

# Update Back ground simulation for Vacuum box window

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2014-03-014

# Material and geometry setup

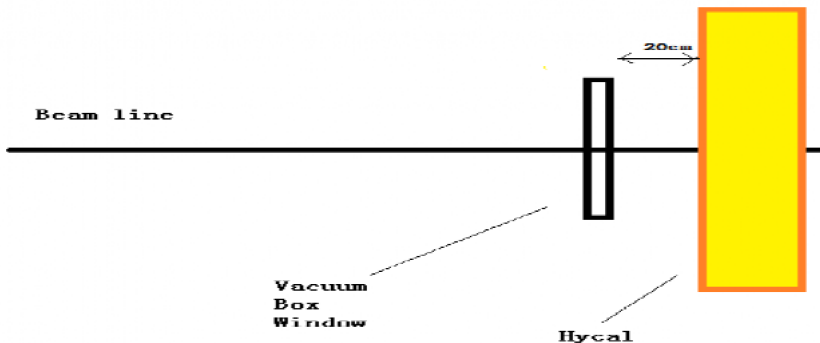
Vacuum Box Window

Material : Kapton -> Aluminium

2 thicknesses : 0.2mm 0.4mm

Distance from Hycal: 20cm, 10cm, 5cm

Hycal : 2\*2 block hole in the center ,with energy resolution



## 0.2mm Al window

Incident :

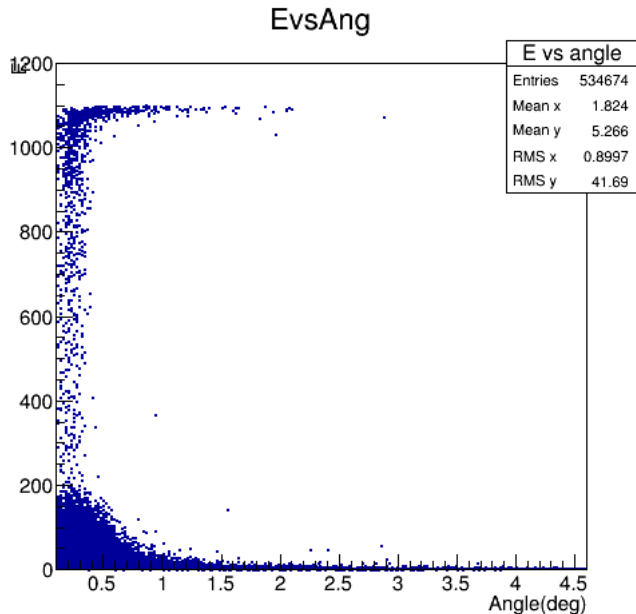
$10^8$  events

Back ground on Hycal  
with energy reselution

534647 events

~Without any cut

Most are low energy  
and small angle events



# 0.4mm Al window

Incident :

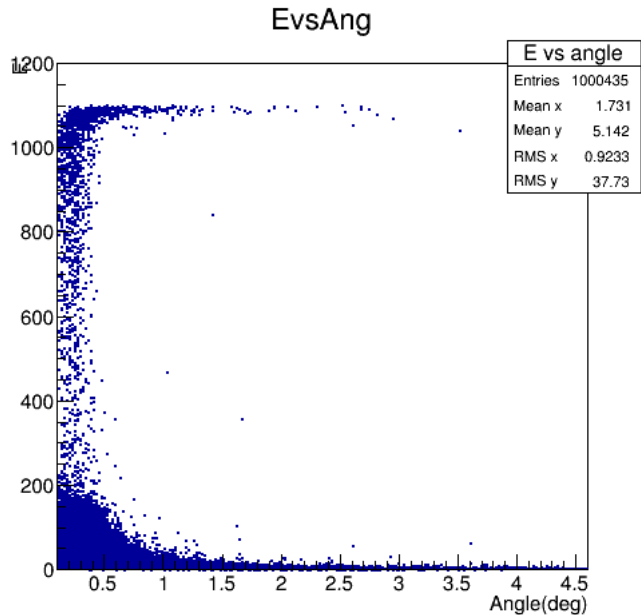
$10^8$  events

Back ground:

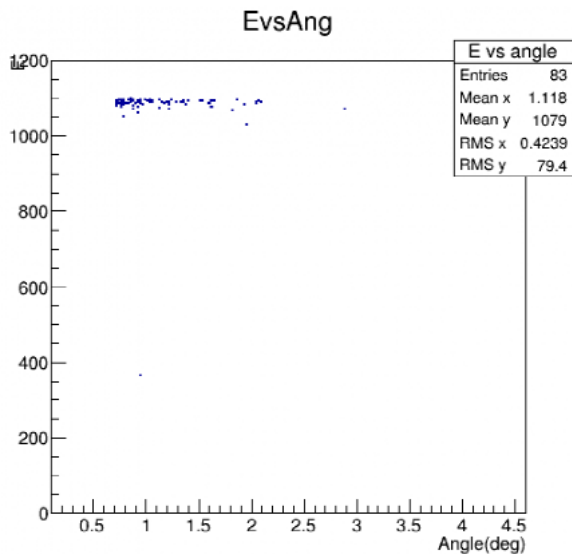
$10^6$  events

~Without any cut

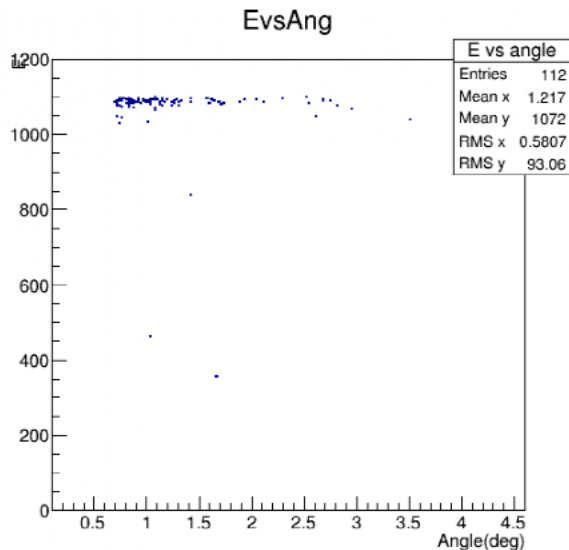
Most are low energy  
and small angle events



# Apply cut angle $>0.7$ E $>200$ MeV (0.2mm)



0.2mm window



0.4mm window

# Back ground ratio for 0.2mm 0.4mm windows

Ratio = (number of back ground)\*( $6 \cdot 10^{10}$  / number of incident ) Hz

Without any cut :

0.2mm window ~ 320 MHz

0.4mm window ~ 600 MHz

Apply cut angle  $> 0.7$ deg , energy  $> 200$  MeV:

0.2mm window ~ 49.8 KHz

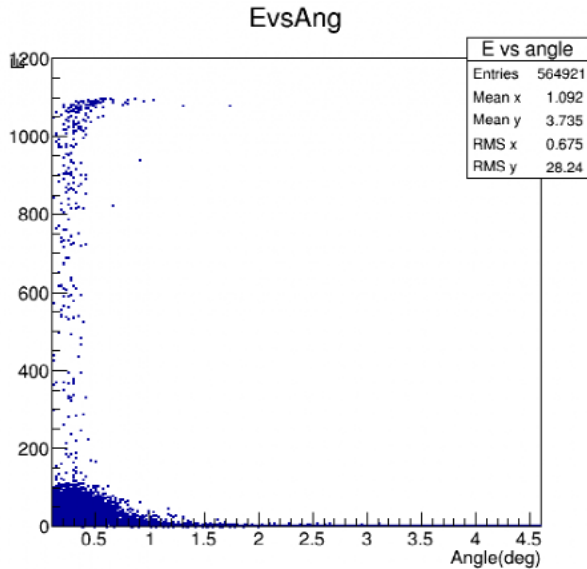
0.4mm window ~ 67.2 KHz

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Back ground is high

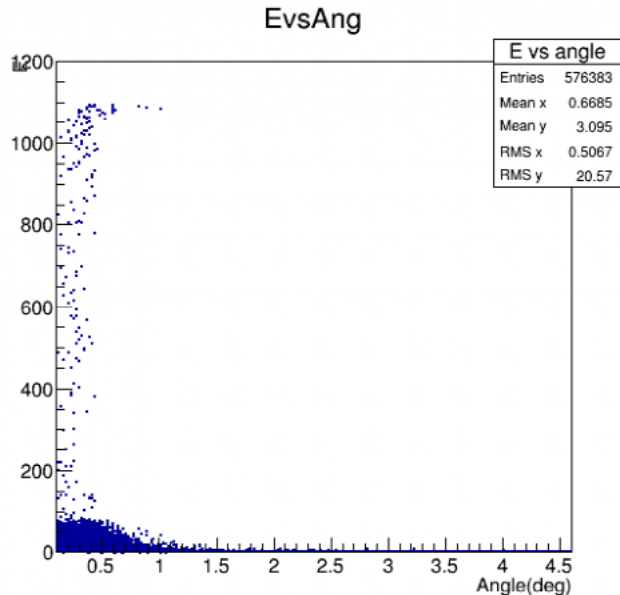
Even apply the angle and energy cut , high energy events rate is still more than 10times singal.

So keep studying the 0.2mm window background with different distanve from Hycal.

# Back ground for 0.2mm windows for 10cm,5cm distance from Hycal



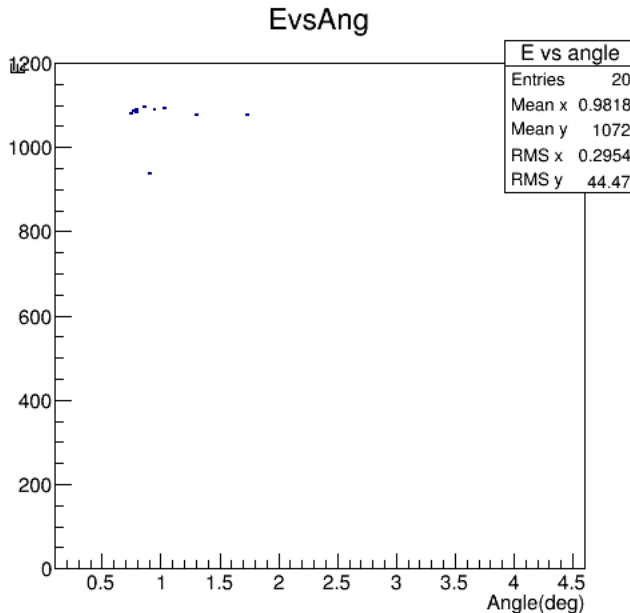
$10^8$  incident events (include Chao's half)  
0.2mm window 10cm from Hycal  
(no cut applied)



$10^8$  incident events(Chao's half)  
0.2mm window 5cm from Hycal  
(no cut applied)

# Back ground for 0.2mm windows for 10cm distance from Hycal with cut

Apply cut : angle > 0.7deg Energy > 200MeV





## Back ground rate for 0.2mm window with different distance

For 0.2mm Al window:

No cut applied:

Distance 20cm ~ 320 MHz

Distance 10cm ~ 339 MHz

Distance 5cm ~ 346 Mhz

With cut angle  $> 0.7\text{deg}$  , energy  $> 200\text{MeV}$  :

Distance 20cm ~ 49.8 KHz

Distance 10cm ~ 12 KHz

Distance 5cm ~ 3.6 KHz

# Summary

If we use 0.2mm 0.4mm Aluminium as vacuum box window  
20cm distance from Hycal, back ground will increase, with out any cut its  
around hundred Mhz.

If use cut Angle  $>0.7\text{deg}$ ,  $E >200\text{MeV}$ ,  
For both 0.2mm 0.4mm window still high.

For 0.2mm window, the less distance from Hycal, the less back gound we have.  
Mixmum 5cm distance will give us about 3600 high energy events per second.