Position sensitive neutron detector.

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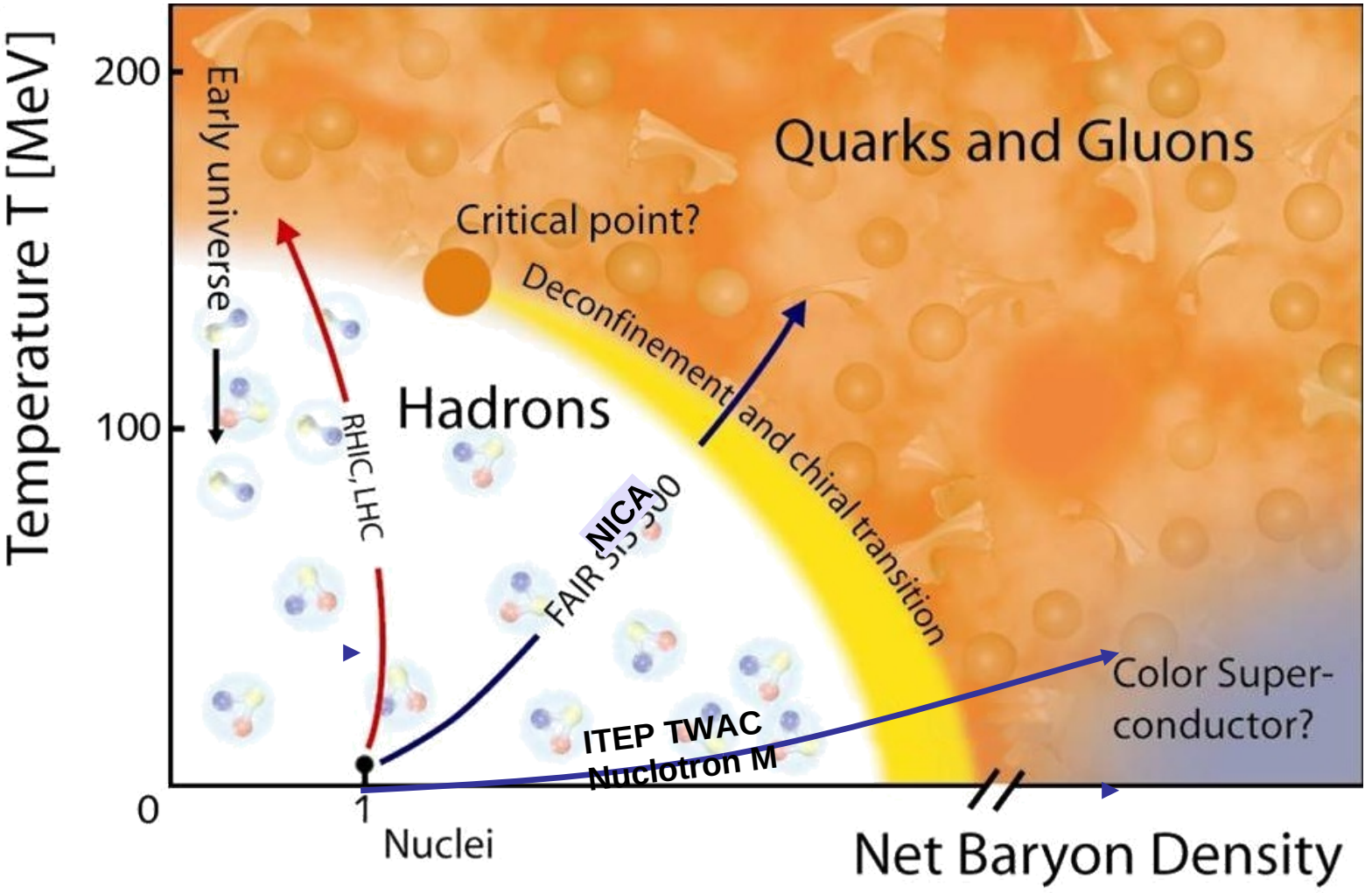
ITEP, Moscow

Outlook

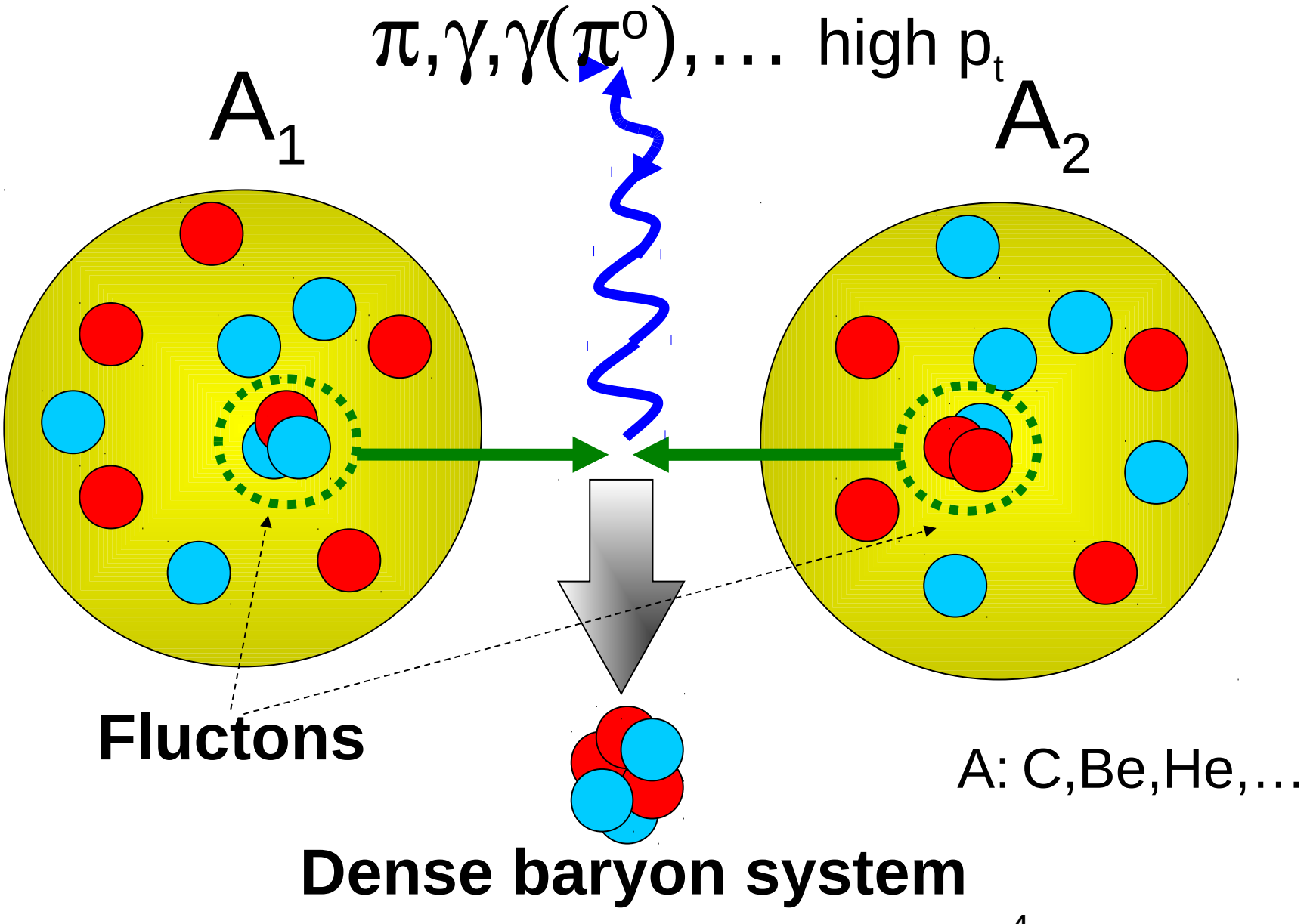
- **Physical motivation**
- **Examples of NDets**
- **NDet for FLINT**
- **Beam tests and results**
- **New prototype of NDet**
- **Conclusions and To Do**

Phase diagram of nuclear matter.

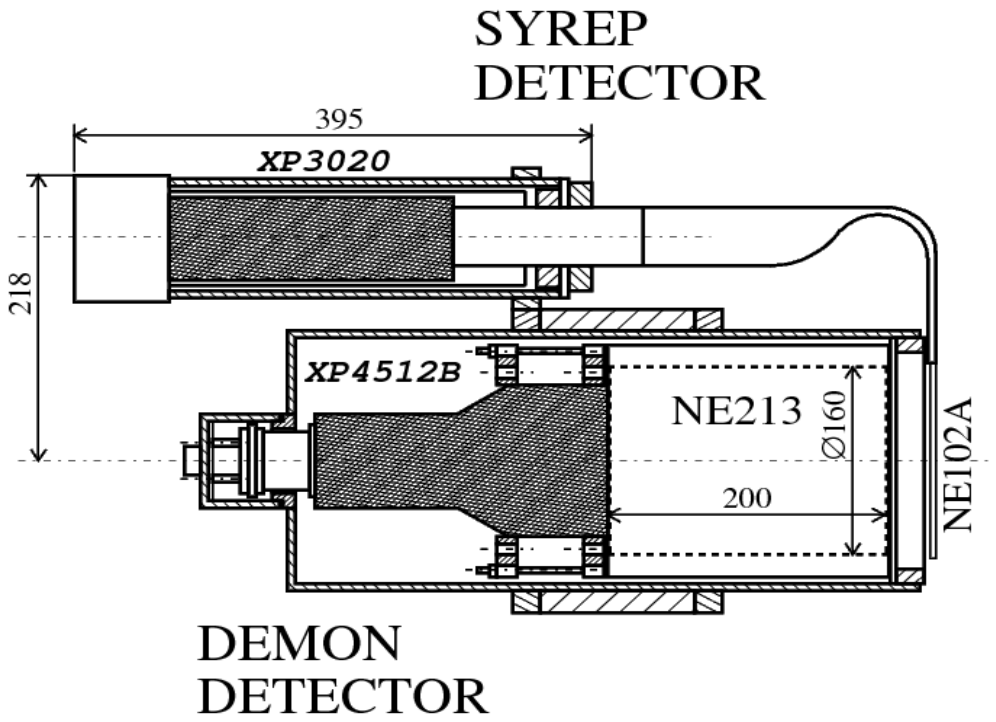


Cold Dense Matter in FLINT

Flucton-flucton interactions



DEMON



V(LxLyLz)=200x160mm

WANS(LINP-1980)

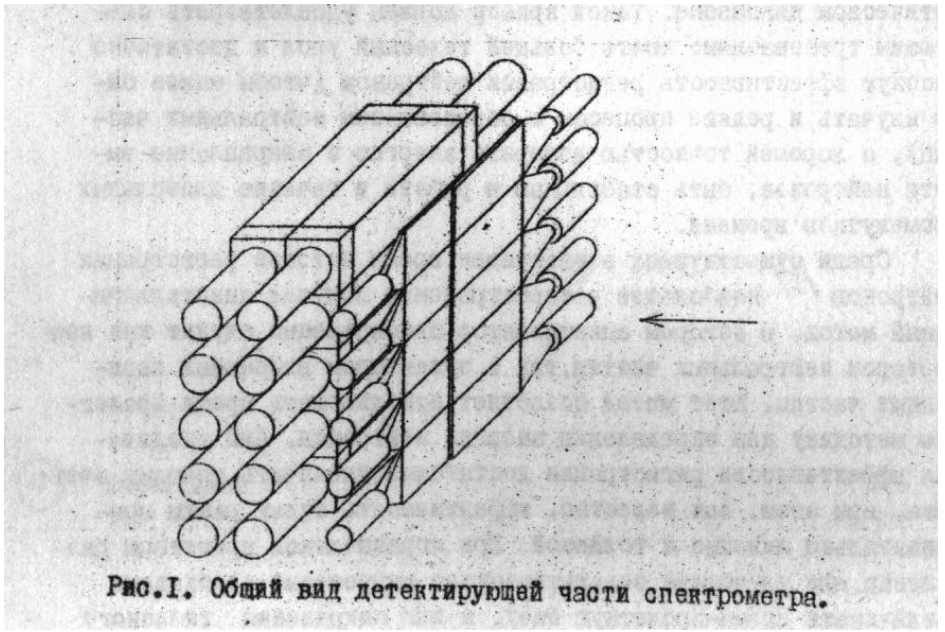


Рис.I. Общий вид детектирующей части спектрометра.

V(LxLyLz)=200x200x1000mm^3

σ= 100mm, σ_τ=2nsec

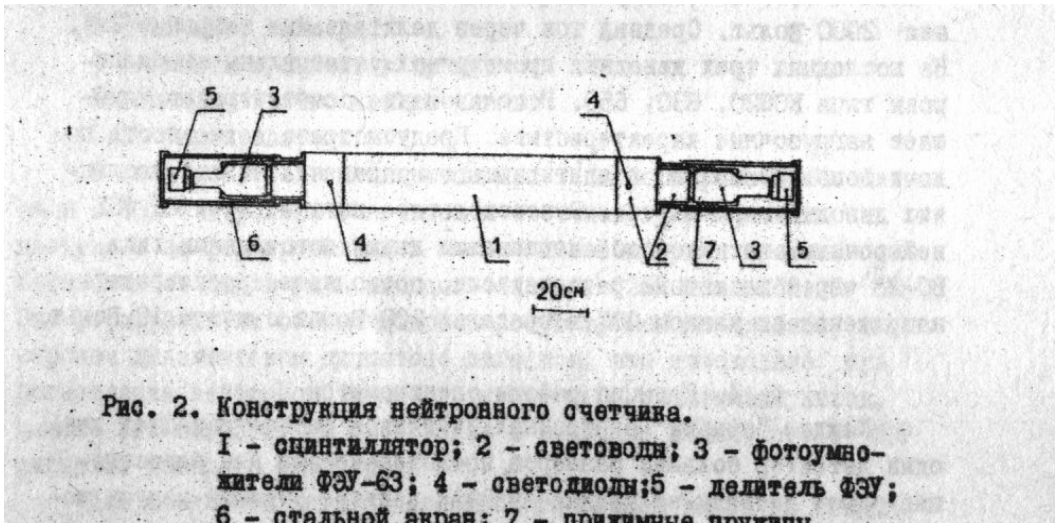
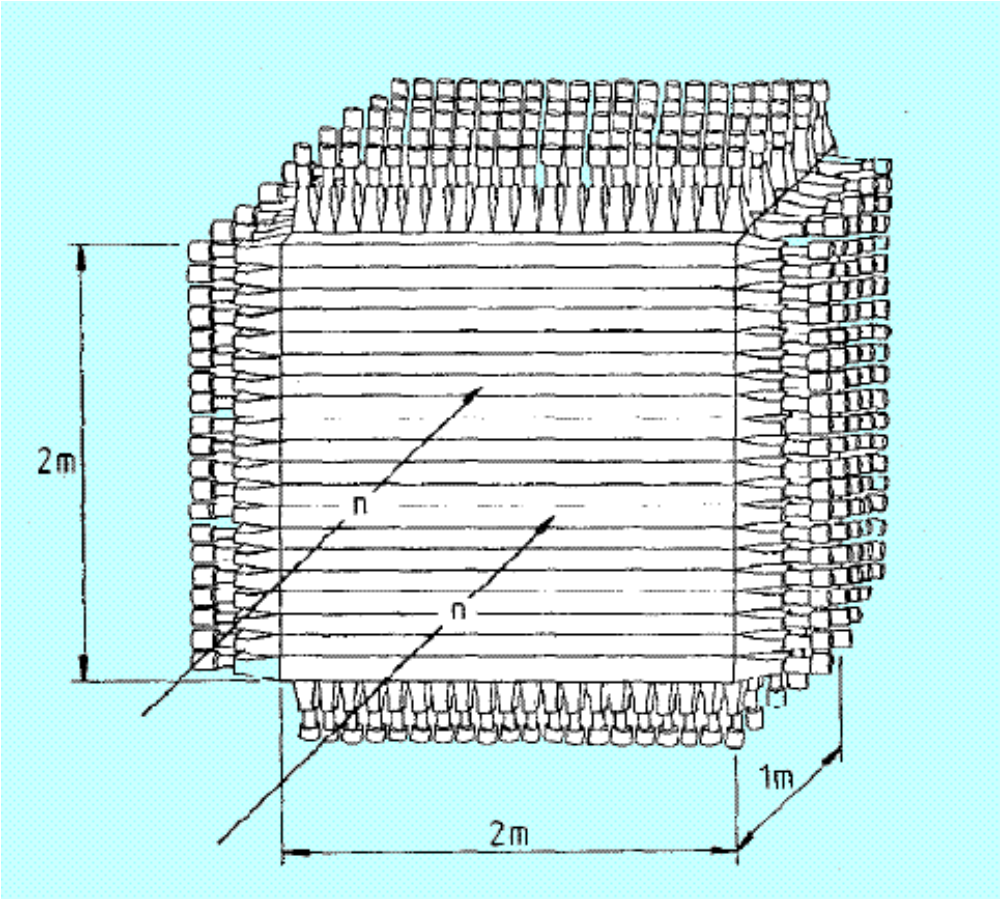


Рис. 2. Конструкция нейтронного счетчика.
I - сцинтиллятор; 2 - световоды; 3 - фотоумножители ФЭУ-63; 4 - светодиоды;5 - делитель ФЭУ;
6 - стальной экран; 7 - прижимные пружины

V.N.Baturin et al., LINP-594,1980

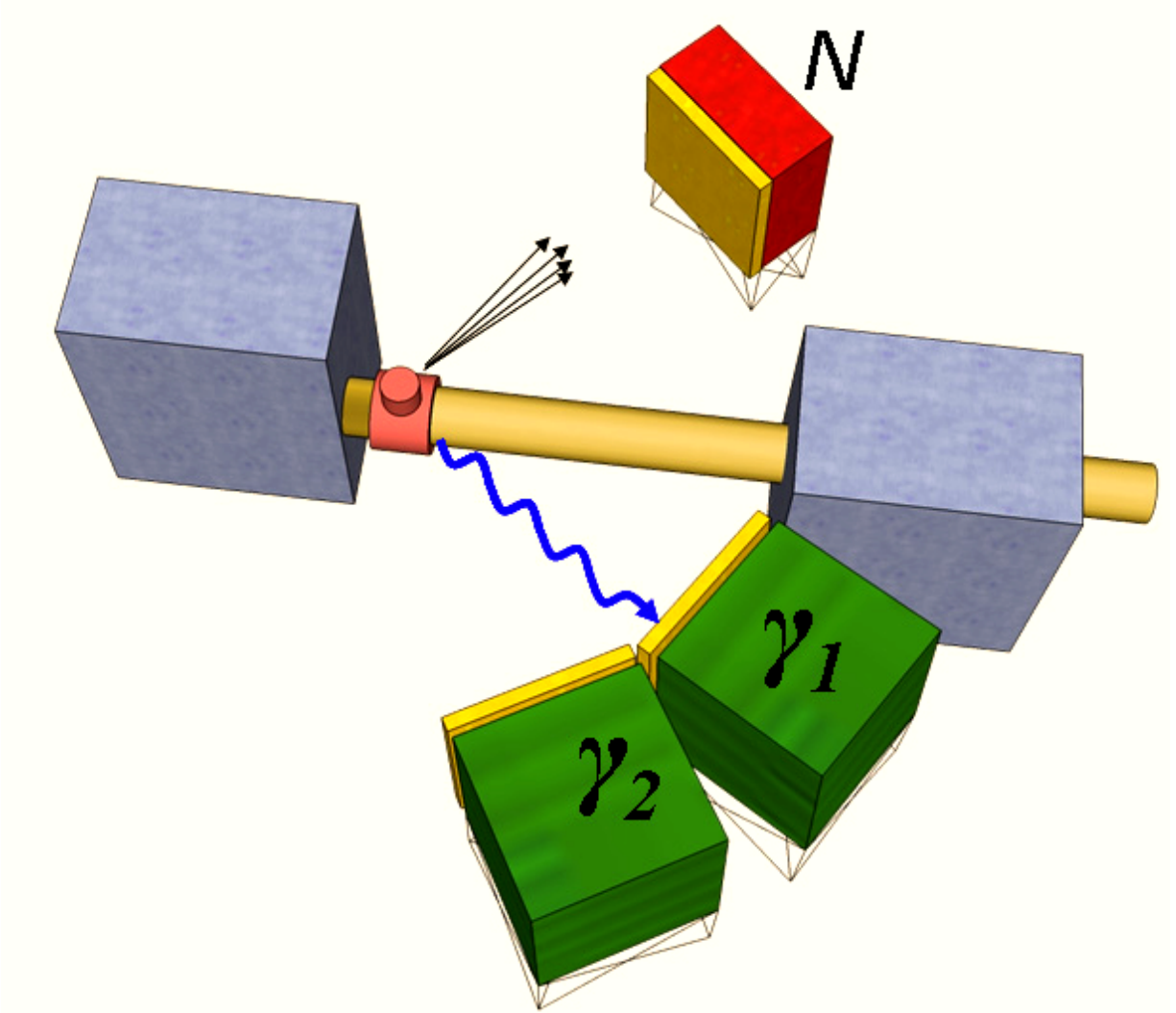
LAND

Large area detector for high-energy neutrons.



$\Delta Tn/Tn$ = 5.3% for neutrons of Tn = 1 GeV for a flight path of 15 m

FLINT setup



- **First steps @ ITEP**
- experiment @ magnet hall (2010)

  $^{12}C + Be \rightarrow \gamma + \ldots$

higher X_1+X_2

Beam tests of neutron position sensitive

detector

To do

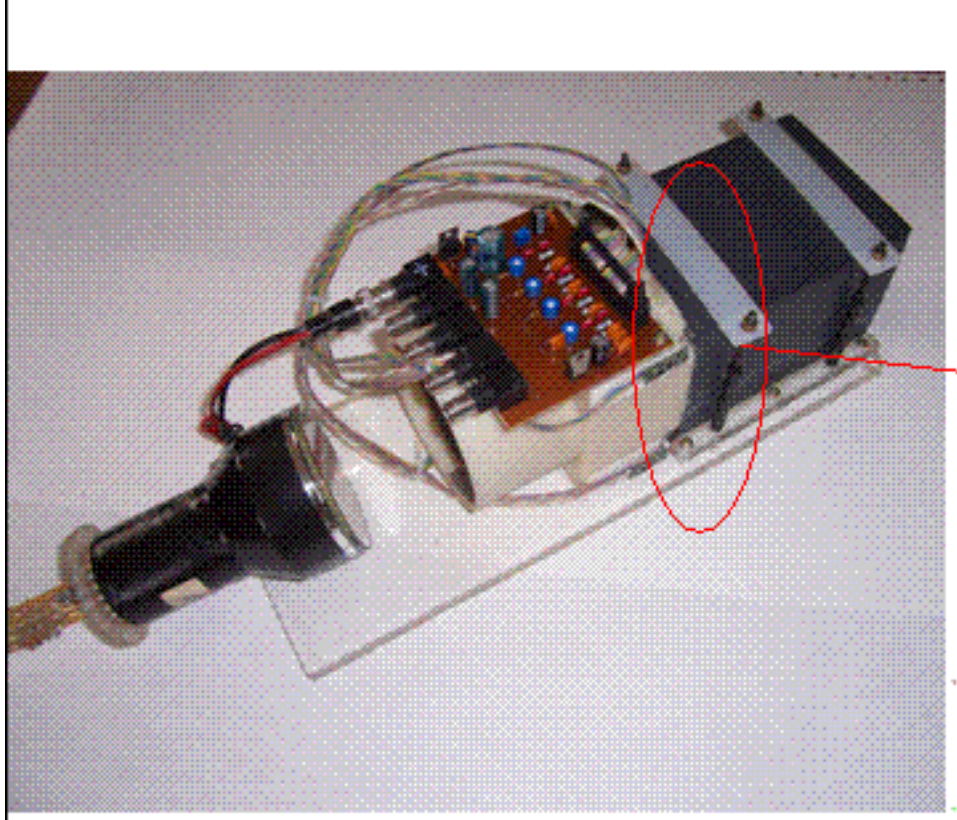
Neutron beam test (Nuclotron M)

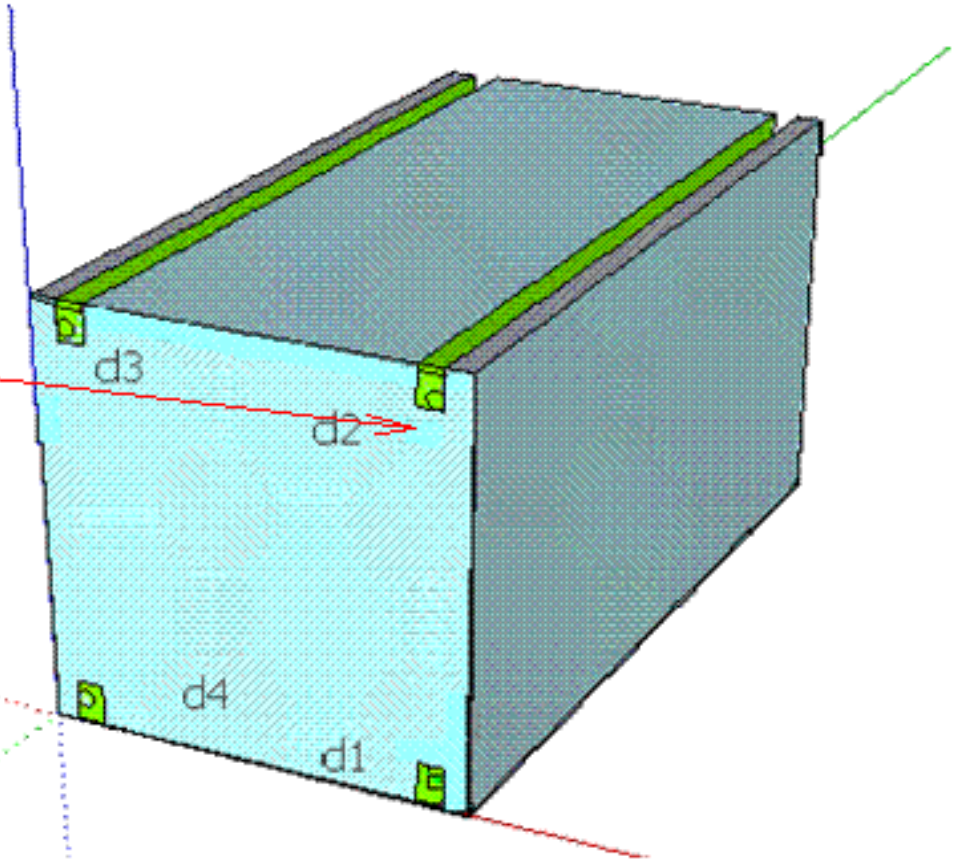
- Neutron efficiency
- New experiment

$AA \rightarrow \gamma + X_{12}+\ldots$

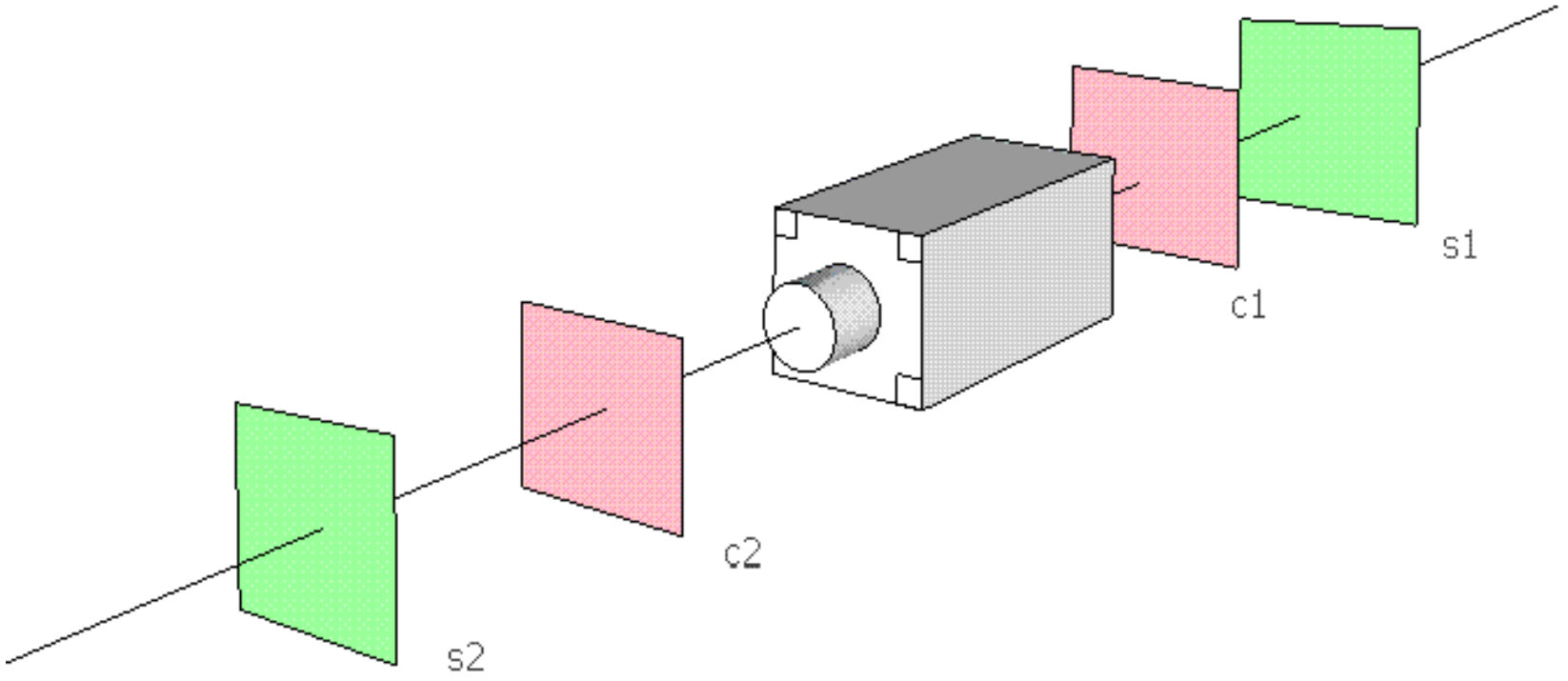
- higher X_1+X_2
- cold dense matter

1st prototype of Ndet





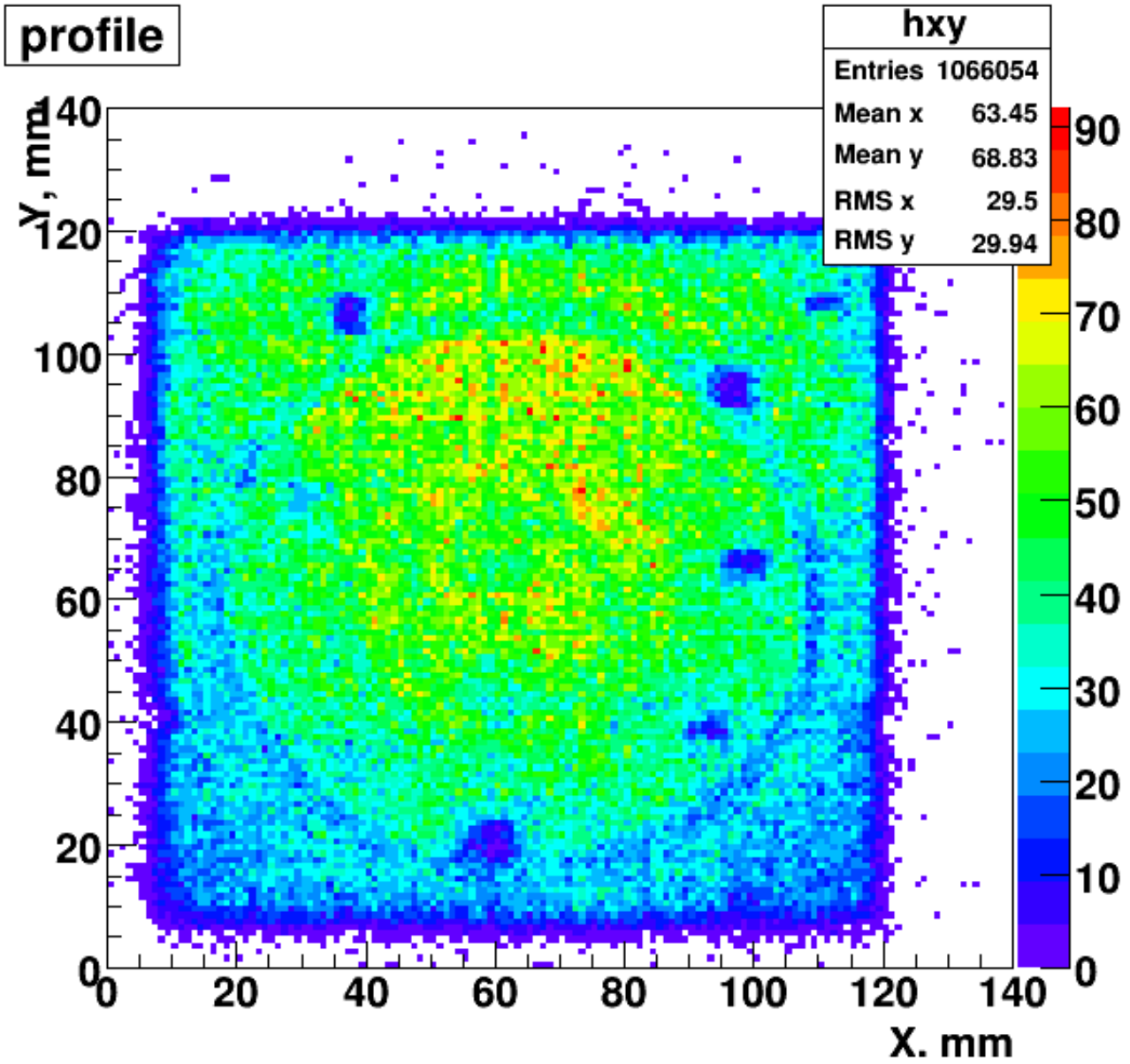
Installation Diagram



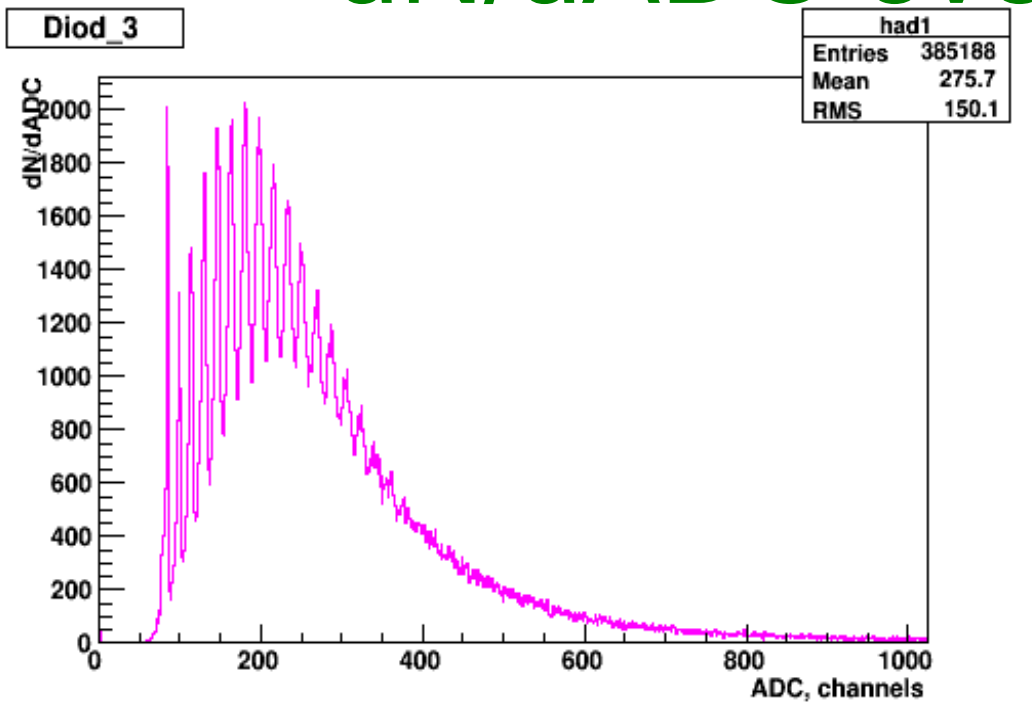
C1, c2 – proportional chamber

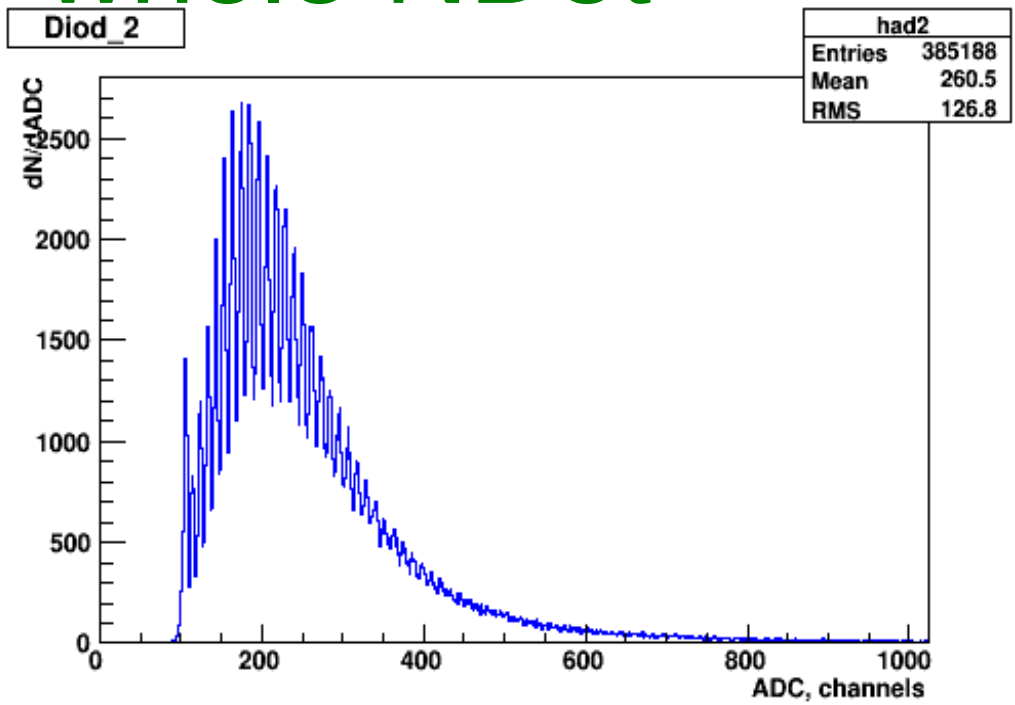
S1, s2-sc.detectors

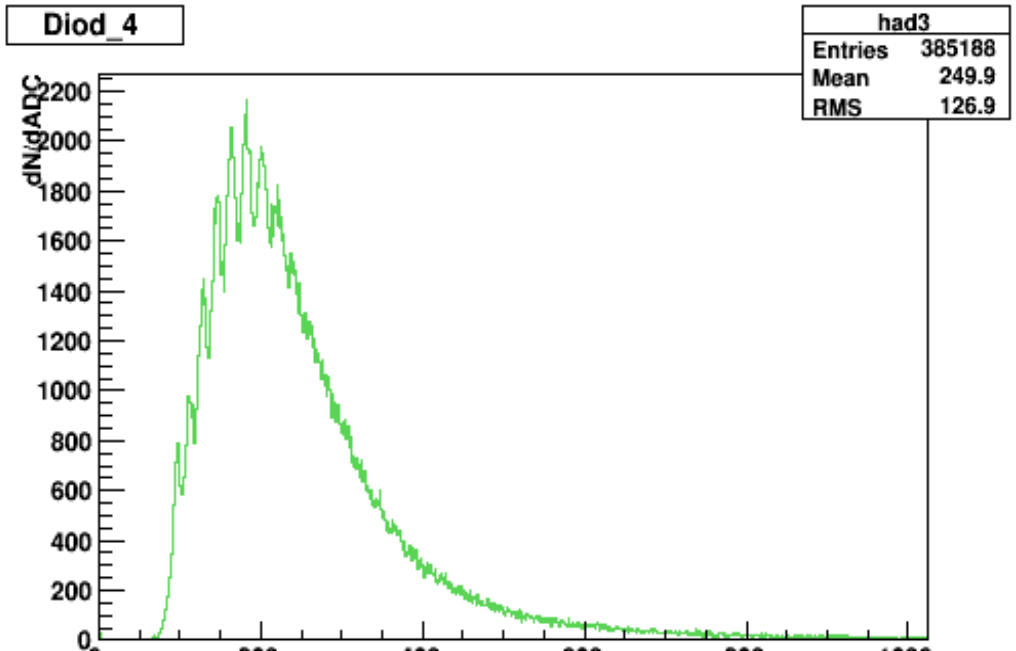
X(Y) chamber 2

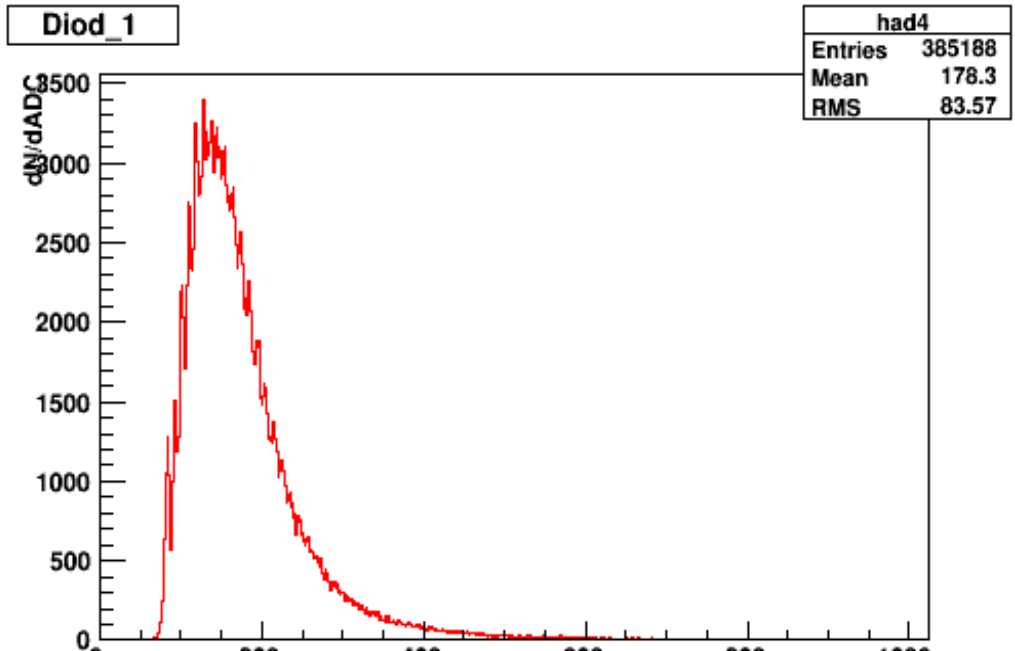

profile
hxy
Entries 1066054
Mean x 63.45
Mean y 68.83
RMS x 29.5
RMS y 29.94
Y, mm
X. mm
0
20
40
60
80
100
120
140
0
10
20
30
40
50
60
70
80
90

dN/dADC over whole NDet

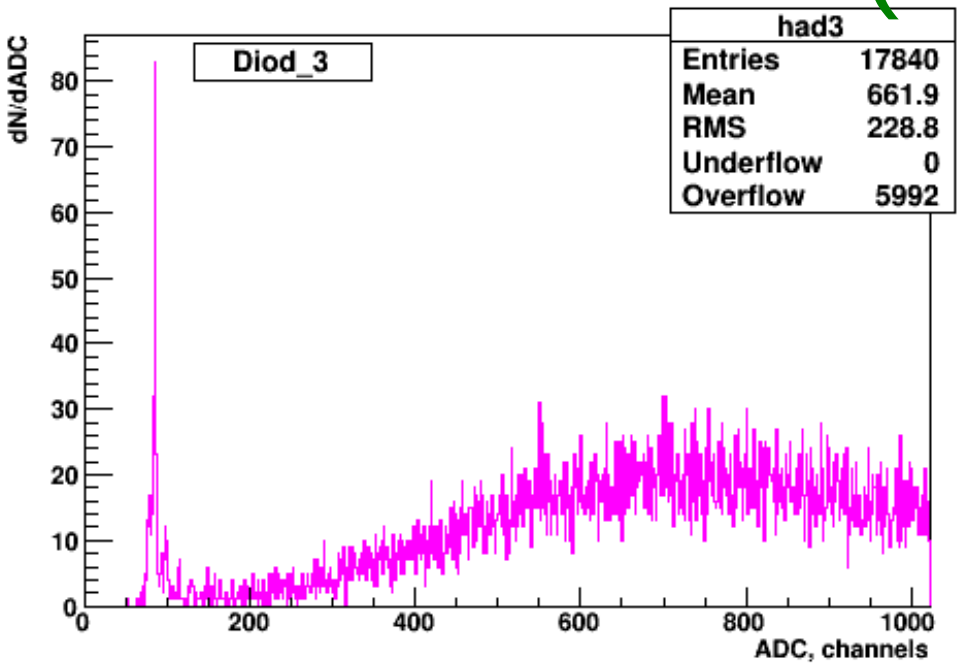


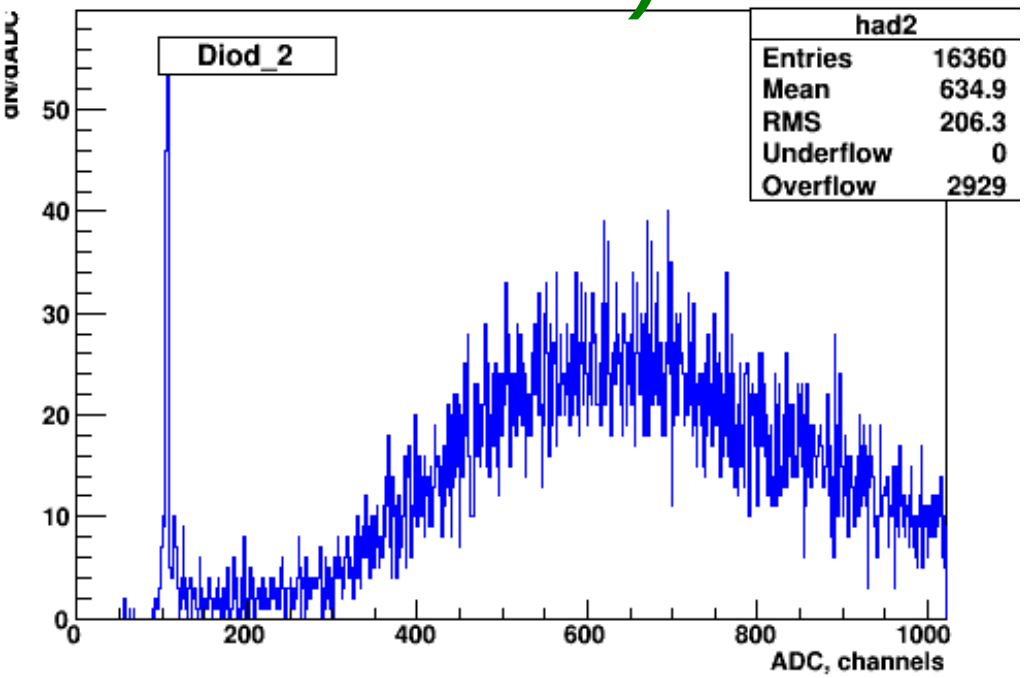


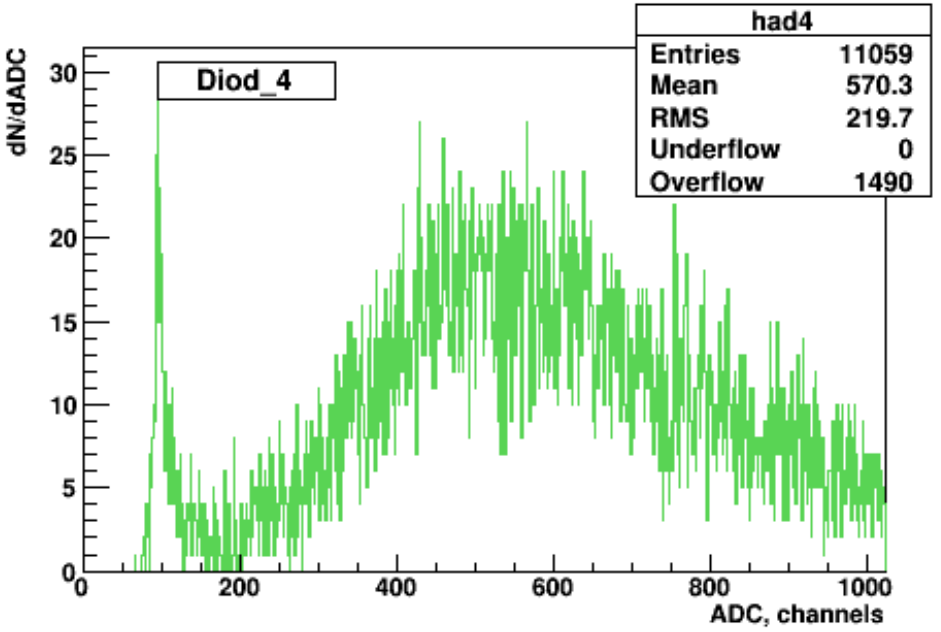


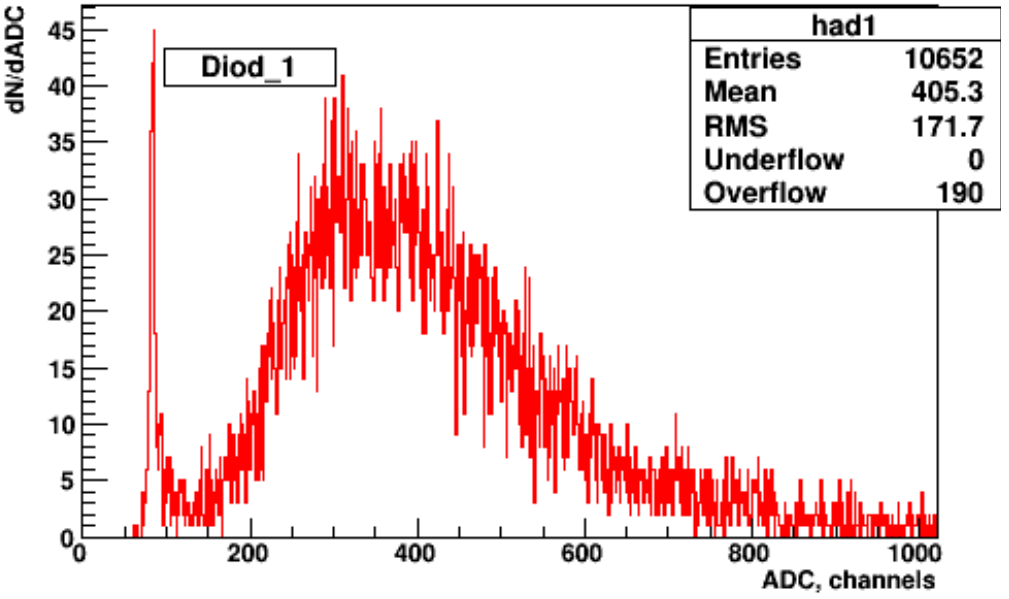


dN/dADC (corners 20x20)







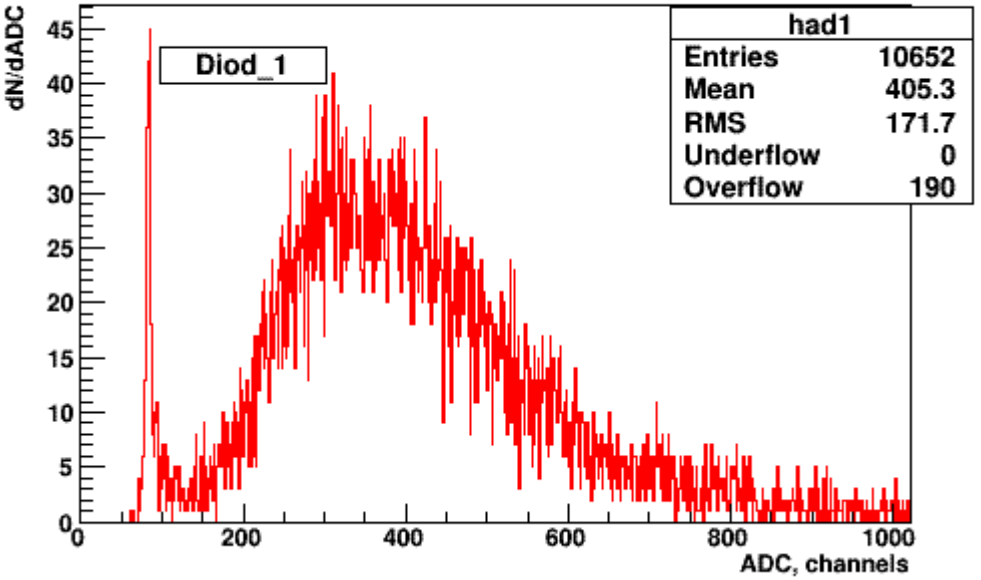


dN/dADC (corners 20x20)

Coordinates:

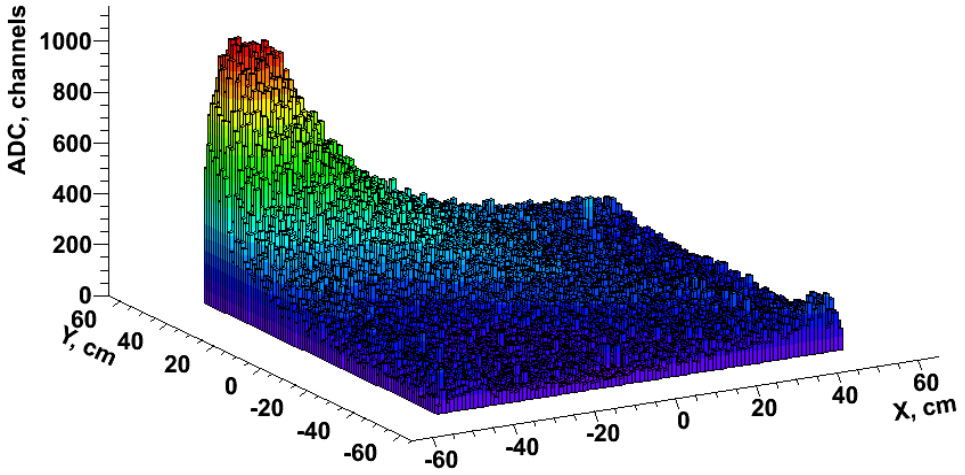
Xl=16
Xr=112
Yb=18
Yt=114

diod_1= 0.0876811
diod_2= 0.016378
diod_3= 0.0602573
diod_4= 0.074664

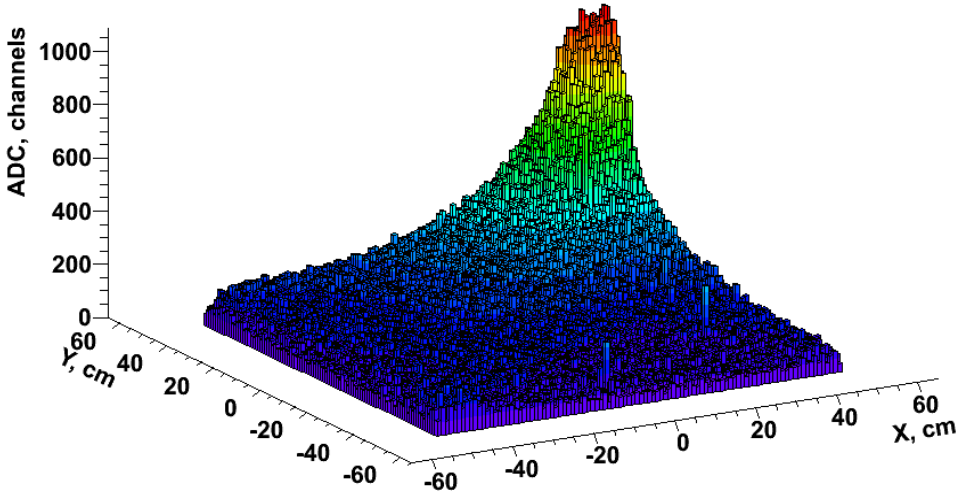


Amplitude X&Y chamber2

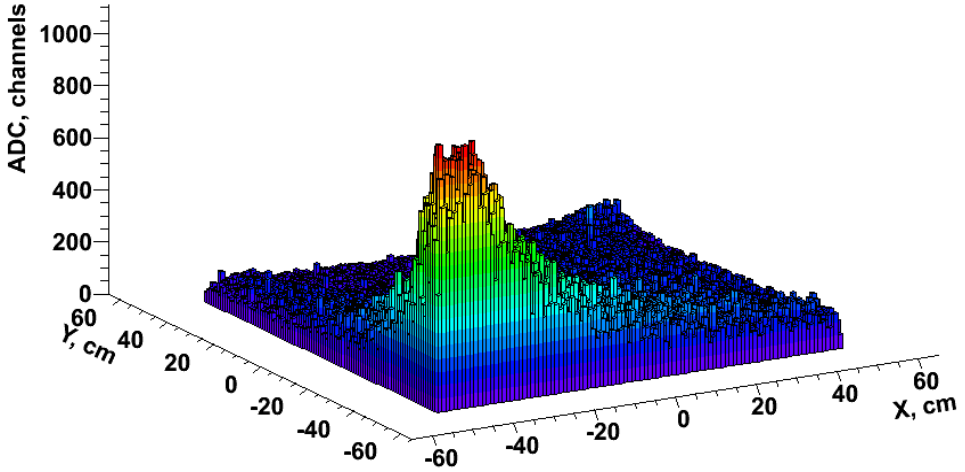
AmpDiod 3



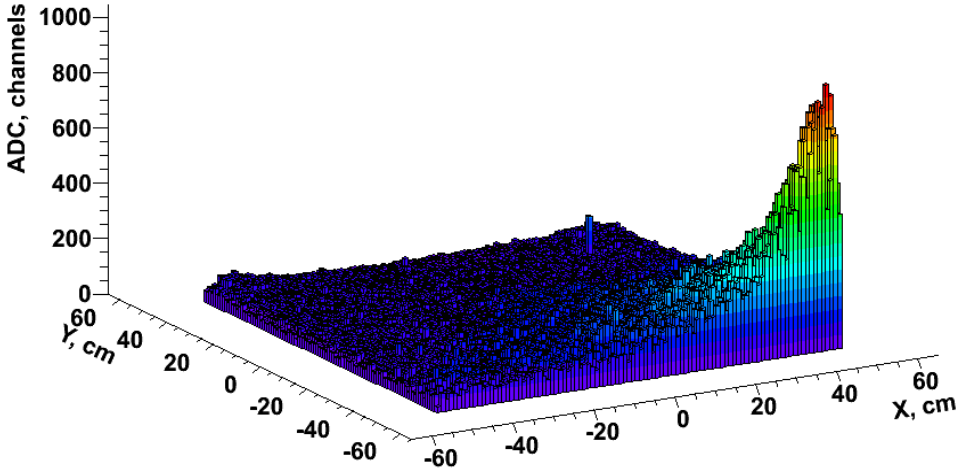
AmpDiod 2



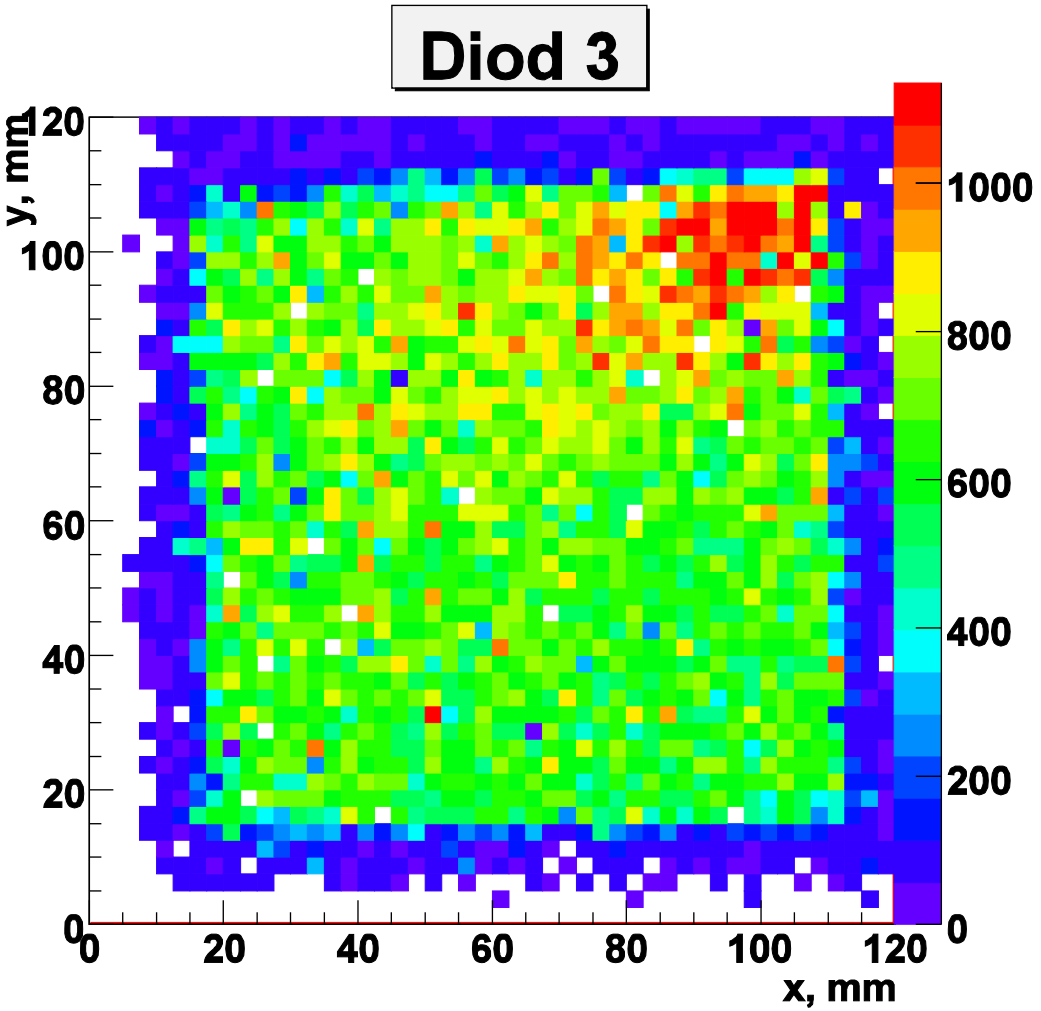
AmpDiod 4

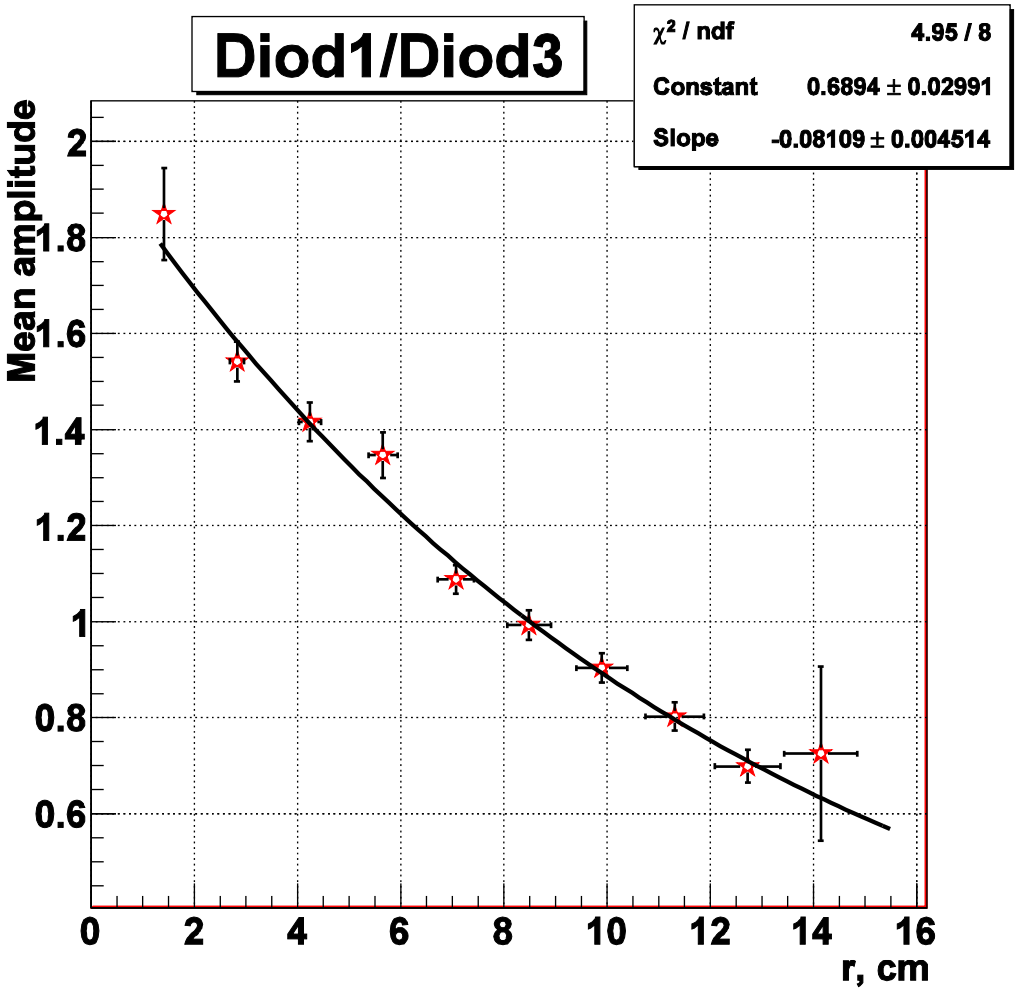


AmpDiod 1



NDet (preliminary results)

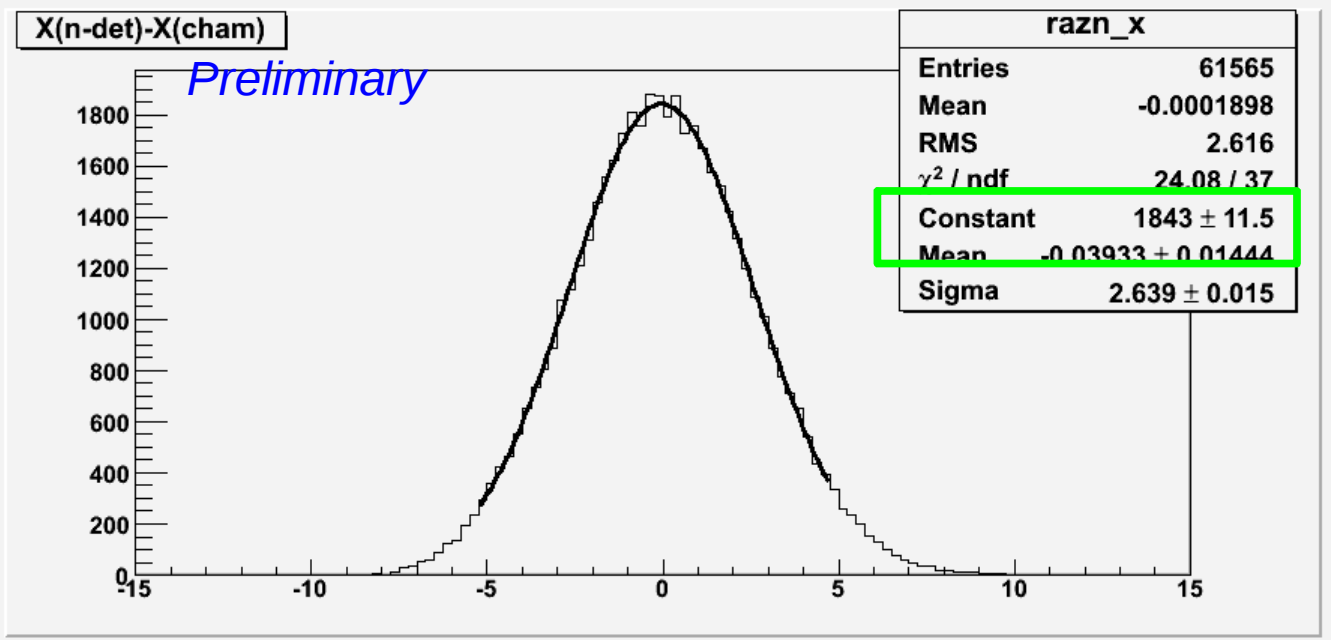


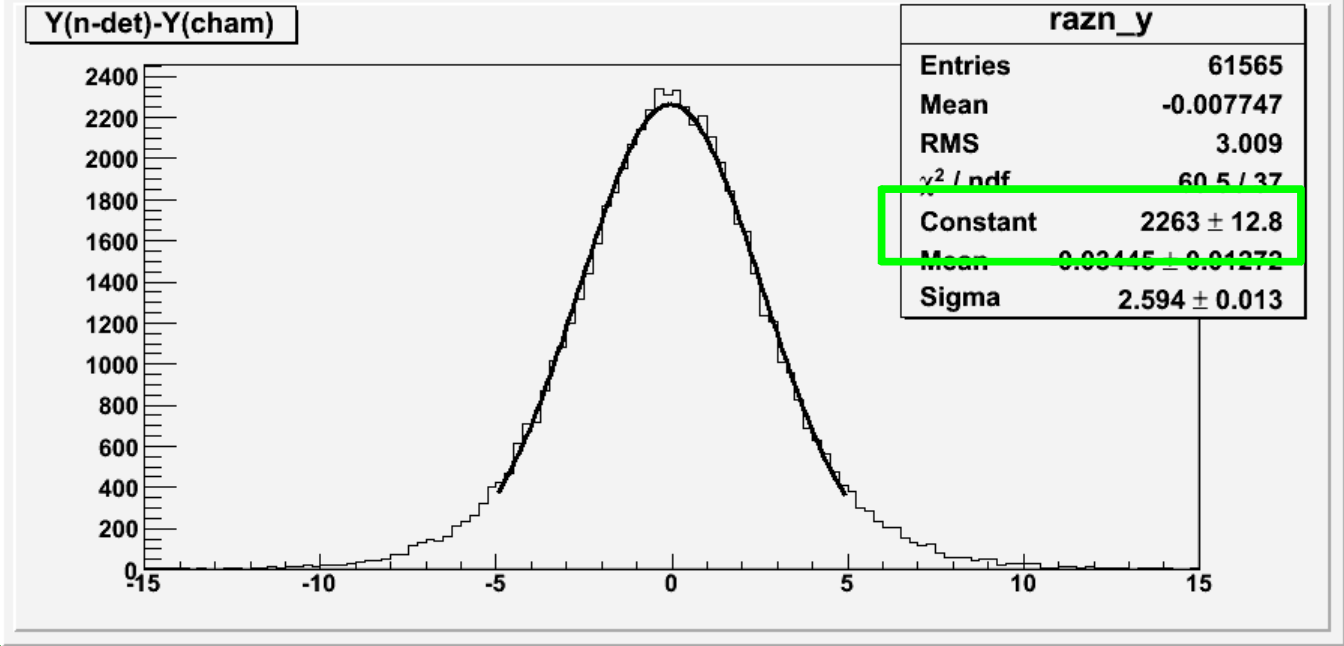


Beam test: Ndet space resolution

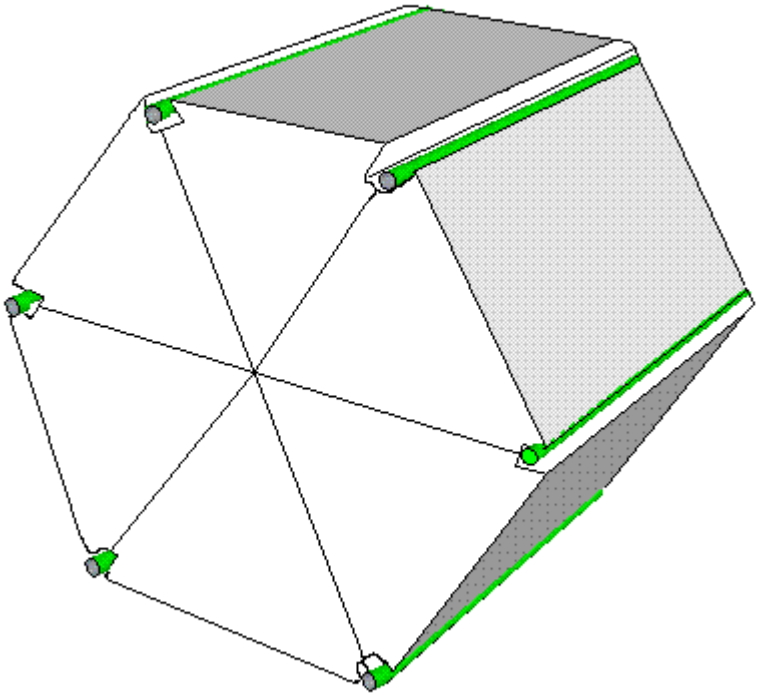
Preliminary resolution of neutron detector

$\sigma_x \approx \sigma_y \approx 2.6$ cm





New prototype of NDet



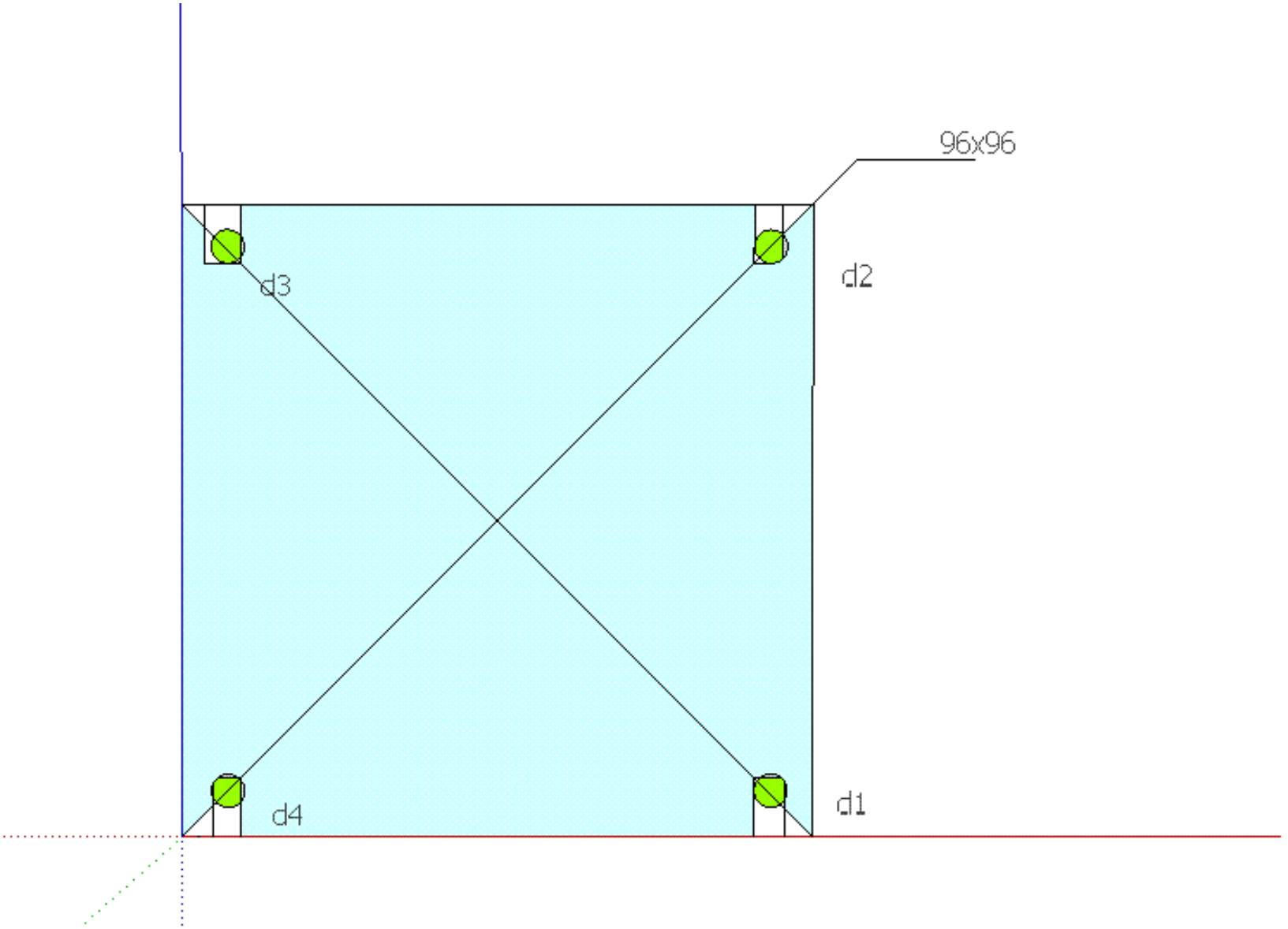
Conclusions and To do

1. Studying software
2. Alignment procedure
3. Studying spatial sensitivity

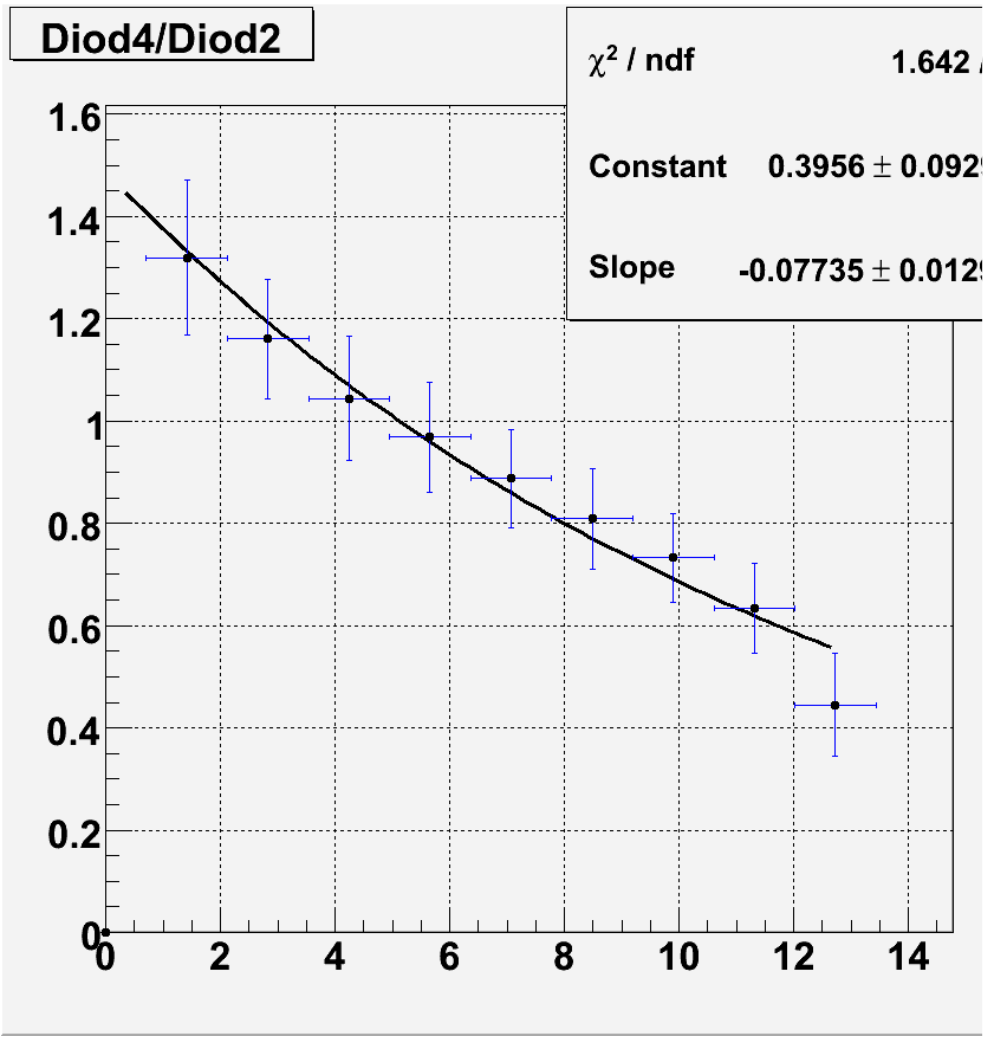
<u>To do:</u>

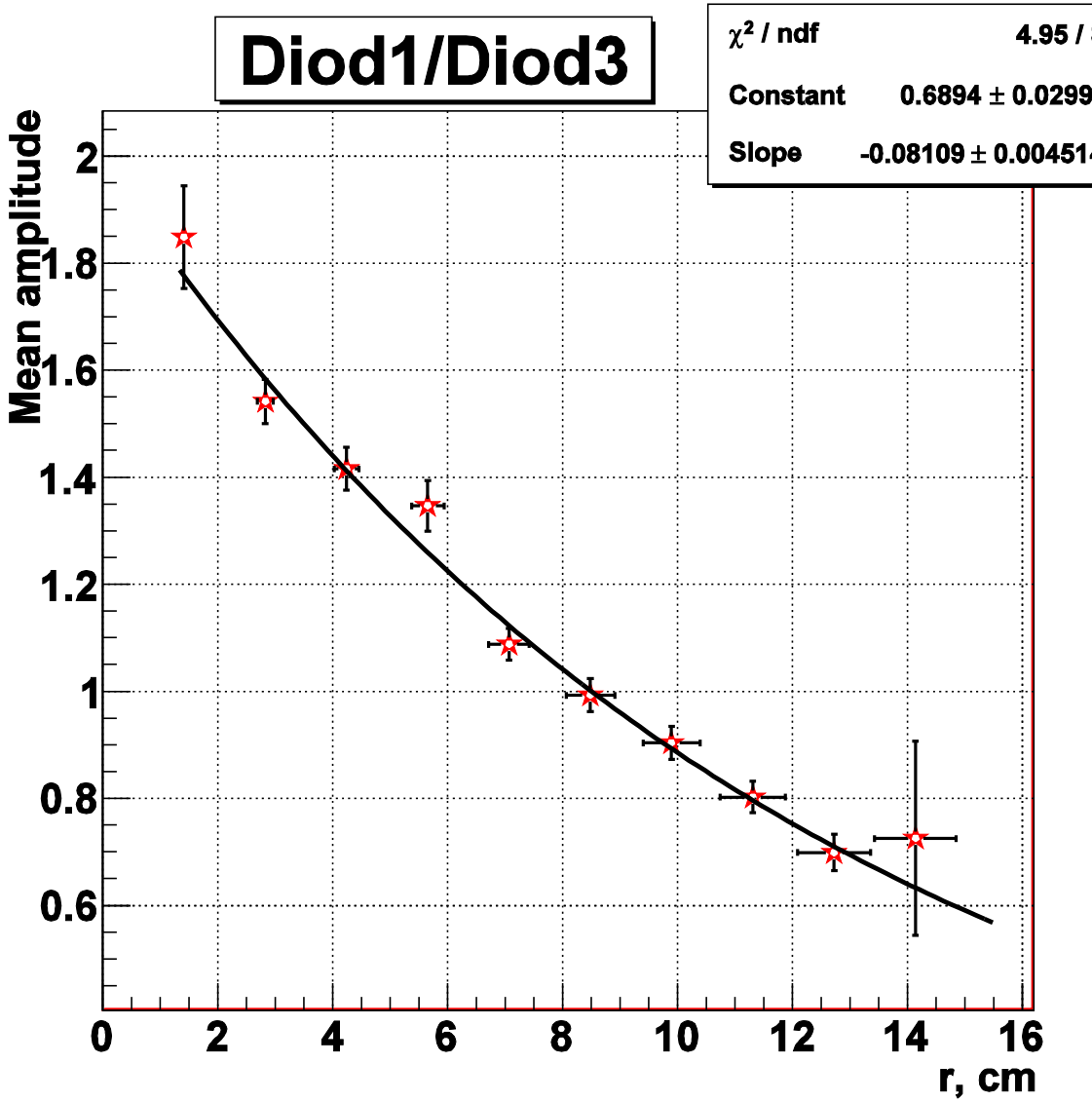
1. Publish to IET
2. Designing and making the prototype
3. Simulation for new prototype in GEANT

Геометрия детектора ?

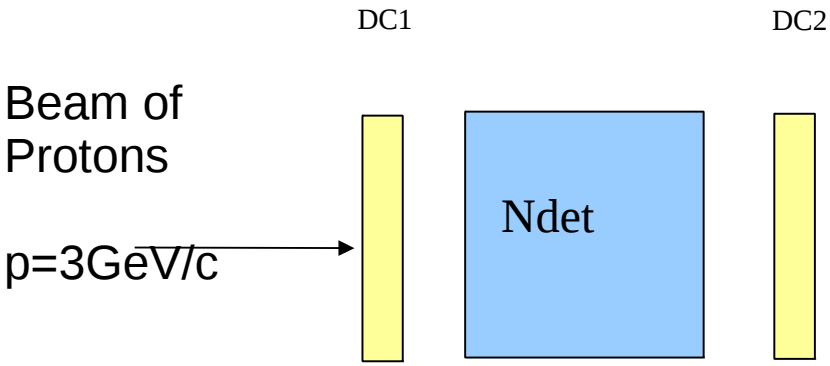


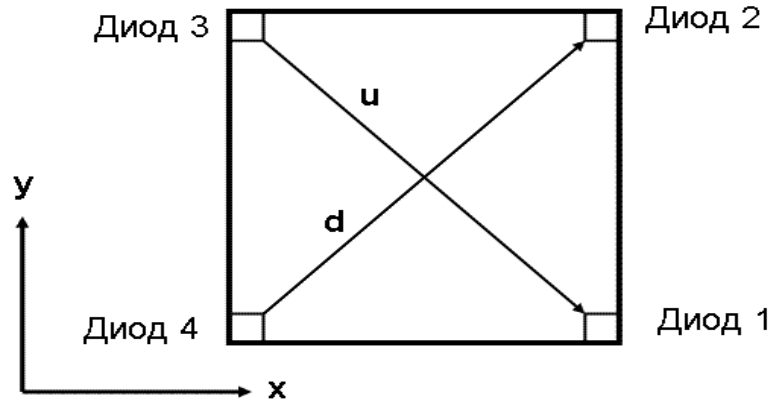
Отношение амплитуд от расстояния





Beam tests of prototype





Ratio ($R=A_4/A_1$) of amplitude as exp(-R/d)