

Low Energy Particles Toroidal Accumulator

Student: Elena Hanu

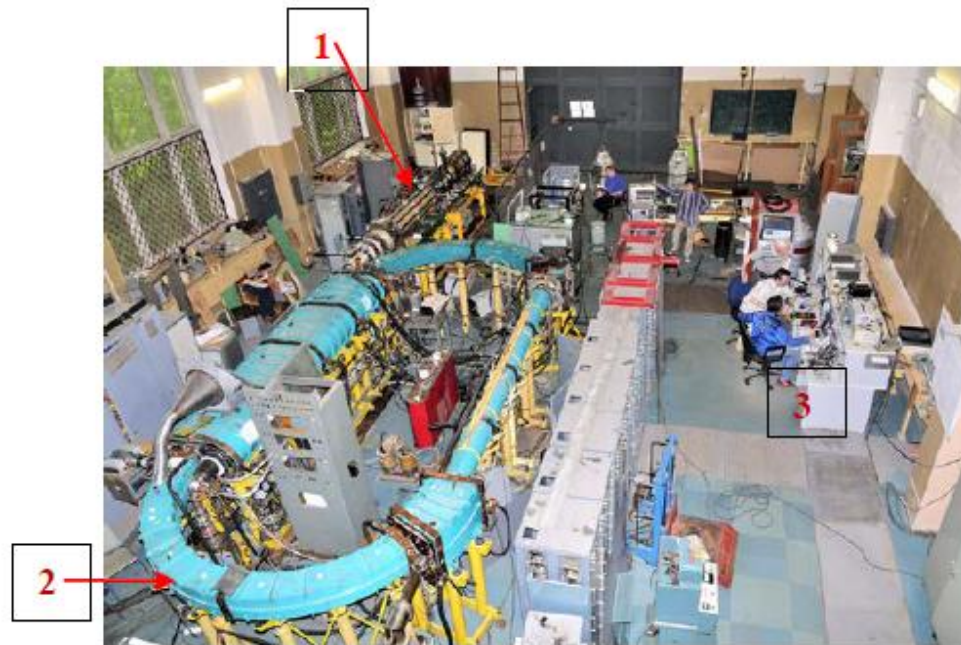
Supervisors: Andrey Kobets

Alexey Sidorin

Laboratory of Nuclear Problems

What is LEPTA facility

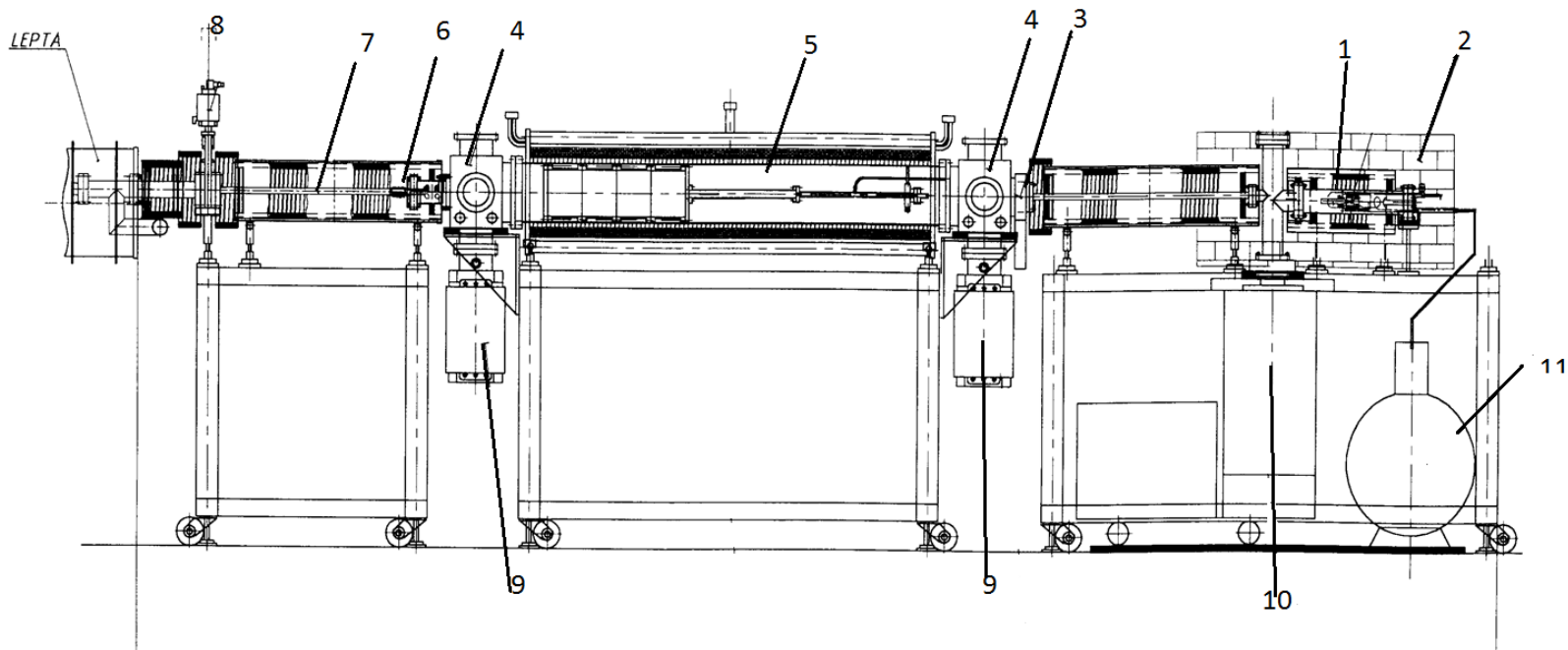
The project of Low Energy Particle Toroidal Accumulator (LEPTA) is dedicated to construction of a small positron storage ring with electron cooling of positrons circulating in the ring.



General view of the LEPTA facility

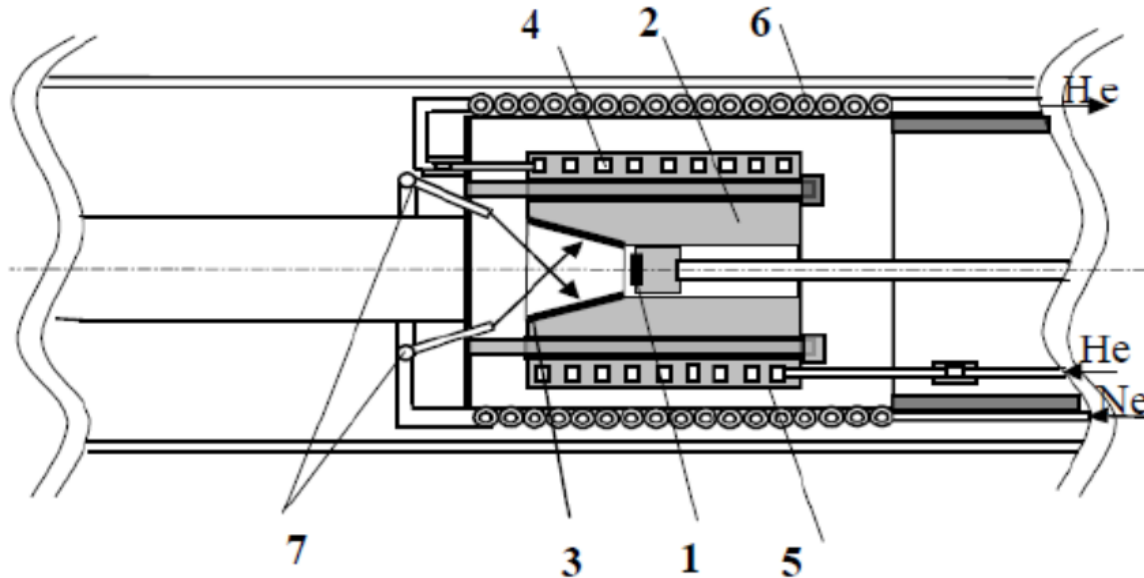
1 – injector, 2 – storage ring, 3 – control panel

About injector



1 - positron source ^{22}Na , 2 - radioactive protection shield, 3 - vacuum valve,
4 - vacuum chamber for pumping out and diagnostic tools, 5 -positron trap,
6 - vacuum isolator, 7 - positron vacuum channel,
8 - vacuum “shutter” (fast valve), 9 - ion pump, 10 - turbo pump, 11 - He vessel

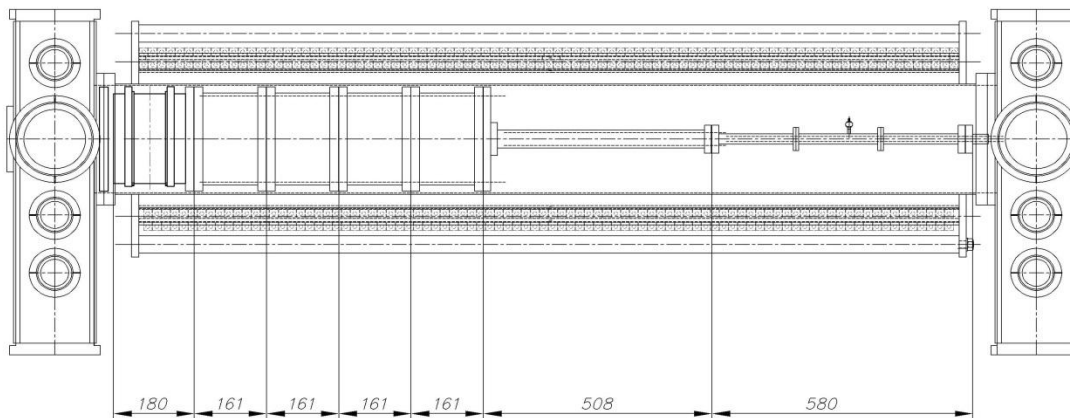
About source



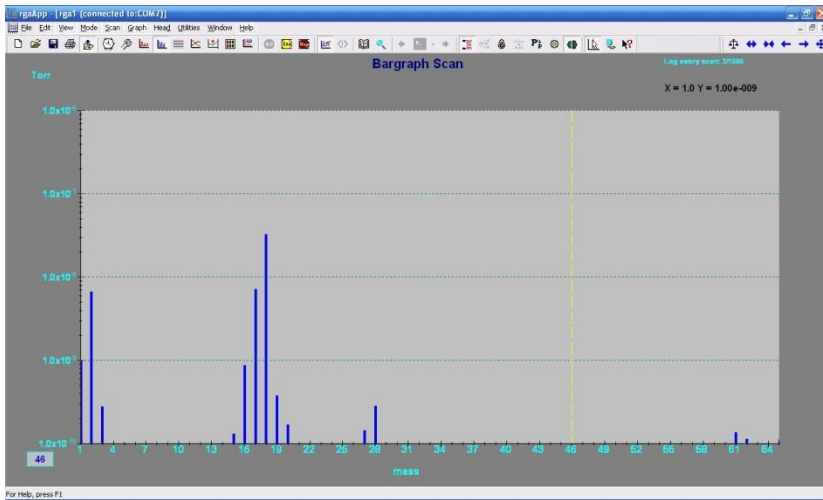
1). inside a copper cylinder 2). copper cone 3). solid neon 4). first cryogenic heat exchanger 5). second cryogenic heat exchanger 6). nozzles (to inject the neon) 7). such design allows checking thickness of the frozen moderator

About trap

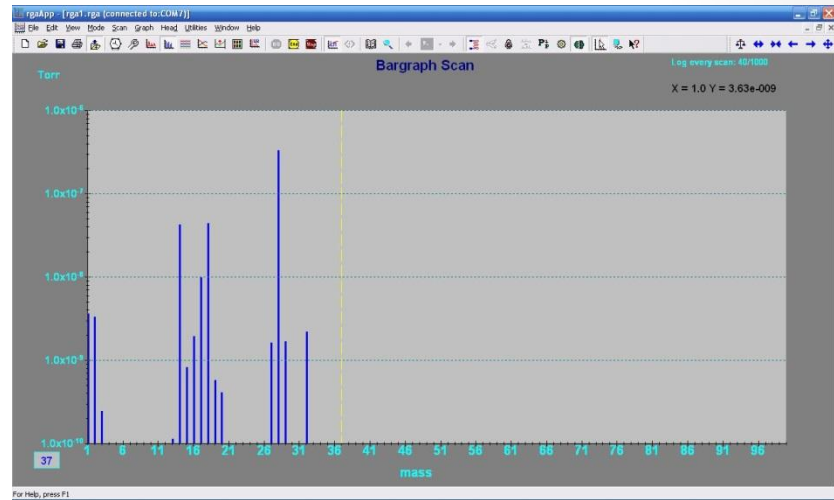
- The electrode assembly is placed in a cylindrical vacuum chamber, which is located in a solenoid creating the longitudinal magnetic field.



Residual gas measurements

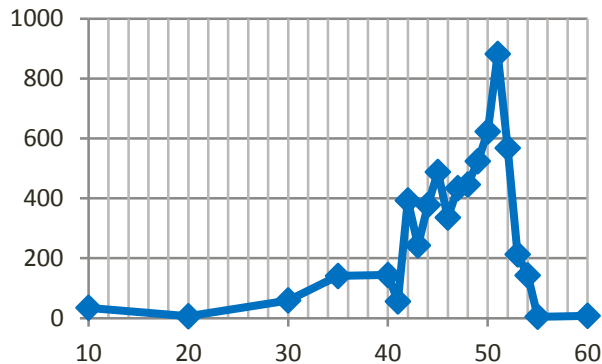


Without buffer gas

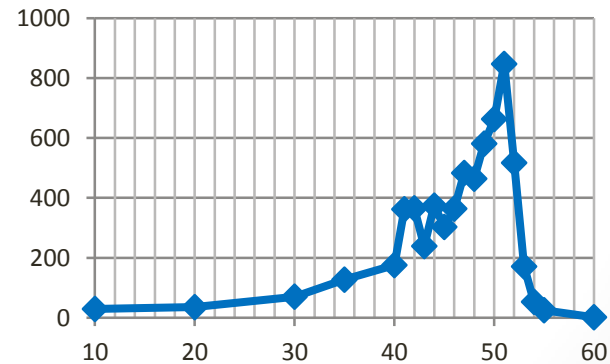


With buffer gas

Energy spectrum measurements



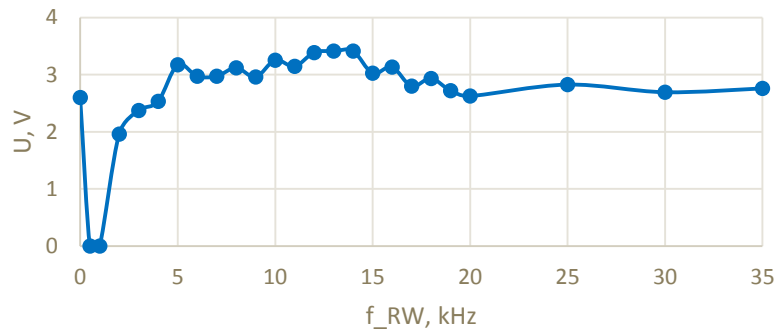
06 July



07 July

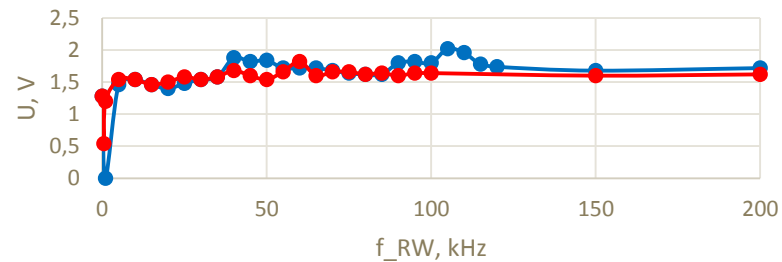
Measurements of Rotating Wall resonance frequency

Number of accumulated particles vs Rotating Wall frequency (standard trap)



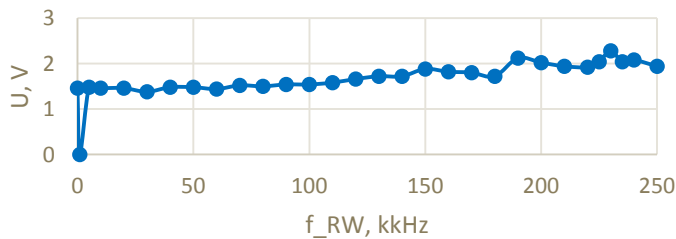
Positrons

Number of accumulated particles vs Rotating Wall frequency (standard trap different RW direction)



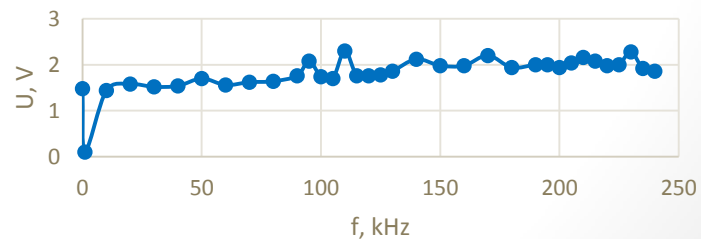
Electrons

Number of accumulated particles vs Rotating Wall frequency (long trap)



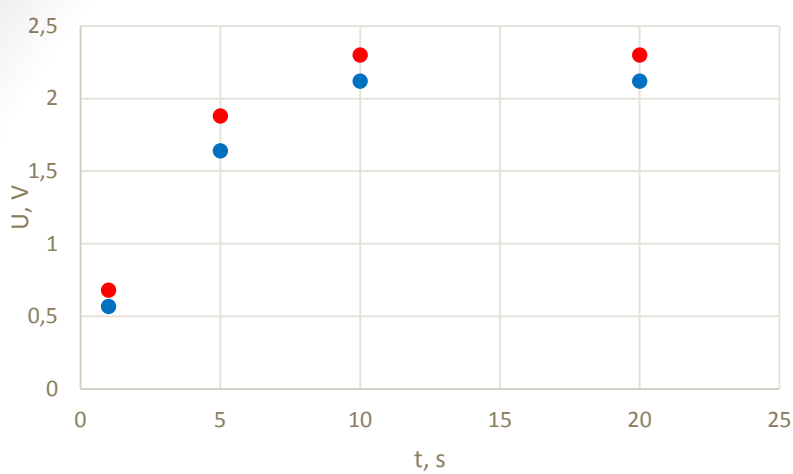
Electrons

Number of accumulated particles vs Rotating Wall frequency (Long trap)

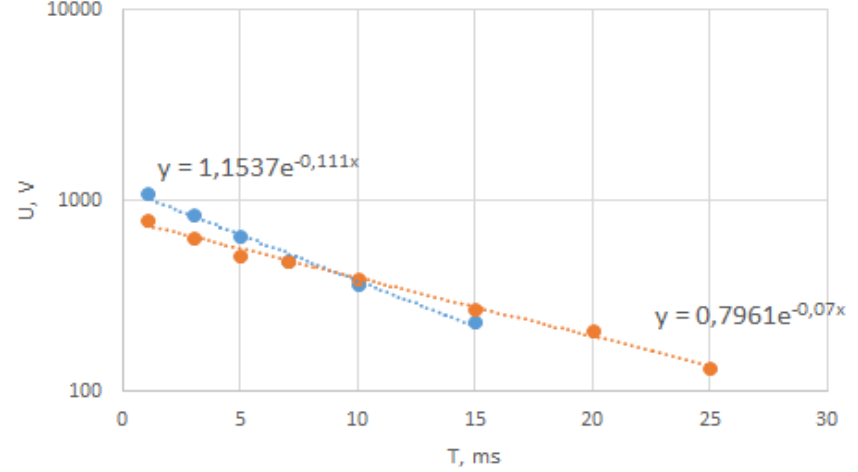


Electrons

Lifetime

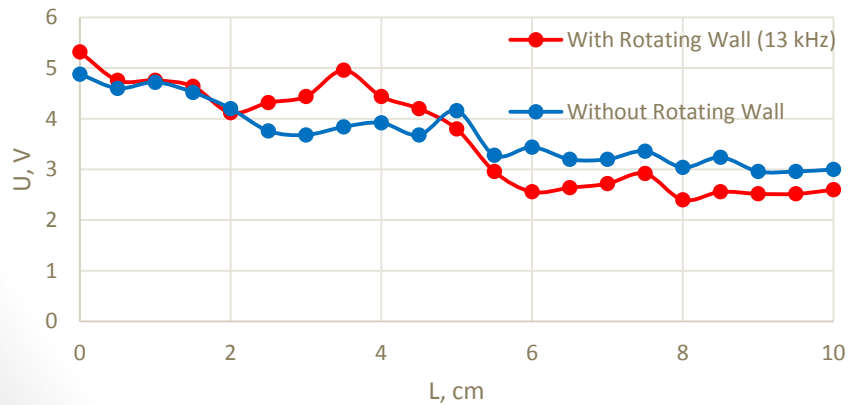


Positrons Lifetime

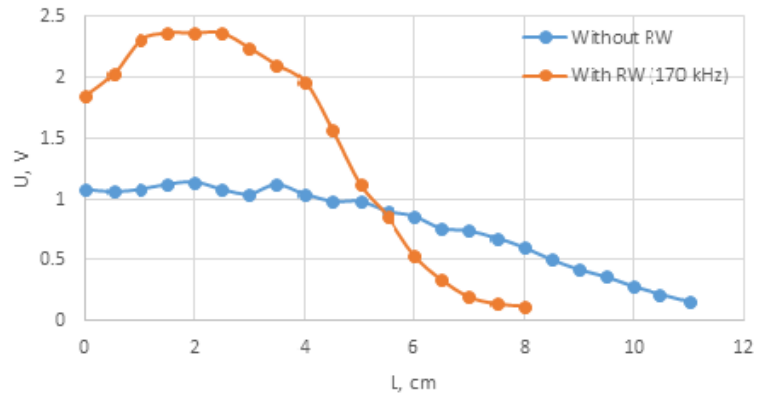


Lifetime in ring

Beam size



Positrons



Electrons

Conclusions

- We analysed residual gas and energy spectrum and saw that if we have a good spectre then we have high resonance;
- We made measurement of rotating wall resonance frequency for positrons and electrons;
- We measured positrons lifetime and positrons lifetime in ring;
- We measured beam size with and without the rotating wall;

Thank you for your attention!