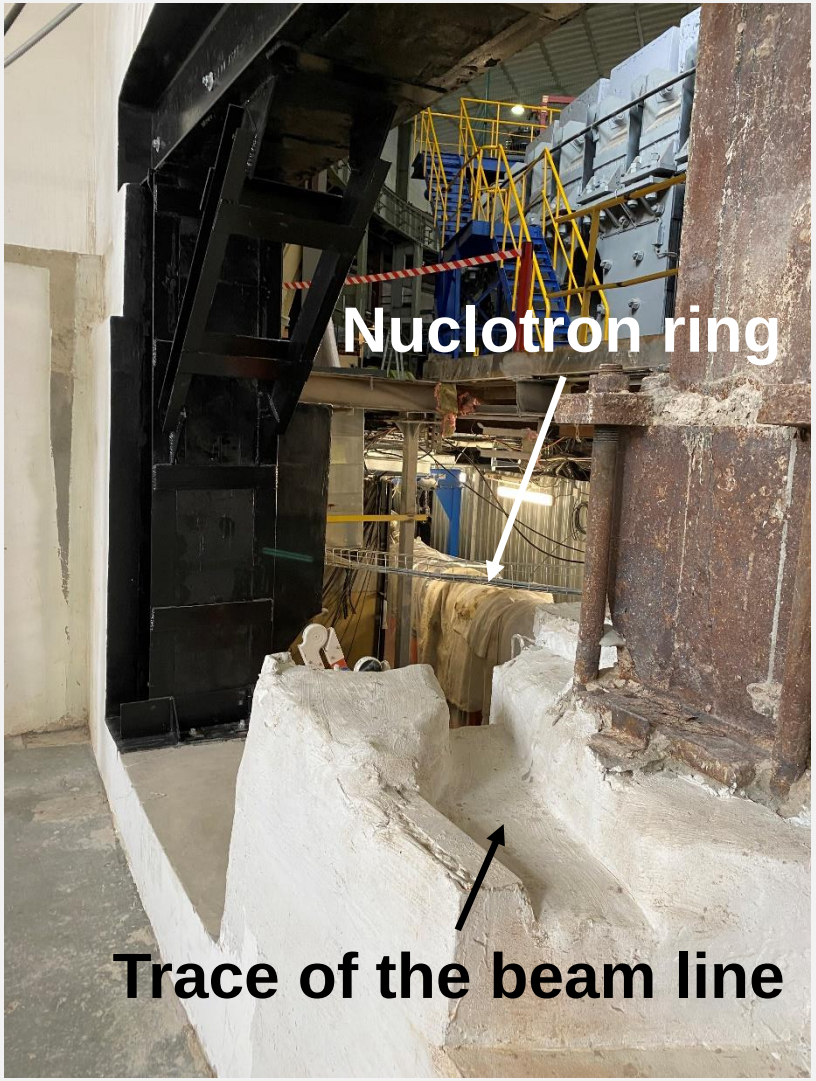
Installation of the elements

Kicker

Lambertson magnet

Nuclotron fast extraction system

The extraction system in assembly



Construction works in bld#1,
required for installation of N-C beam line
are completed

Nuclotron – Collider beam line

First branch of the

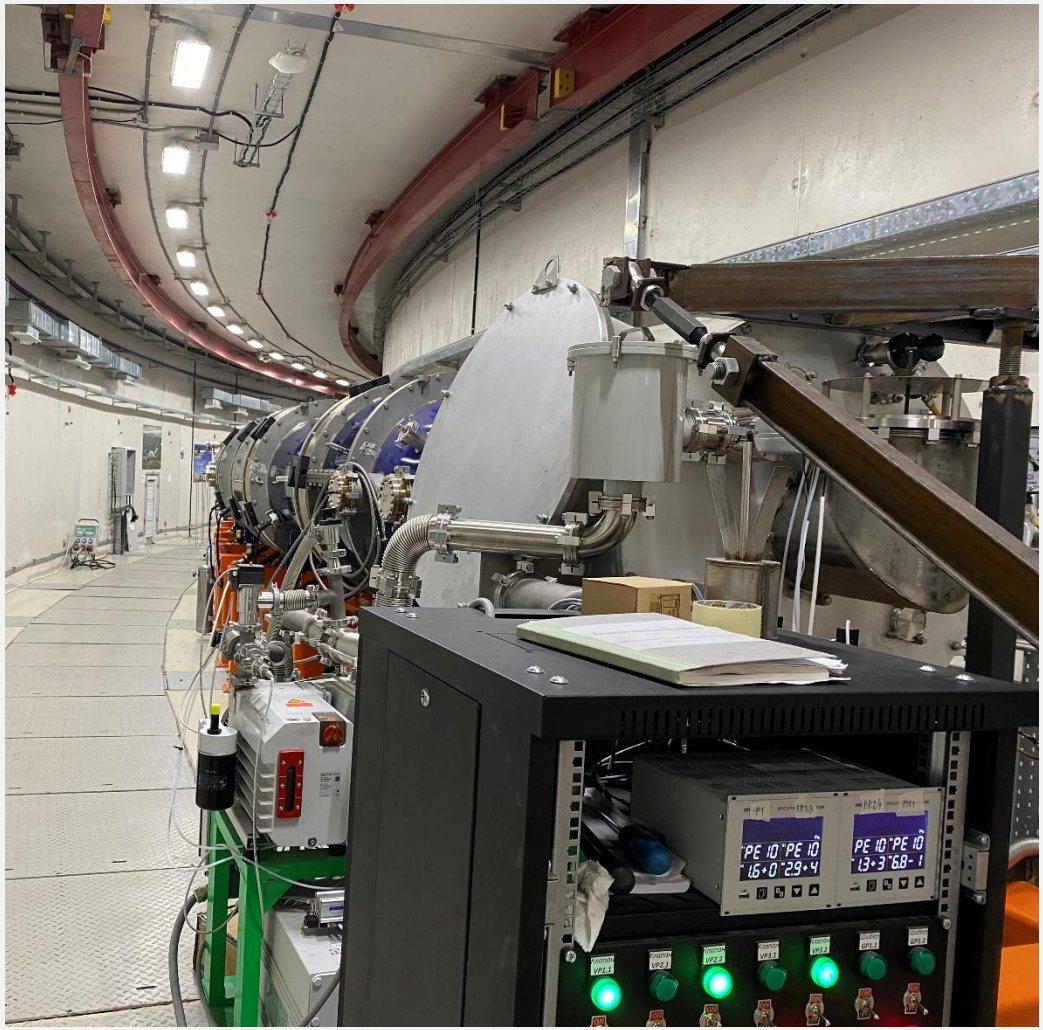
Nuclotron – Collider beam transfer line

is expected to be ready for beam test

at the end of August

Progress in assembly of the Collider cryo-magnetic system

A.Galimov



Vacuum tests and preparation for cryogenic tests are in progress

Thank you for attention