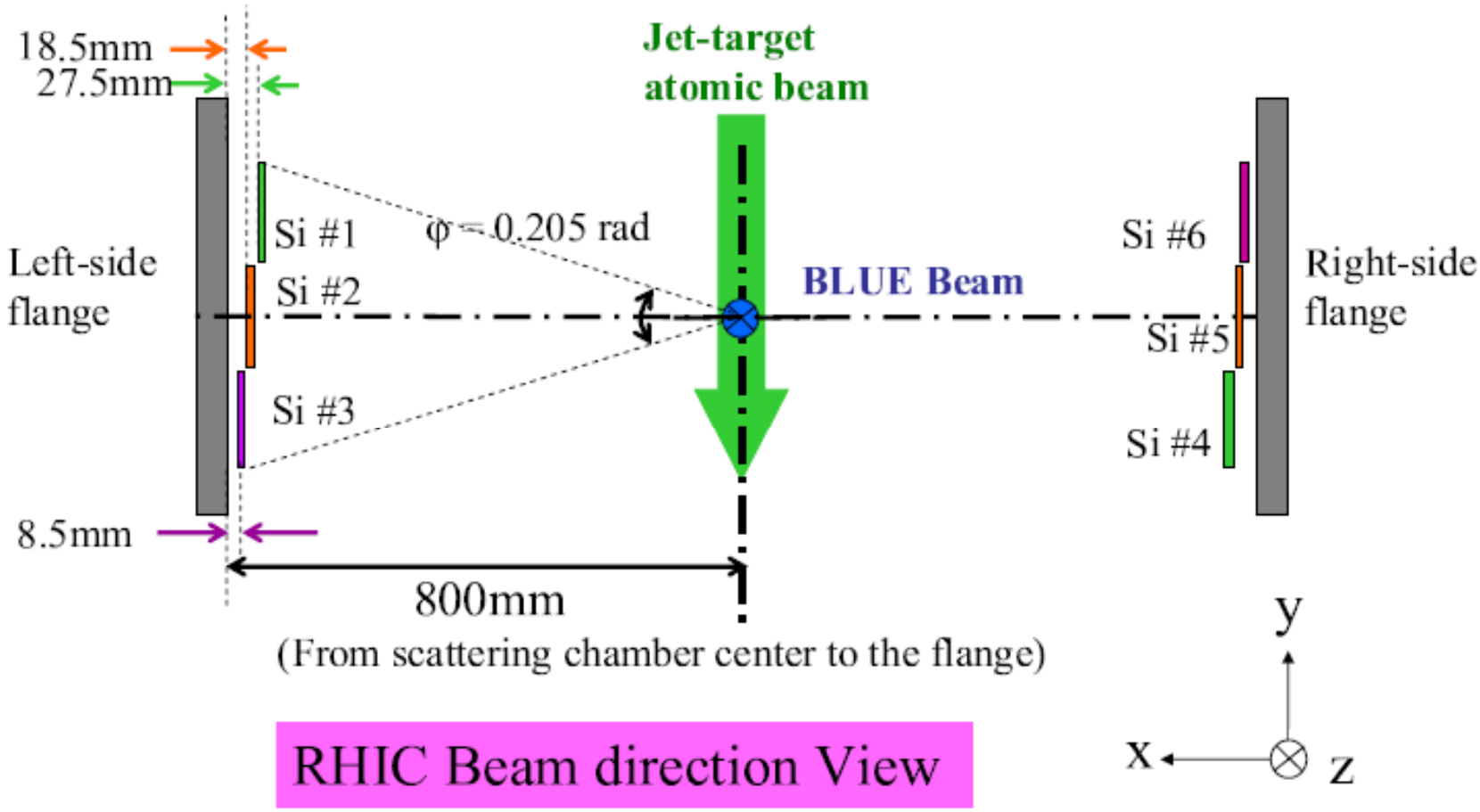
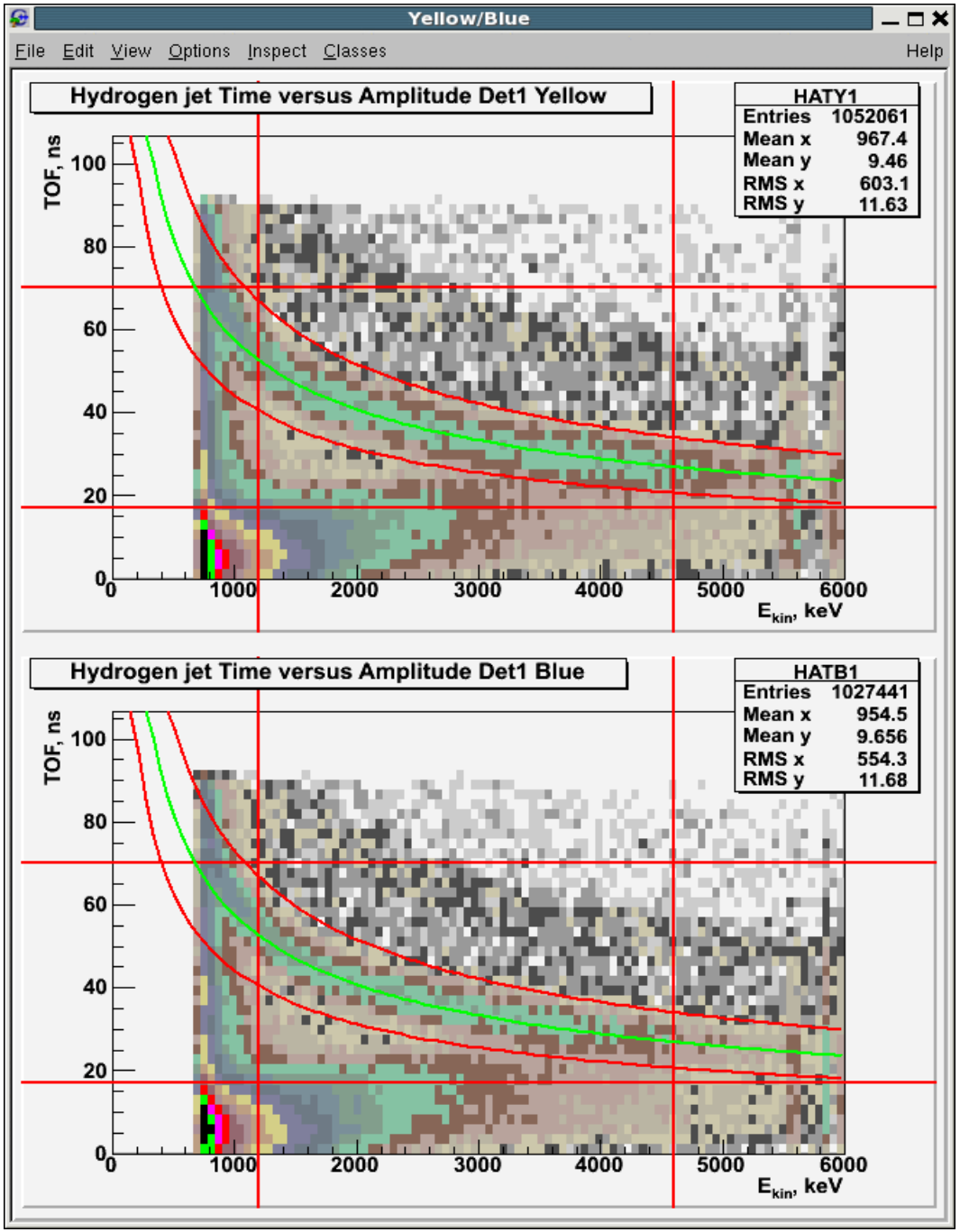
# Upgrade of the H-jet detector

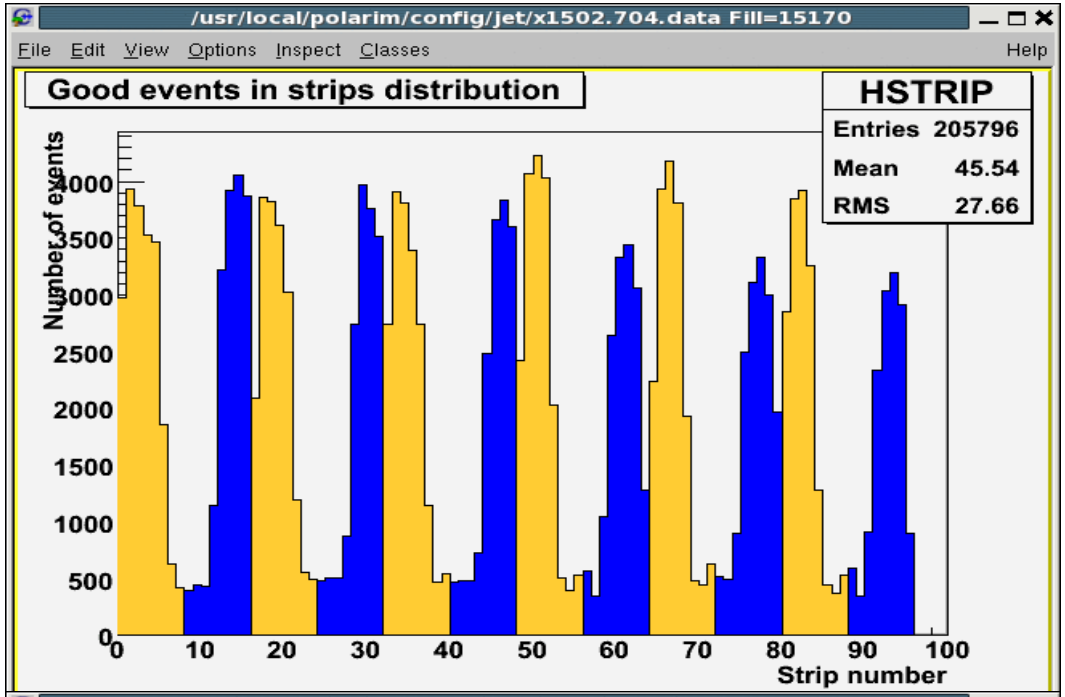
G.Atoian

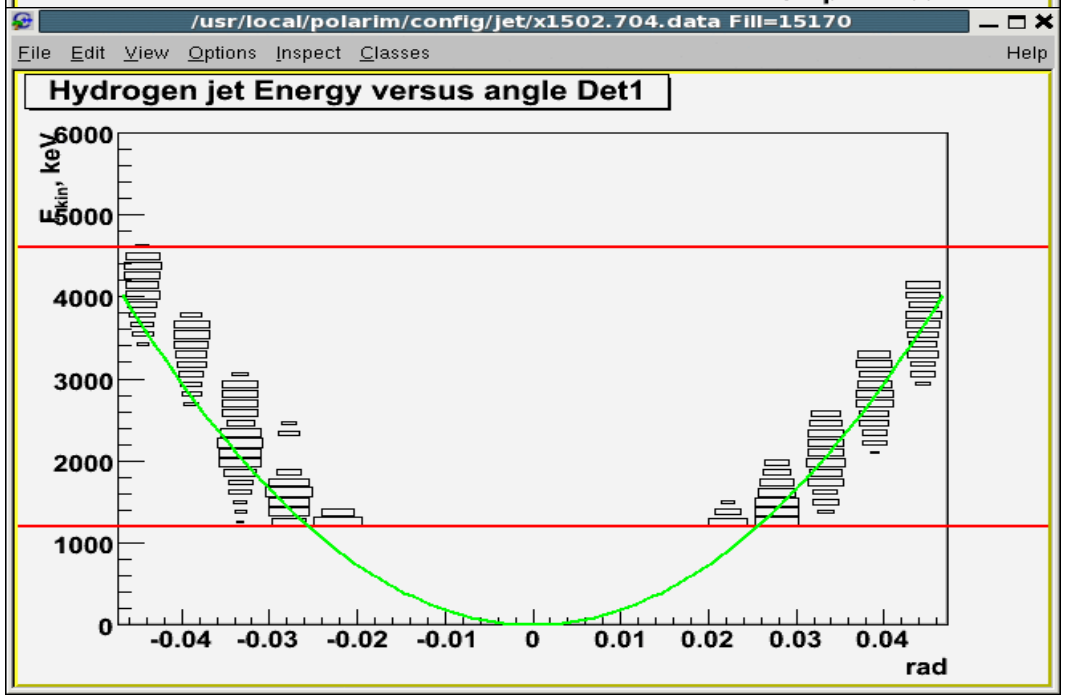
BNL, May 26, 2011



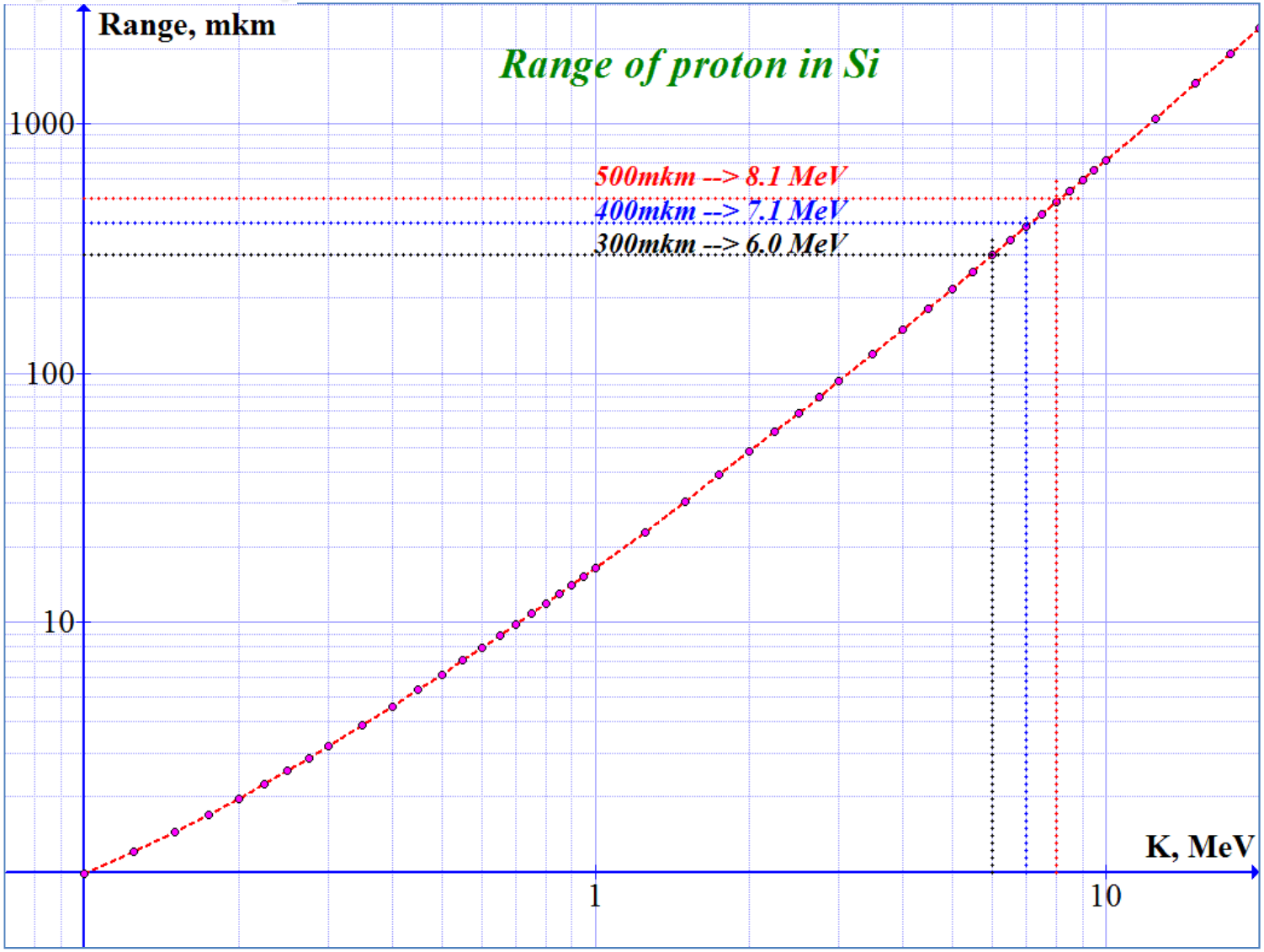

RHIC Beam direction View

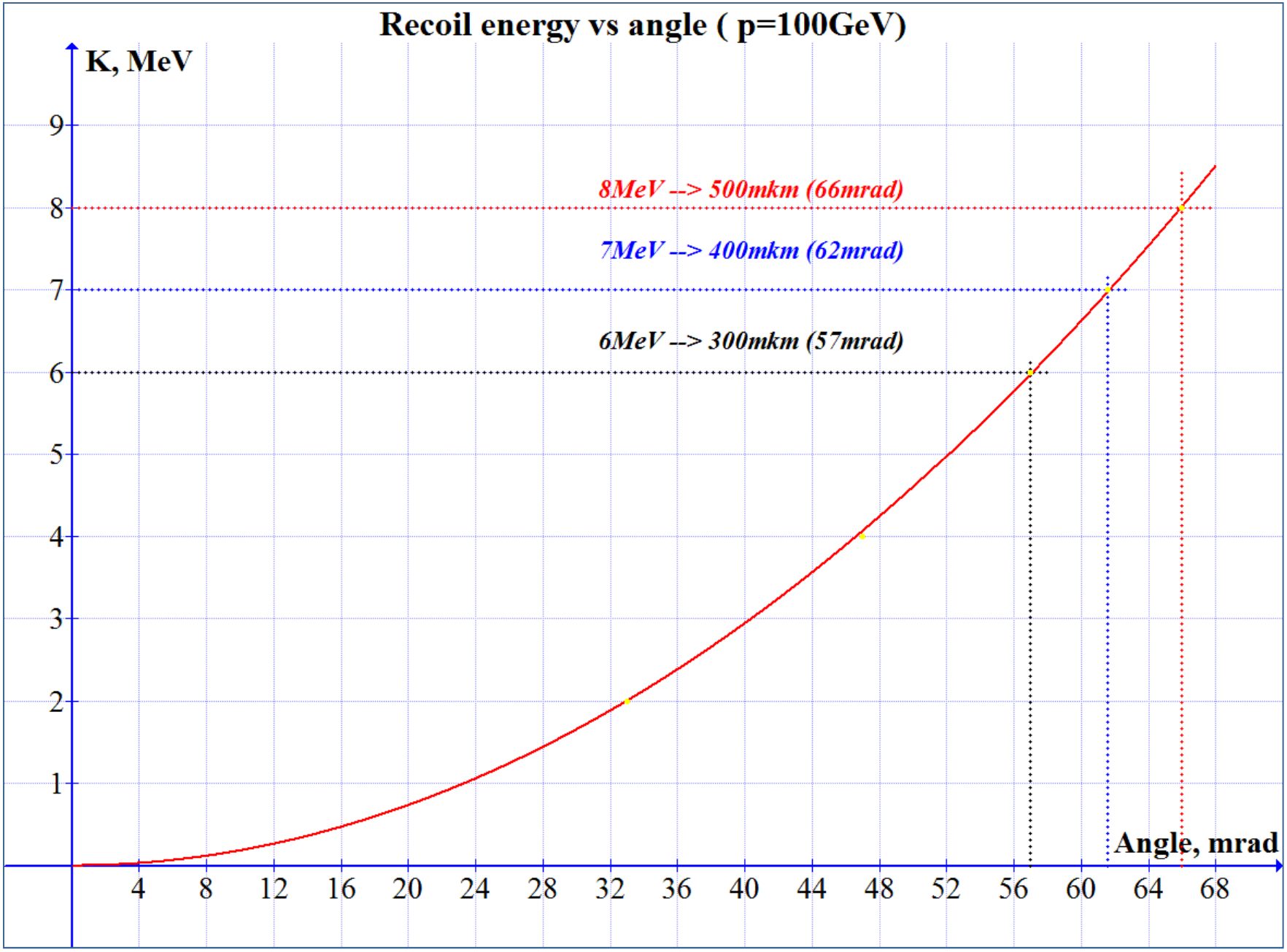

Yellow/Blue
File Edit View Options Inspect Classes Help
Hydrogen jet Time versus Amplitude Det1 Yellow
HATY1
Entries 1052061
Mean x 967.4
Mean y 9.46
RMS x 603.1
RMS y 11.63
TOF, ns
E_kin, keV
Hydrogen jet Time versus Amplitude Det1 Blue
HATB1
Entries 1027441
Mean x 954.5
Mean y 9.656
RMS x 554.3
RMS y 11.68
TOF, ns
E_kin, keV


/usr/local/polarim/config/jet/x1502.704.data Fill=15170
File Edit View Options Inspect Classes Help
Good events in strips distribution
HSTRIP
Entries 205796
Mean 45.54
RMS 27.66
Number of events
0
500
1000
1500
2000
2500
3000
3500
4000
0 10 20 30 40 50 60 70 80 90 100
Strip number


/usr/local/polarim/config/jet/x1502.704.data Fill=15170
File Edit View Options Inspect Classes Help
Hydrogen jet Energy versus angle Det1
E_kin, keV
0
1000
2000
3000
4000
5000
6000
-0.04 -0.03 -0.02 -0.01 0 0.01 0.02 0.03 0.04
rad

National Institute of Standards and Technology
Physical Meas. Laboratory




Recoil energy vs angle ( p=100GeV)
K, MeV
9
8
7
6
5
4
3
2
1
8MeV --> 500mkm (66mrad)
7MeV --> 400mkm (62mrad)
6MeV --> 300mkm (57mrad)
Angle, mrad
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68

Hiromi Okada July, 2006

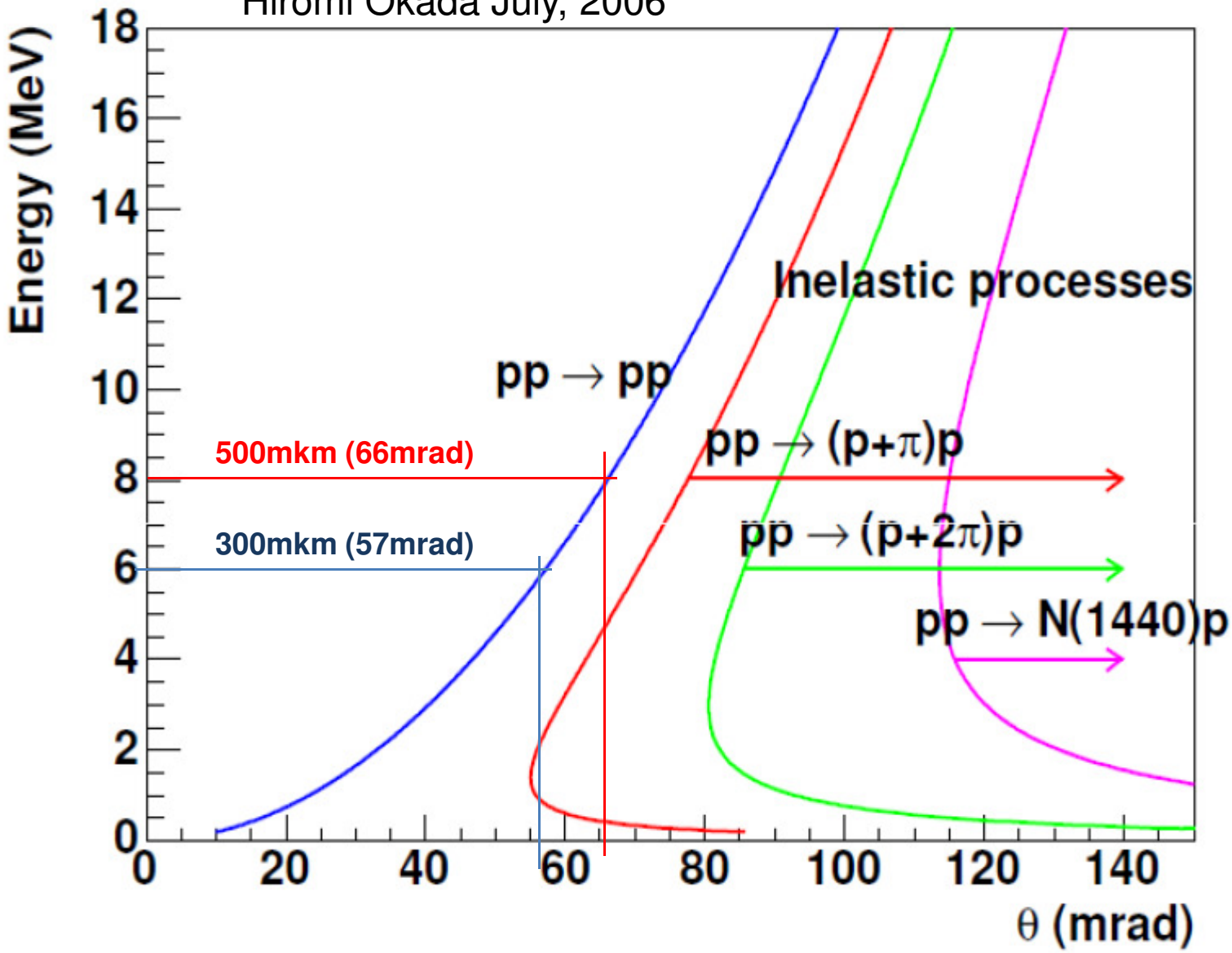
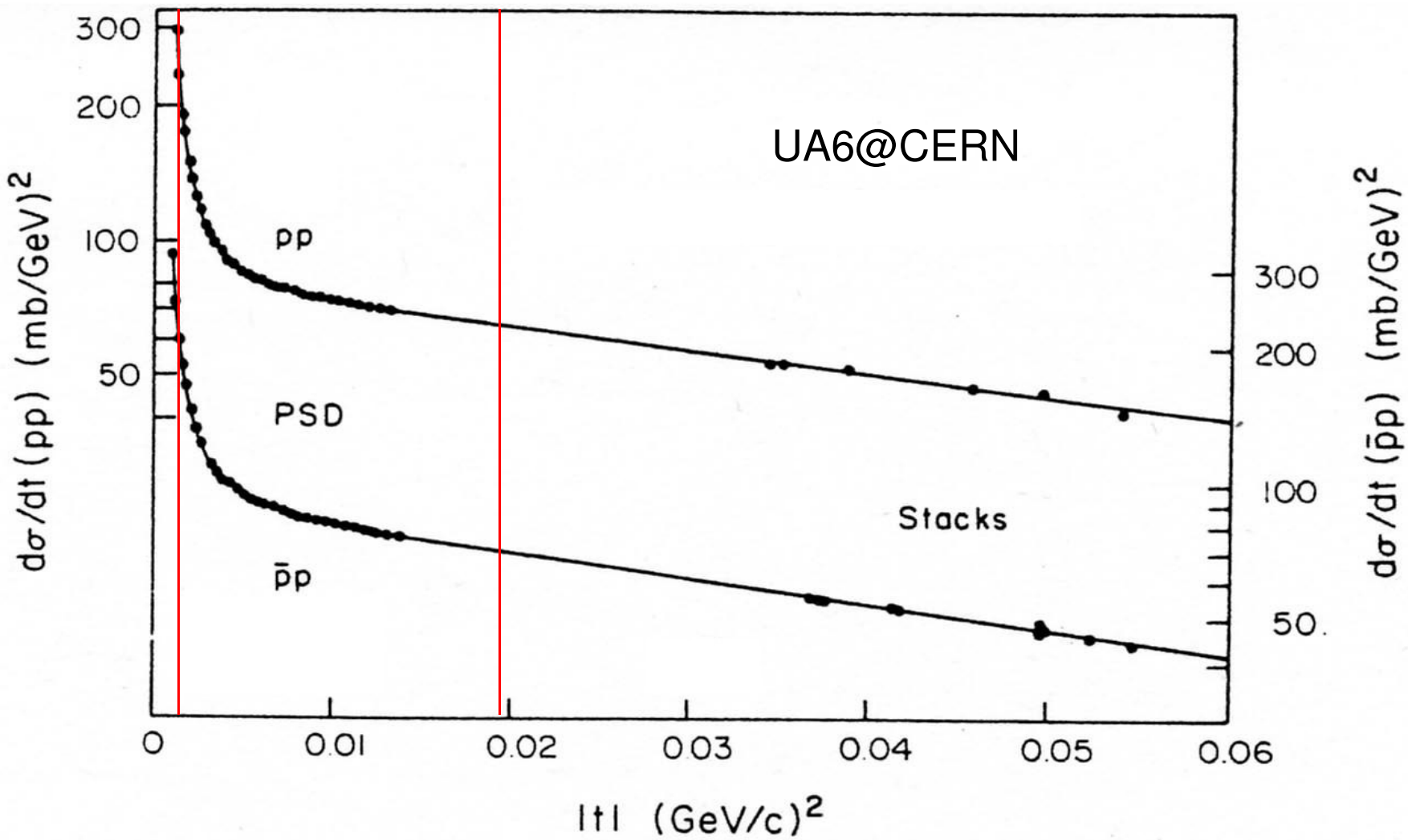
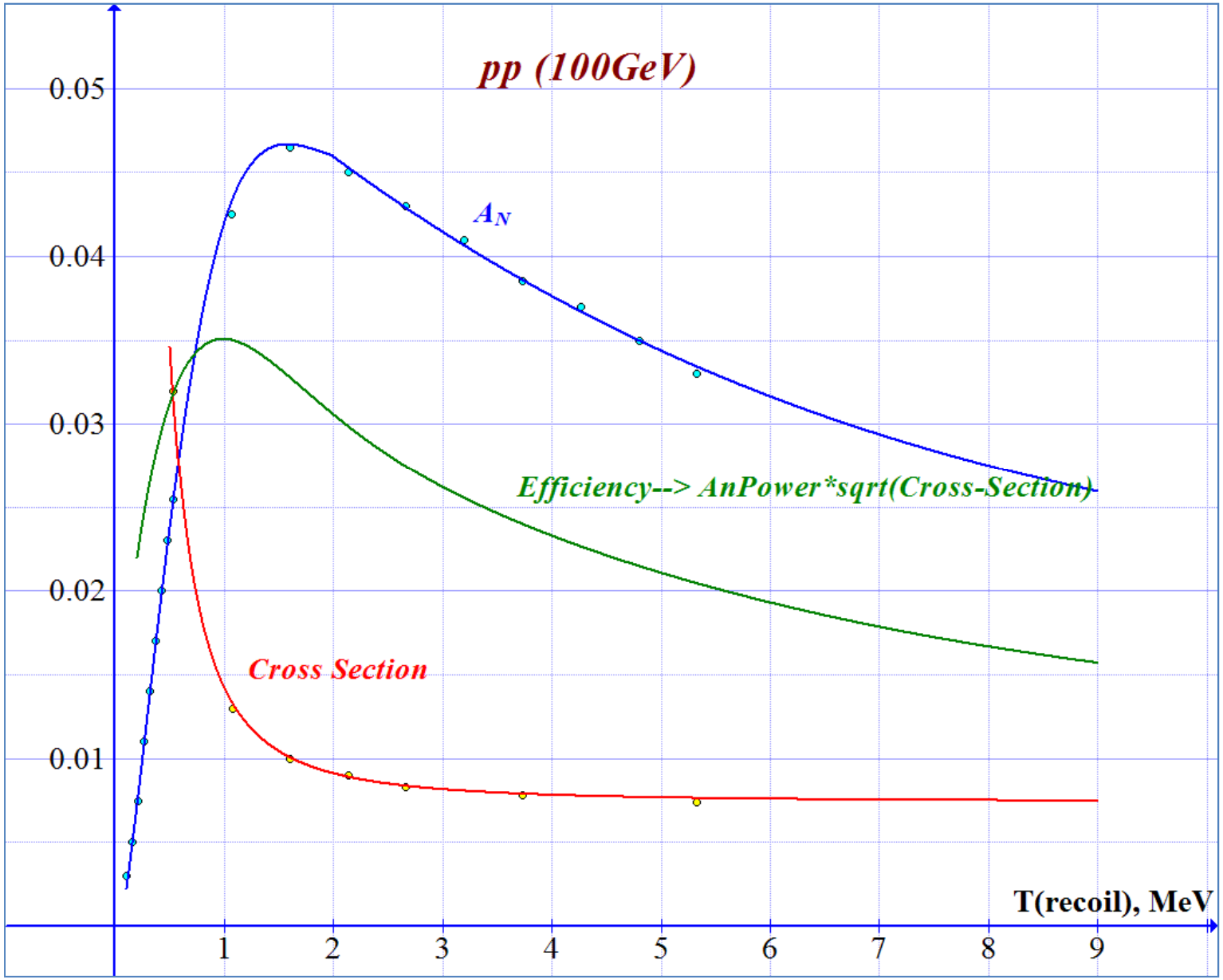
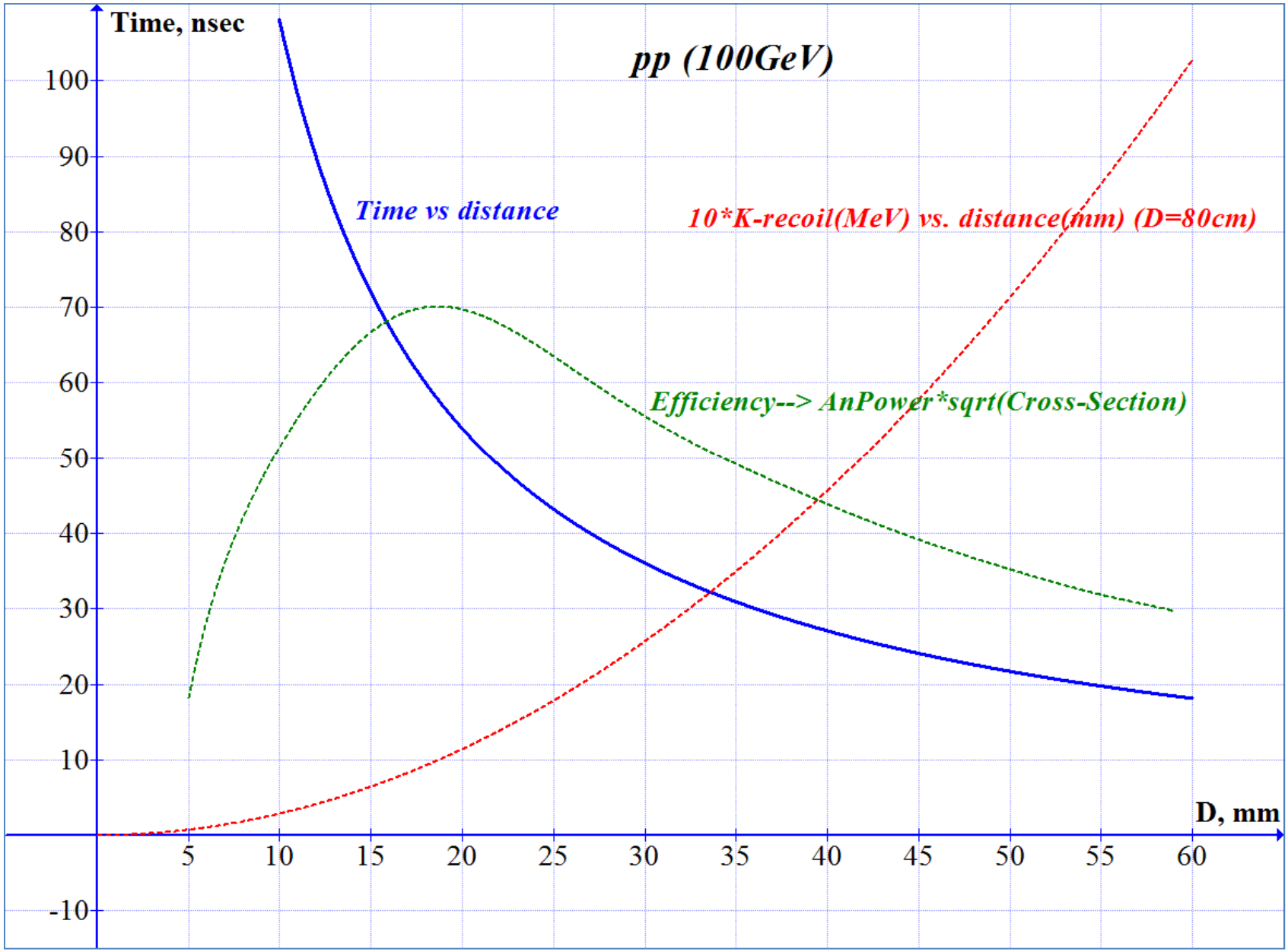


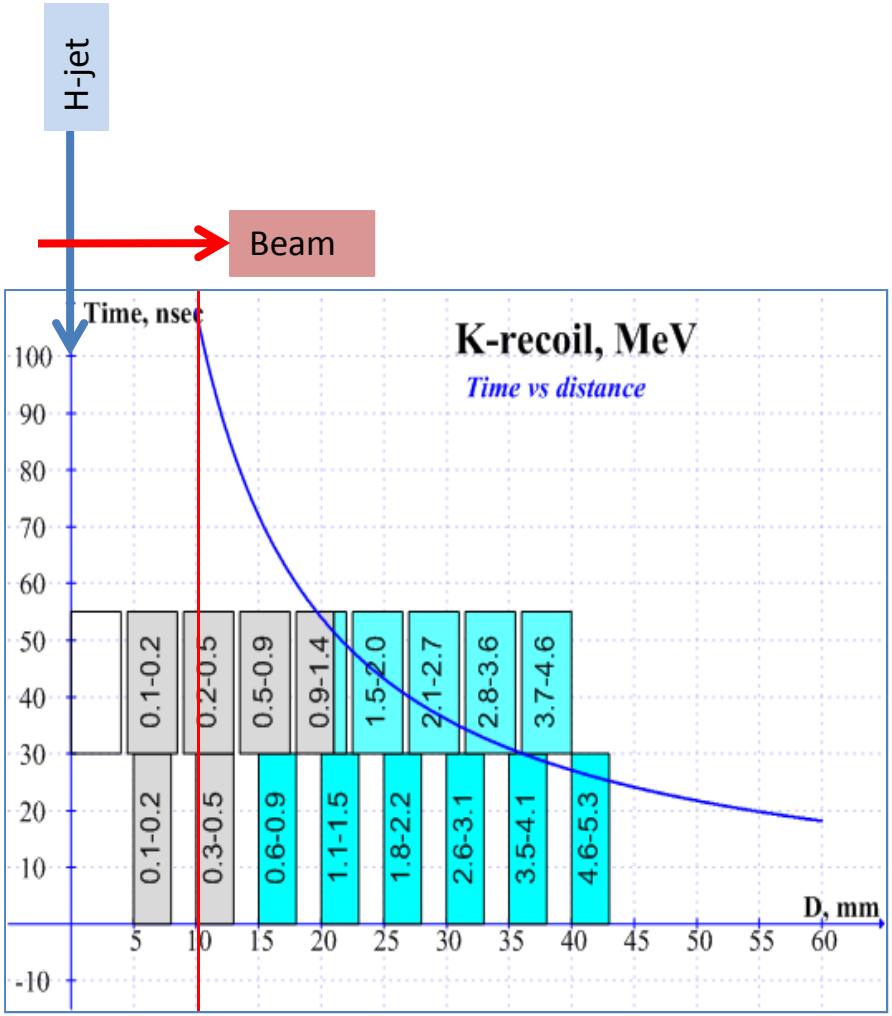

Figure 2.2: The correlations between energy and angle of recoil particle of elastic and inelastic process.

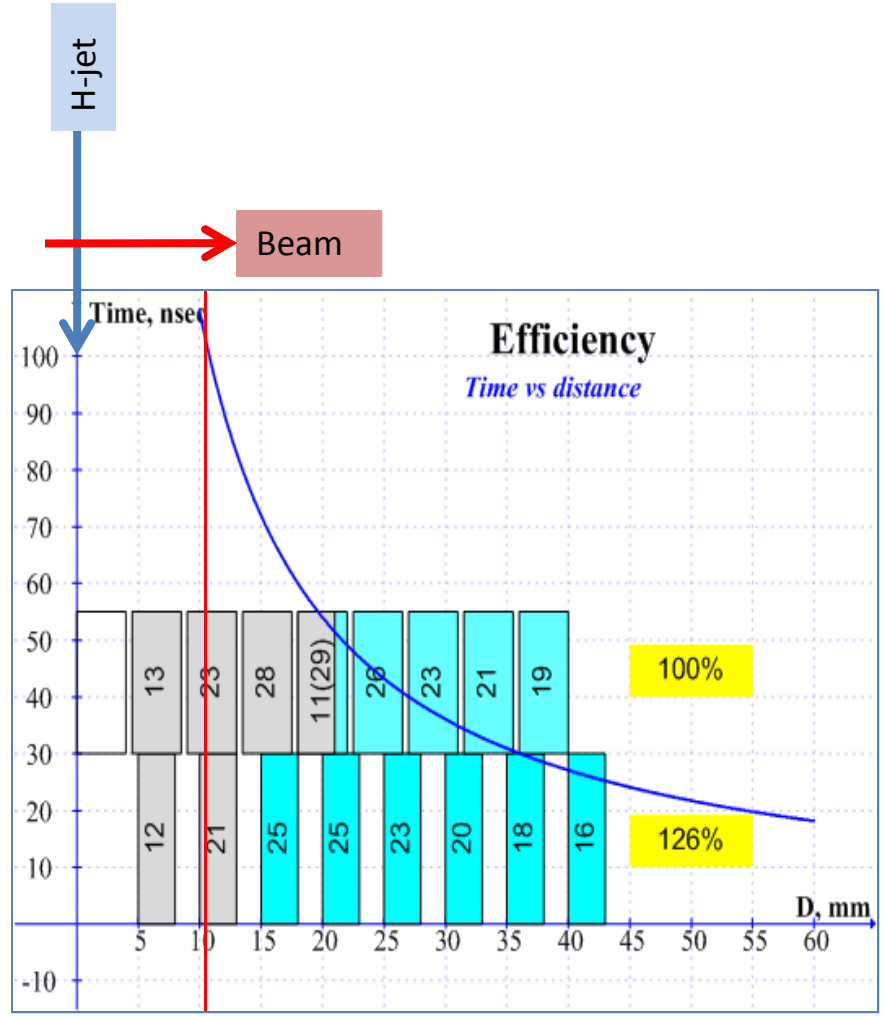
# Elastic *pp* dσ / d*t*

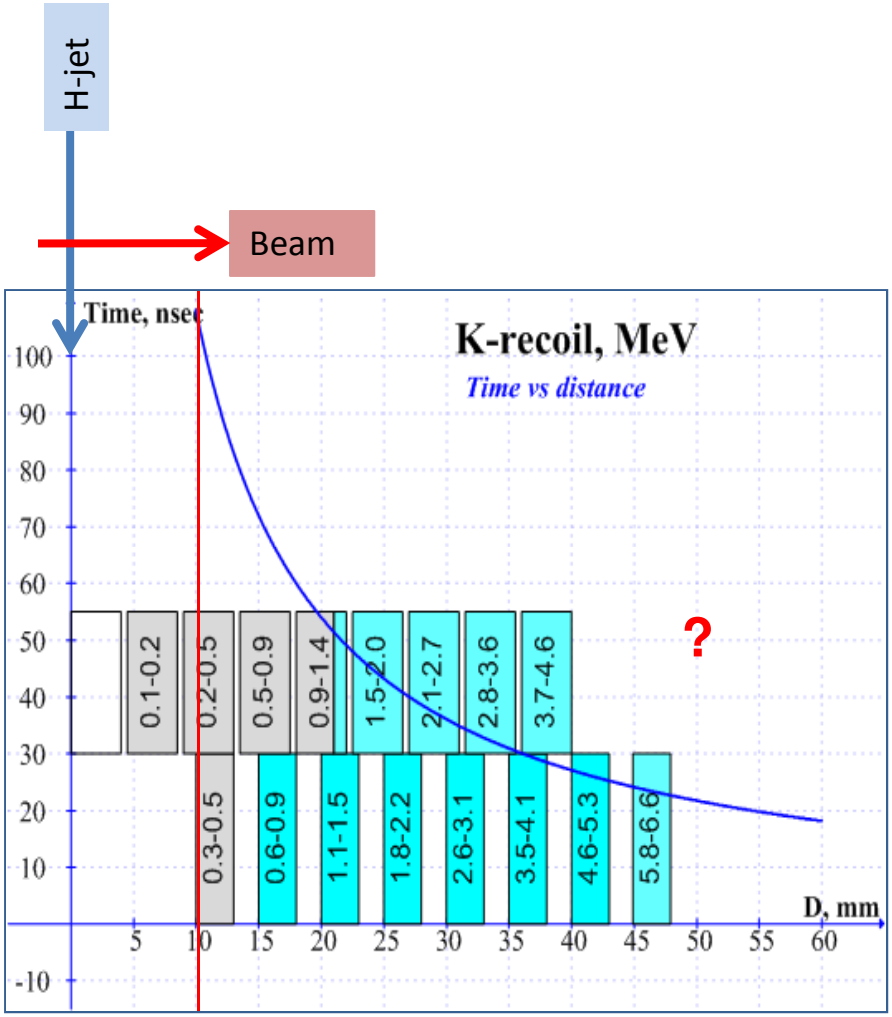


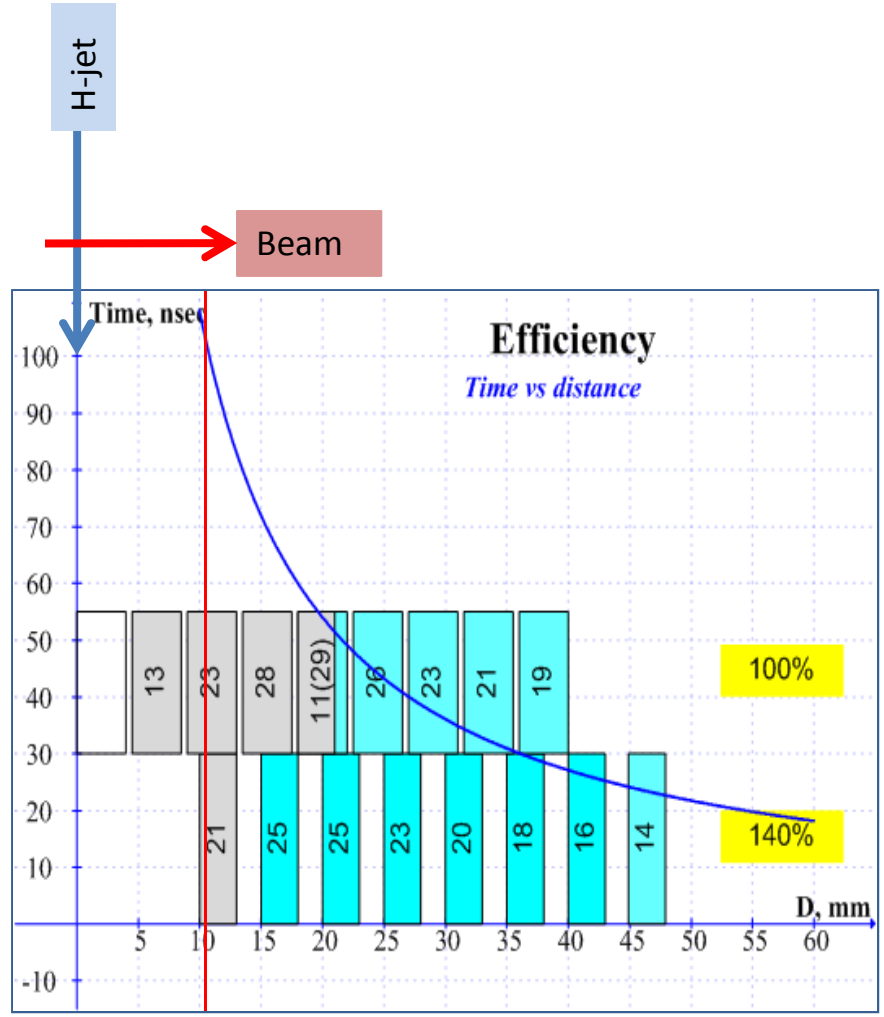

pp (100GeV)
0.05
0.04
0.03
0.02
0.01
$A_N$
Efficiency--> AnPower*sqrt(Cross-Section)
Cross Section
T(recoil), MeV
1
2
3
4
5
6
7
8
9


Time, nsec
pp (100GeV)
Time vs distance
10*K-recoil(MeV) vs. distance(mm) (D=80cm)
Efficiency--> AnPower*sqrt(Cross-Section)
D, mm
100
90
80
70
60
50
40
30
20
10
-10
5
10
15
20
25
30
35
40
45
50
55
60

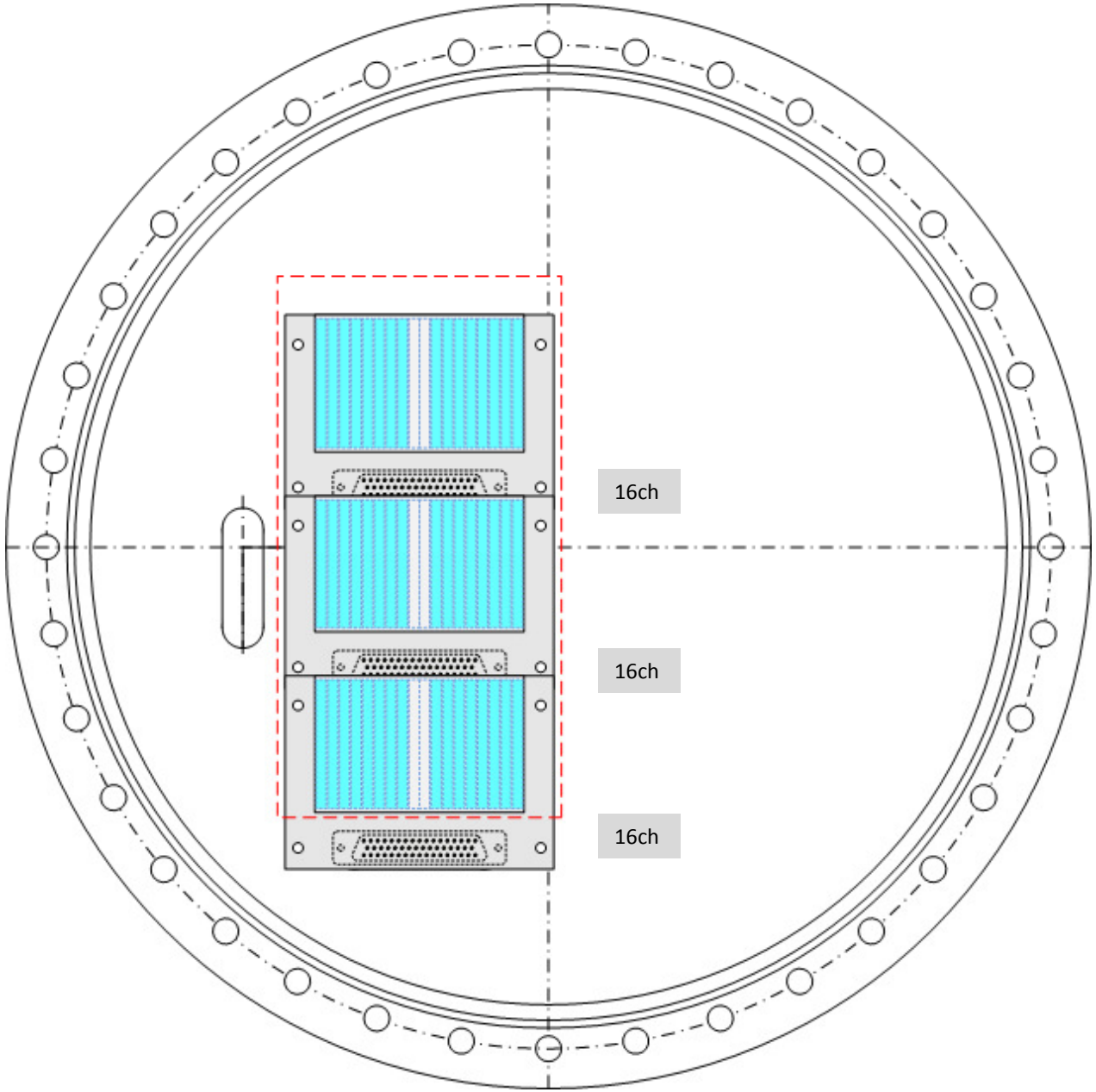

H-jet
Beam
Time, nsec
K-recoil, MeV
Time vs distance
0.1-0.2
0.2-0.5
0.5-0.9
0.9-1.4
1.5-2.0
2.1-2.7
2.8-3.6
3.7-4.6
0.1-0.2
0.3-0.5
0.6-0.9
1.1-1.5
1.8-2.2
2.6-3.1
3.5-4.1
4.6-5.3
D, mm


H-jet
Beam
Time, nsec
Efficiency
Time vs distance
13
23
28
11(29)
26
23
21
19
12
21
25
25
23
20
18
16
100%
126%
D, mm

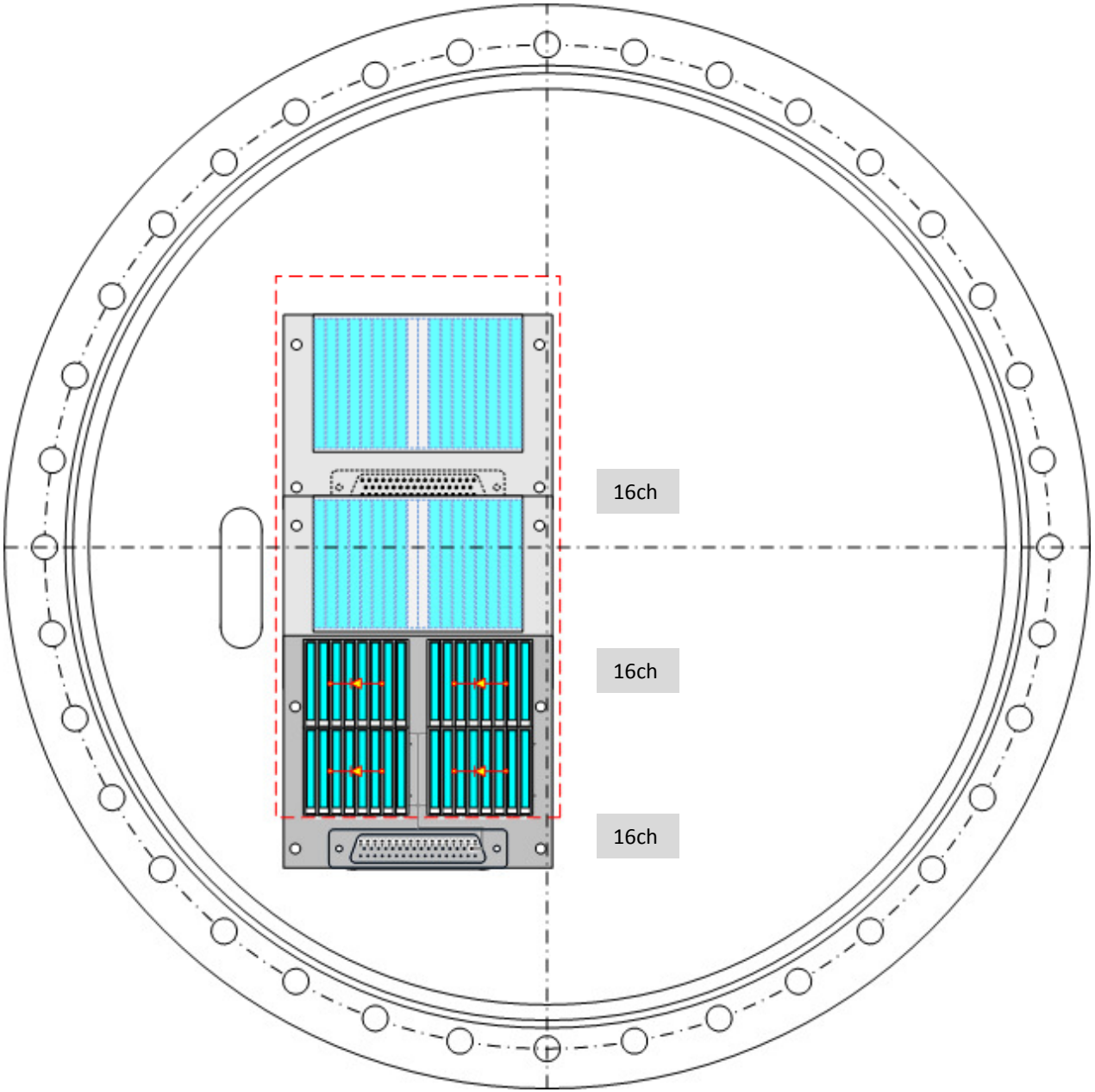

H-jet
Beam
Time, nsec
K-recoil, MeV
Time vs distance
0.1-0.2
0.2-0.5
0.5-0.9
0.9-1.4
1.5-2.0
2.1-2.7
2.8-3.6
3.7-4.6
0.3-0.5
0.6-0.9
1.1-1.5
1.8-2.2
2.6-3.1
3.5-4.1
4.6-5.3
5.8-6.6
?
D, mm


H-jet
Beam
Time, nsec
Efficiency
Time vs distance
13
23
28
11(29)
26
23
21
19
21
25
25
23
20
18
16
14
100%
140%
D, mm

# Current Hamamatsu strips detector 80x50mm, 16x3 strips (4mm by 50mm)

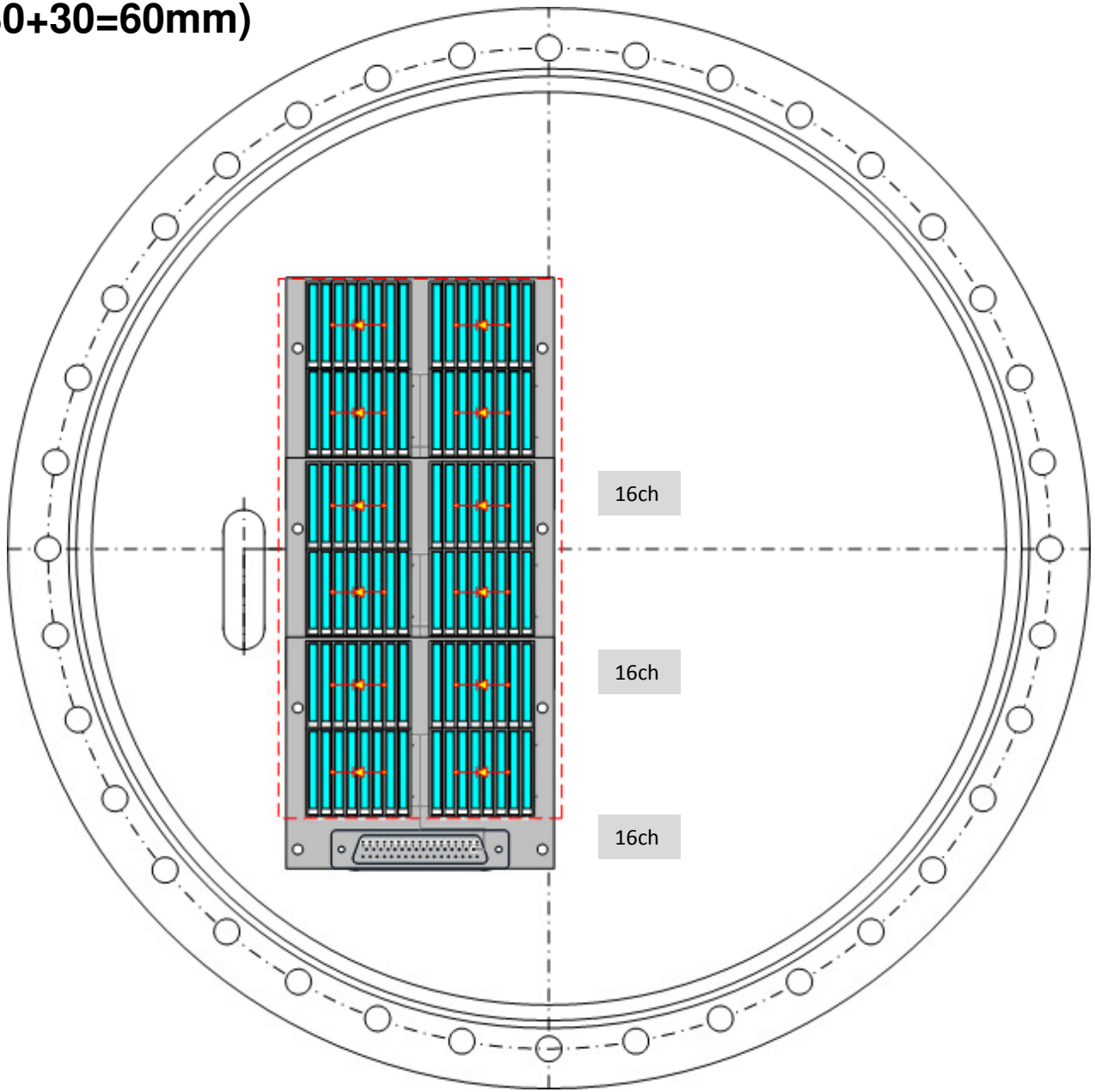


# Upgrade to the next run

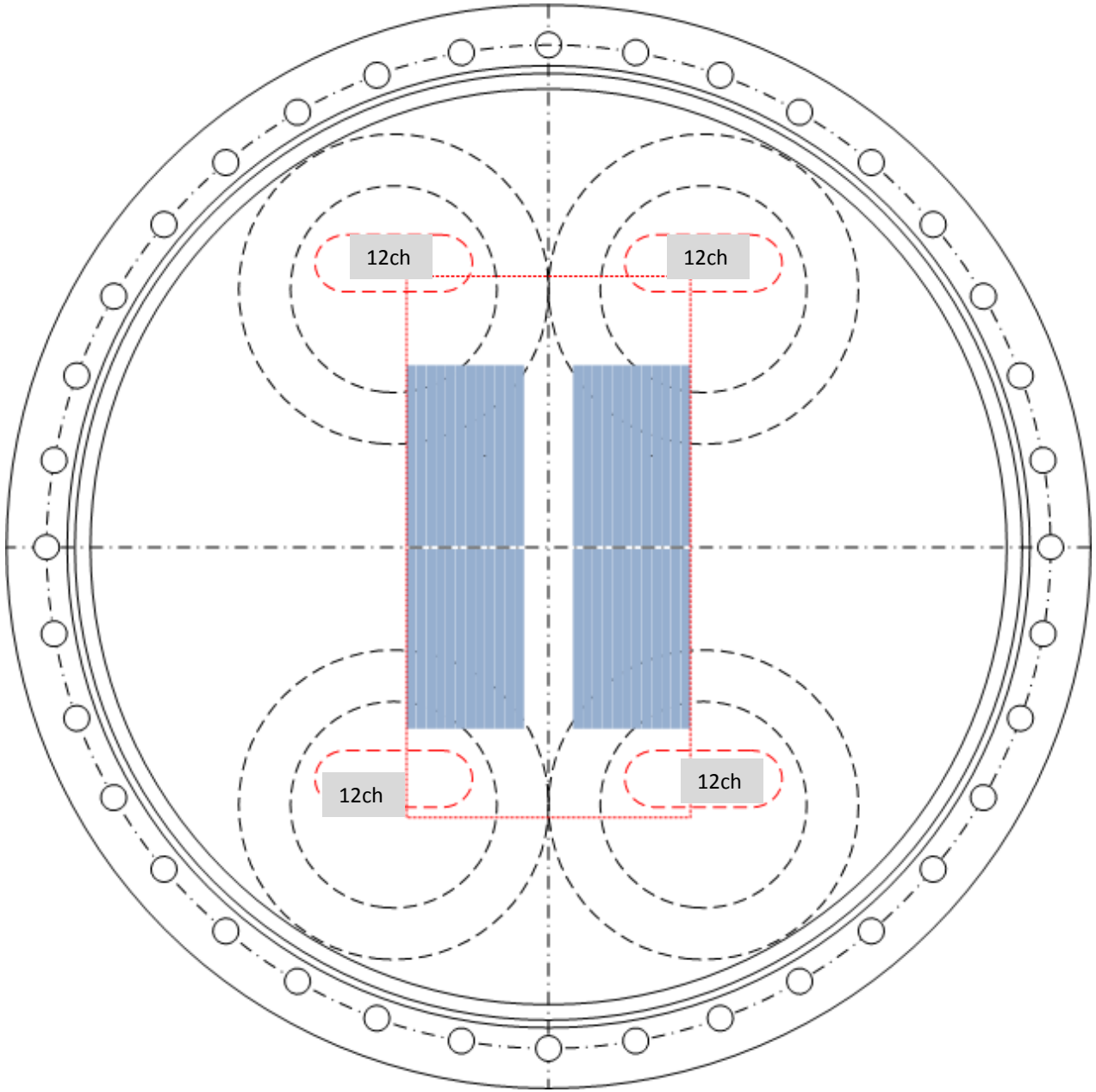


# Upgrade in the future

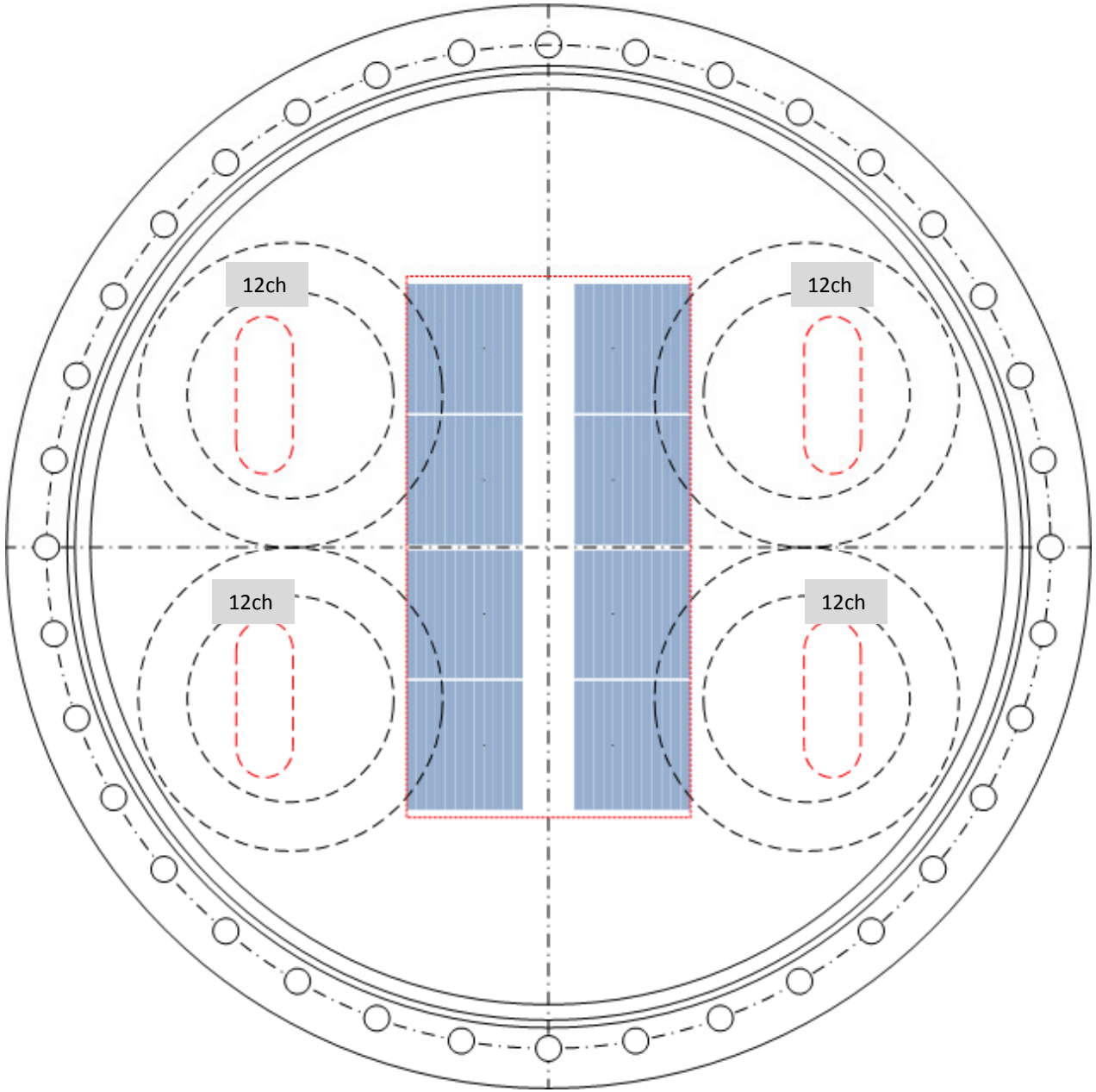
**Detector from single Hamamatsu 3x30mm PIN diodes, 3x16=48 strips (3 by 30+30=60mm)**



# Strips detector 45x70mm, 4x12=48 strips (4mm by 70mm)



# Strips detector 45x50mm, 4x12=48 strips (4mm by 50+50=100mm)



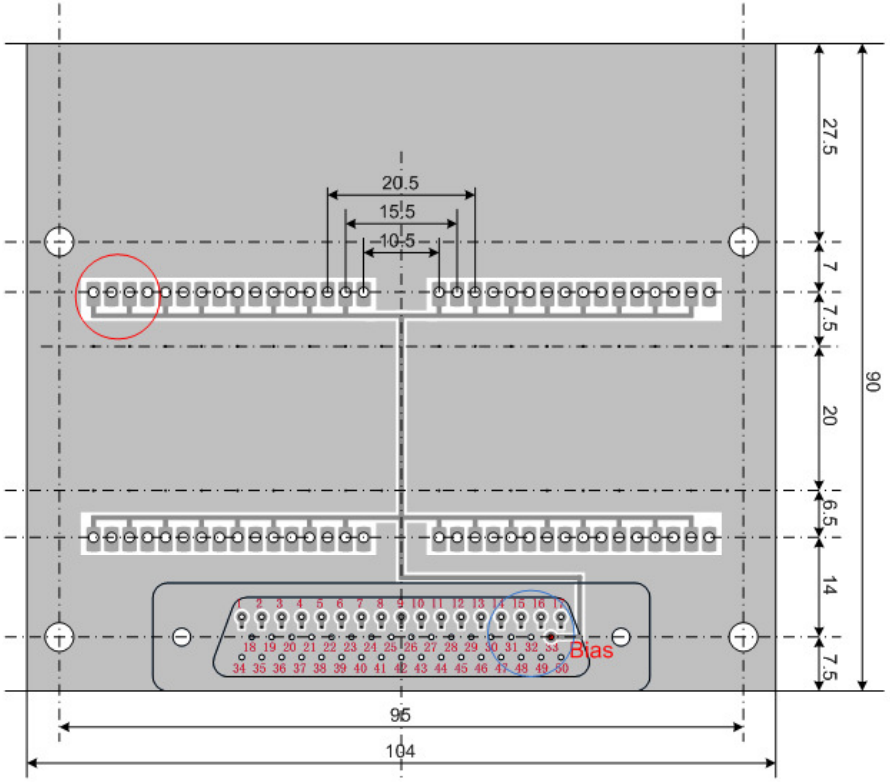
| Detector | Energy range (MeV) | Time range (nsec) | Angle (mrad) | Distance (mm) | Efficiency* | Thickness of Si (mkm) |
|---|---|---|---|---|---|---|
| **Current Hamamatsu strips detector 80x50mm** | | | | | | |
| 50mmx80mm, 16x3 strips | 1.2-4.6 | 27 | 25-50 | 20-40 | 1.00 | 400 |
| **Detector from single Hamamatsu 3x30mm PIN diodes** | | | | | | |
| 3mmx30mmx16, 16x3 strips | 1.1-5.3 | 25-54 | 24-54 | 20-43 | 1.01 | 300 |
| 3mmx30mmx16, 16x3 strips | 0.6-5.3 | 25-72 | 18-54 | 15-43 | 1.26 | 300 |
| 3mmx30mmx16, 16x3 strips | 0.6-8.0 | 21-72 | 18-66 | 15-53 | 1.53 | 500 |
| **Strips detector 45x70mm** | | | | | | |
| 50mmx70mm, 24x2 strips | 1.1-5.3 | 25-54 | 24-54 | 20-43 | 1.20 | 300 |
| 50mmx70mm, 24x2 strips | 1.1-8.0 | 21-54 | 24-66 | 20-53 | 1.55 | 500 |
| 50mmx70mm, 24x2 strips | 0.9-8.0 | 21-62 | 22-66 | 18-53 | 1.68 | 500 |
| **Strips detector 45x(50+50)mm** | | | | | | |
| 40mmx50mmx2, 24x2 strips | 1.1-5.3 | 25-54 | 24-54 | 20-43 | 1.71 | 300 |
| 40mmx50mmx2, 24x2 strips | 1.1-8.0 | 21-54 | 24-66 | 20-53 | 2.22 | 500 |
| 40mmx50mmx2, 24x2 strips | 0.9-8.0 | 21-62 | 22-66 | 18-53 | 2.41 | 500 |

* Efficiency ~ $A_N$ x sqrt(cross section)

# Backup

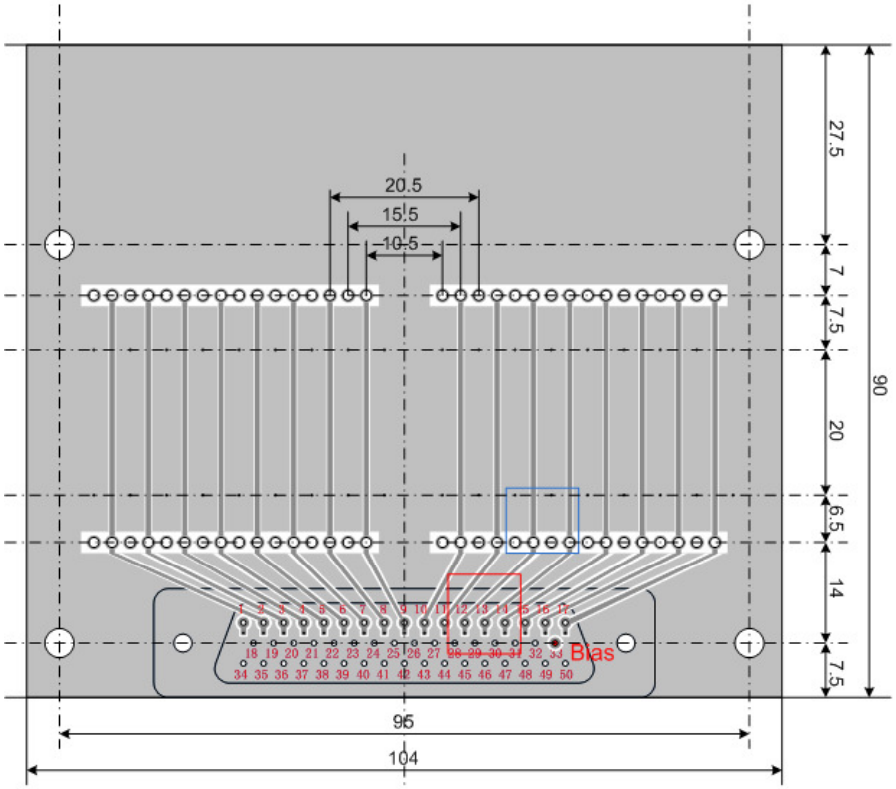
# JET ceramic board

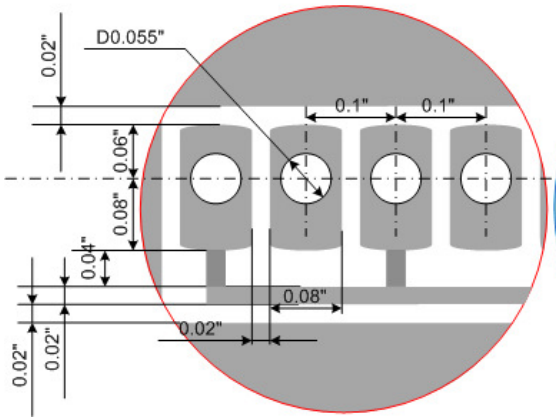
## Front side

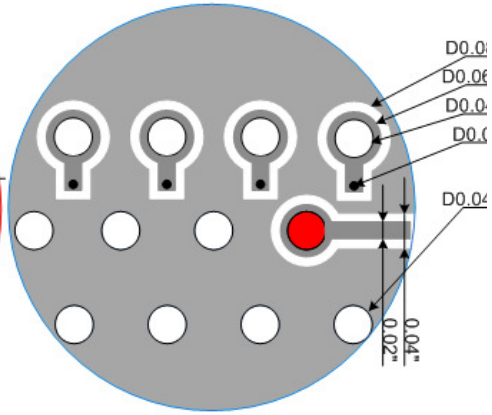


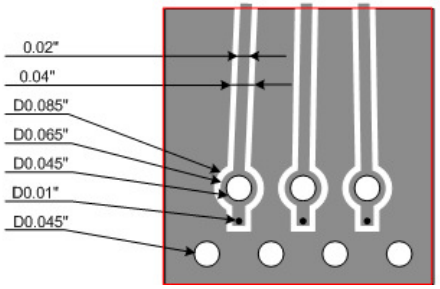

## Back side

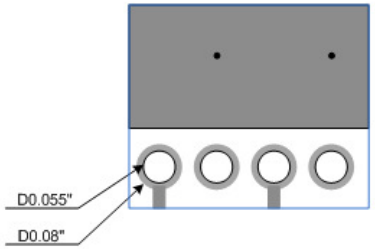
LOOKING FROM THE TOP VIEW THROUGH THE BOARD



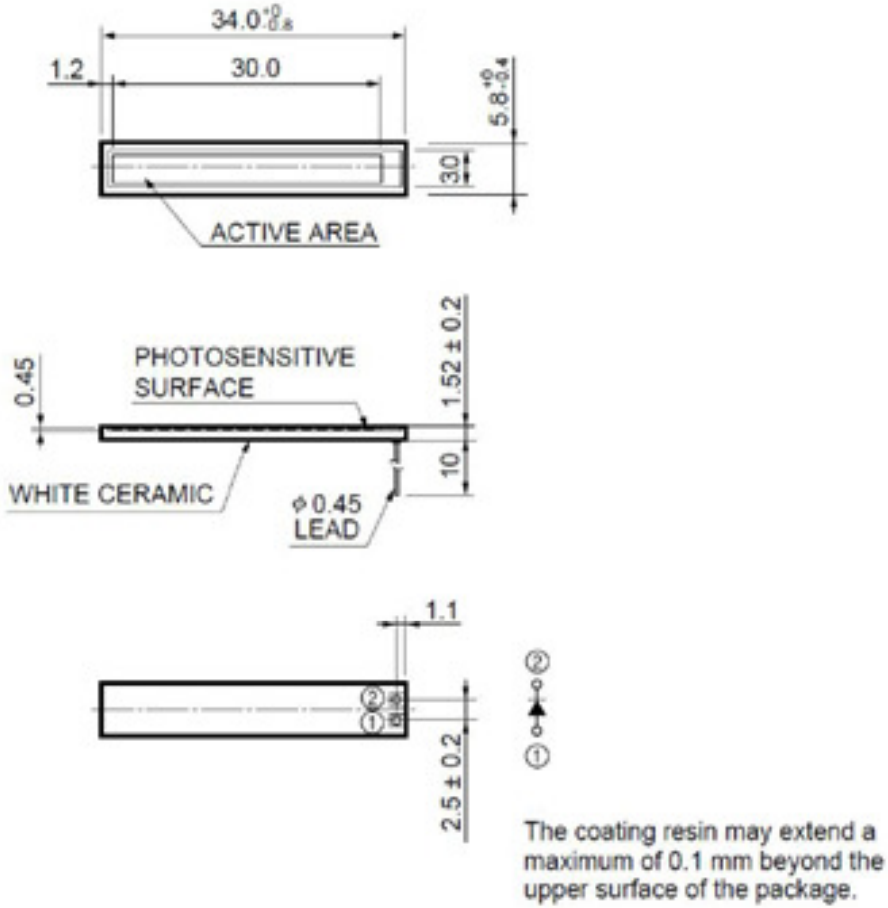



## ② S3588-08/-09




| Valid Until | Sales Engineer | Terms | Ship Via | FOB |
|---|---|---|---|---|
| 4/20/2011 | MidAtlanticSalesRegion Team | Net 30 Days | Best Method | Middlesex, NJ |

| Product Number | Description | RoHS | Quantity | Qty Range | Unit Price | Lead Time |
|---|---|---|---|---|---|---|
| S3588-09 SPL | S3588-09 500um thickness | | 100 | 100-299 | 210.00 | TBD |
| S3588-09 | SILICON PIN DIODE | | 100 | 100-299 | 140.00 | 1.5m ARO & 50/m |