XXII International Baldin Seminar on High Energy Physics Problem

Experimental set-up MARUSYA-FLINT for the study of correlations in cumulative process at Nuclotron-M beams. Current status.

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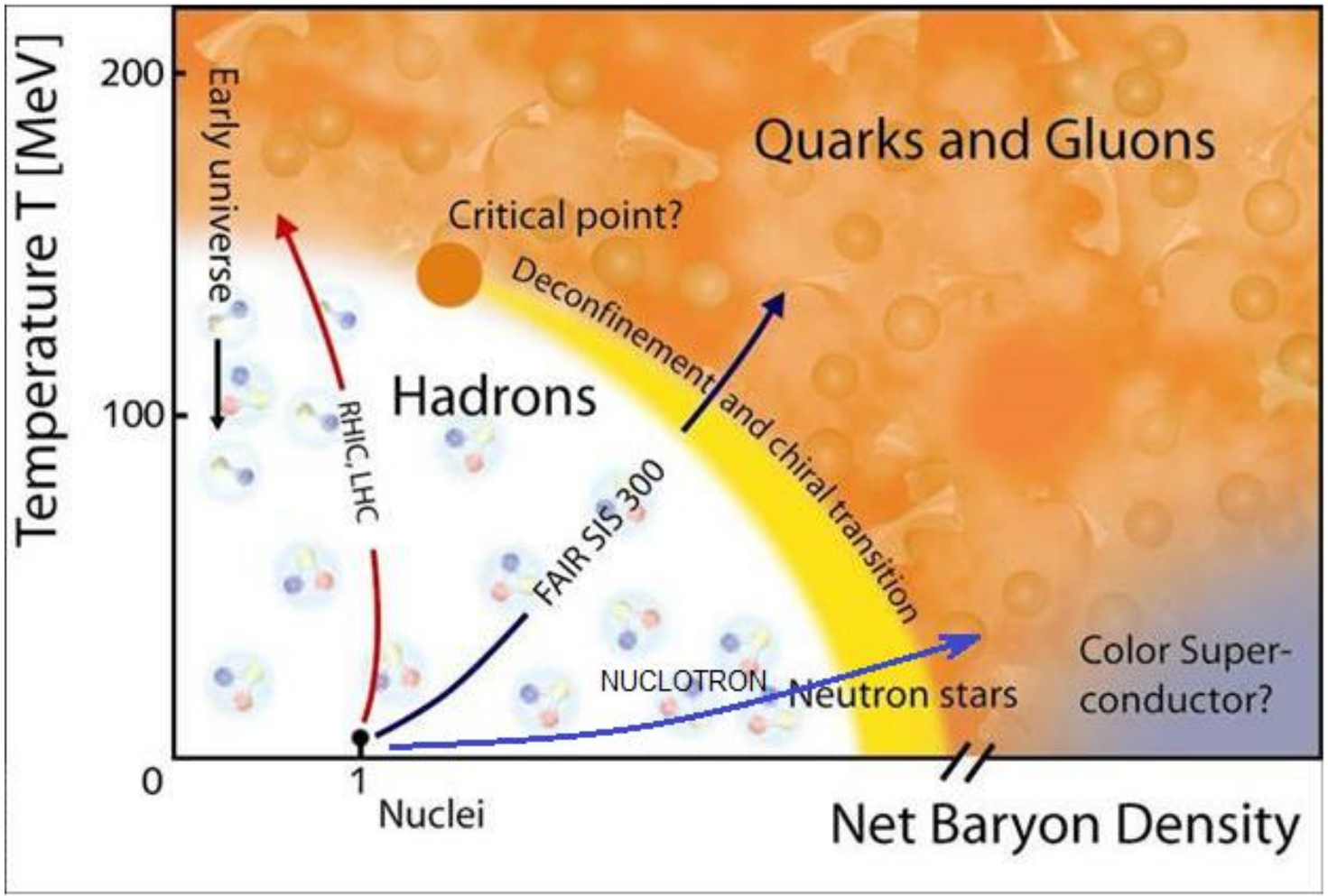
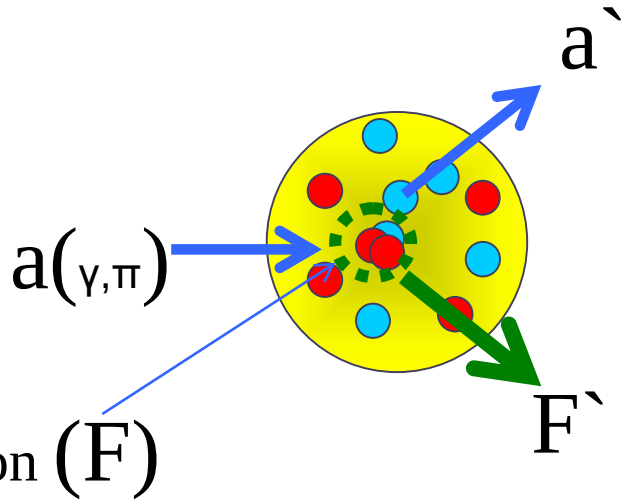
1. Motivation

- Purpose of study - low temperature and high density part of the phase diagram



a) Knockout Task of the experiment: the study of the structure of flucton in knockout process

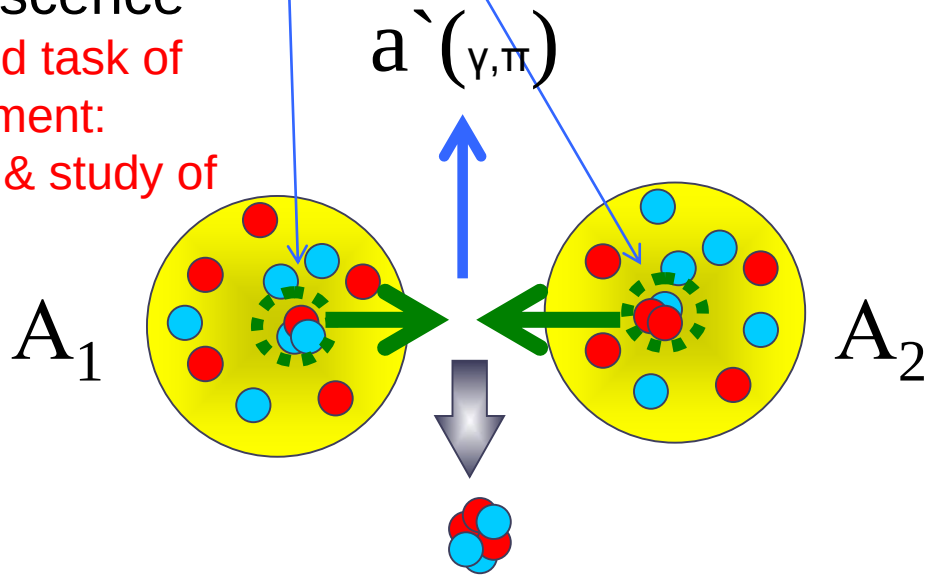


S.S. Shimansky, in Proc. of the VIII Intern. Workshop on Relativistic Nuclear Physics:from Hundreds of MeV to TeV, May 23-28, 2005 , 297 (Dubna, 2006); nucl-ex/0604014.

a&b: in both cases high p_T trigger ($\pi,\gamma,\gamma(\pi^o),\ldots$)

b) Coalescence

The second task of the experiment: search for & study of DCM

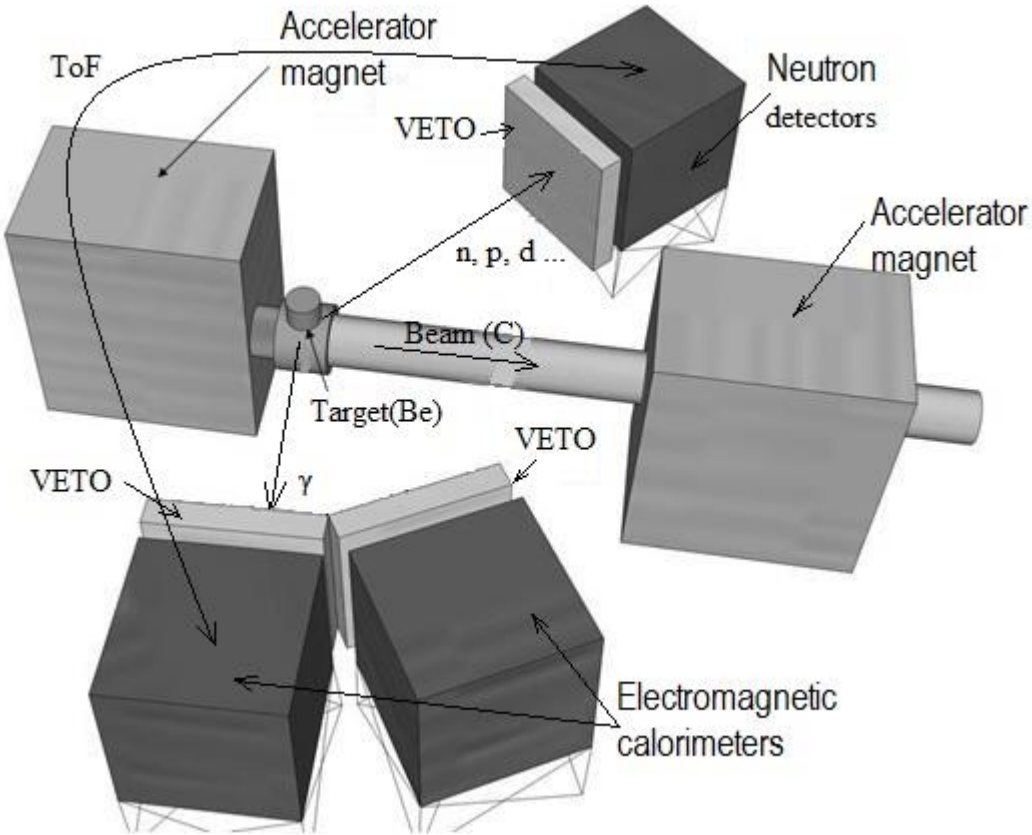


A_1,A_2: He,Be,C,…

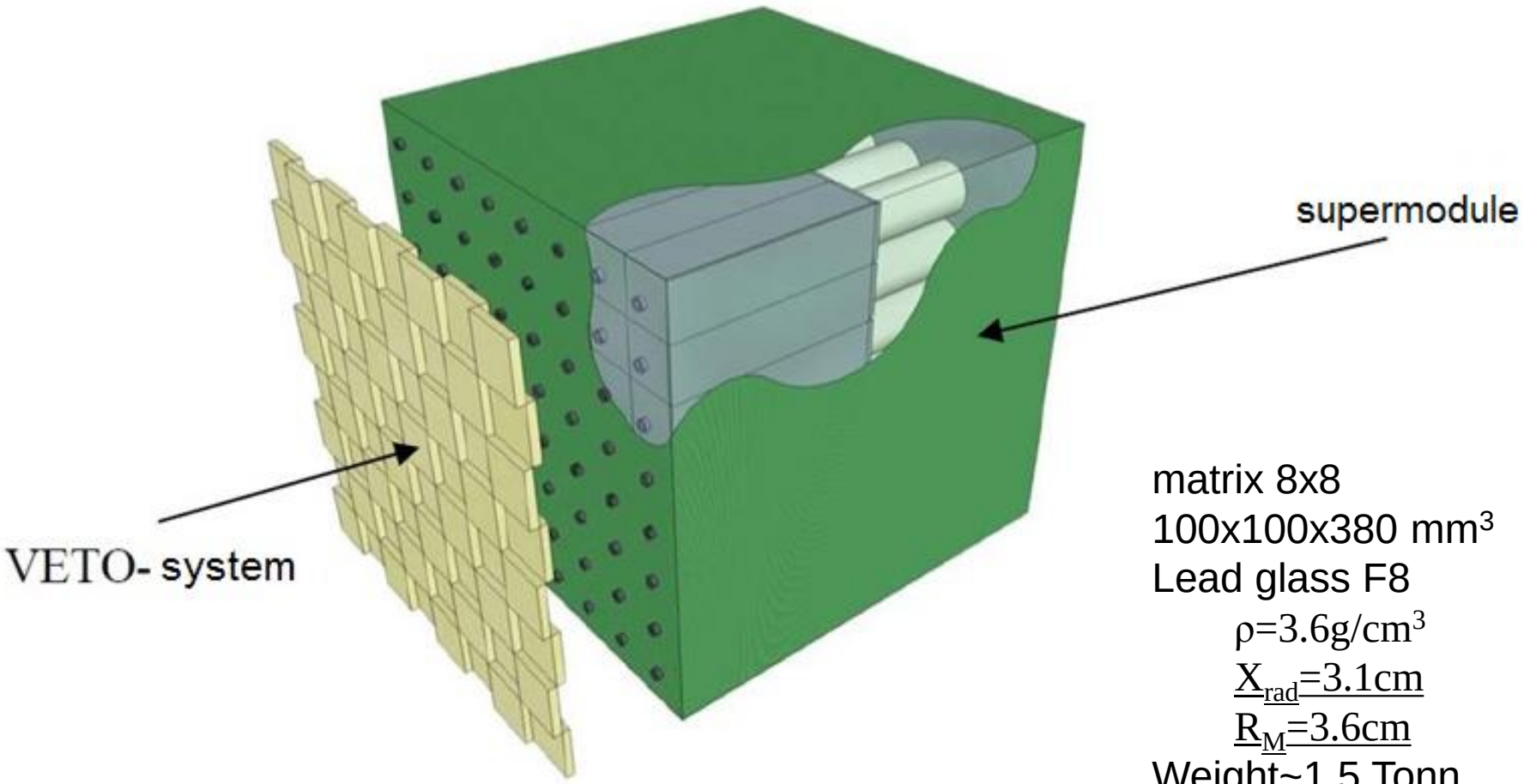
Dense baryon system

2. FLINT experiment (ITEP)

- Experiment was made in a magnetic hall of ITEP accelerator U10

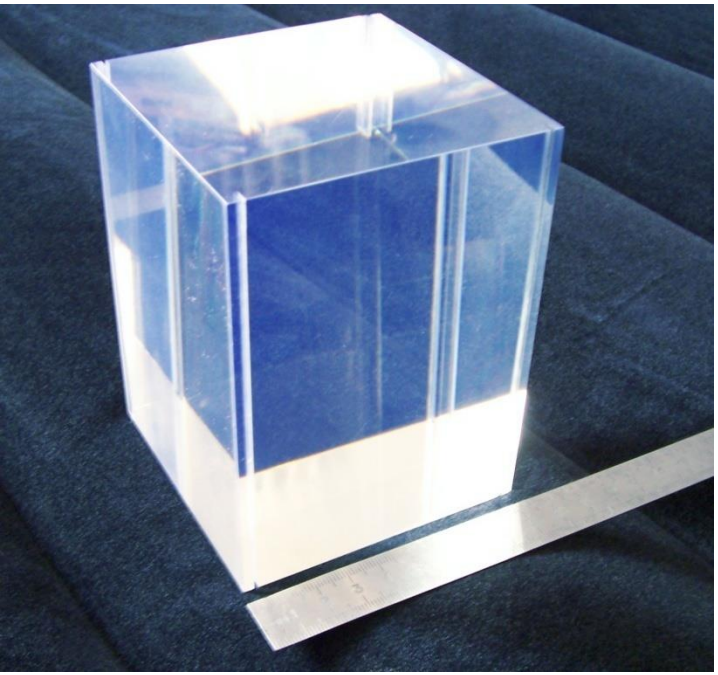


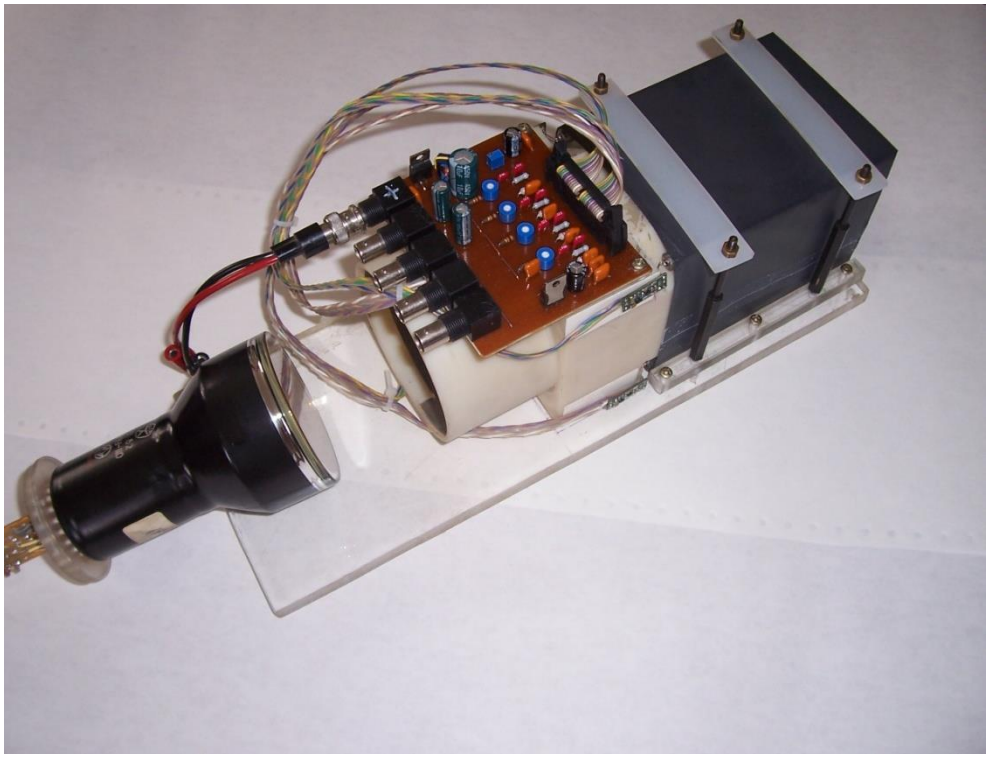
FLINT ECalorimeter in ITEP with VETO system



matrix 8x8
100x100x380 mm^3
Lead glass F8
$\rho=3.6 g/cm^3$
$X_{rad}=3.1cm$
$R_M=3.6cm$
Weight~1.5 Tonn

Neutron detector for FLINT (prototype 1)





Plastic Scintillator 96 * 96 * 128 mm^3

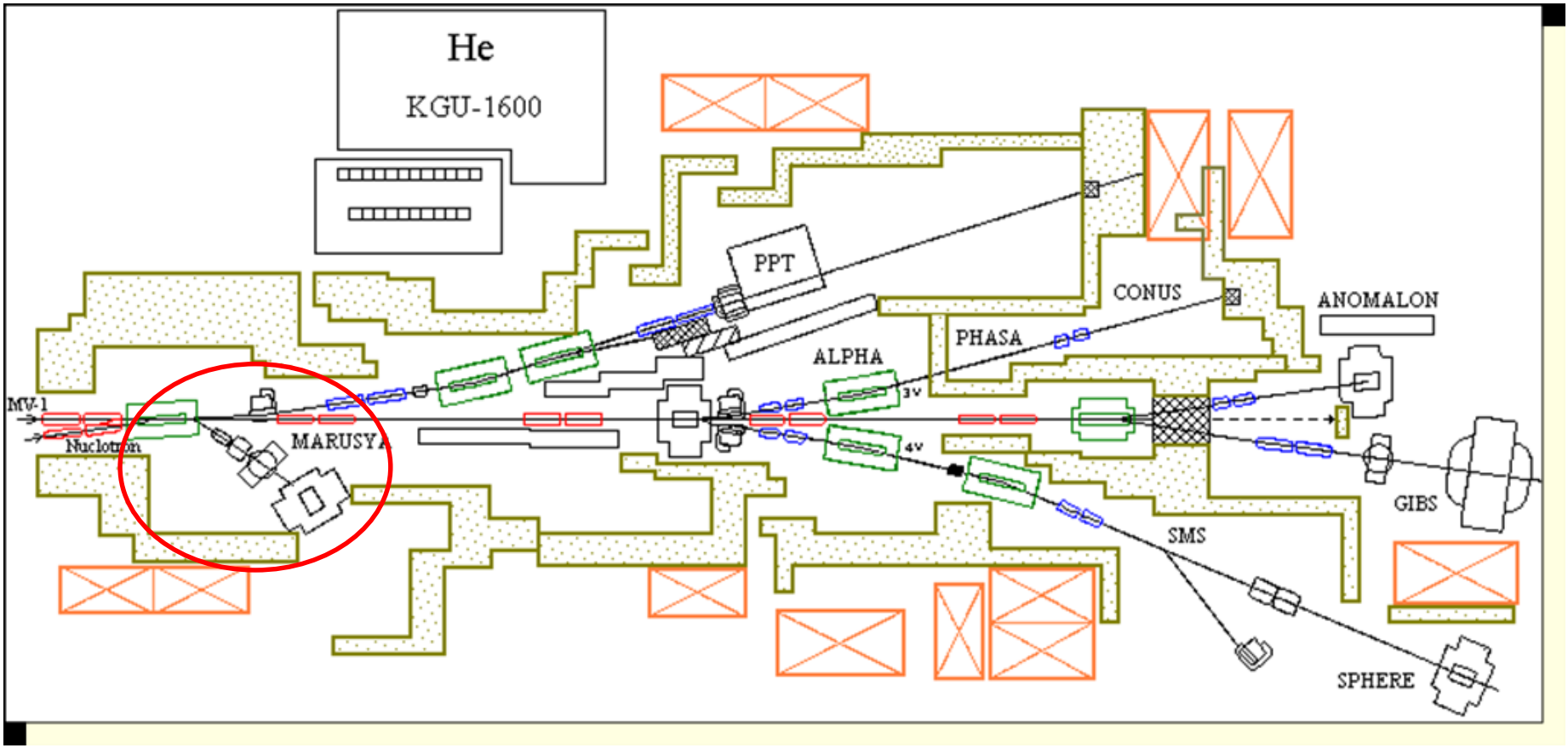
Fiber: KYRARAY,Y-11,d =1mm,

wavelength shift

4 MRS APD & Amplifier - CPTA(Golovin)

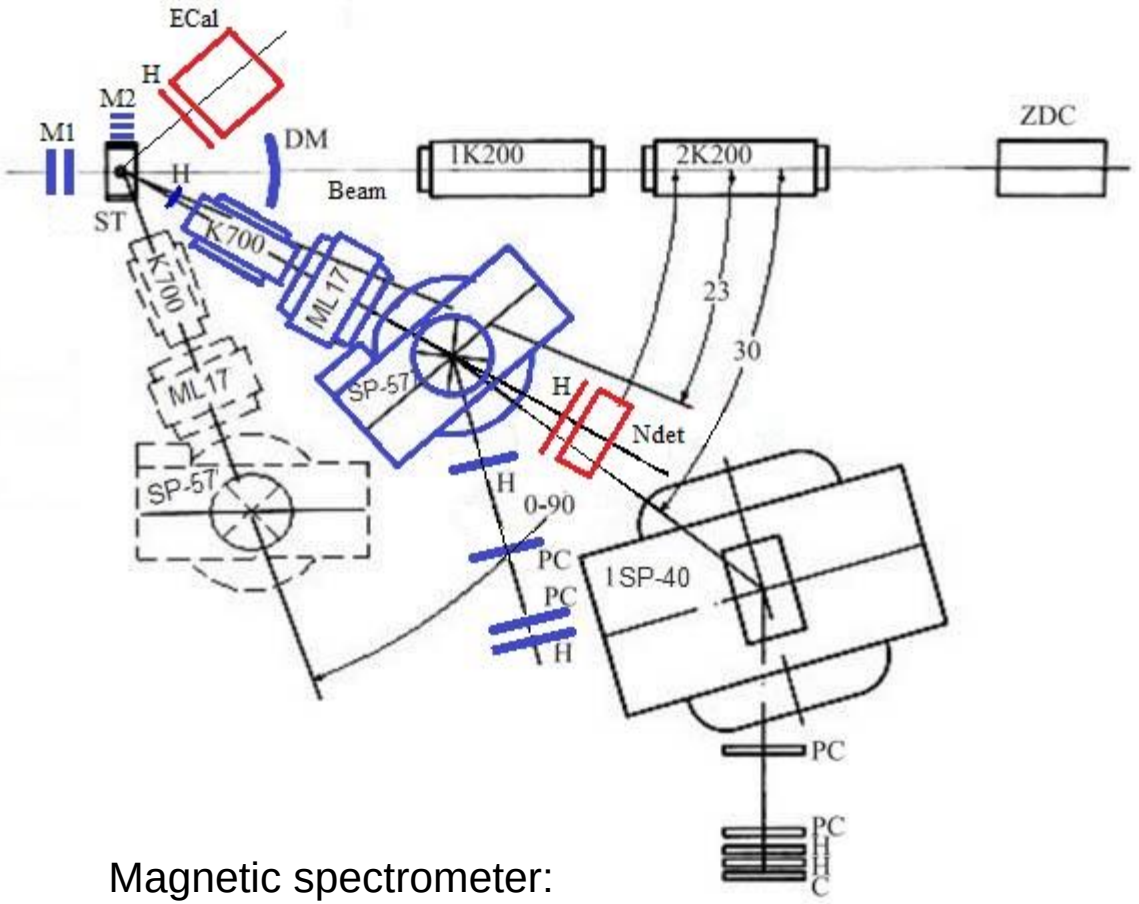
Efficiency (estimate) 15%

3.Experiment MARUSYA-FLINT at JINR



Scheme of experimental hall. Red circle – MARUSYA set-up.

MARUSYA-FLINT set-up at NUCLOTRON

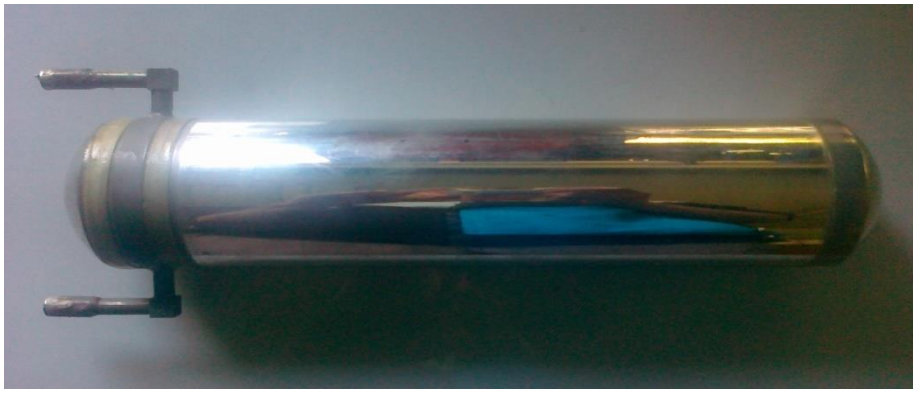


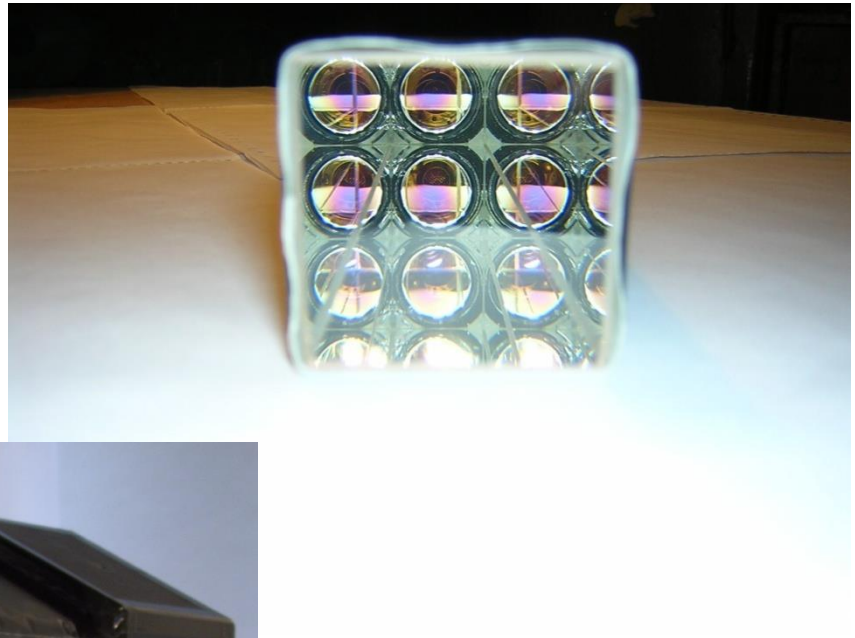
Scheme of experimental set-up MARUSYA-FLINT:

- ST - cryogenic target station,
- M1, M2- scintillation monitors,
- DM- multiplicity detectors,
- H- scintillation hodoscopes,
- ZDC - hadron calorimeter,
- PC - proportional chambers,
- C – cherenkov counter,
- ML17, K100 - quadrupole lens,
- SP-57, SP-40 - dipole magnets,
- ECal - electromagnetic calorimeter,
- acceptance ΔΩ ~ 50-80msr.

Magnetic spectrometer:
For P_t = 0,3-0,8 GeV/c used magnet SP-57
For P_t = 0,6-2 GeV/c used magnet SP-57 and SP-40
Coordinate system on scintillation hodoscopes provide resolution 2-5% in area 0,3-0,8 GeV/c

4. Components under development: Cryogenic Target, ECal, Neutron Detector.



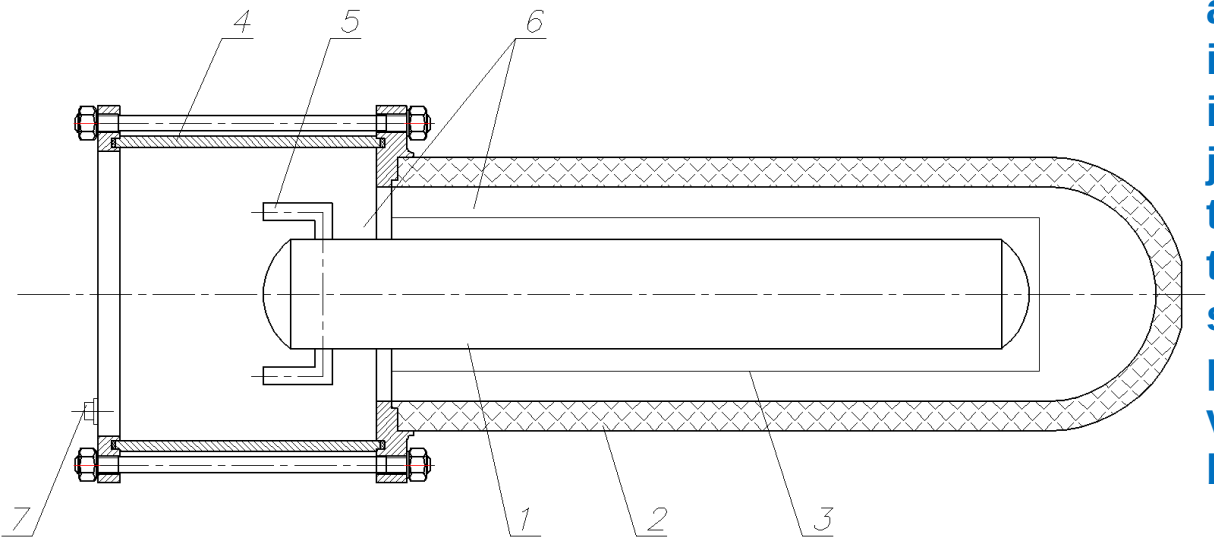


LHEP JINR mobile cryogenic target

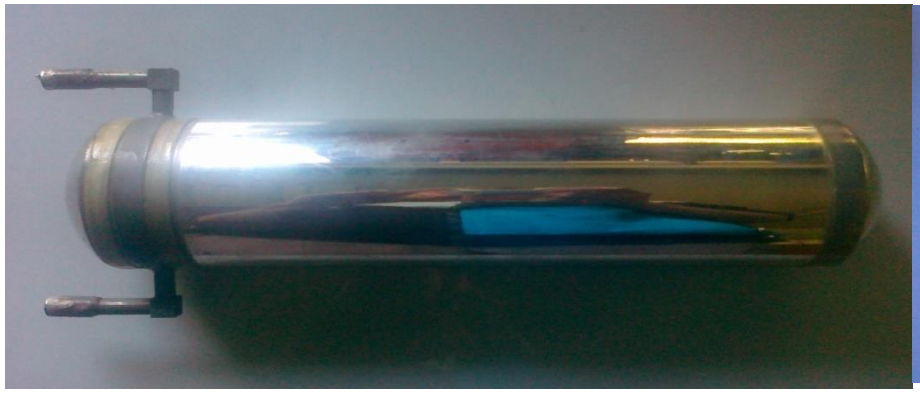
A cryogenic target is a cylindrical vessel made of polymer film filled with liquid H_2, D_2, or ^4He.

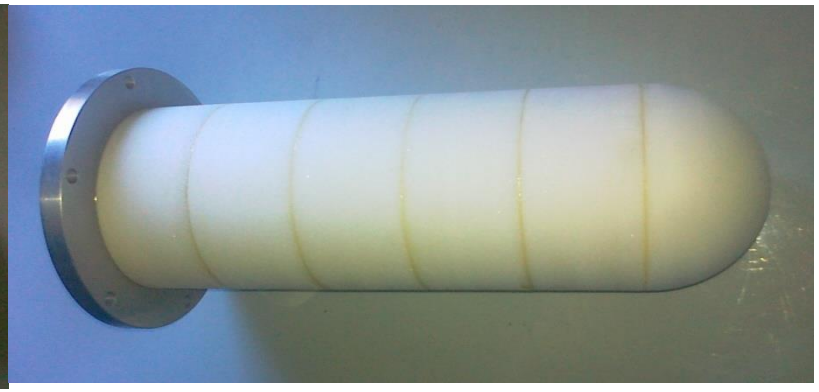
Materials of the walls ≈ 0.004 X_0

Working substance ≈ 0.04 X_0

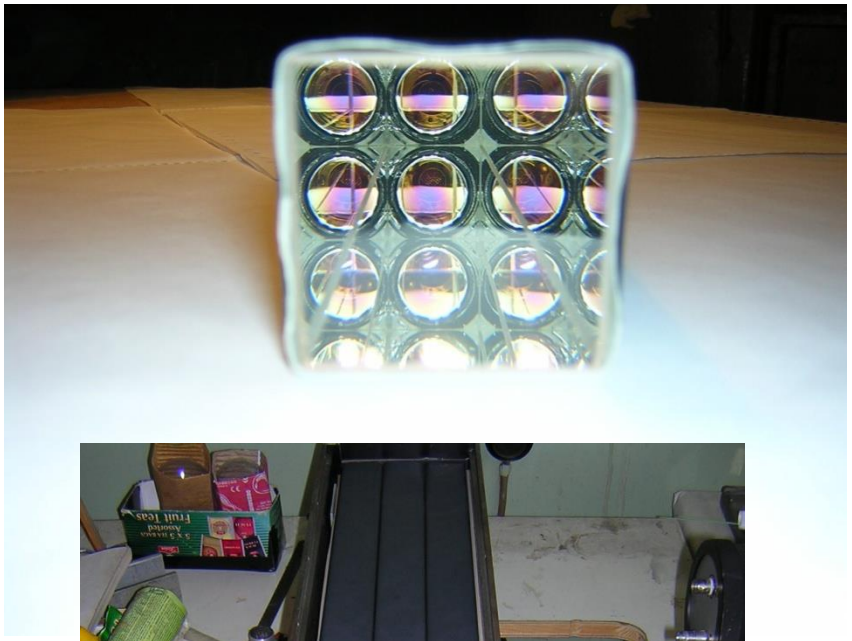


The scheme of the cryogenic target developed at LHEP JINR: It consists of the internal vessel (1) containing the working substance of the target, and vacuum jackets (2) and (4). The thermal screen (3) is installed between the internal vessel and the vacuum jacket. It is used to decrease the radiation heat flow. The target is filled with the working substance by means of the pipeline (5). Pumping of the vacuum volume (6) is provided by means of the joint (7).

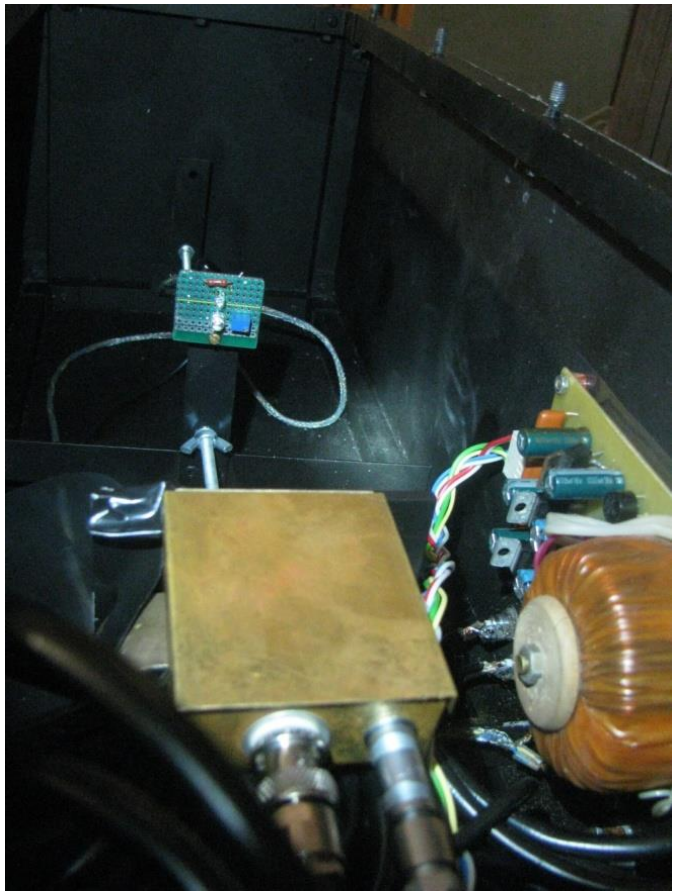




Lead glass Electromagnetic Calorimeter for tests



Calibration system (on LED)

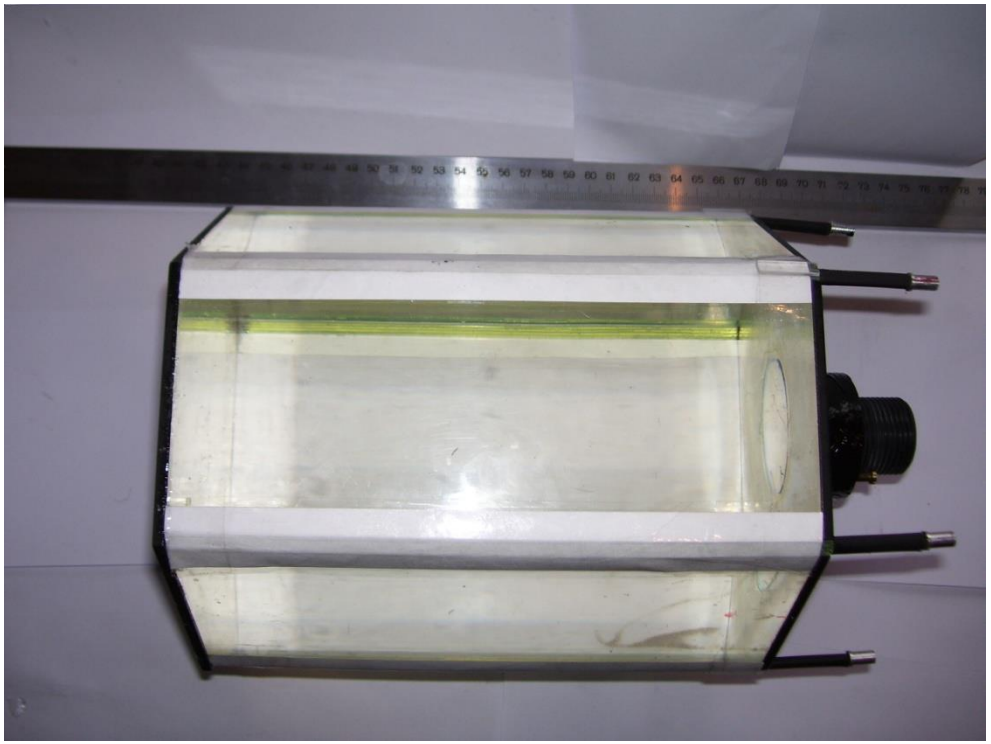


Neutron detector FLINT (prototype 2)

-registration of neutrons with energies in the range 10-200 MeV

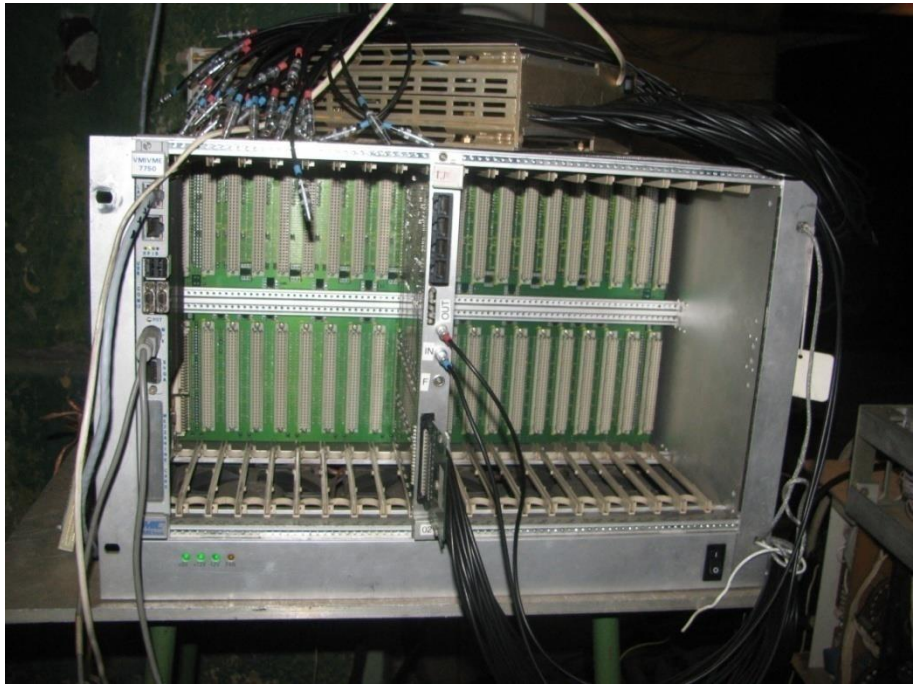
-expected dimensional resolution ~ 1 sm

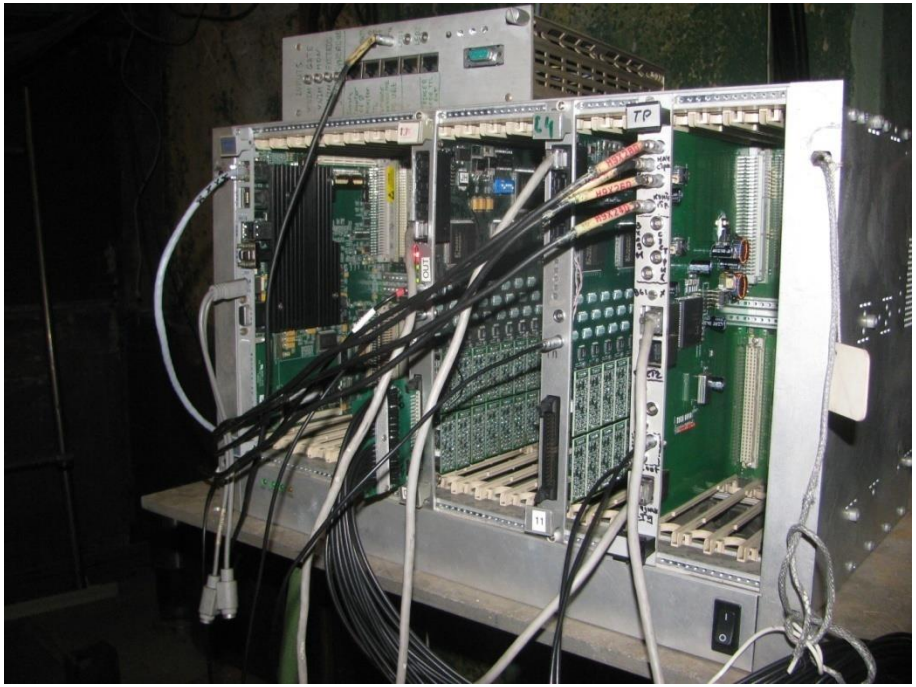
-used avalanche photodiodes



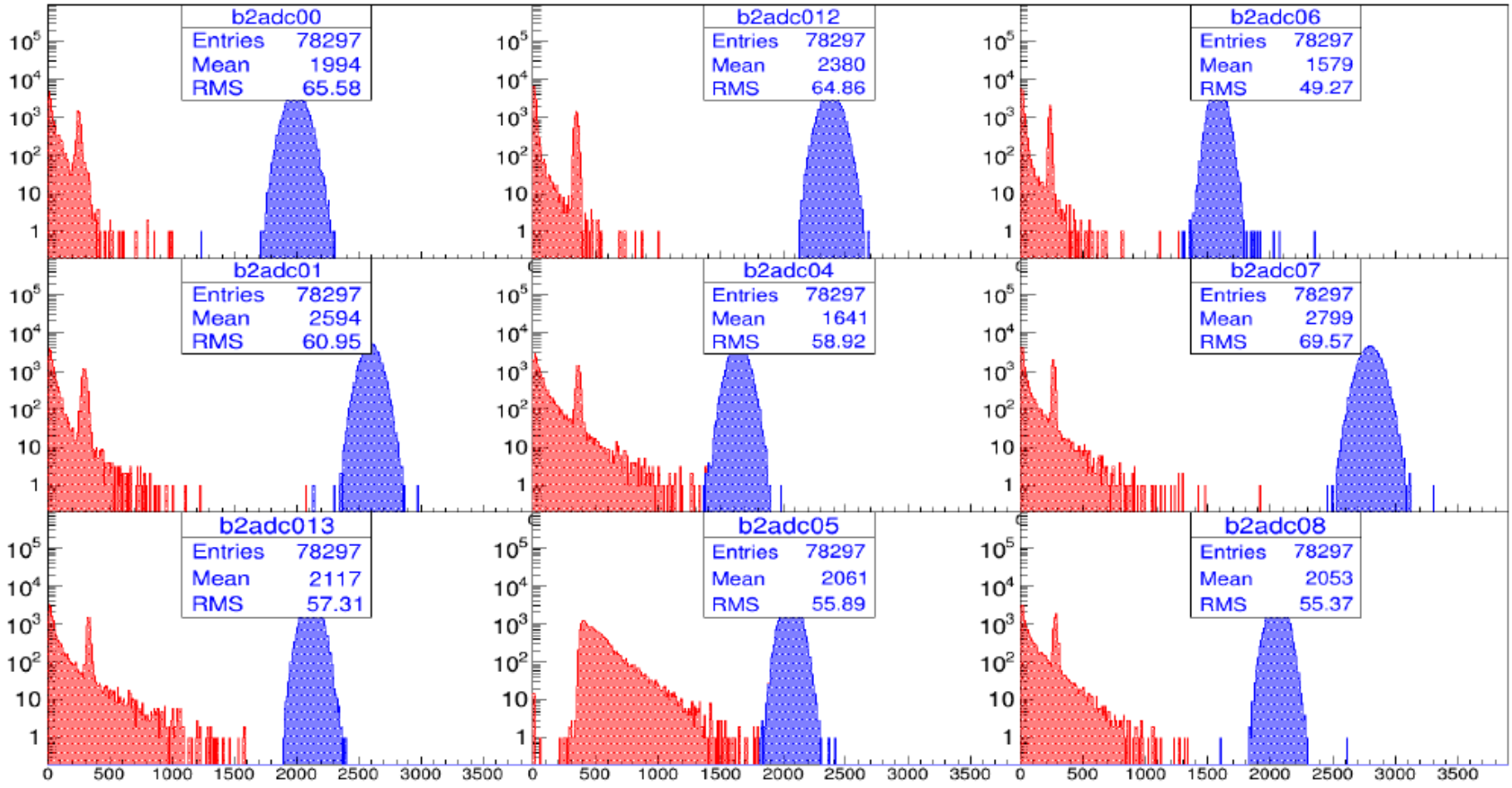
VME based DAQ system

- ADC and trigger module on VME, connected with PC server





Results of test run (2014)



All ADC chanels are shown. Red is total amplitude spectra. Blue (adc15>800) is a LED spectra. adc015 is a PIN with LED signal.

Conclusion

- The prototype Electromagnetic Calorimeter are ready, tested in 2014 experimental runs;
- The cryogenic target under design;
- Neutron detector (prototype 2) is ready for test.

Thank you for the attention!

Monitor and anticoincidence count

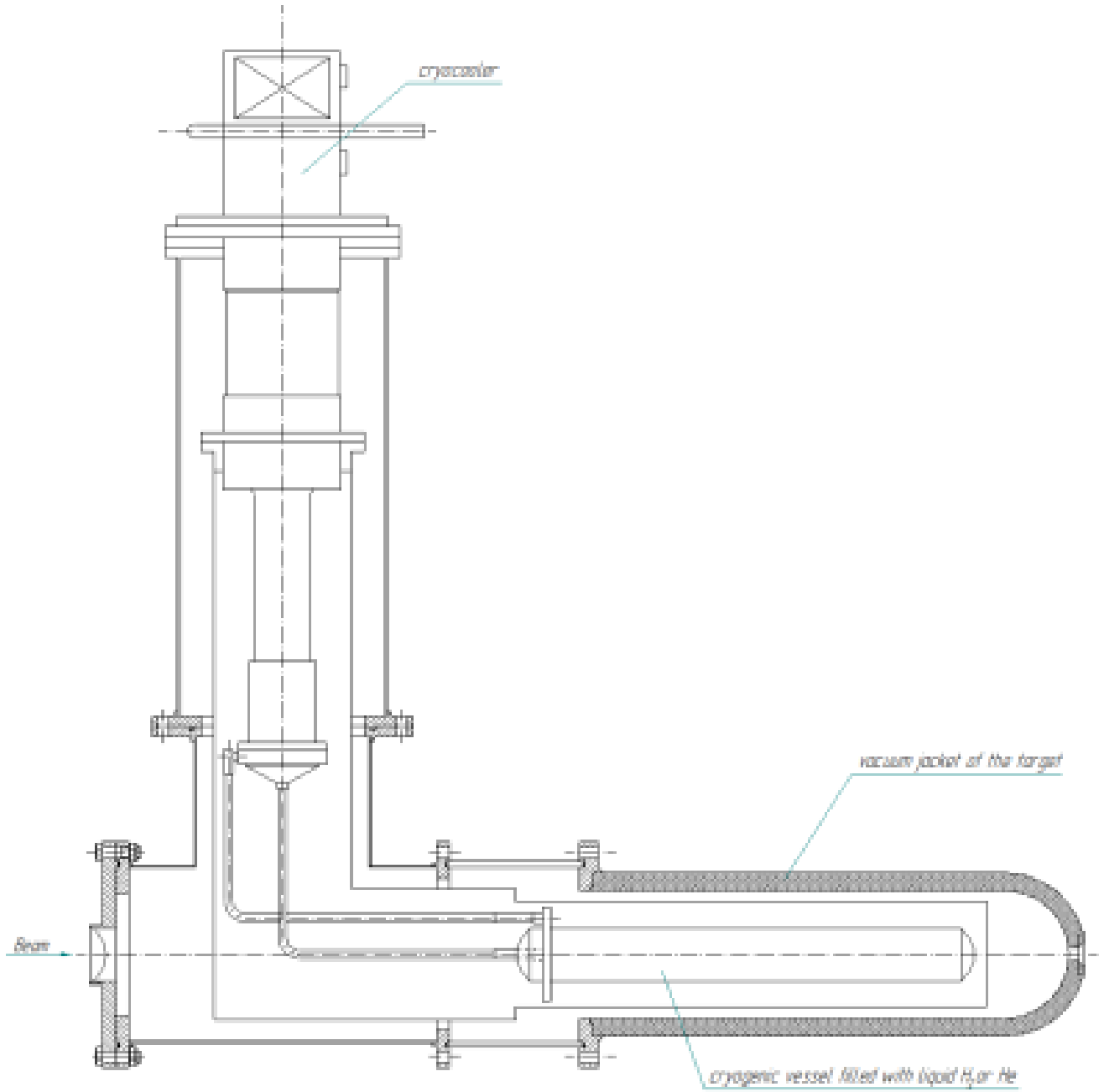
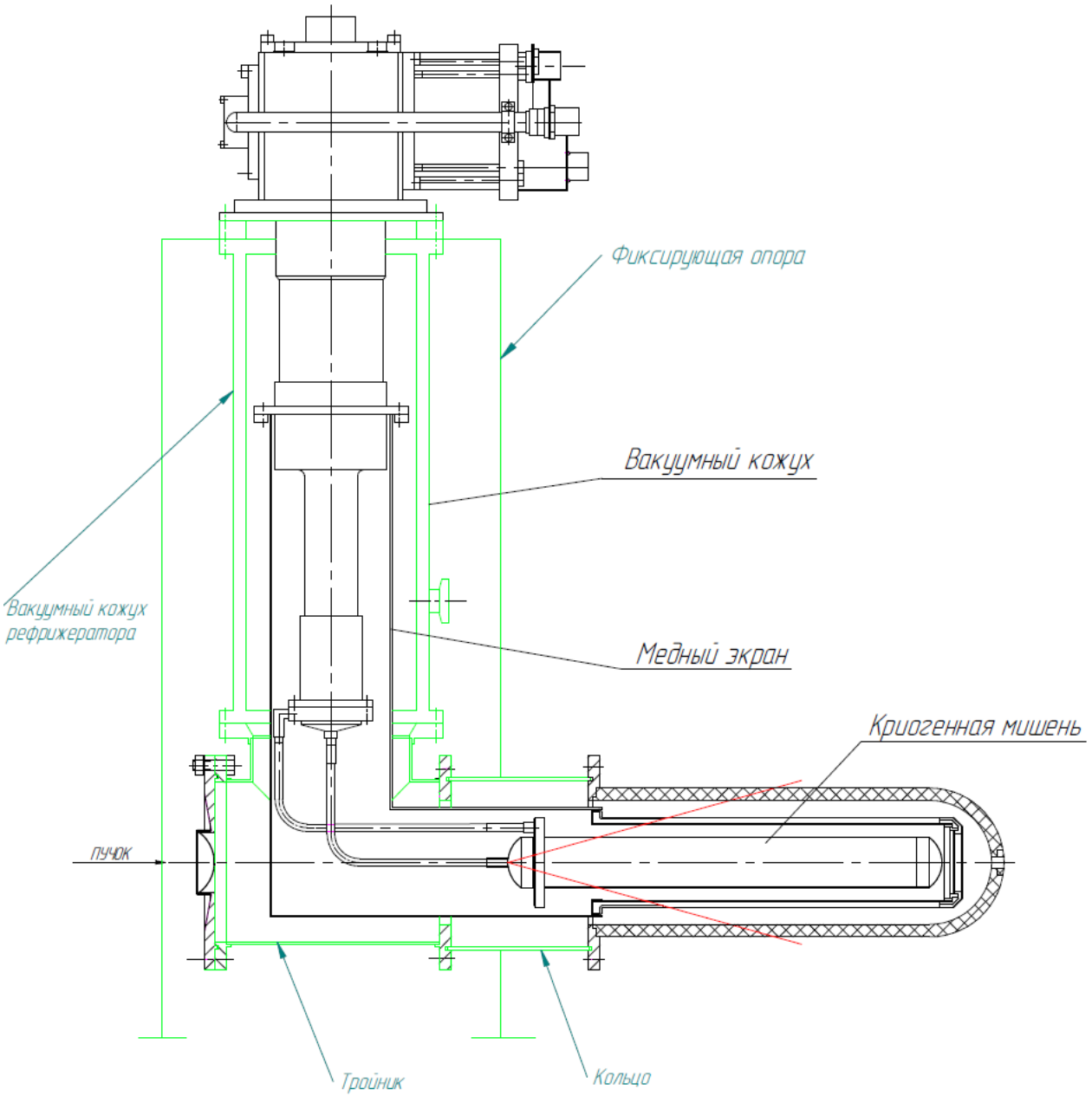

cryocooler
vacuum jacket of the target
Beam
cryogenic vessel filled with liquid H_2 or He

Схема соединения мишени ЖВМ D40/L350 с криорефрижератором




Э.-М.Калориметр
MS1
Ко1
Ко2
Мишенная станция