

γ -ray Telescope

by

Emulsion Detector

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Ex : 0.2 ~ 20 GeV

* Emulsion Basic

• MSC Balloon Exposure
Micro Segment Chamber

• γ -ray Telescope idea.

• Angle reso.

• Plan

γ rays

Angle reso.

1 mrad

for

1 GeV

0.1 mrad

for

10 GeV

$$\underline{1 \text{ mrad} = 0.06^\circ}$$

(Cnc b nucleus
223 mrad.)

?

$$\sim 250 \text{ } \gamma / \text{m}^2 \cdot 10 \text{ h}$$

$$\text{for } E_\gamma > 1 \text{ GeV}$$



乳劑 119 (新) と 40% dilution

ト 7 手ぬり 厚 $50\mu\text{m}$ 片面

現像 XAA (市販現像液)

20°C 15分.



After development

Size $\approx 1 \mu\text{m}$

Chemical
amplification

8-10

~ 10

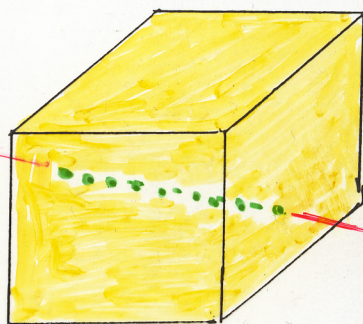


Development probability 15-30% for MIP
 $\sim 30 \text{ grain} / 100 \mu\text{m}$

EMULSION

		in volume	
AgBr cristal	50 %	(20%)	(30%)
Gelatine	50 %	(80%)	(70%)
	↑ old 45	↑ New	

charged partile
M.I.P



0.24 μm

AgBr band gap energy	<u>2.6 eV</u>
Energy loss for MIP	<u>310 eV/cristal</u>

ET-7C

Fuji Film Co.

AgBr crystal



size distribution

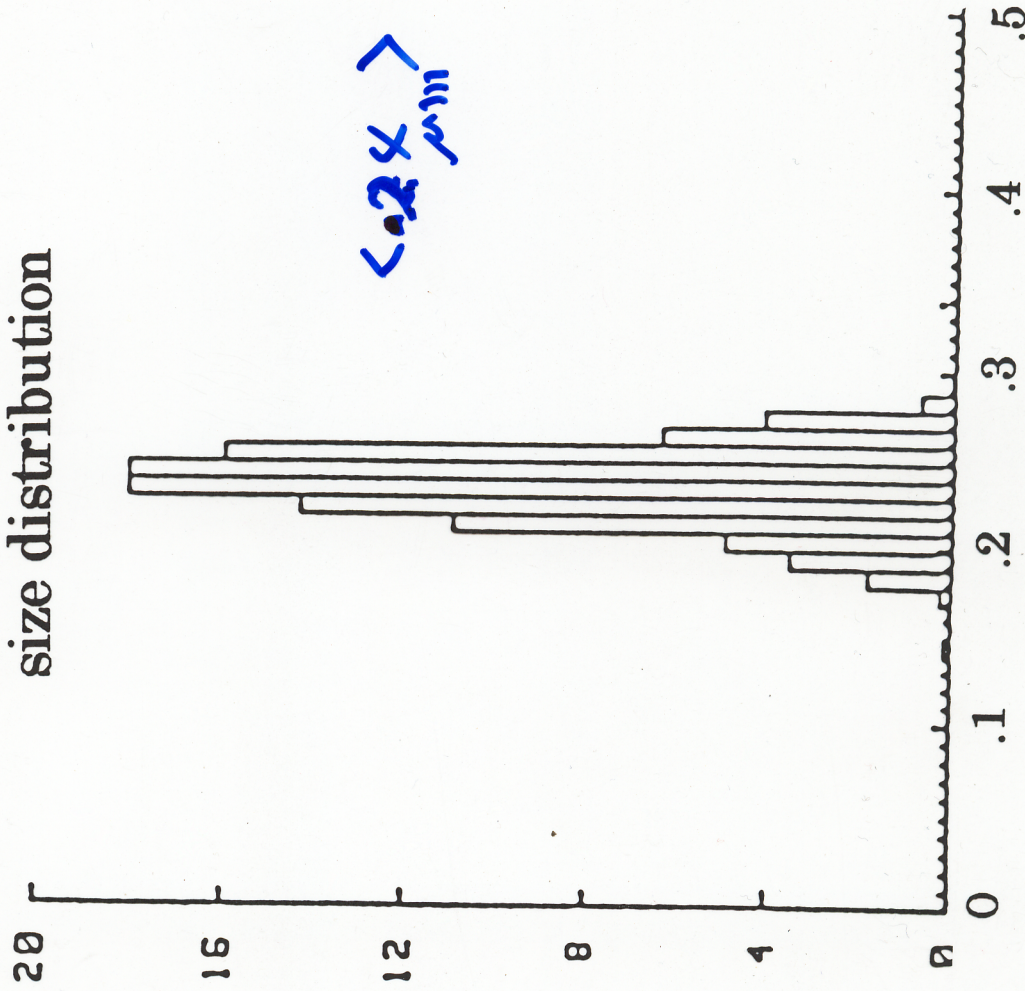
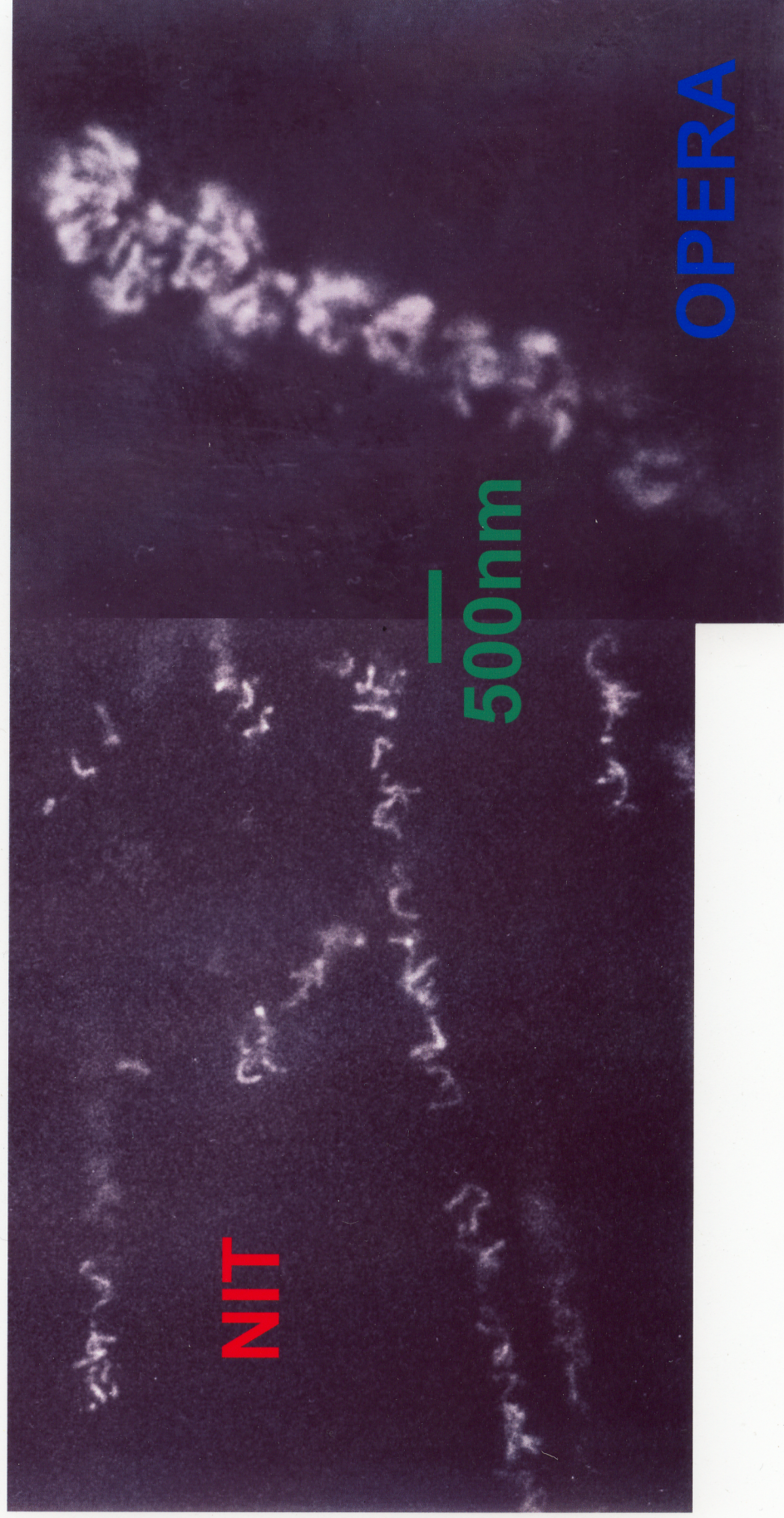


PHOTO by electron microscope

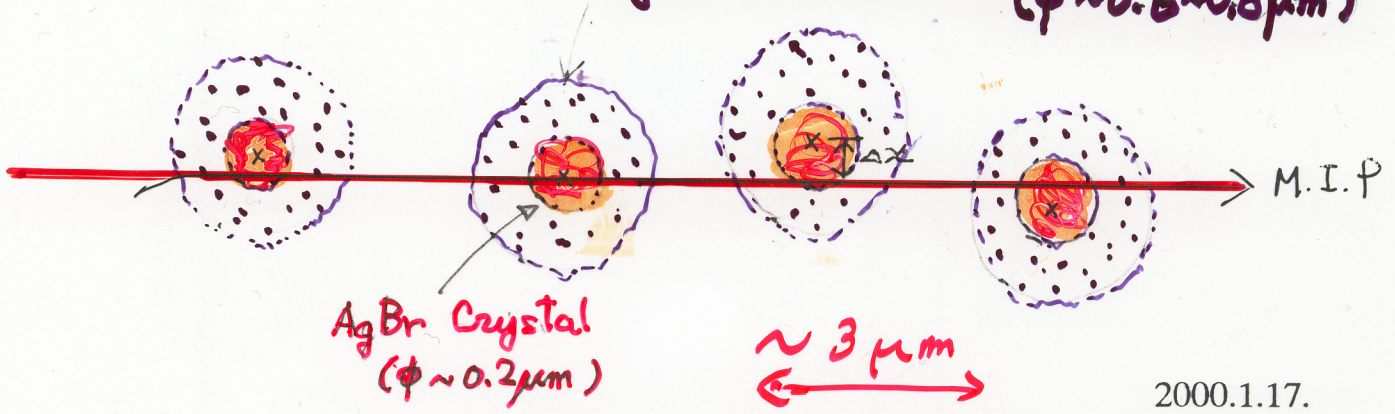
size (μm)

α 線飛跡をSEMで見る

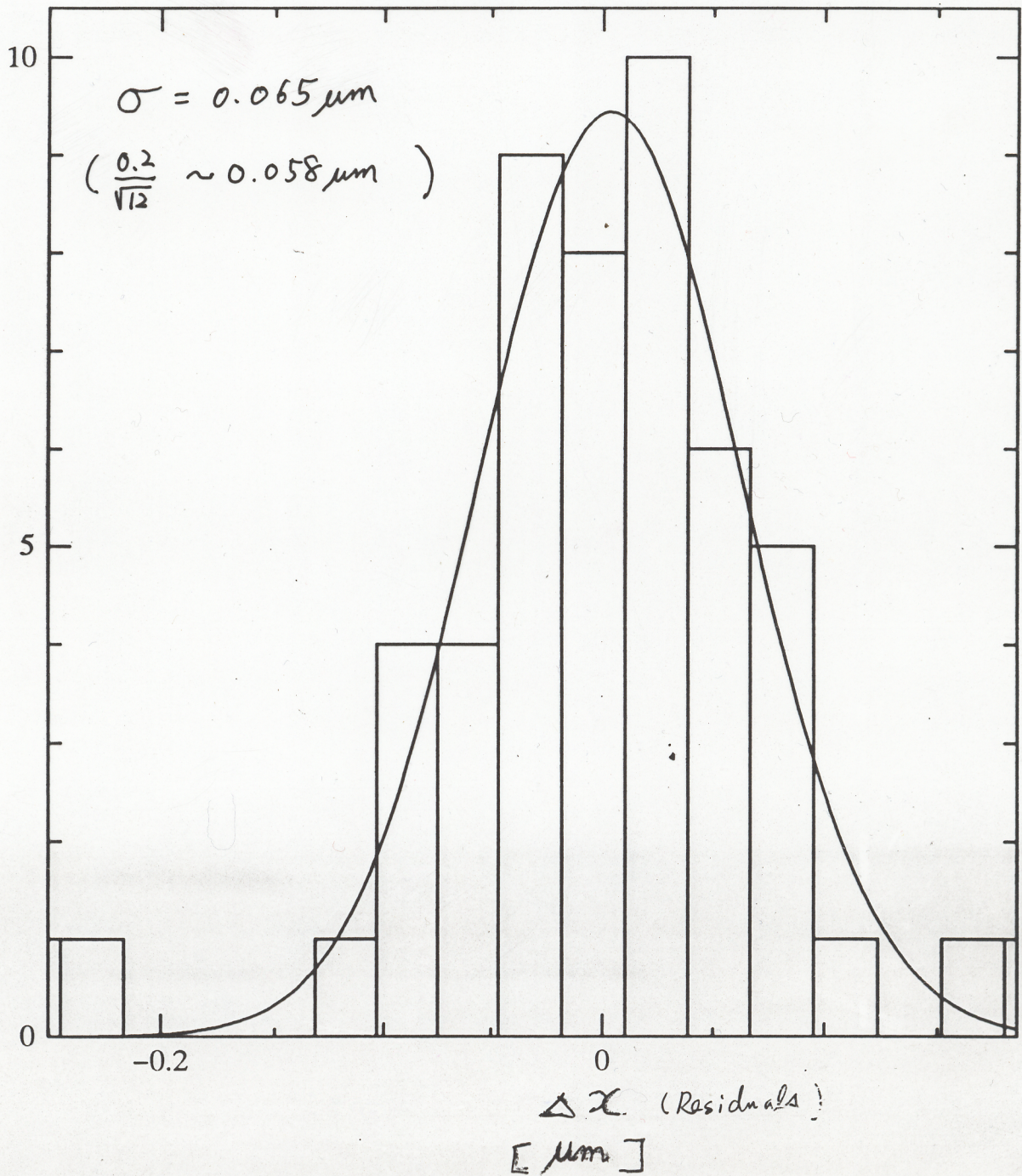
エッチングによってSEM観察が可能



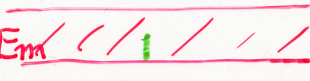
Ag Grain after development
($\phi \sim 0.6 \sim 0.8 \mu\text{m}$)



2000.1.17.

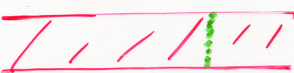


Em 

43 μ m Em 

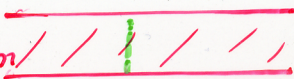
Emulsion
43 μ m

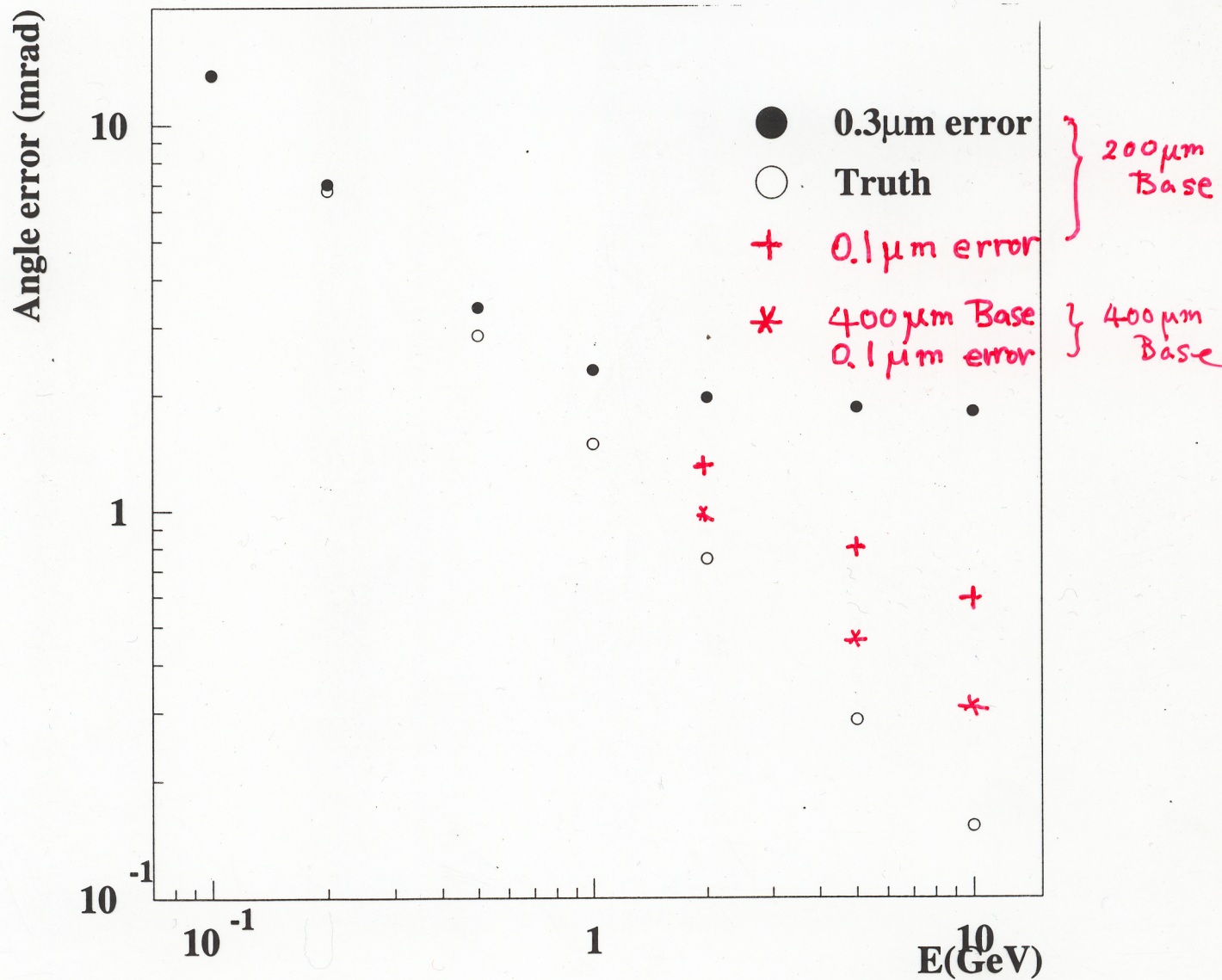
Base
200 μ m

Em 

Base
400 μ m

Single film

Em 

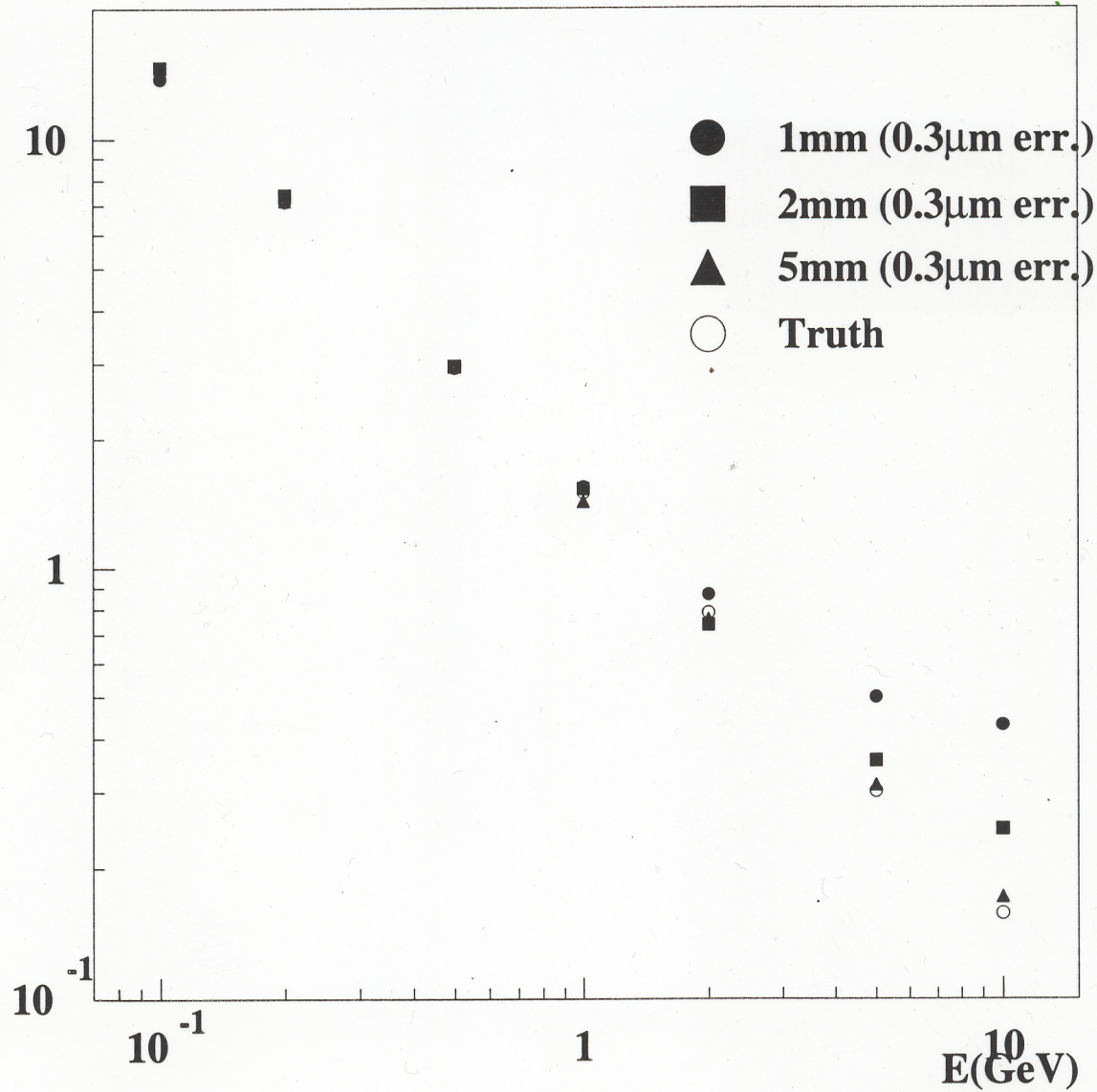


OPERA
film

Gap
plastic

Using gap between films

Angle error (mrad)



γ -converter

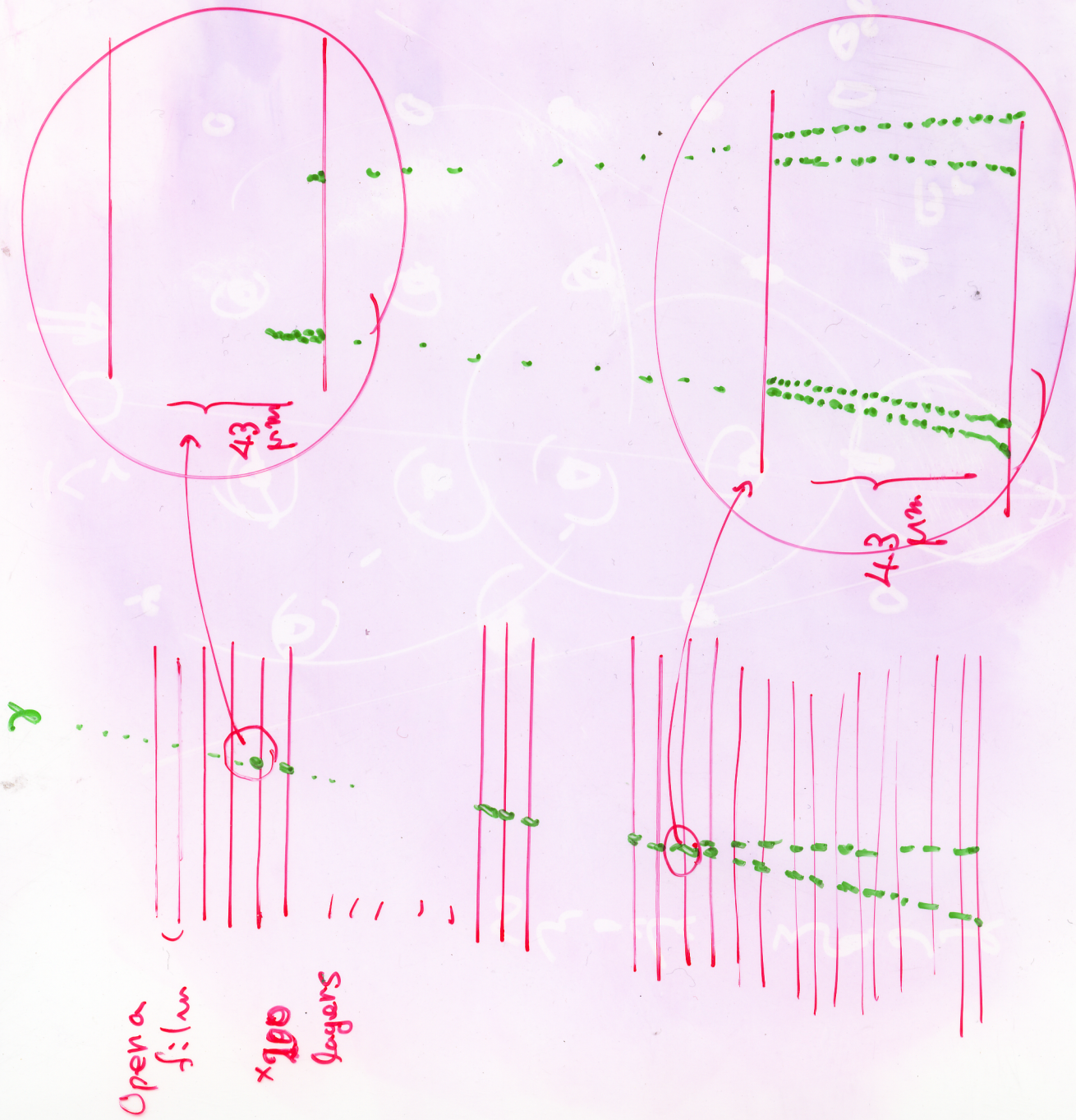
Emulsion tracks

35 grains/100 μm SN HIP

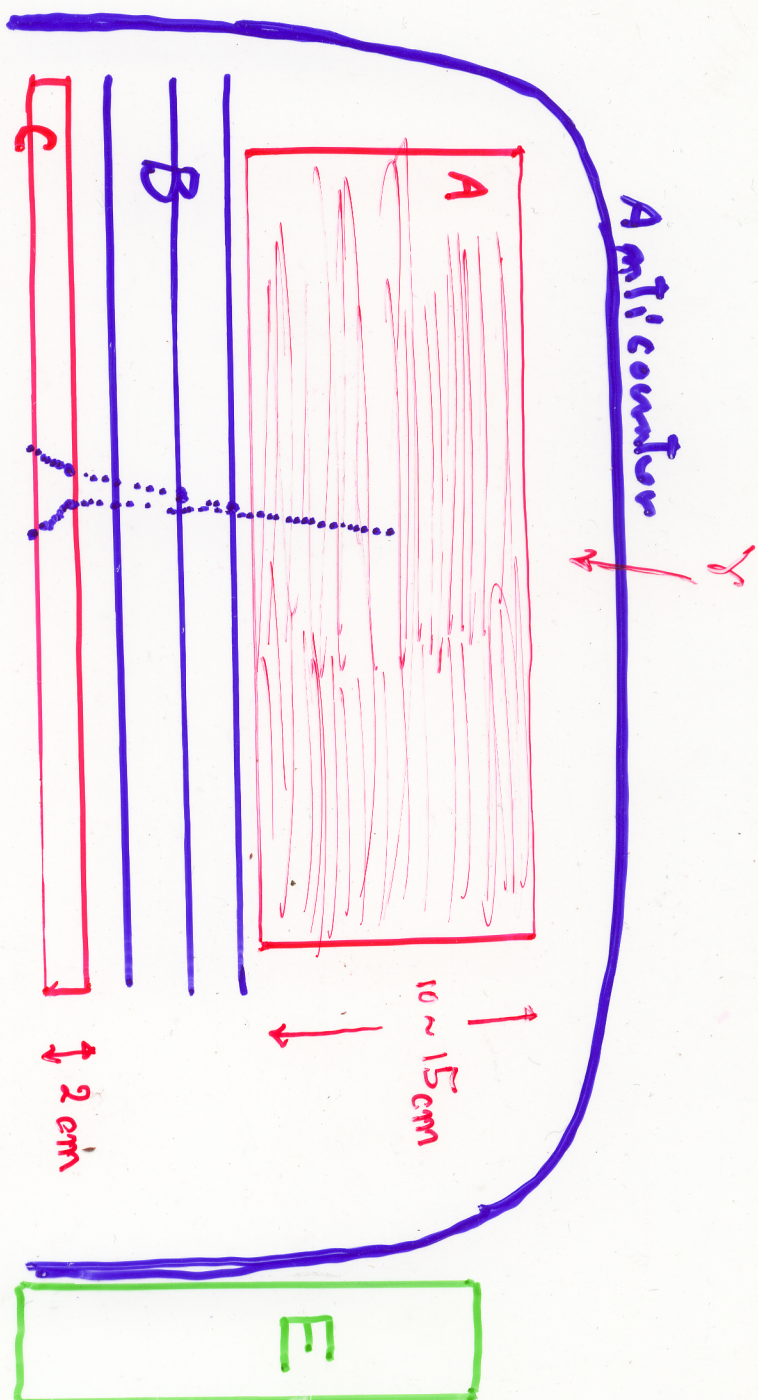
To detect $\gamma \rightarrow e^+e^-$ conversion point

minimum length $\sim 5\mu\text{m}$

e^+e^- separation
0.5 μm .



γ ray Telescope.



S.Ω.T

$S \sim 1 \text{ m}^2$

$\Omega \sim 4.8 \text{ st}$

T

A: γ ray converter (film 200 layers. conv. eff = 33%)

B: SFT trackers

C: Calorimeter ((film + lead (0.5mm)) $\times 20$ 120kg/m²)

E: STAR camera

} + Electronics
Idematac
Bo11ast 200kg

Future

- Multiple Balloon flights
- Satellite

Refresh and Quick Dev.

Cost & Scanning

film $150 \text{ E}20 / \text{m}^2$

Scanning time $10 \text{ day} / \text{m}^2 \cdot \text{sys.}$

• Group

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