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V.Malakhov, I.Meshkov, V.Pavlov, R.Pivin, A.Rudakov,
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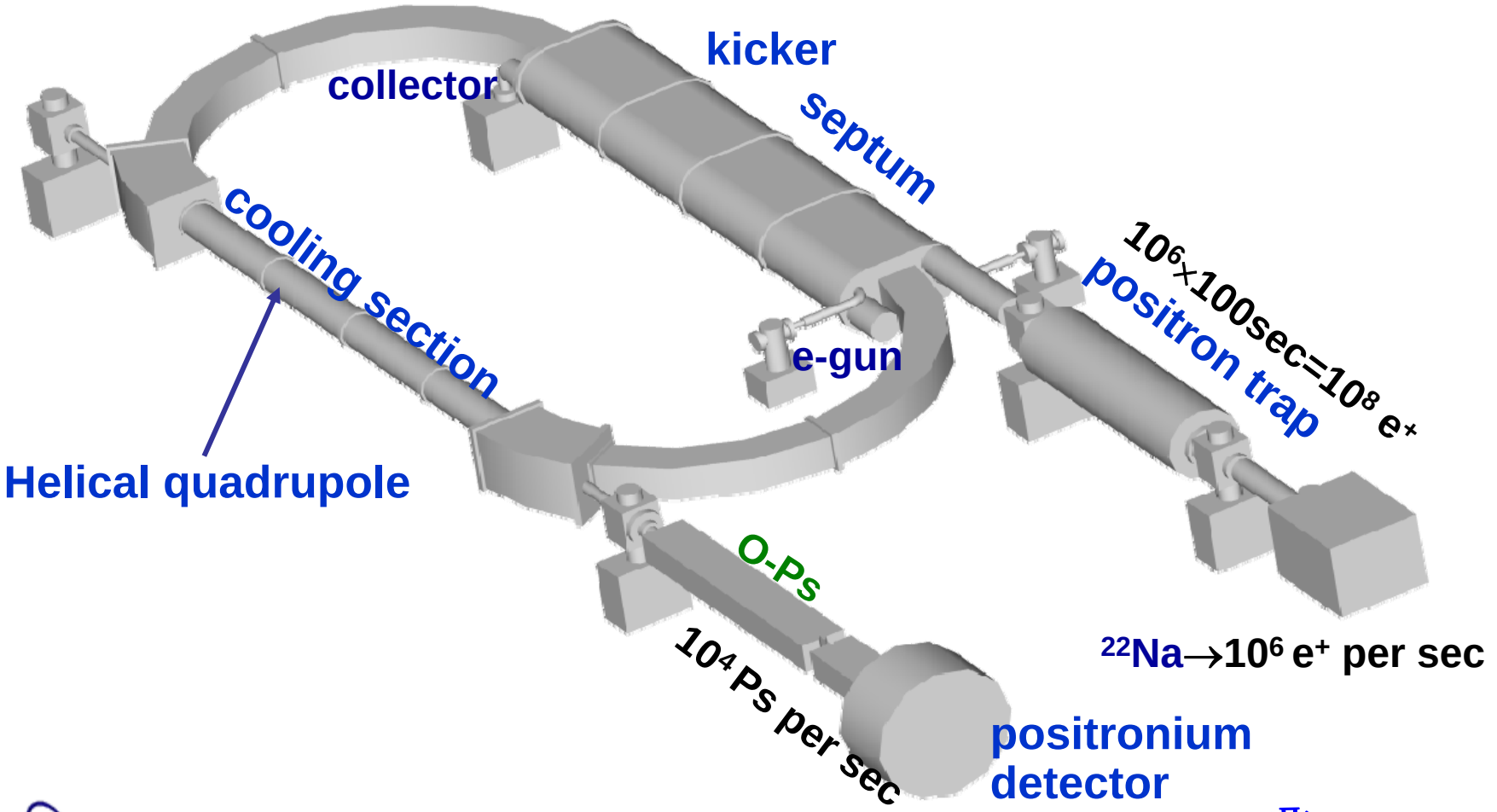
JINR, Dubna

Status of The LEPTA Project

Contents

1. LEPTA facility
2. LEPTA development
3. Results
4. For conclusion: The nearest plans

1. LEPTA Facility



Project Parameters of The LEPTA

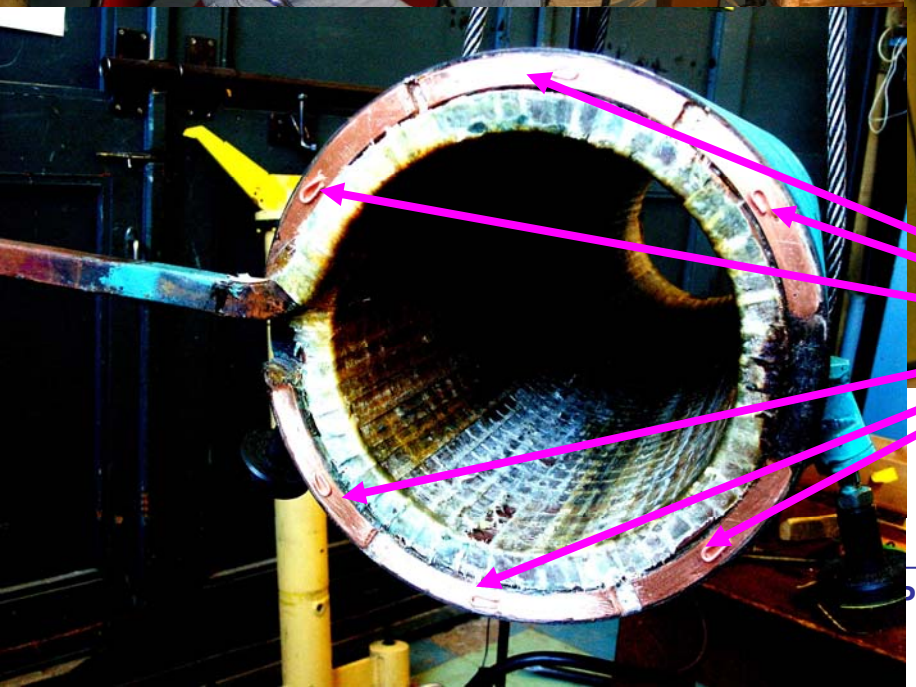
Circumference , m	17.2
Positron energy, keV	10.0
Revolution time, ns	300
Longitudinal magnetic field, G	400
Average radius of the toroidal magnets, m	1.45
Helical quadrupole gradient, G/cm	10.0
Positron beam radius, cm	0.5
Number of positrons in the ring	$1 \cdot 10^{8}$
Residual gas pressure, Torr	$< 1 \cdot 10^{-10}$
Positronium beam parameters	
Intensity, atom/s	$1 \cdot 10^{4}$
Angular spread, mrad	1
Velocity spread	$1 \cdot 10^{-4}$
Beam diameter at the exit of the ring, cm	1.1

Goals of the LEPTA

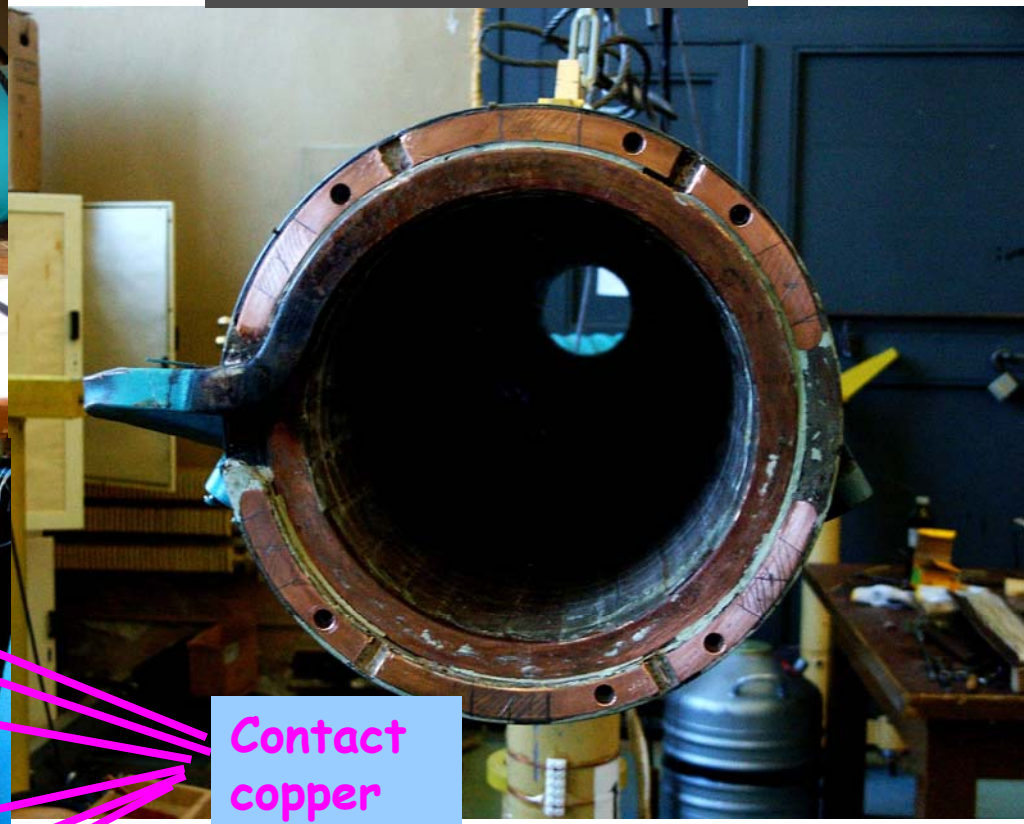
- Particle dynamics in LEPTA
- Electron cooling of positrons
- Positronium generation in flight
- Feasibility studies of antihydrogen generation in flight
- Experiments on Positronium physics

2. LEPTA Development

Reanimation of return current rods

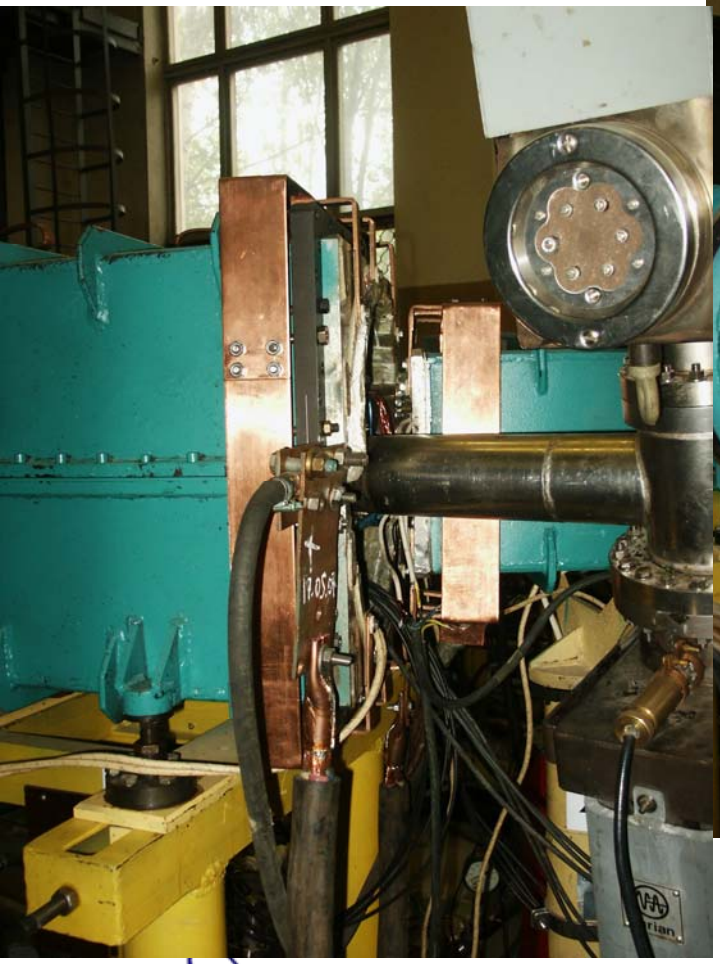


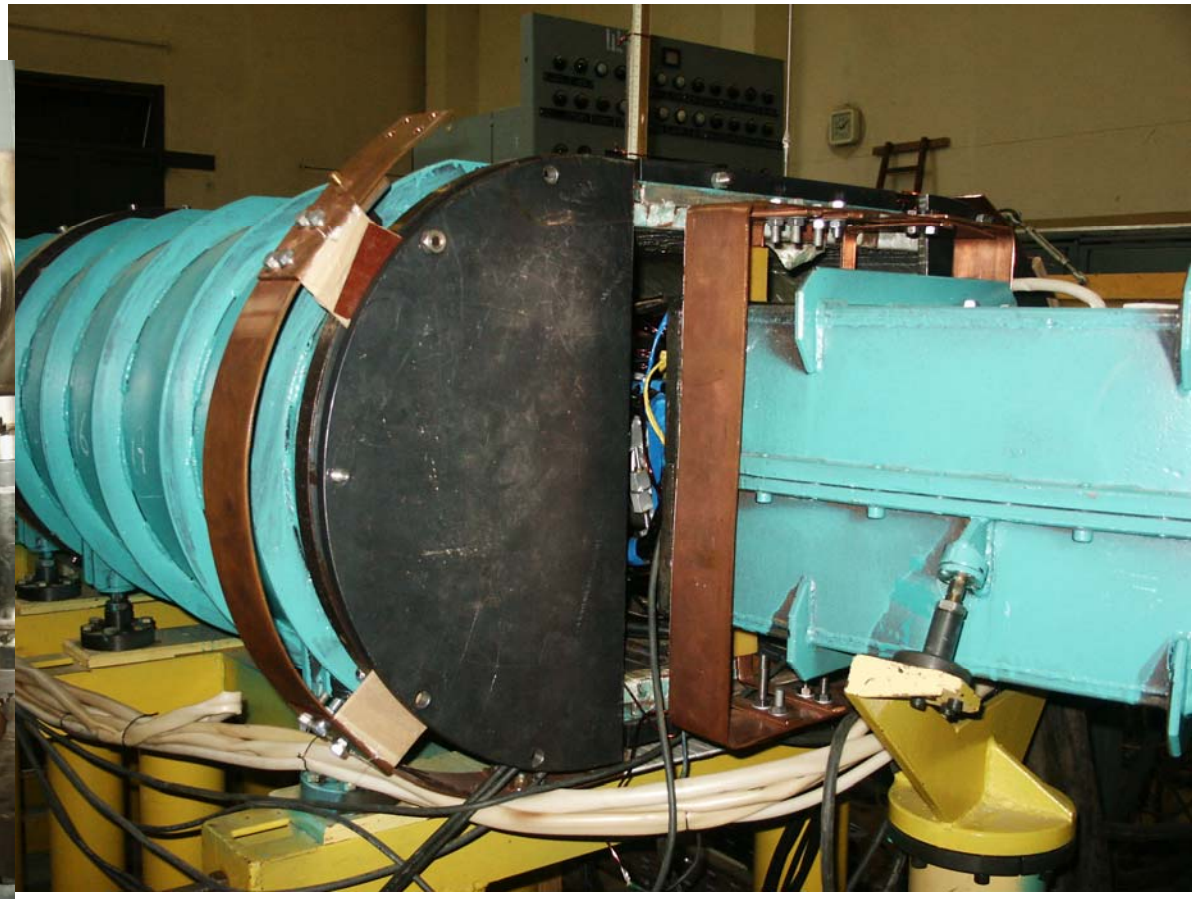
December 2006



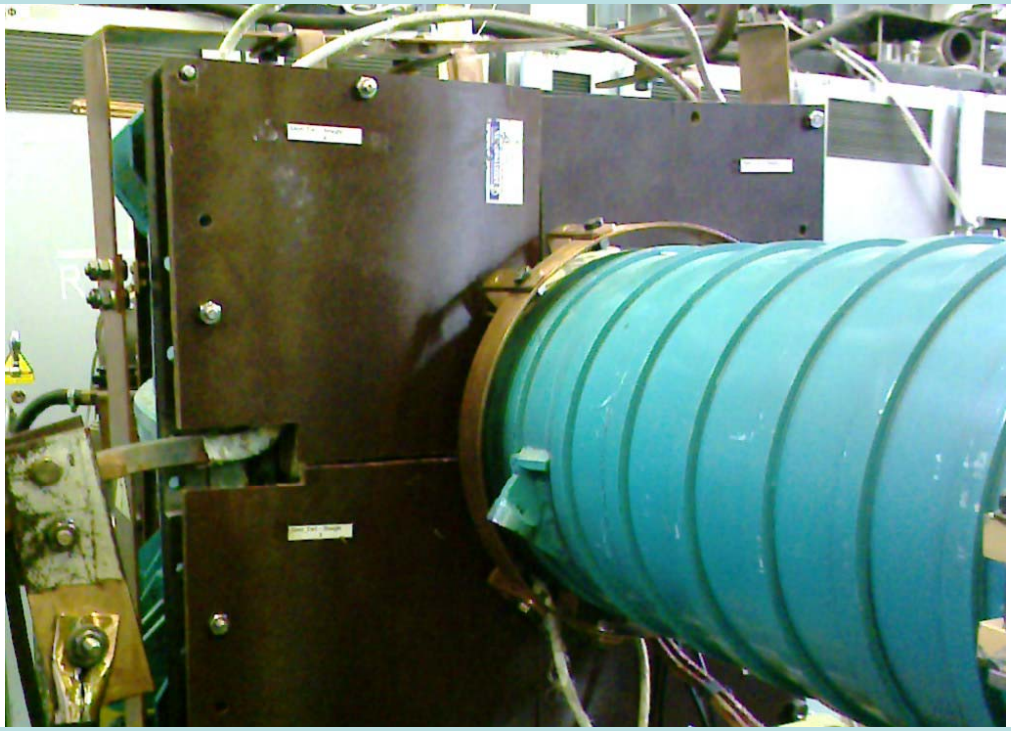
Contact copper wires

1. Reconstruction of return current rods

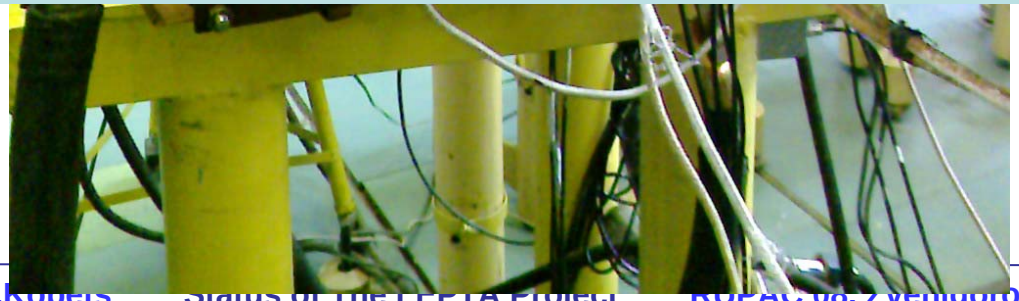




2. Construction of new magnetic shields



3. Reconstruction of bending field current bars



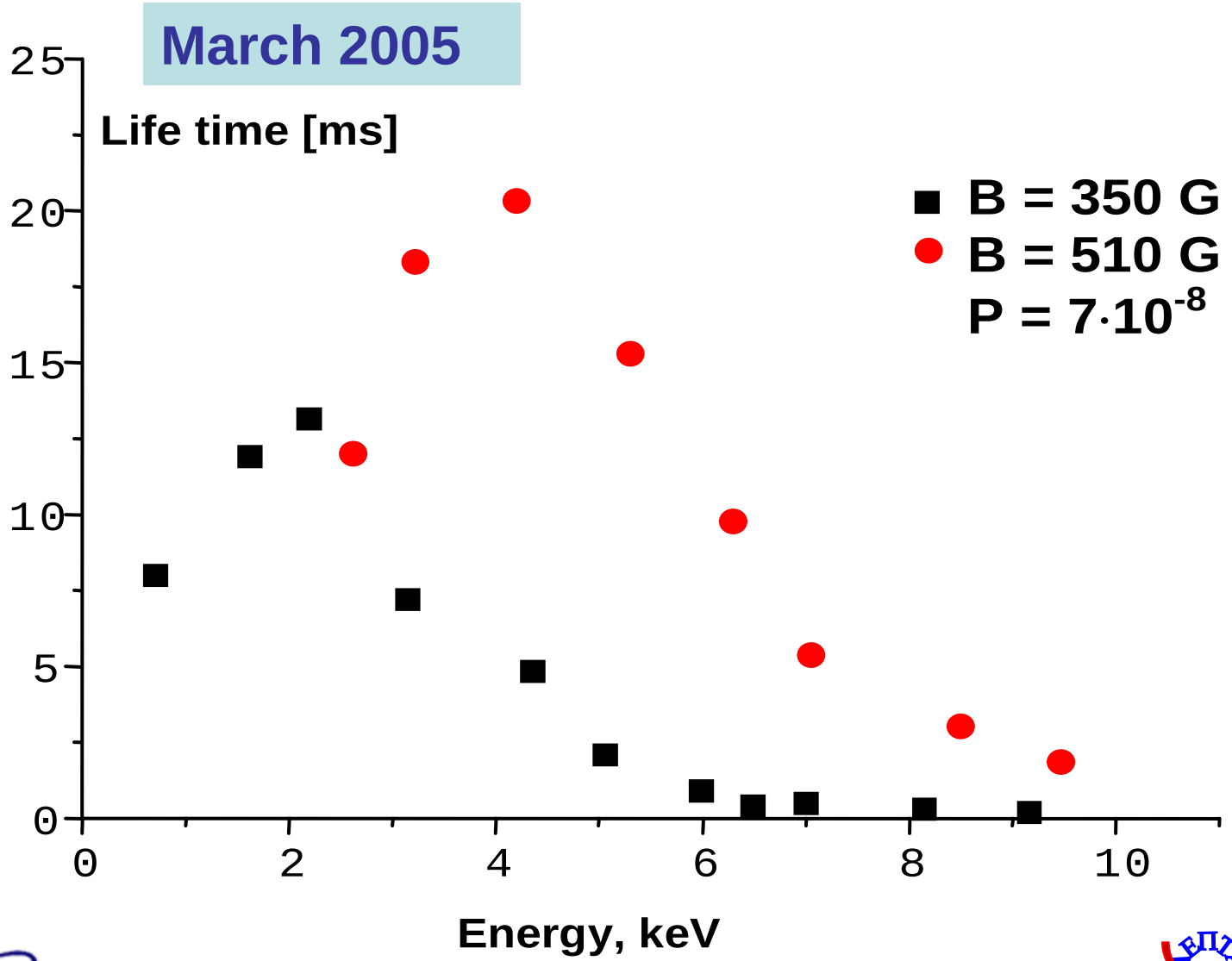
2. LEPTA Development since Sept.2005 (Contnd)

upole

Vertical PU
Horizontal PU

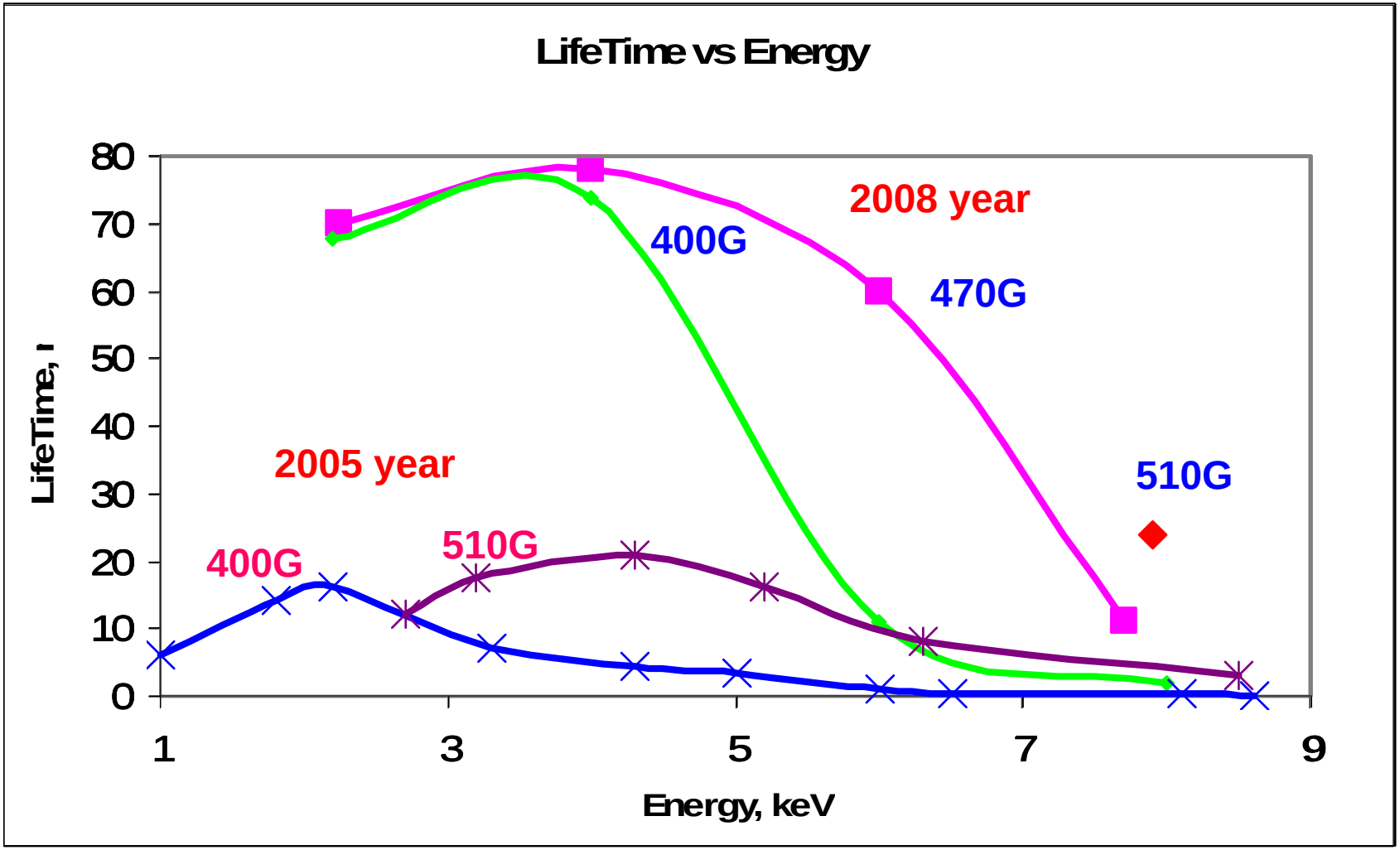
Electron
gun

3. Results


March 2005
Life time [ms]
25
20
15
10
5
0
0
2
4
6
8
10
Energy, keV
B = 350 G
B = 510 G
P = 7·10-8

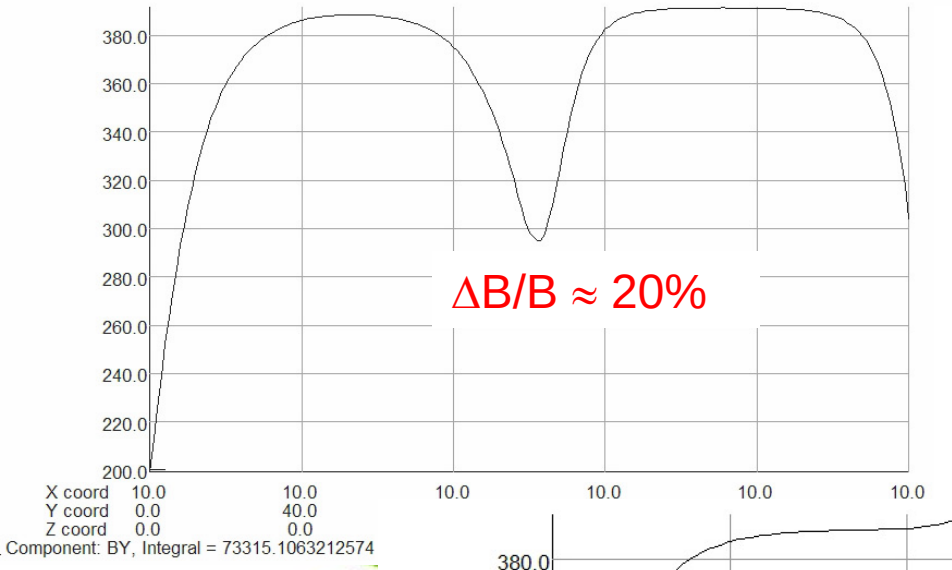
3. Results (Contnd)

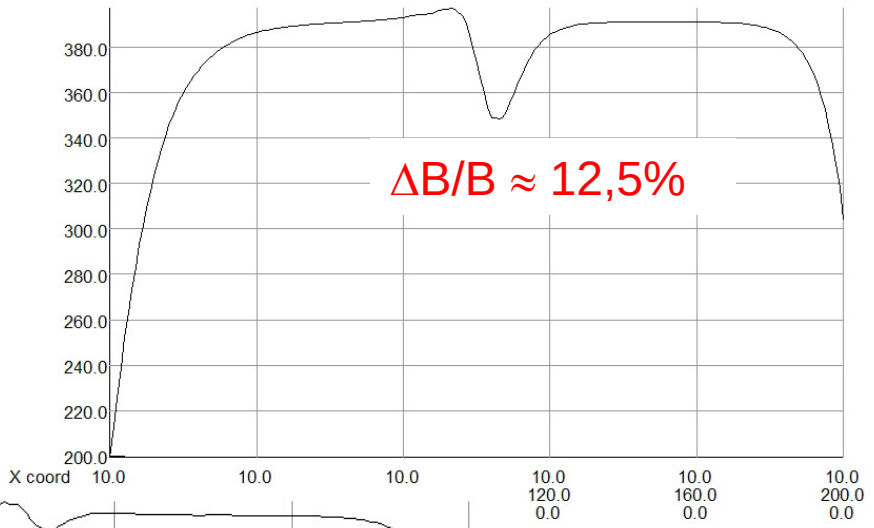
June 2008

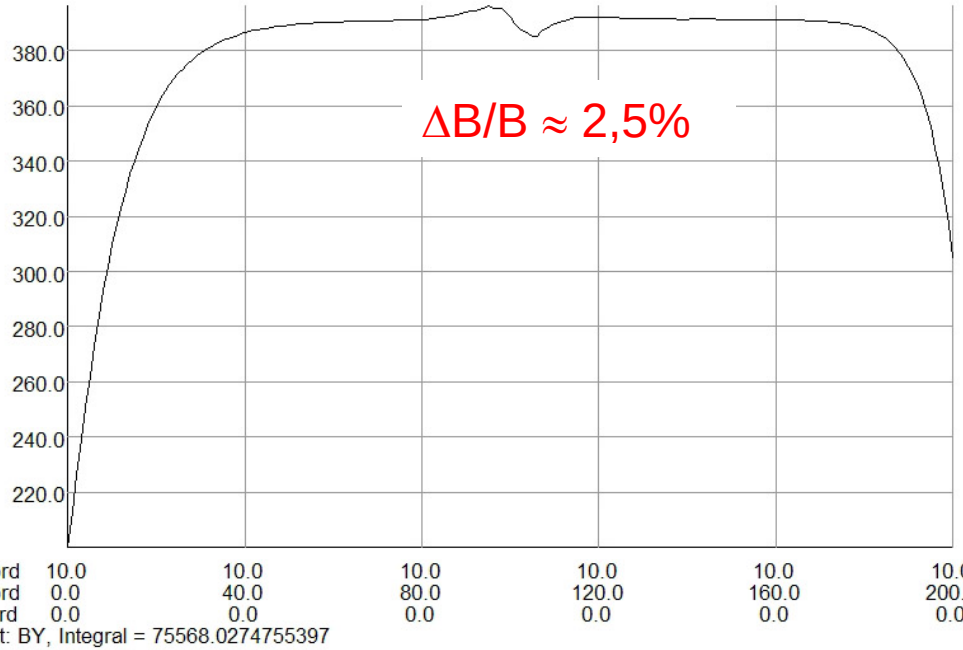


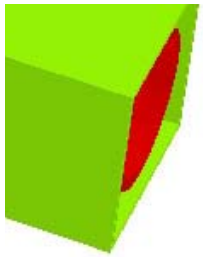
3. Results (Contnd)

Magnetic field modeling at solenoid junctions

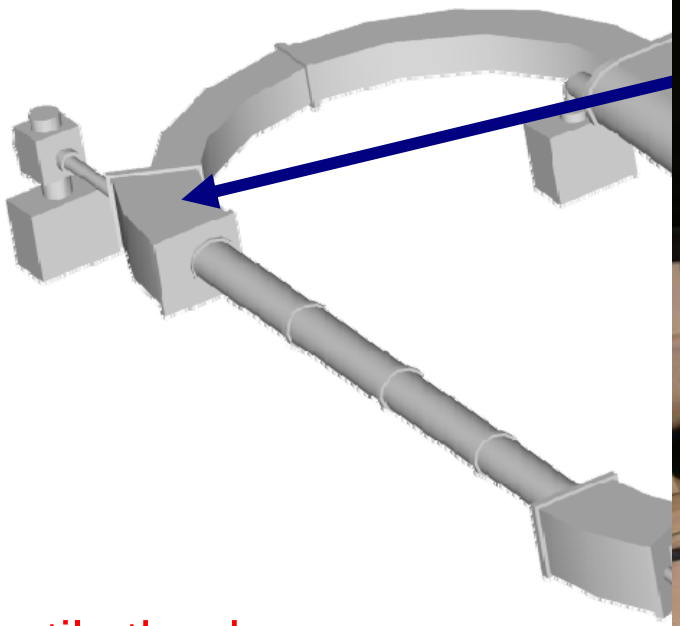


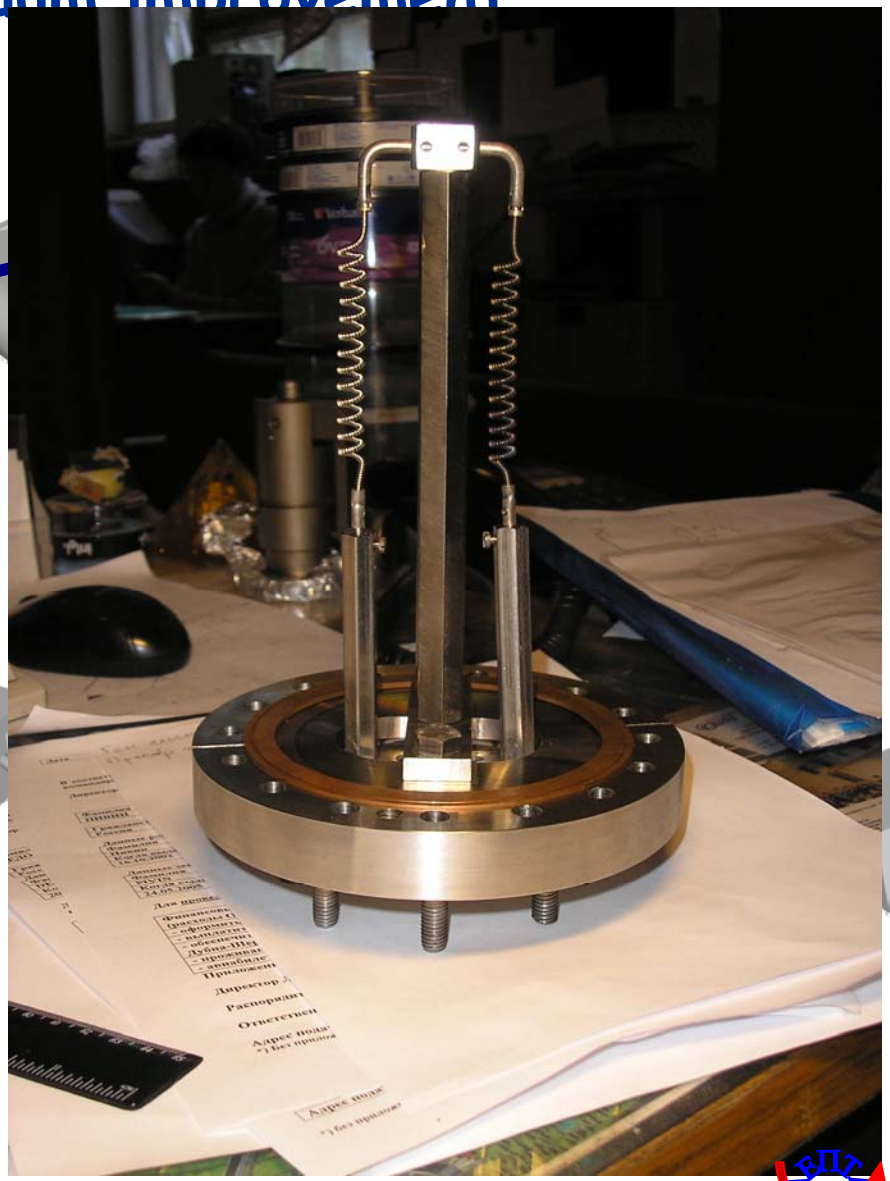






Vacuum improvement

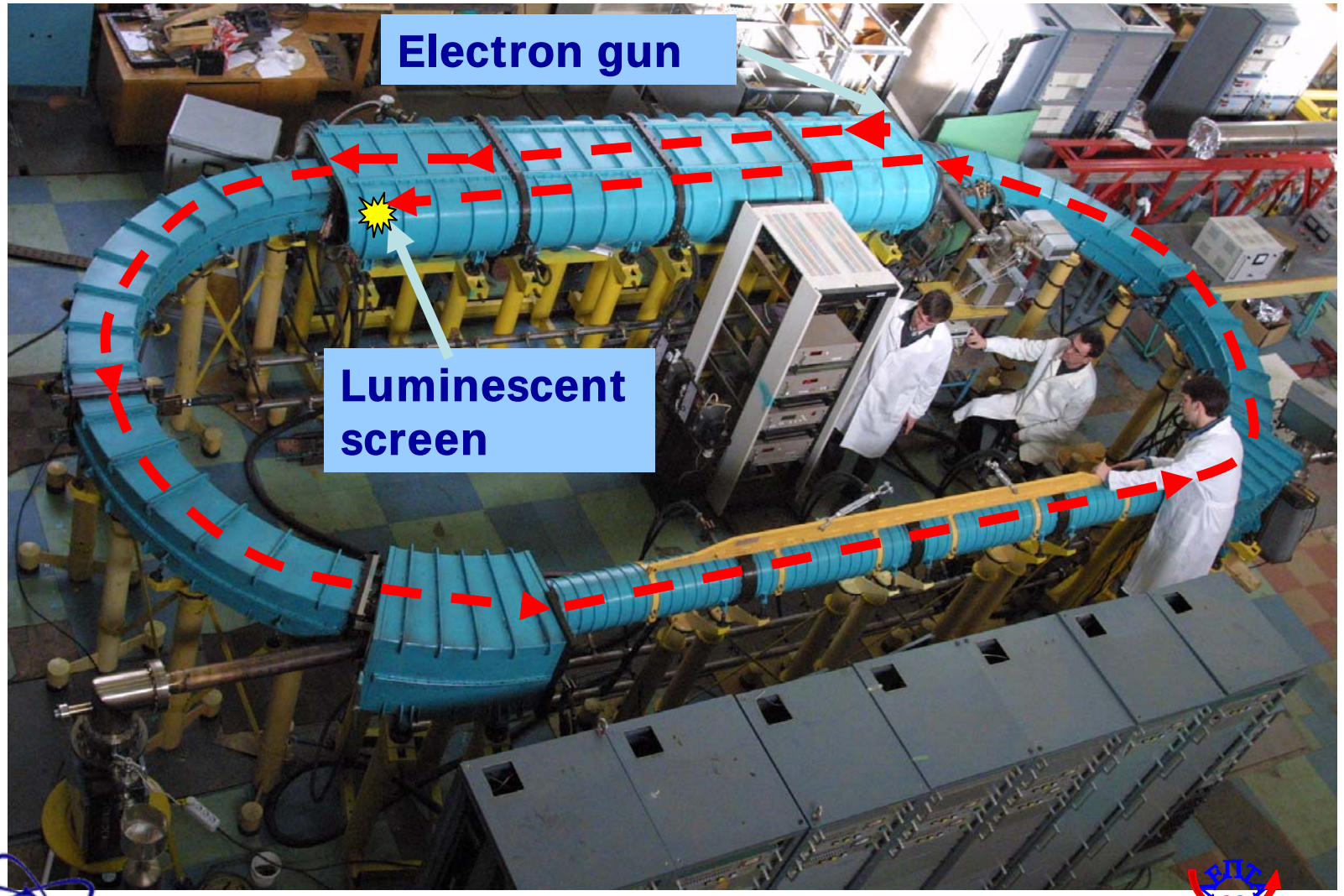




We heartily thank our colleagues from Budker INP, especially Leonty Mironenko, for providing us with the getter pumps

3. Results (Contnd)

Cooling electron beam transportation to the collector channel in pulsed mode operation



4. Conclusion

Nearest plans

1. Test and tuning of electron cooling system with continuous electron beam
2. Assembling of the positron injector and test the ring with positrons
3. Electron cooling of positrons and Positromium generation