

Emulsion refreshing

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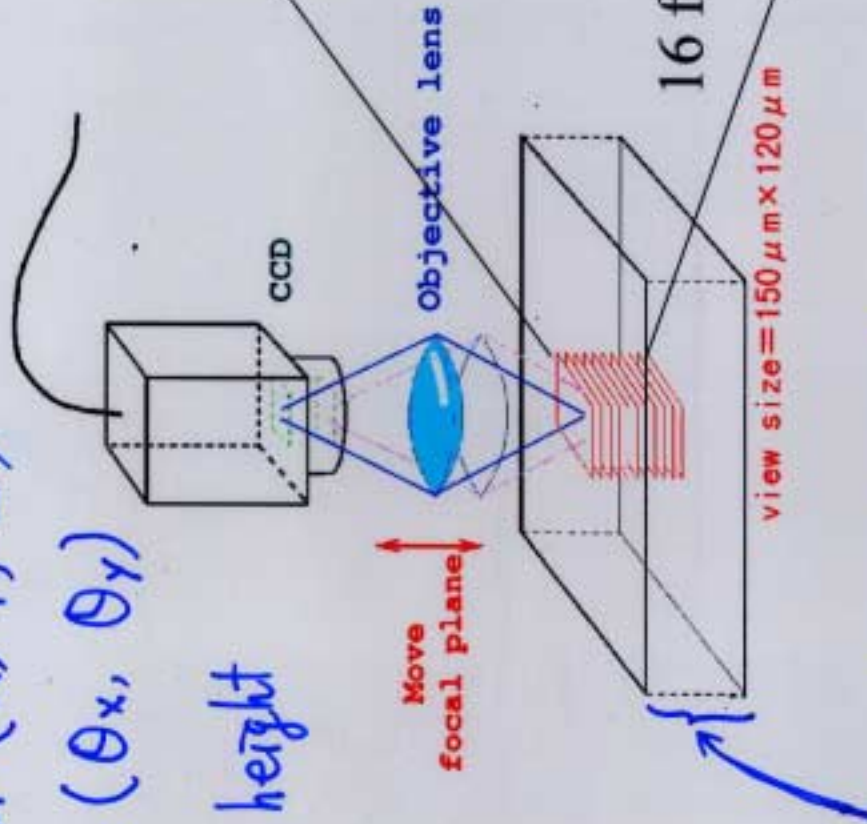
# Track recognition and Pulse Height

Read out information

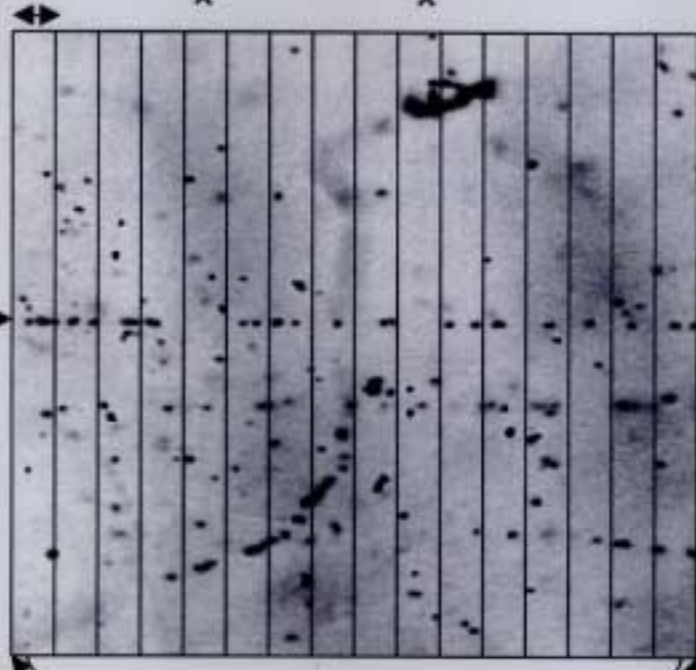
Position (X, Y, Z)

Angle ( $\theta_x, \theta_y$ )

Pulse height



M.I.P.



x no grain

x no grain

1 Emulsion layer (44 μm)

P.H.  $\geq$  p.H. threshold  $\rightarrow$  Track

P.H.  $<$  "  $\rightarrow$  not a track

16 frames [ 14 grain

2 no grain

$\Downarrow$   
Pulse Height = 14

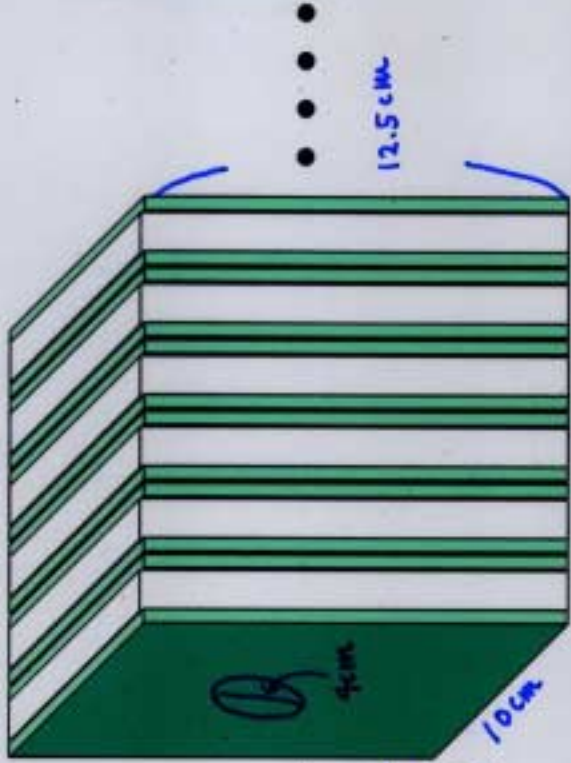
# Refresh Beam Test

CERN 10GeV/c  $\pi^-$

Beam

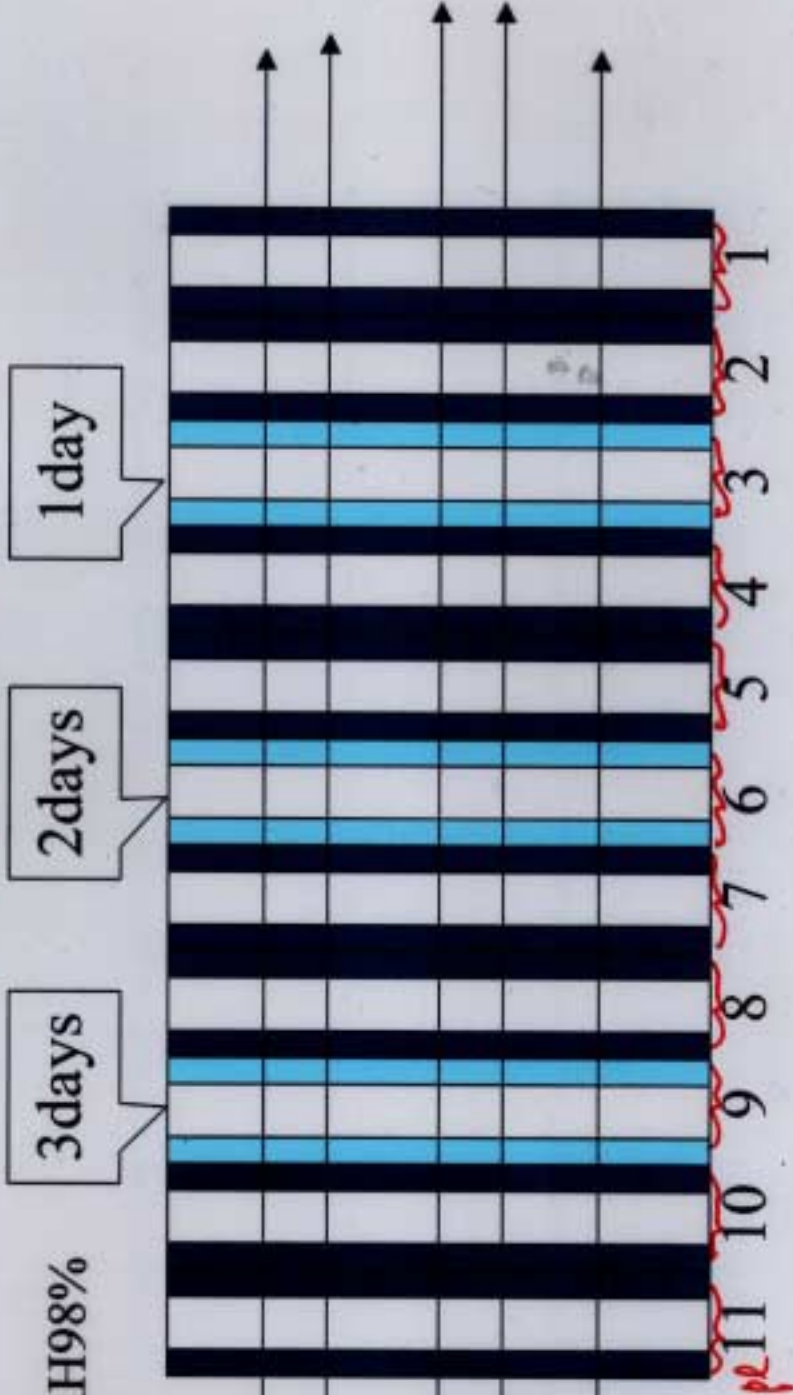
Beam density 0 mrad :  $\sim 10^4 / \text{cm}^2$

200 mrad :  $\sim 10^4 / \text{cm}^2$



Data taking

3mm X 3mm



1 day

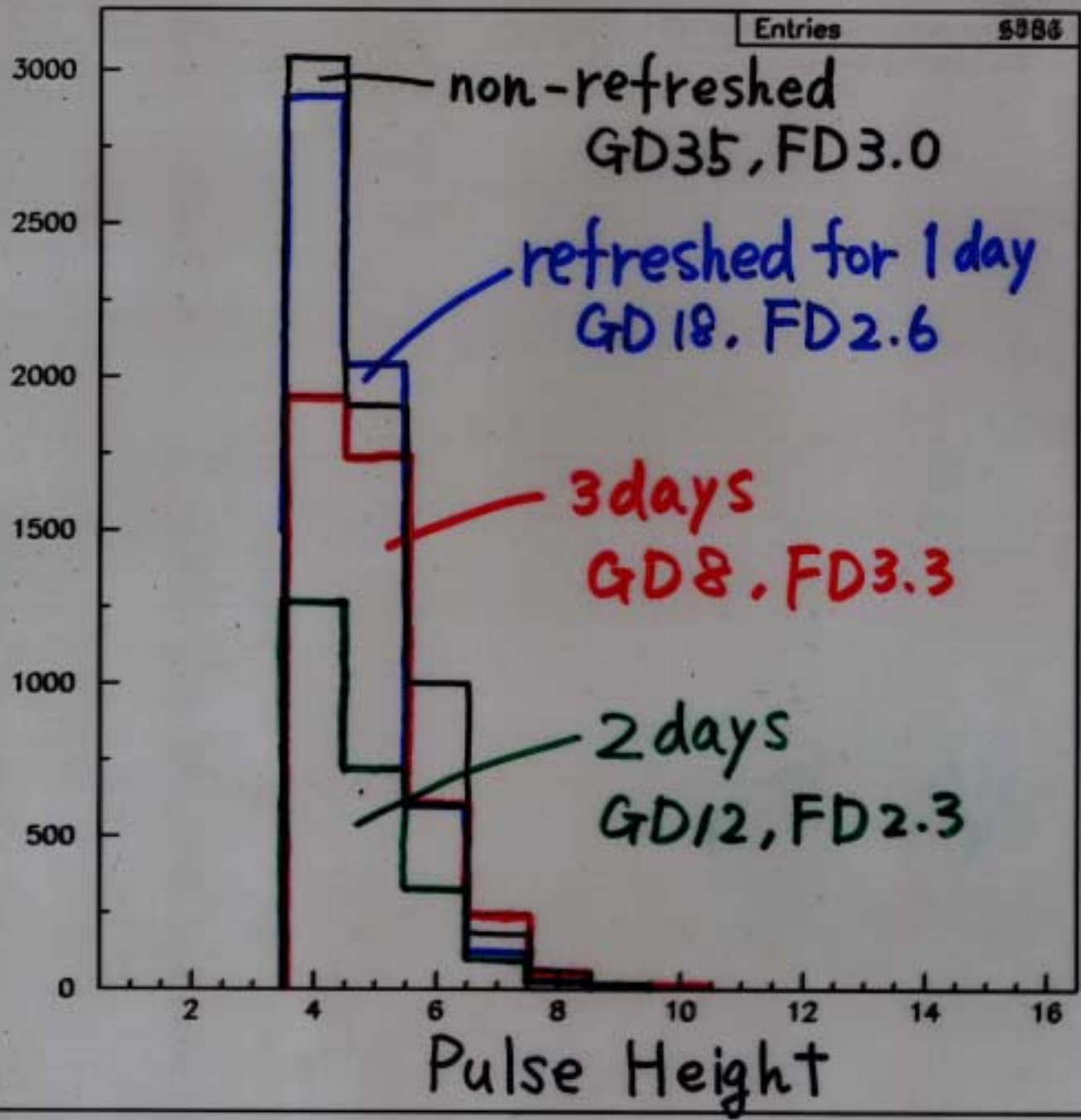
2 days

3 days

30°C RH98%

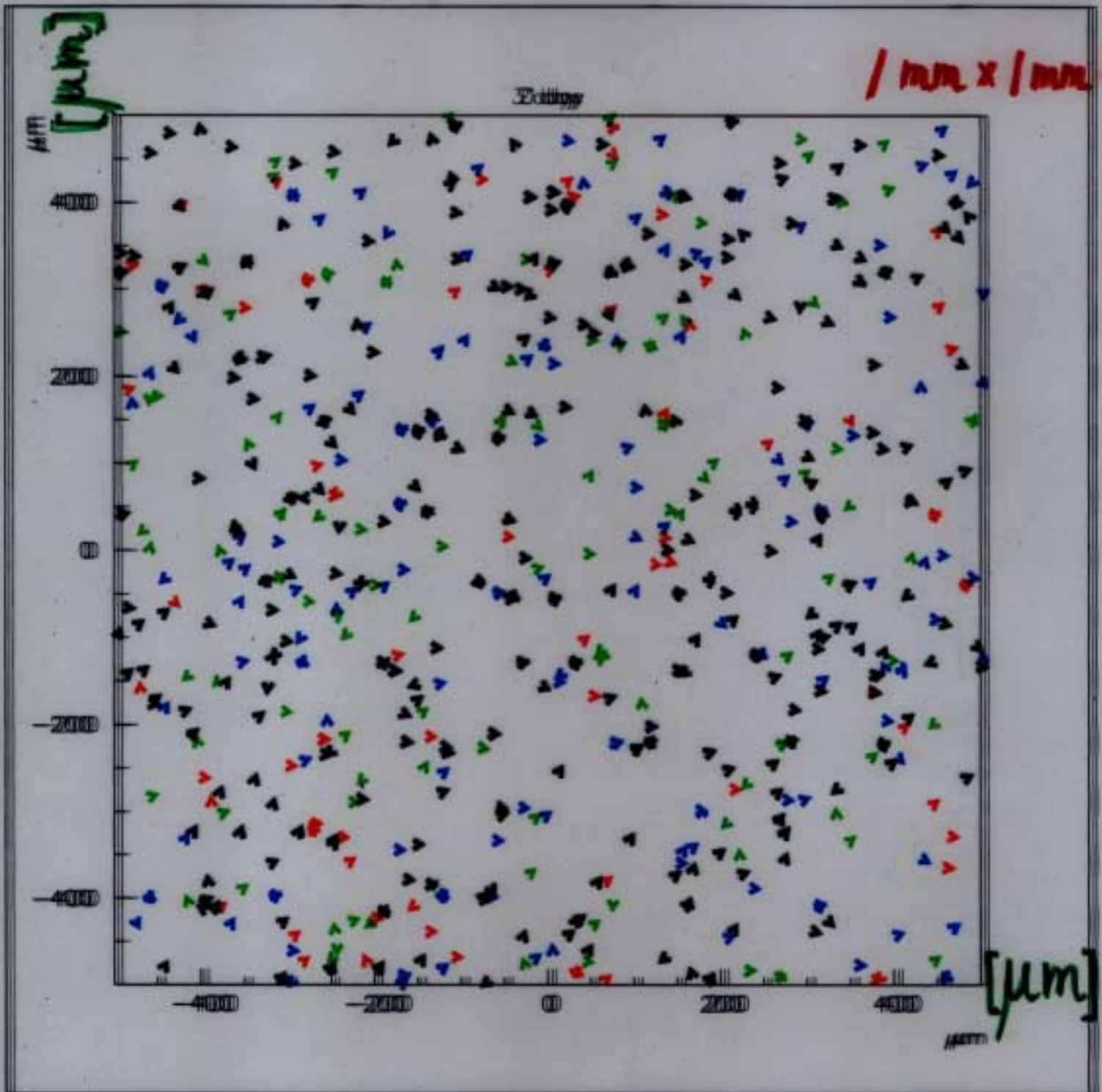
Fake tracks caused by fog  
Non-beam exposed area. 3mm x 3mm

6183



Beam exposed area

0 mrad ( $\pm 50$  mrad)

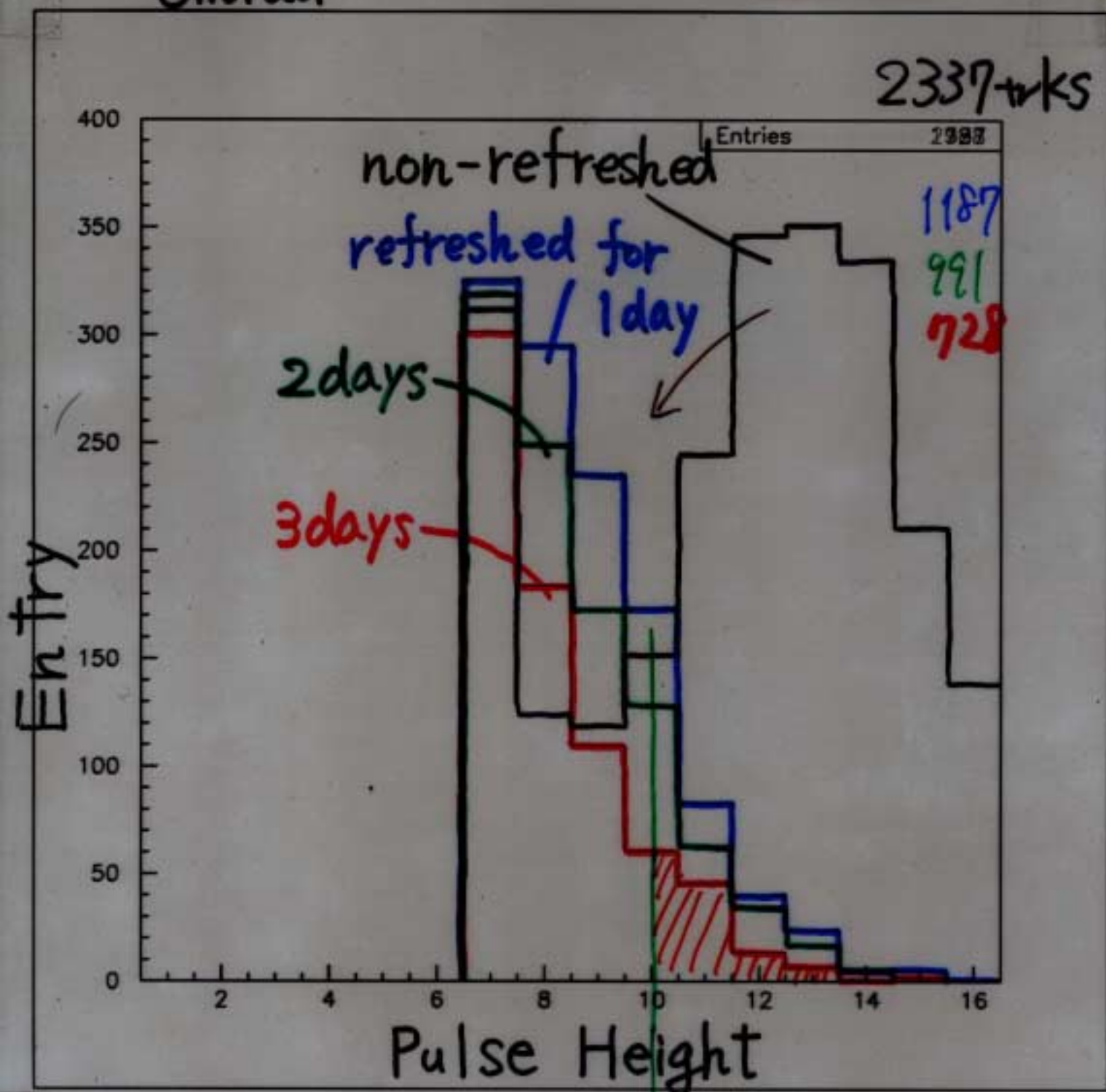


0 day : 320 tracks/mm<sup>2</sup>  
1 day : 146 tracks/mm<sup>2</sup>  
2 days : 113 tracks/mm<sup>2</sup>  
3 days : 72 tracks/mm<sup>2</sup>

Omrad

3mm x 3mm

2337 trks

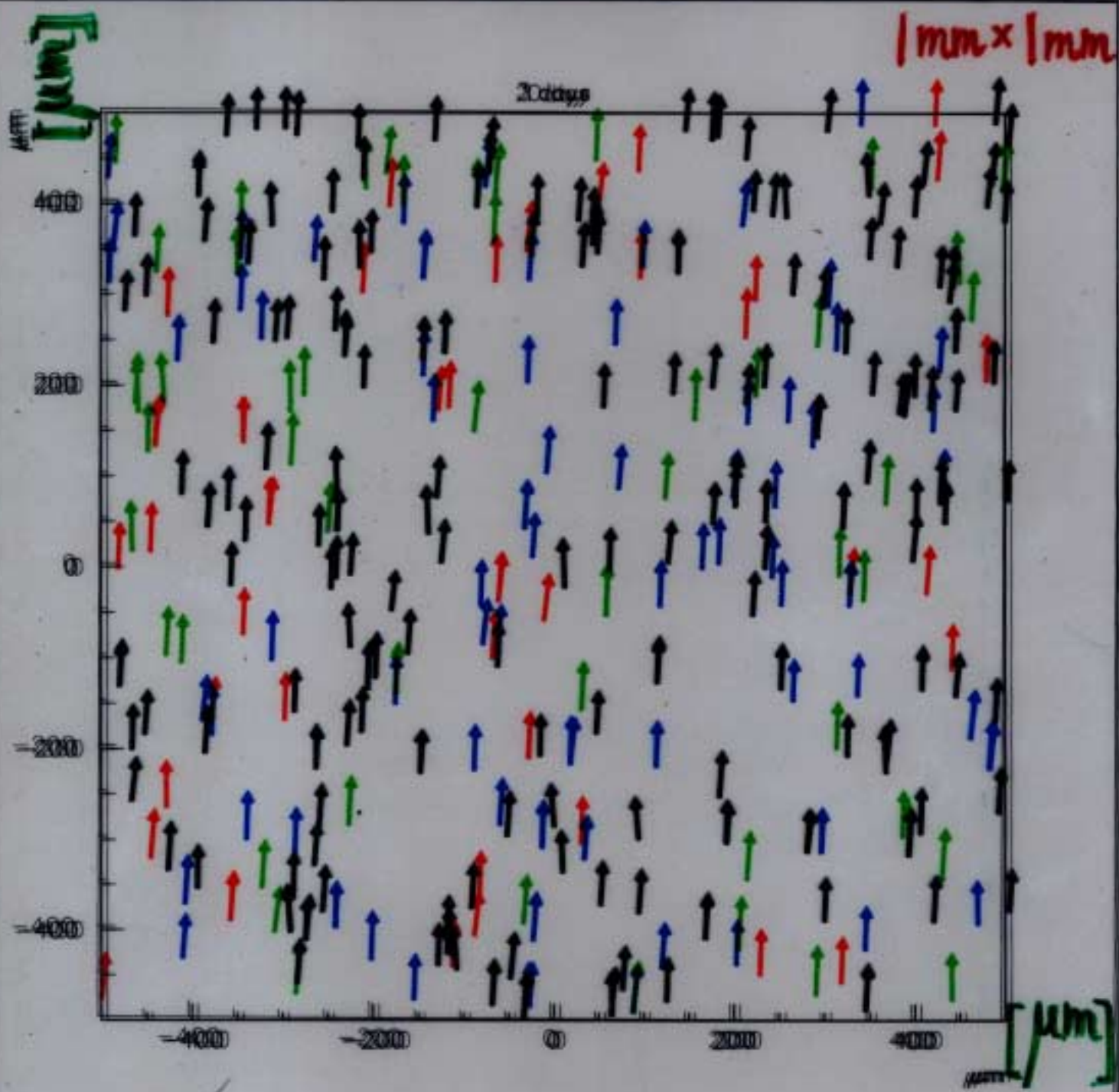


threshold

Not erased track: 132

$$\text{Erasing rate} : \frac{2337 - 132}{2337} = 94\%!$$

200 mrad

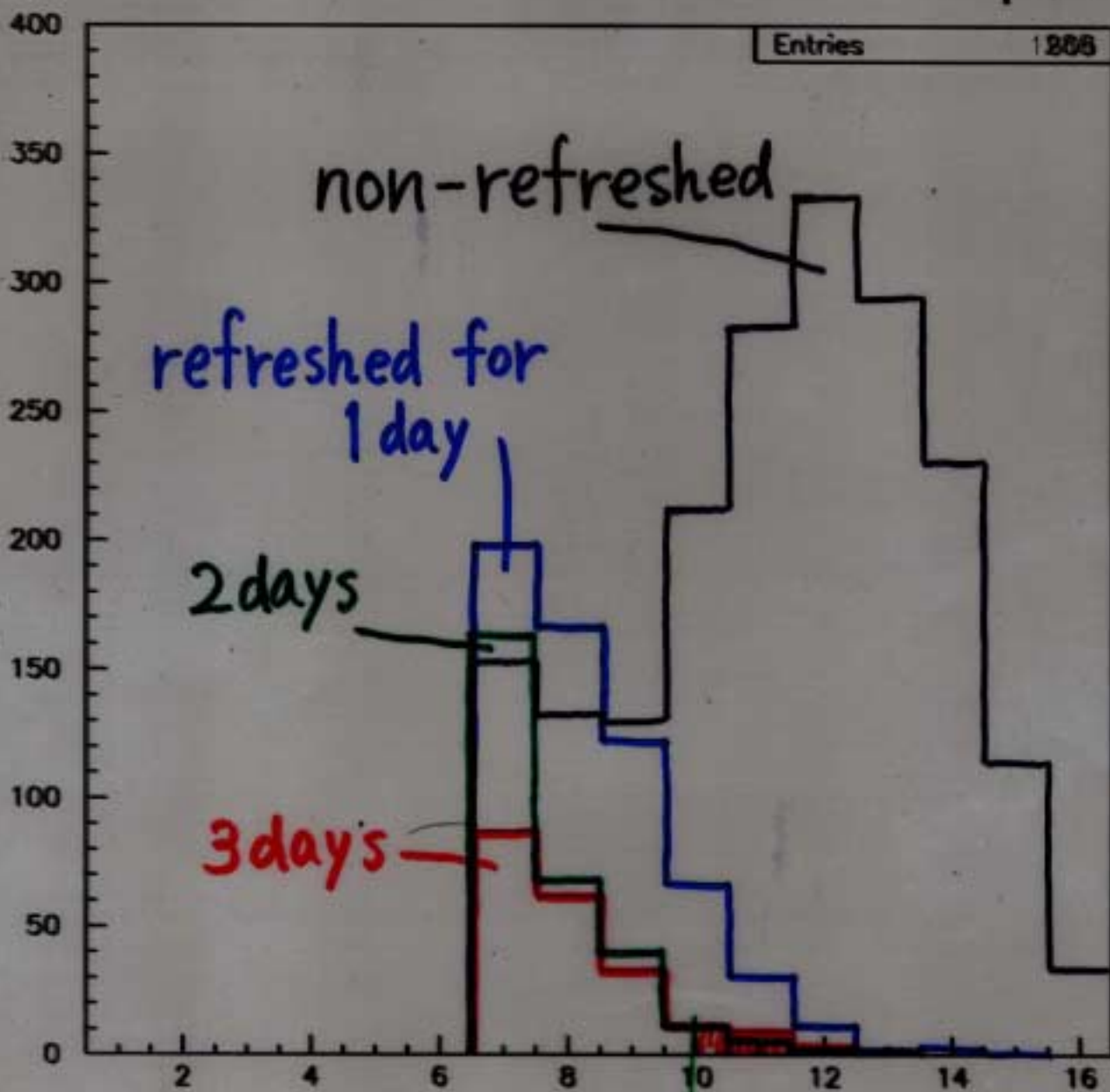


0 day : 191 tracks / mm<sup>2</sup>  
1 day : 75 tracks / mm<sup>2</sup>  
2 days : 53 tracks / mm<sup>2</sup>  
3 days : 45 tracks / mm<sup>2</sup>

200mrad

3mm X 3mm

1919 trks



Pulse Height

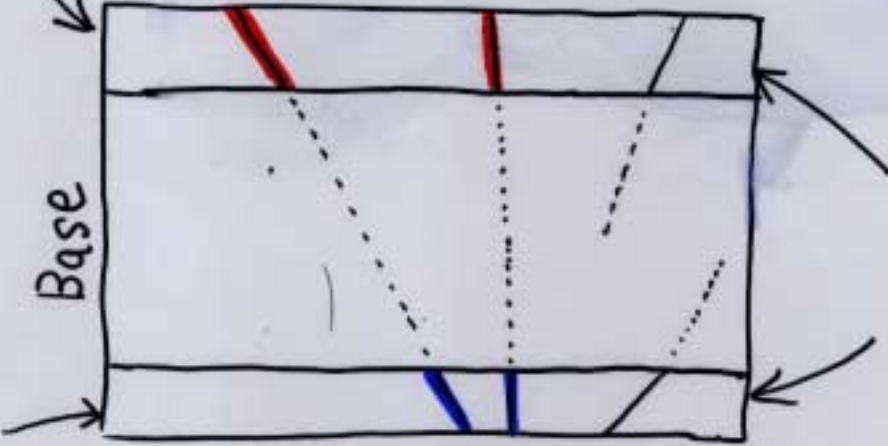
threshold

Not erased track : 32

Erasing rate :  $\frac{1919 - 32}{1919} = \underline{98\%}$



1st layer  
Base  
2nd layer



Connected track



Base track

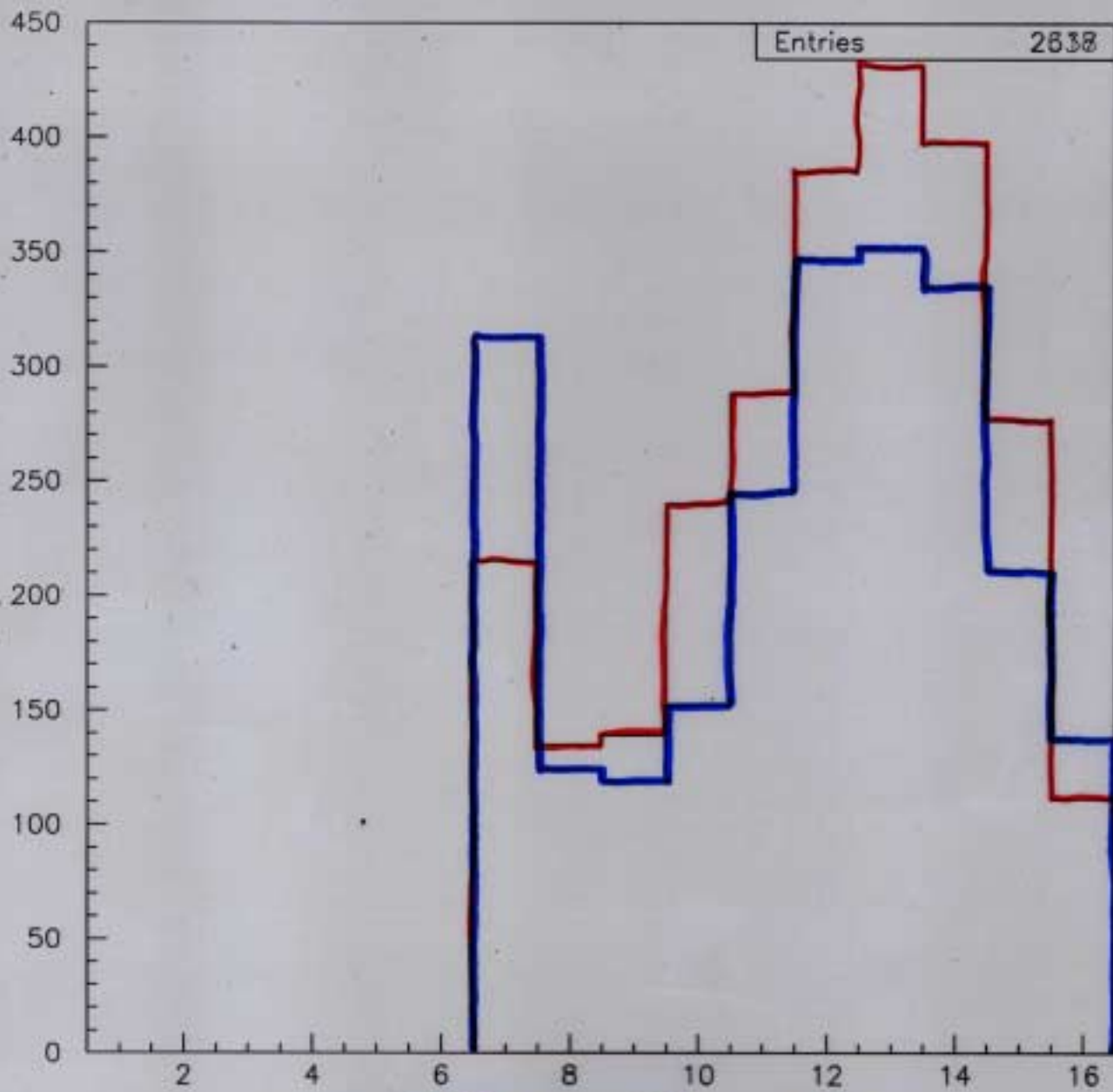
To reject fake tracks  
caused by random fog.

Emulsion layer

1 emulsion plate

1st Layer

2nd Layer



Pulse - Height

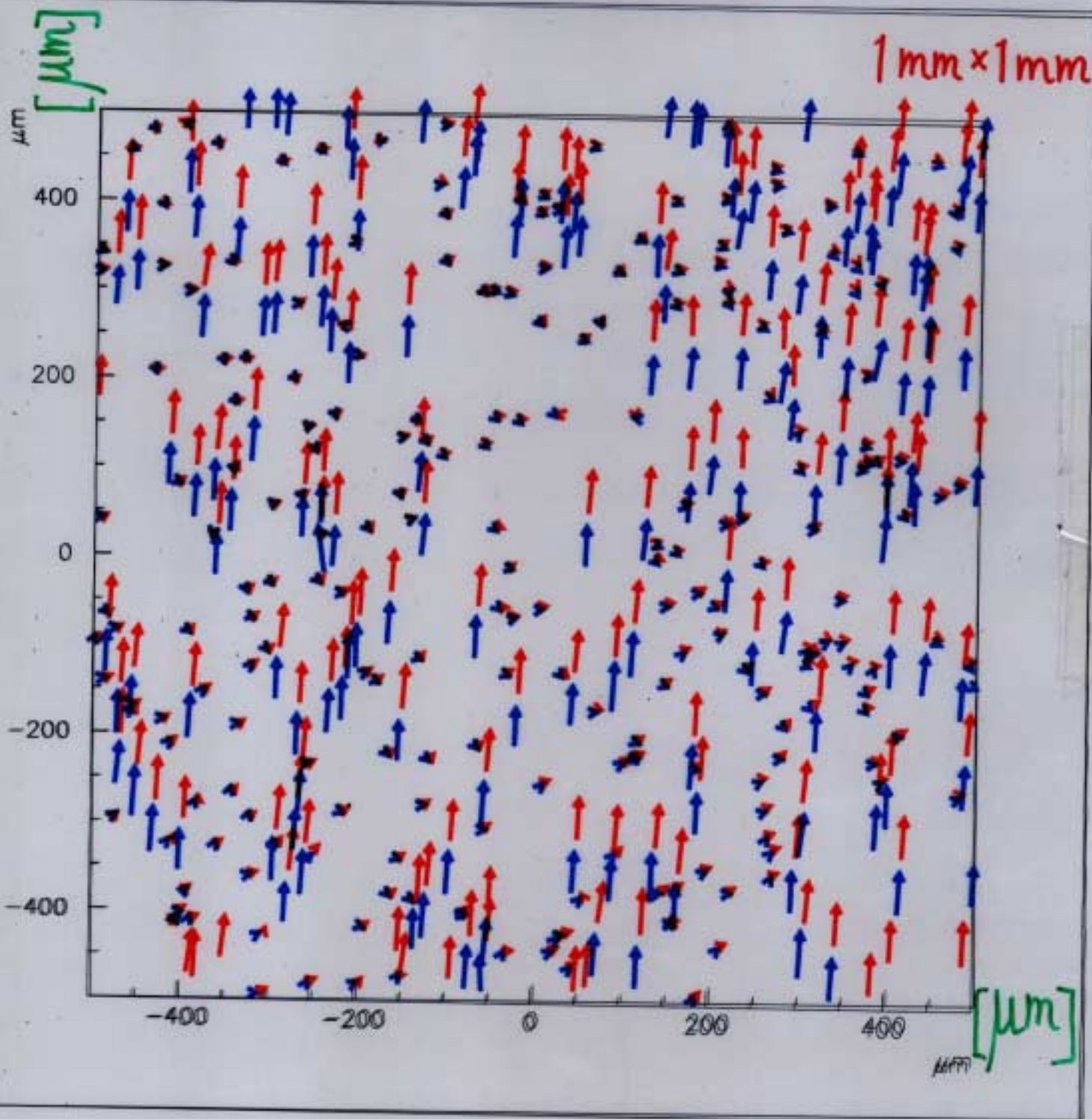


1st Layer



2nd Layer

1 mm x 1 mm

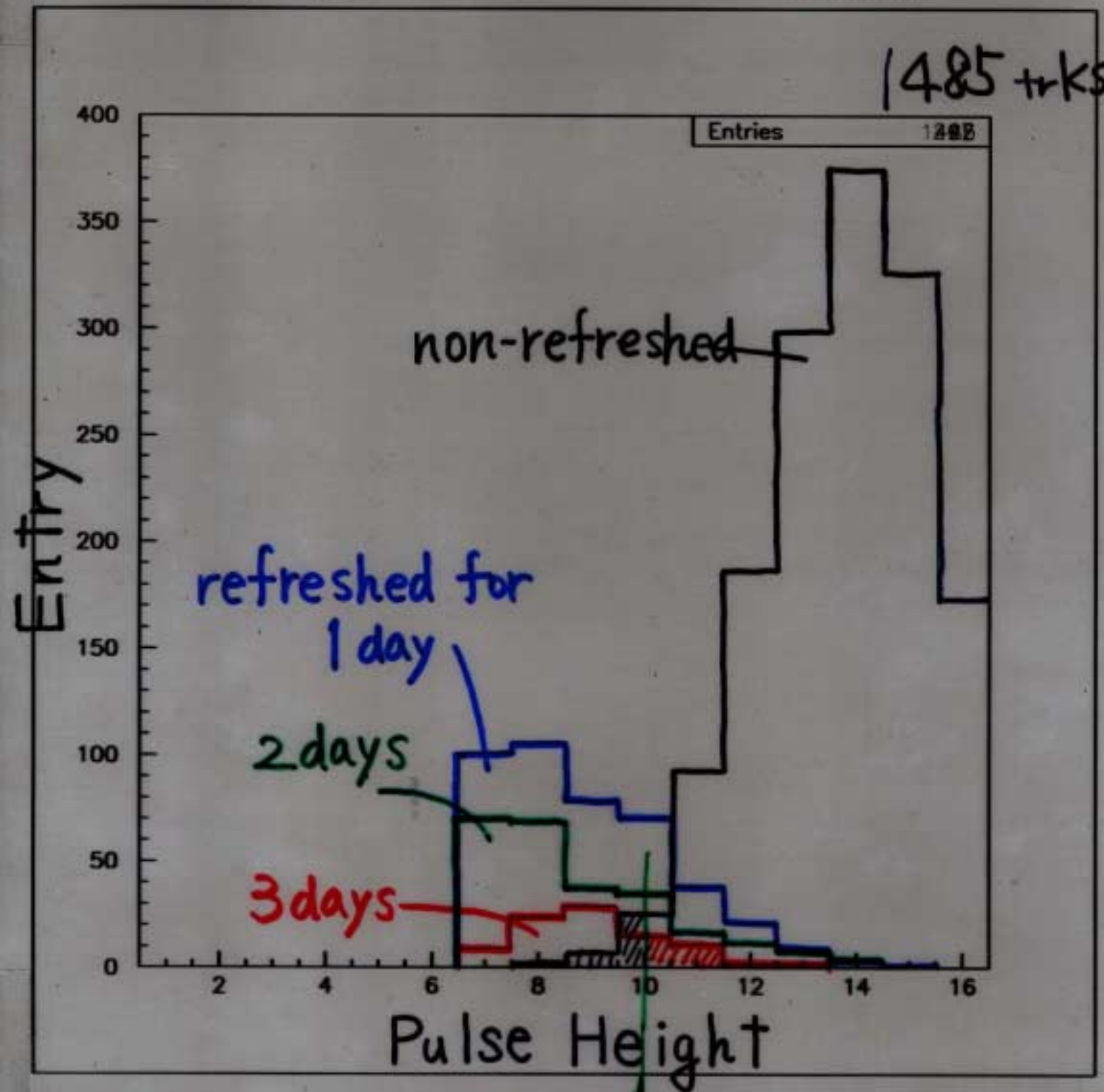


# Base Track

0 mrad

3 mm x 3 mm

1485 trks

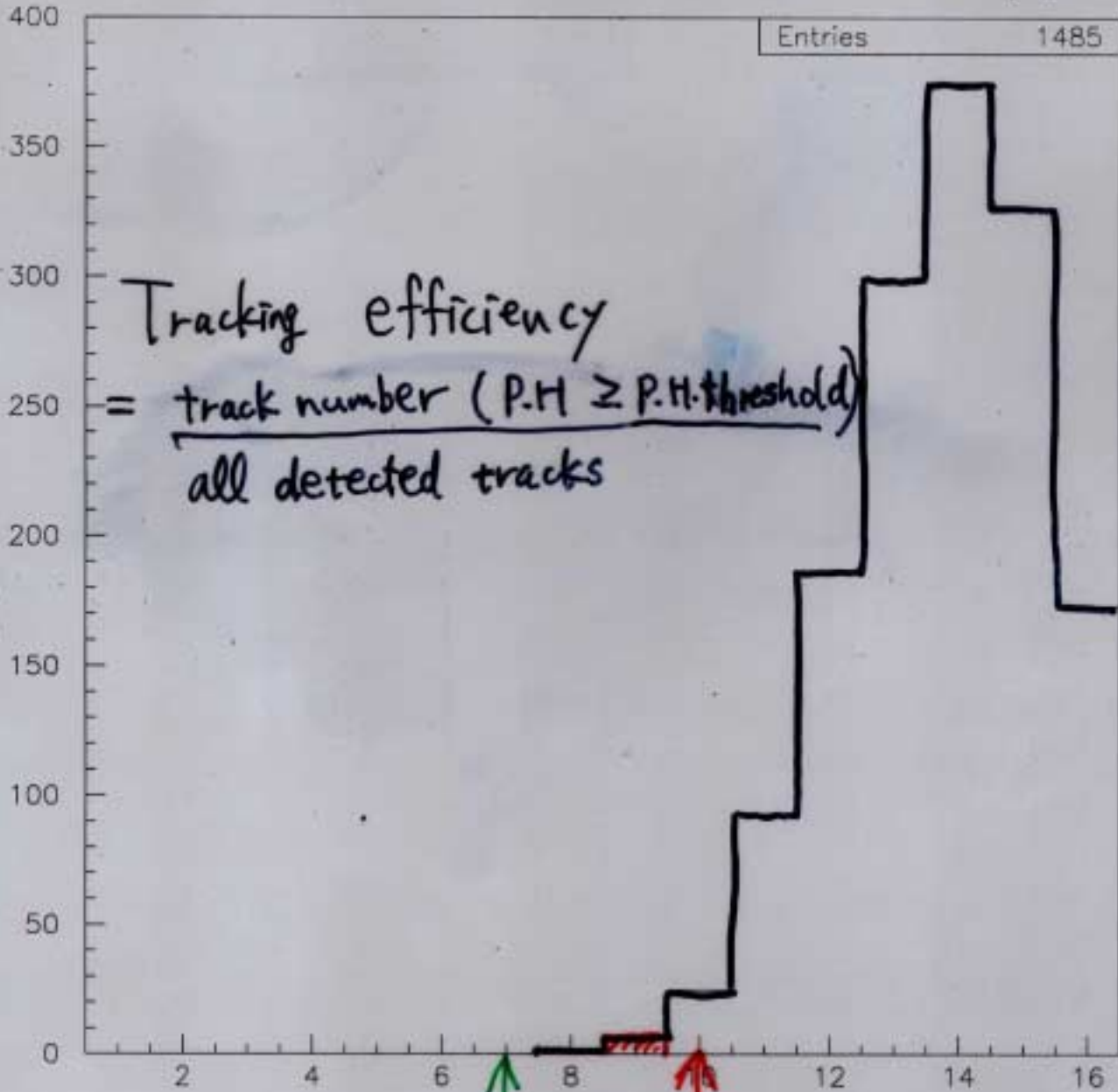


Not erased track : 30

Erasing rate :  $\frac{1485 - 30}{1485} = 98.0\%$

# Base track

1485 trks



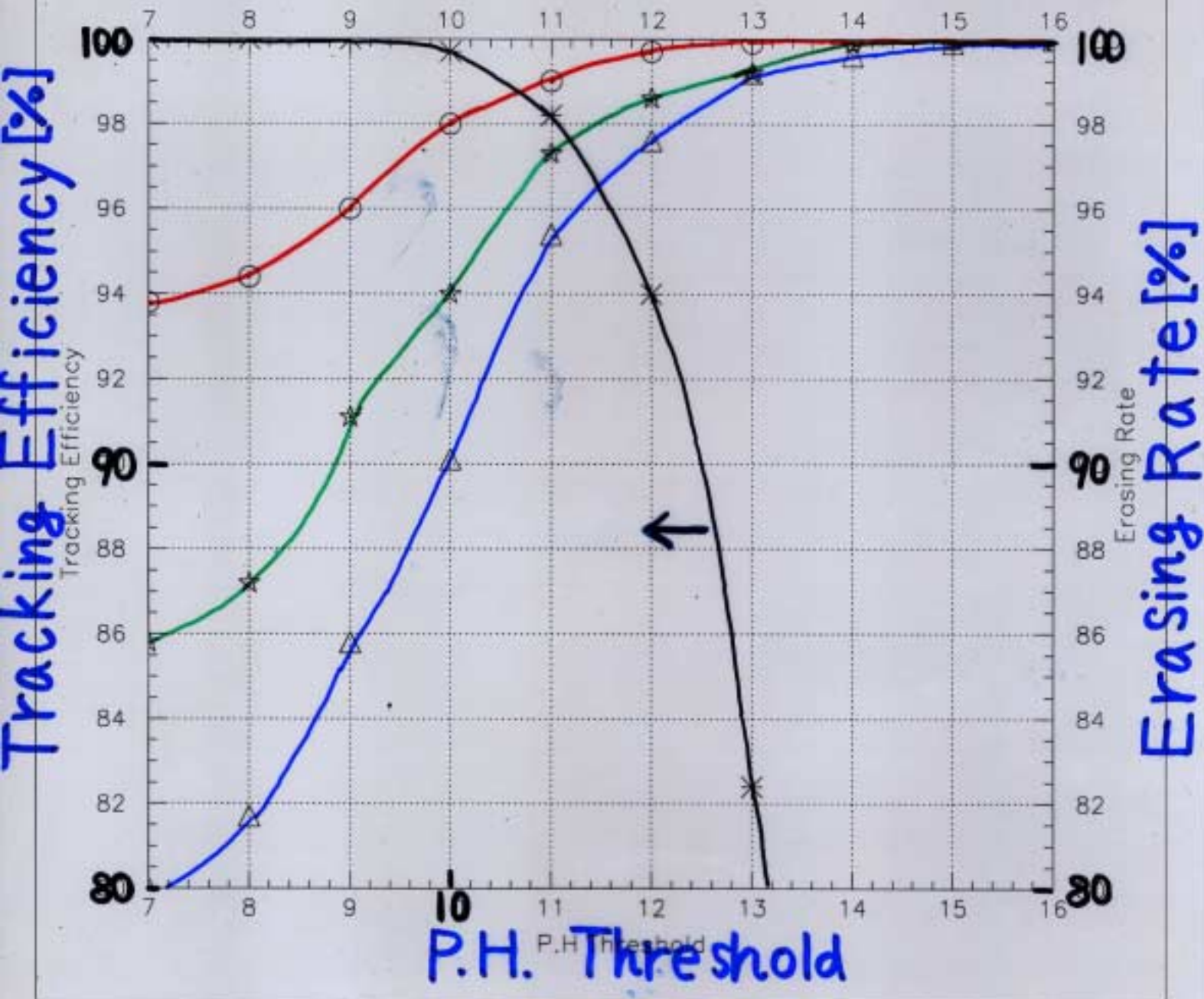
Tracking efficiency  
$$= \frac{\text{track number (P.H.} \geq \text{P.H. threshold)}}{\text{all detected tracks}}$$

Tracking efficiency 100%

Tracking efficiency:  $\frac{1485 - 9}{1485} = \underline{\underline{99.4\%}}$

# Omrad

Pulse Height threshold dependence of Tracking efficiency and Erasing rate



\*: Tracking efficiency

Erasing rate

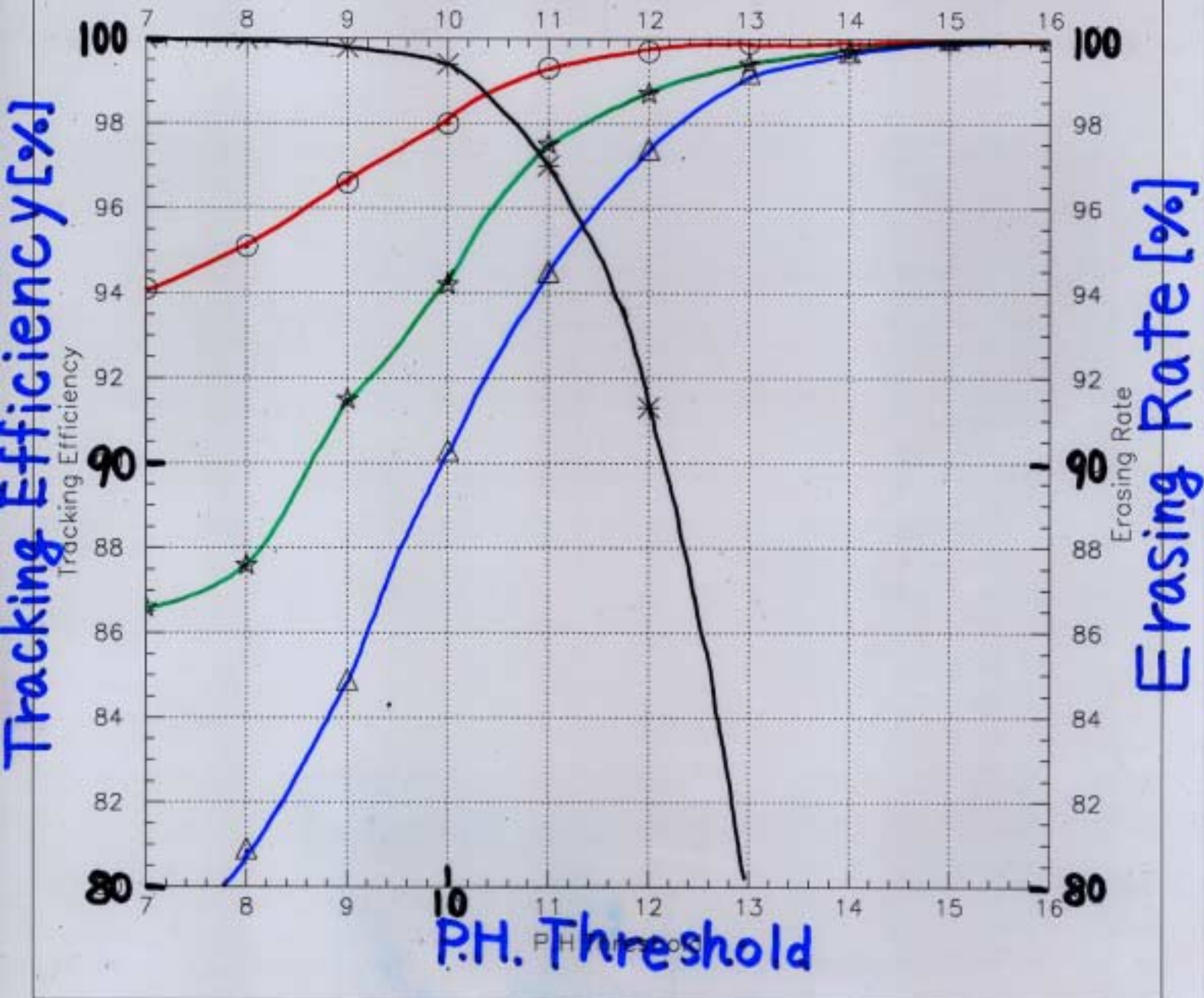
O: refreshed for 3 days

☆: 2 days

Δ: 1 day

200mrad

Pulse Height threshold dependence of Tracking efficiency and Erasing rate



\*: Tracking efficiency

Erasing rate  
O: refreshed for 3 days  
☆: 2 days  
△: 1 day

# Summary

Refreshing performance of current emulsion film:

Time	Tracking efficiency [%]	Erasing rate [%]
3 days	99	98
2 days	99	94
1 day	99	90

Refreshing works well.