

IC/76/79



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v.2

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INTERNAL REPORT
(Limited distribution)

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International Atomic Energy Agency

and

United Nations Educational Scientific and Cultural Organization

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

T O P I C A L M E E T I N G

ON LEPTON INTERACTIONS AND NEW PARTICLES

6 - 9 July 1976

P A R T I I

(Contributions)

MIRAMARE - TRIESTE

July 1976

RECENT RESULTS ON FINAL STATES CONTAINING LEPTONS
AND K^0 IN e^+e^- FROM PLUTO

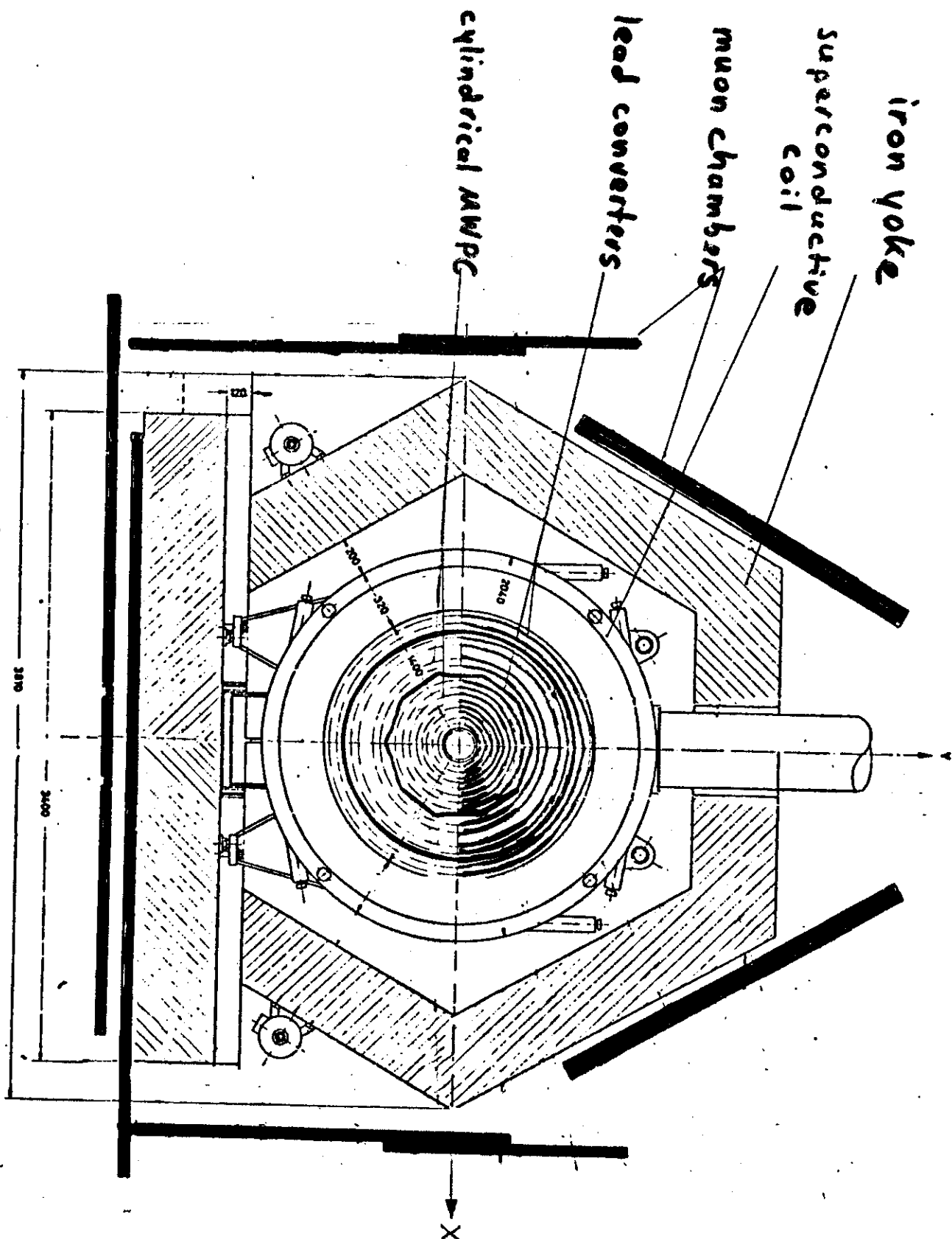
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DES4 - HAMBURG - SIEGEN - WUPPERTAL



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PLUTO ab Okt. 75, Querschnitt

DATA TAKING

① Two particle trigger

② Overall Efficiency

≥ 3 prongs 85%

2 prongs 47%

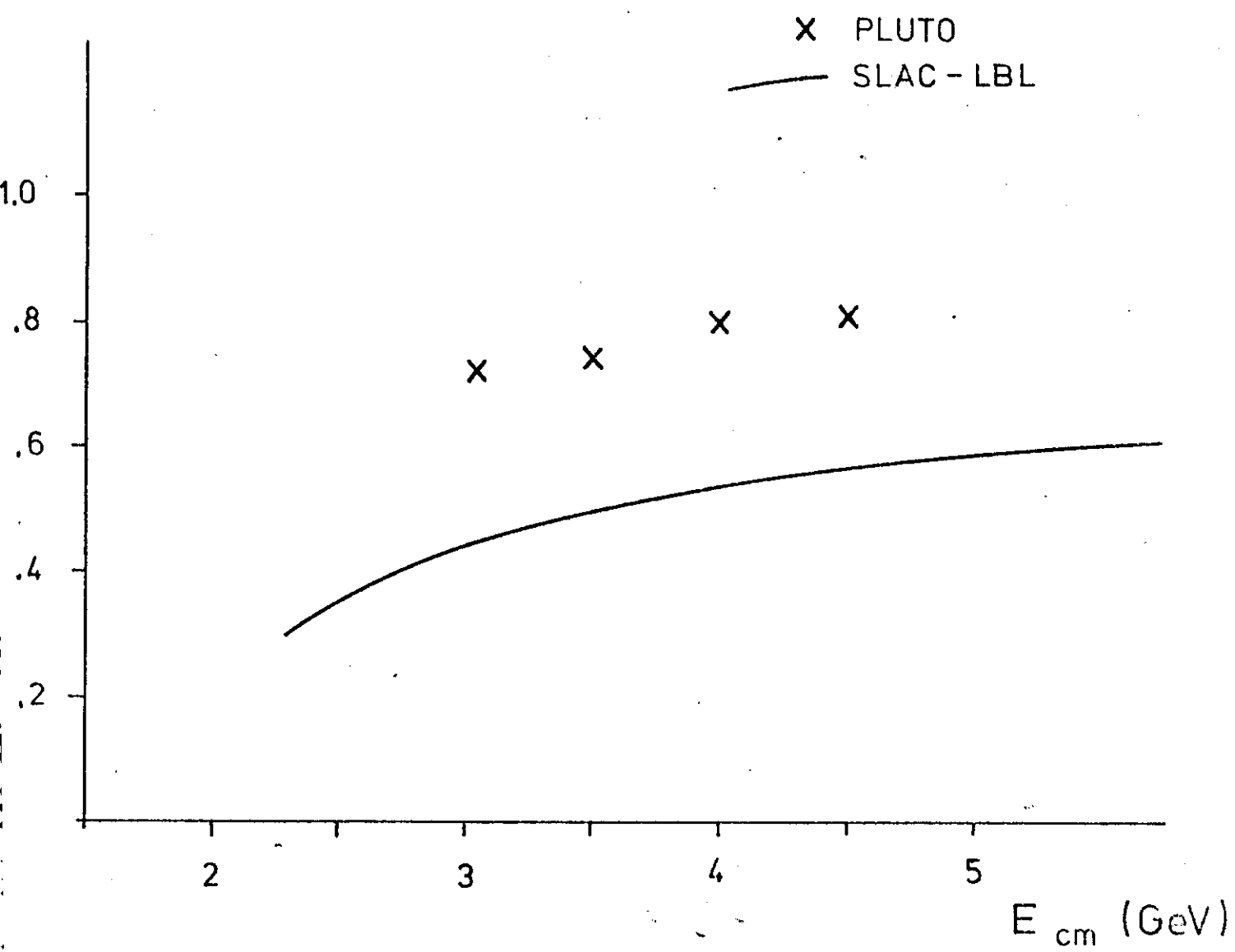
③

E_{CM} (GeV)	L (nb^{-1})
3.60-3.67	271
4.00-4.20	722
4.38-4.48	235

④ a.) $e^+e^- \rightarrow \mu^\pm \text{ hadrons}$

b.) $e^+e^- \rightarrow e^\pm K_0^0 + \text{hadrons}$

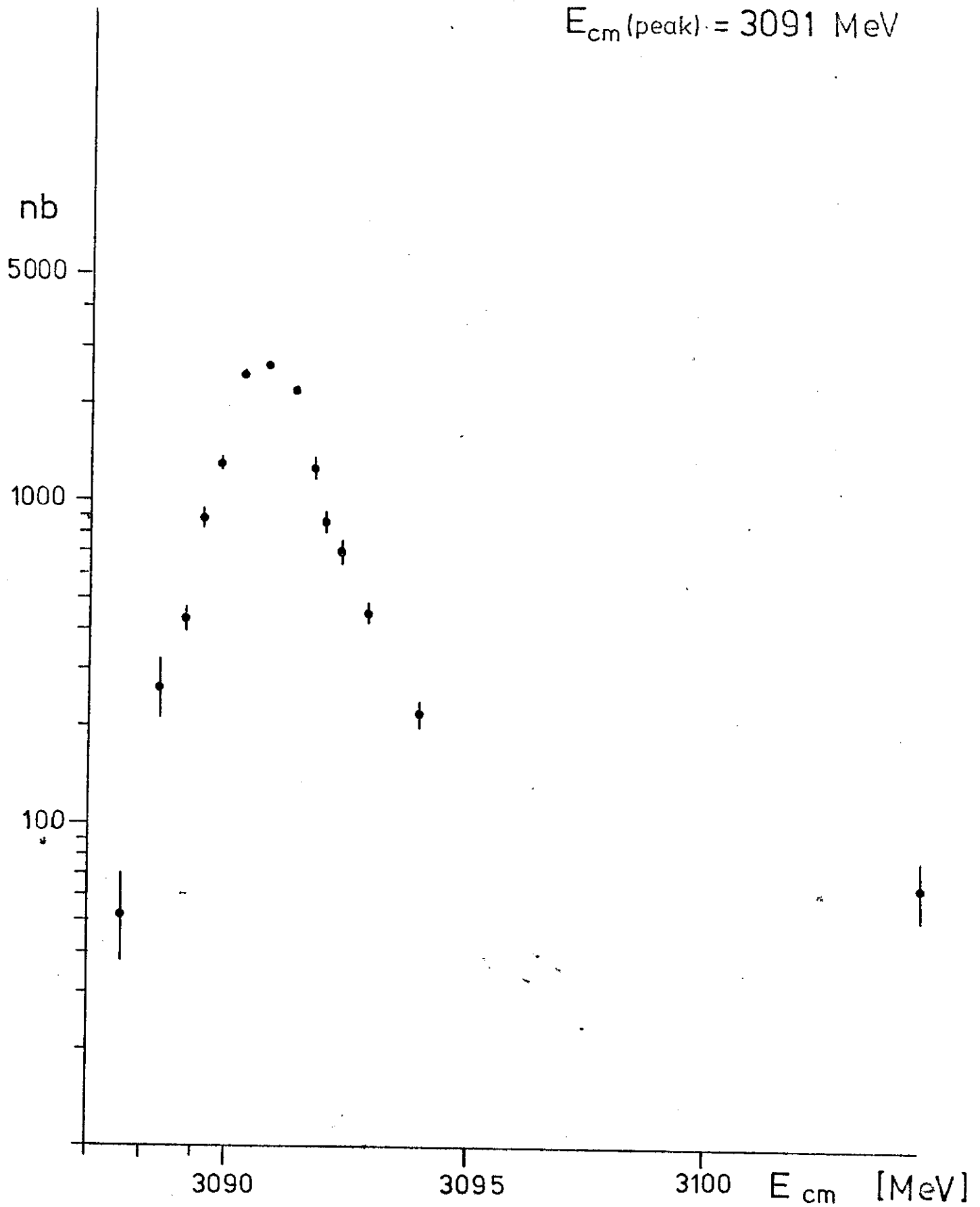
Overall Efficiency



ψ (3.1)

$9050 \pm 910 \text{ nbMeV}$

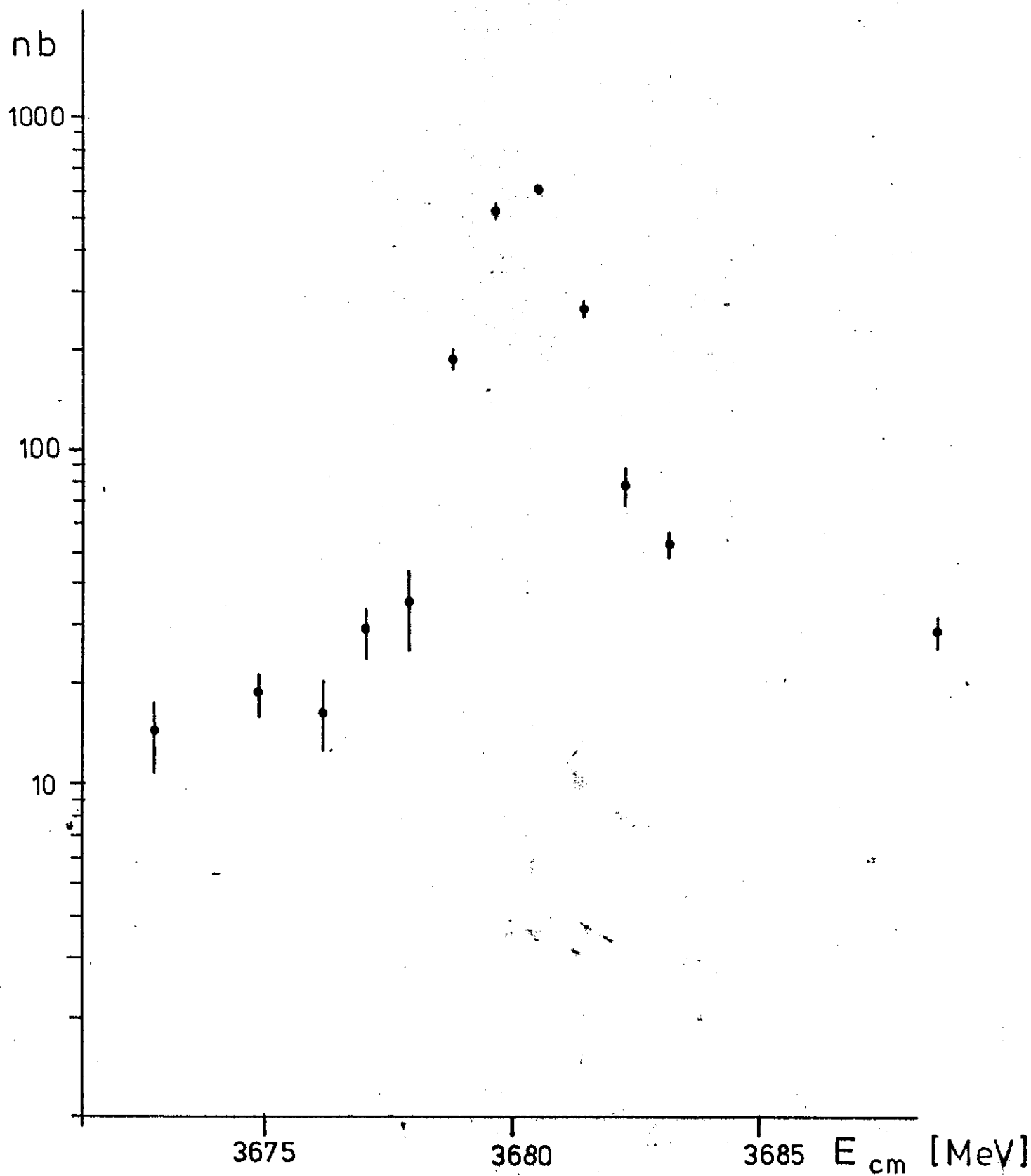
$E_{\text{cm}}(\text{peak}) = 3091 \text{ MeV}$



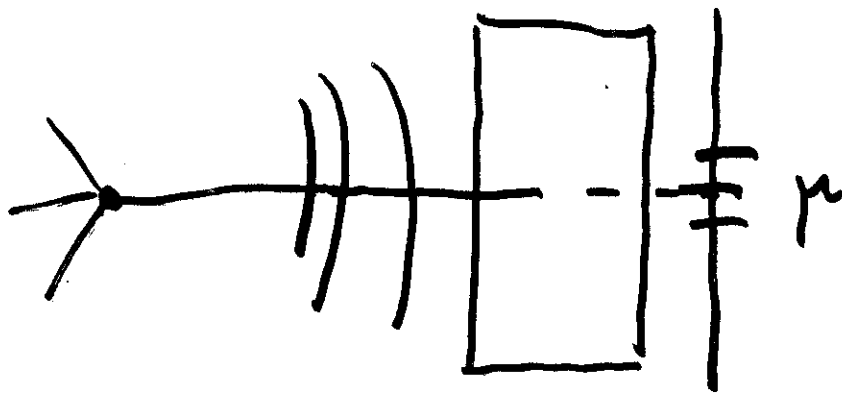
$\Upsilon(3,7)$

$3290 \pm 350 \text{ nb MeV}$

$E_{\text{cm}}(\text{peak}) = 3687 \text{ MeV}$



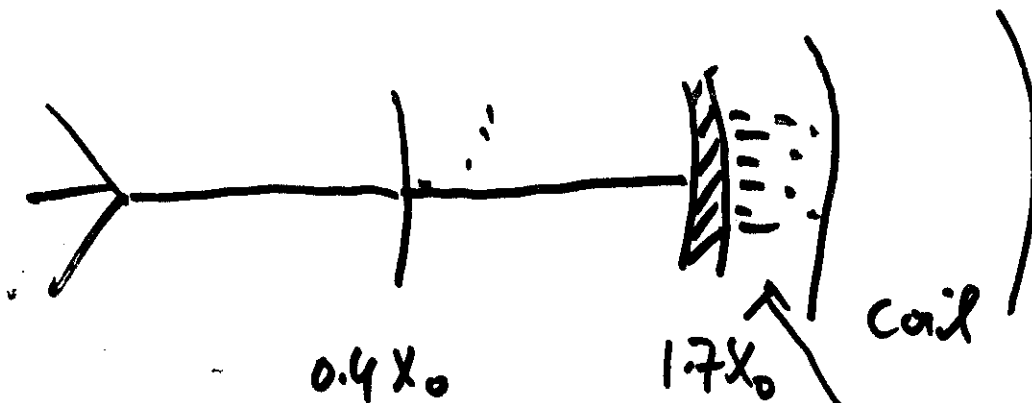
μ Identification



Coil IRON
 $\geq 65 \text{ cm}$

$p > 1.0 \text{ GeV}$

e Identification

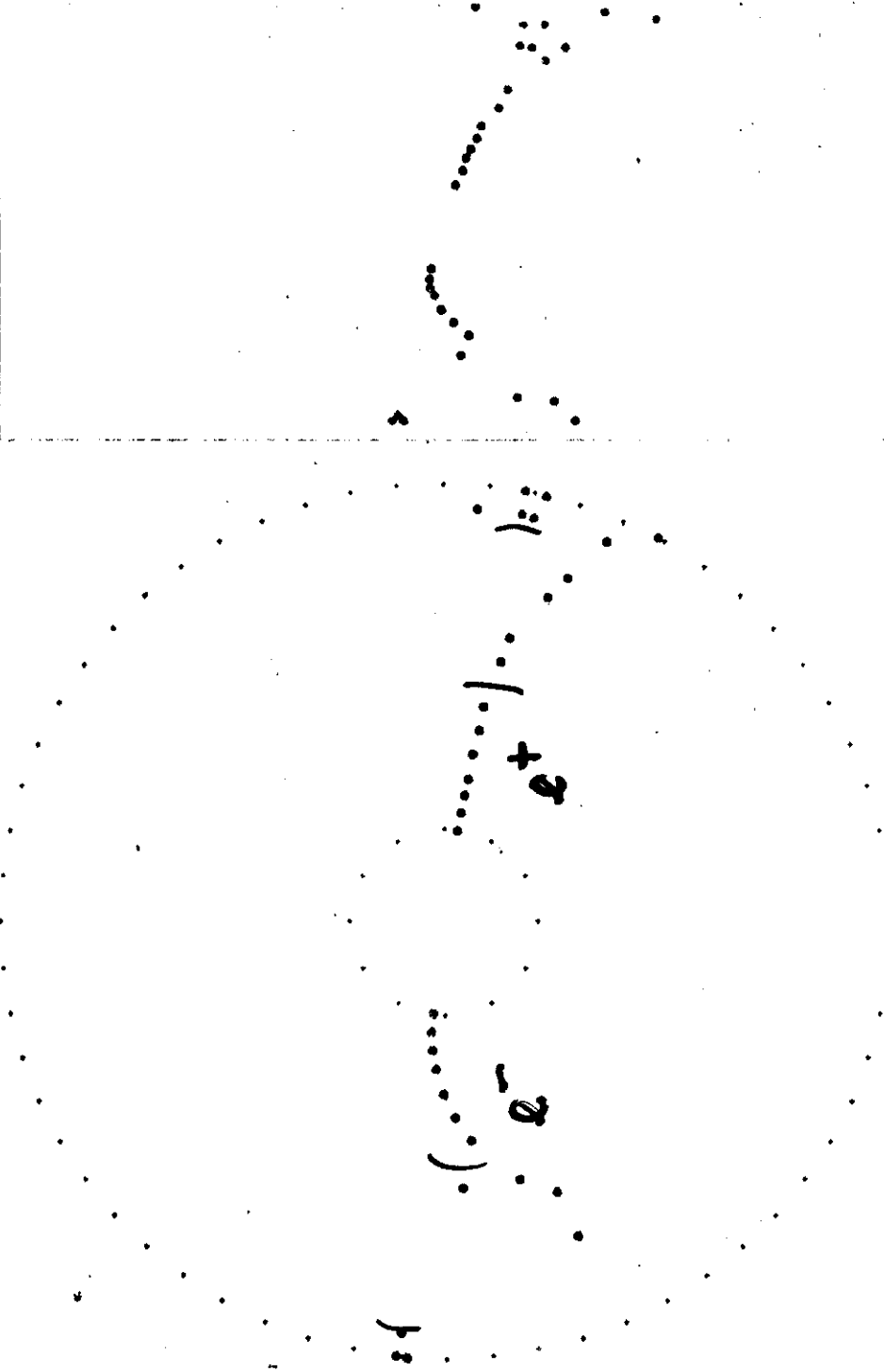
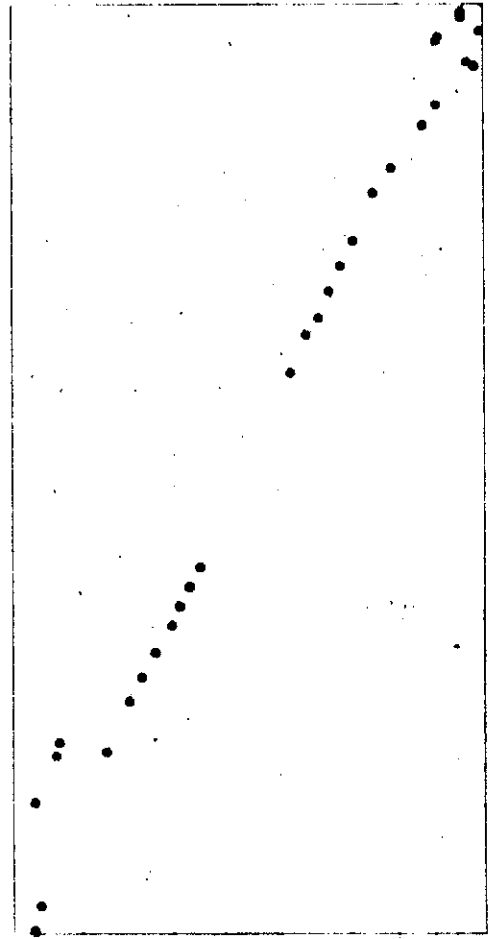


$\geq 10 \text{ hits}$

(wires fired in two chambers)

RUN 7292

EVENT 16433



LEPTON —

IDENTIFICATION

μ

by penetration of IRON

$$\geq 68 \text{ cm} \quad \Delta R \sim 0.55 \text{ u}$$

e

by shower development

$$0.4 \text{ r.l.} \quad \text{and}$$

$$1.7 \text{ r.l.} \quad \Delta R \sim 0.64 \text{ u}$$

$$\text{Prob. } \pi, K \rightarrow \mu \quad \sim 3.5 \%$$

$$\text{Prob. } \pi, K \rightarrow e \quad \sim 2.5 \%$$

Determined at 3.1 resonance

3.1 GeV

$\frac{dN}{dp} (0.1 \text{ GeV})$

100

10

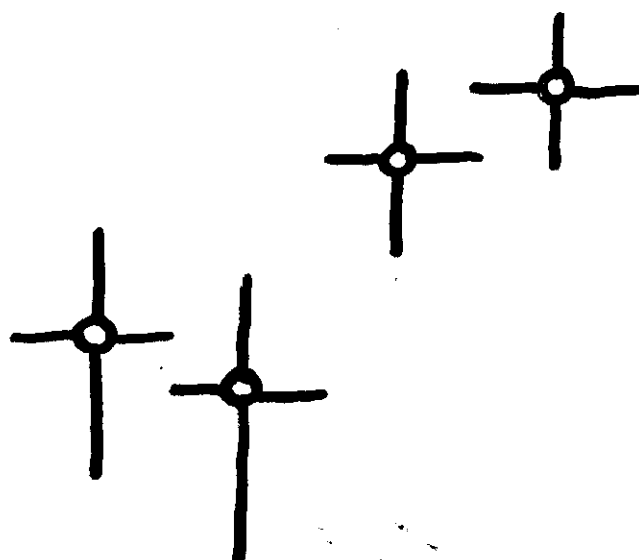
3.5%

$P(\text{GeV})$

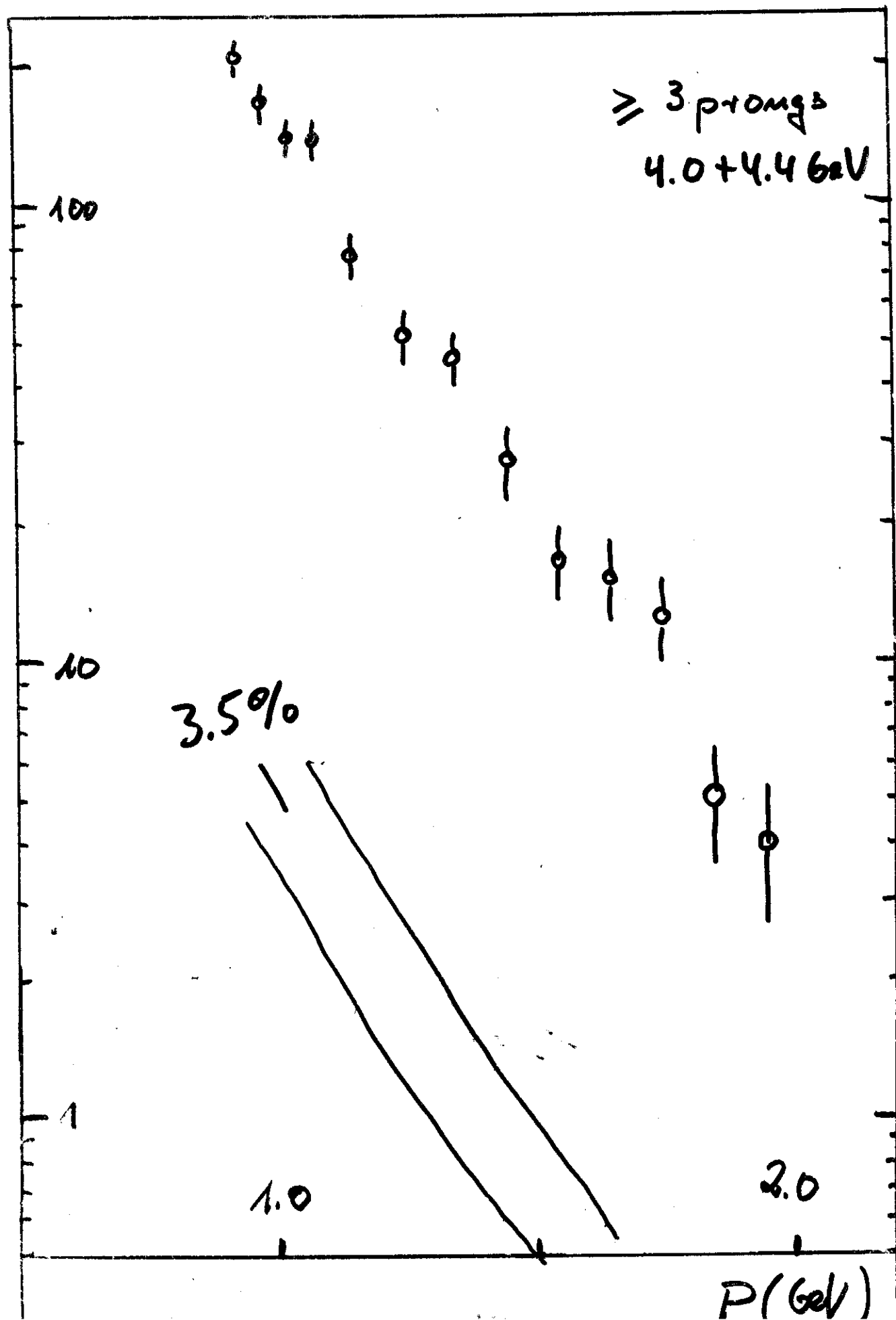
2.0

1.0

1.5



$$\frac{dN}{dp} (0.05 \text{ GeV}^{-1})$$



$$e^+e^- \rightarrow \mu^\pm + \geq 2 \text{ prongs}$$

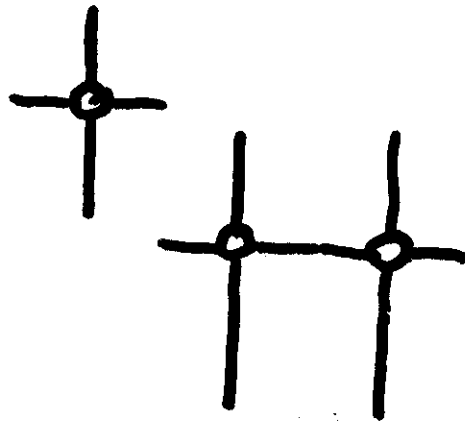
tracks in μ chamber Acceptance	862	$P > 1.06\%$
muon candidates	43	
radiate ψ'	7	
expected BG	29	
Signal	7 ± 7	

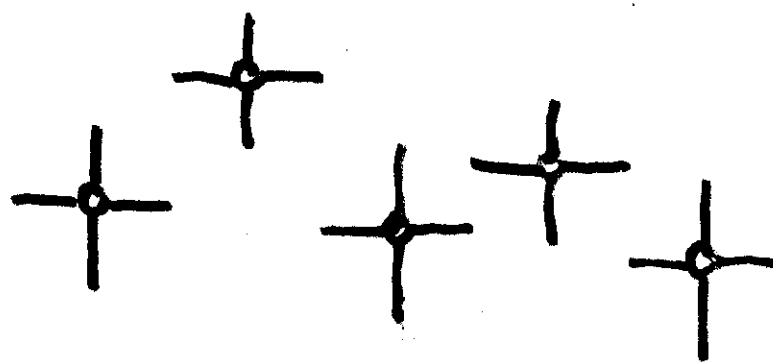
upper limit (2 s.d.) for

$$e^+e^- \rightarrow \mu^\pm + \geq 2 \text{ prongs}$$

70 pb

2 prongs





dN/dp (0.2 GeV^{-1})

2 prongs

200

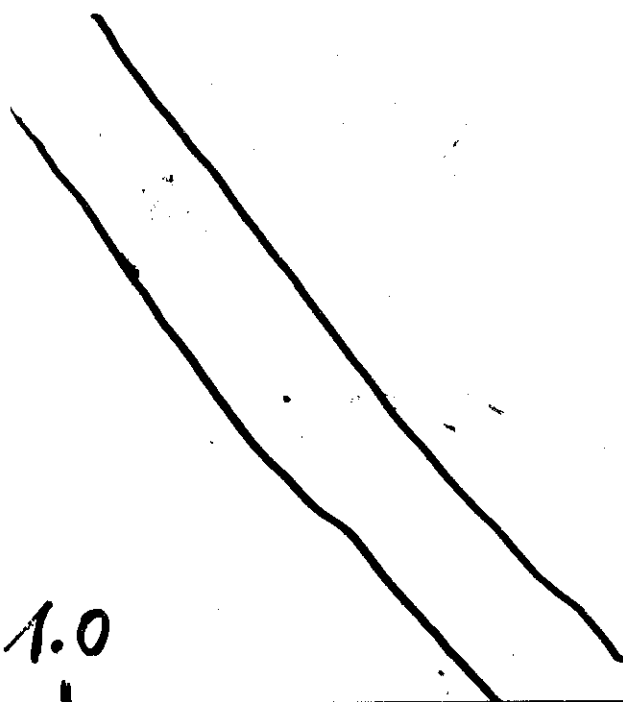
100

10

1.0

2.0

$P (\text{GeV})$



Background ("μ")

①

$$e^+e^- \rightarrow \underbrace{e^+e^-}_{\rightarrow \gamma'} \gamma$$

radiation
γ'

$$\rightarrow \pi\pi \text{ } 3/\gamma$$

$$\rightarrow \mu\mu$$

②

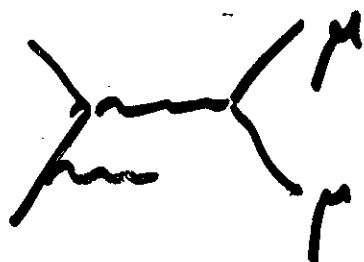
$$e^+e^- \rightarrow h + \text{any}$$

$$\rightarrow \text{"}\mu\text{"}$$

punch
thru

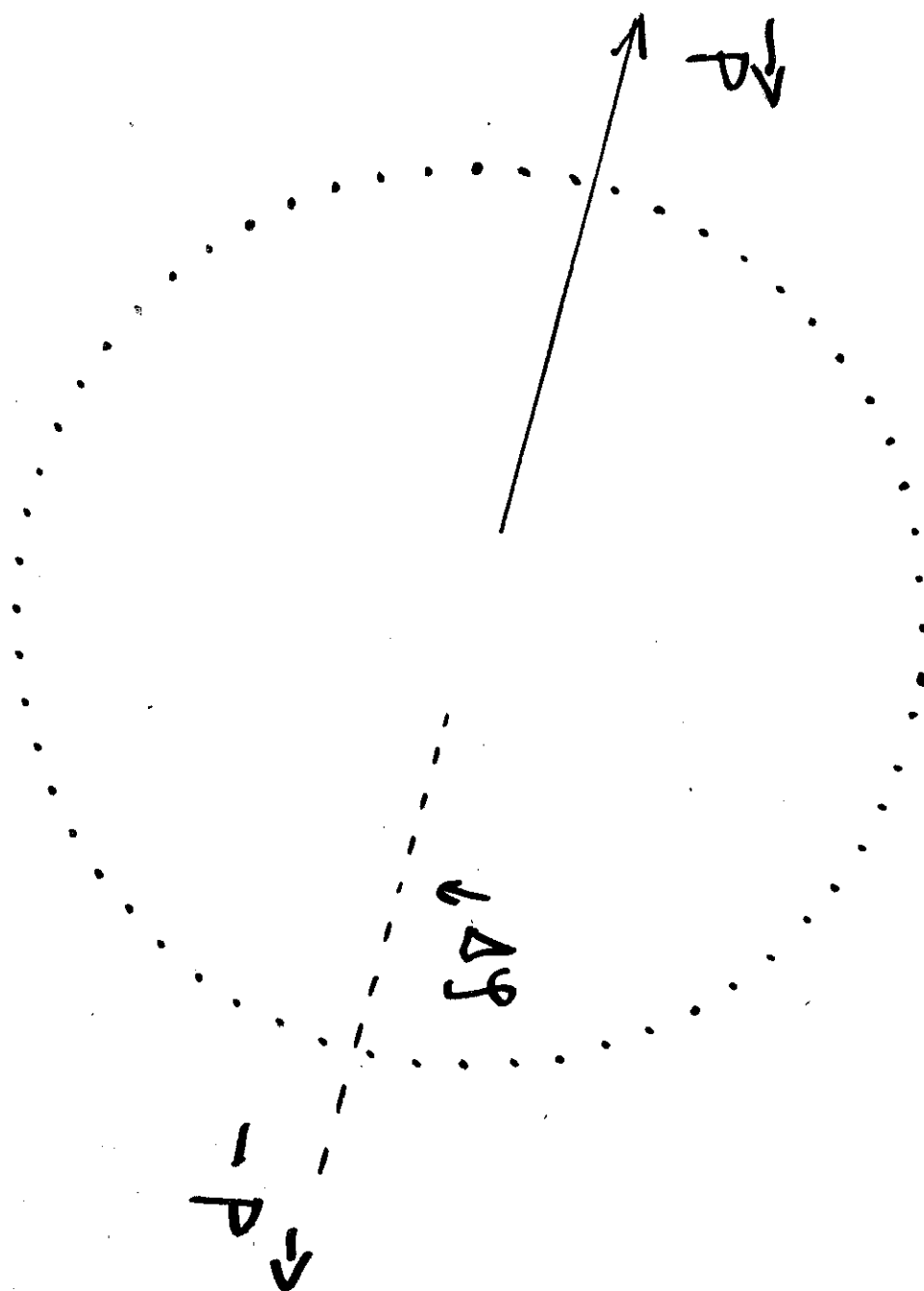
③

$$e^+e^- \rightarrow \mu\mu \gamma$$

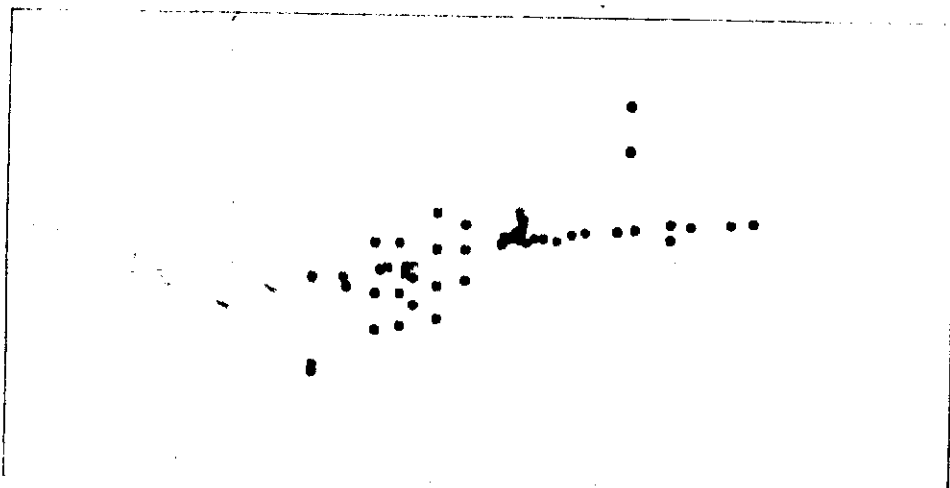
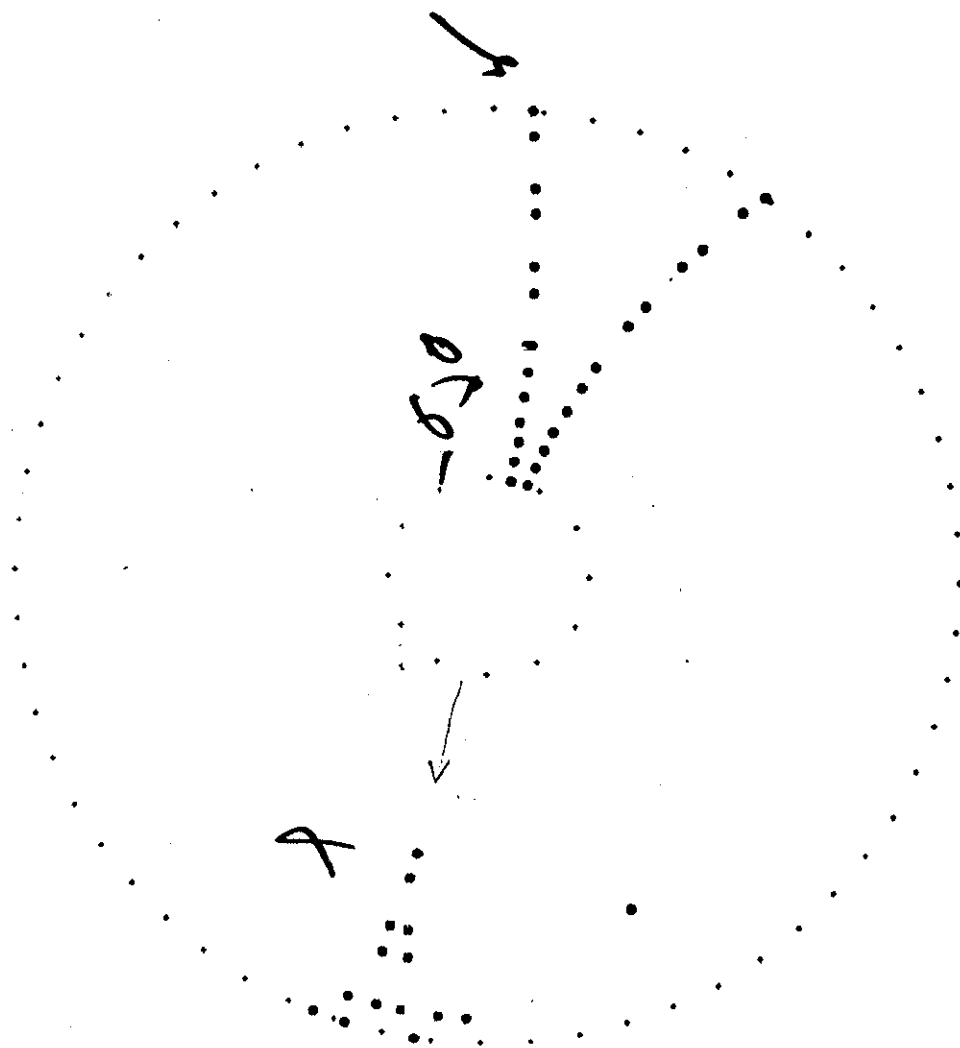
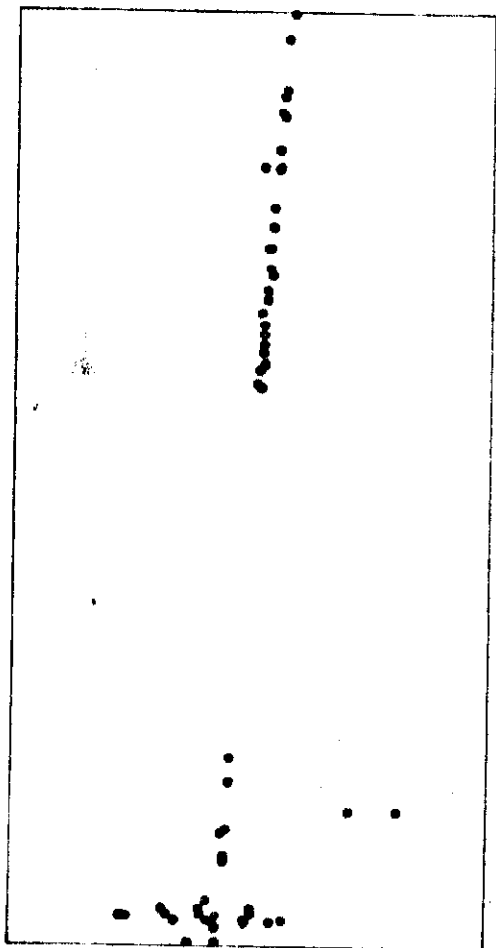


$$\Delta\phi > 18^\circ$$

radiation
QED
μ



RUN 7332
EVENT 11920

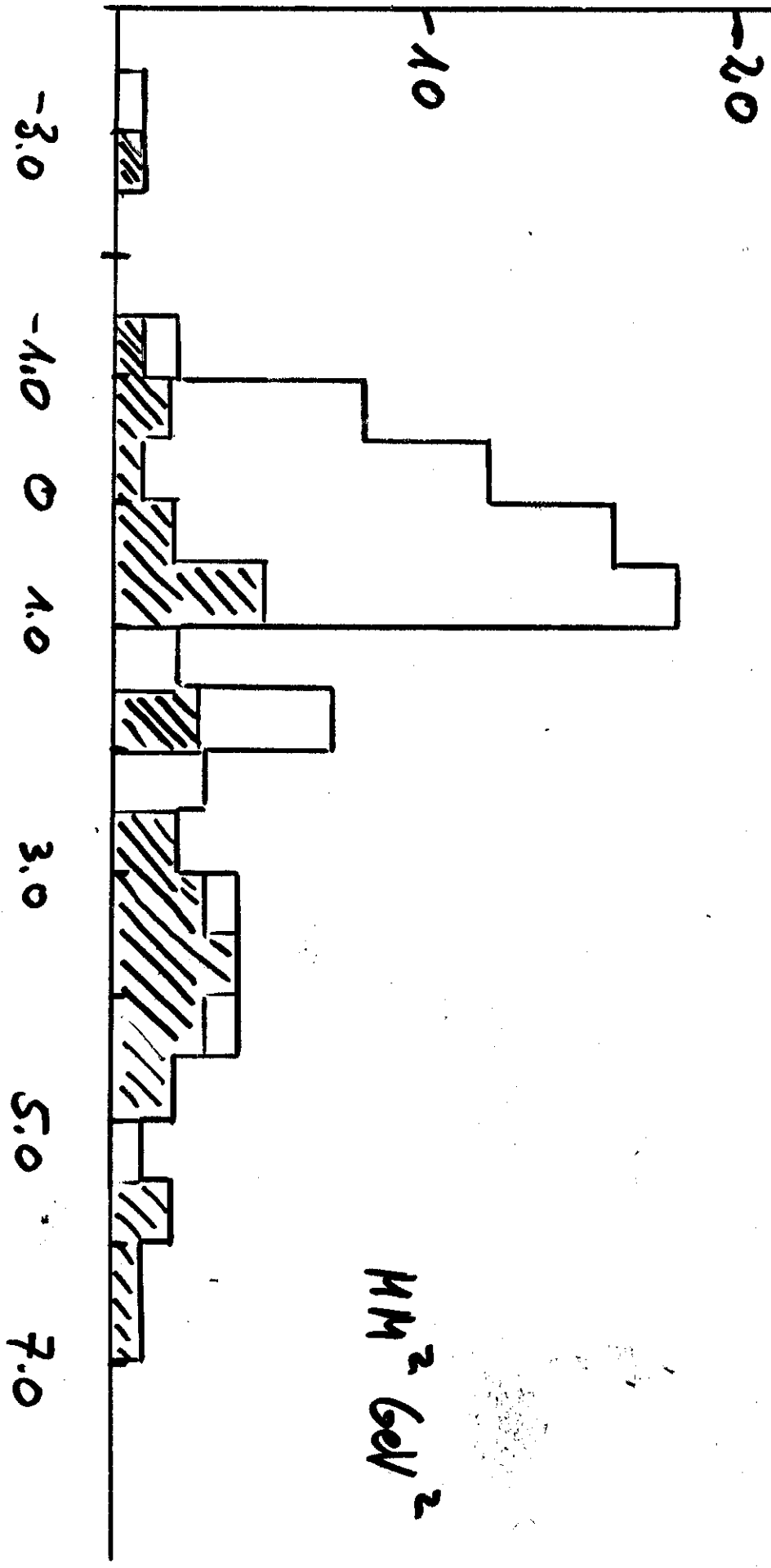


$\frac{dN}{0.5 \text{ GeV}^2}$

2 prongs

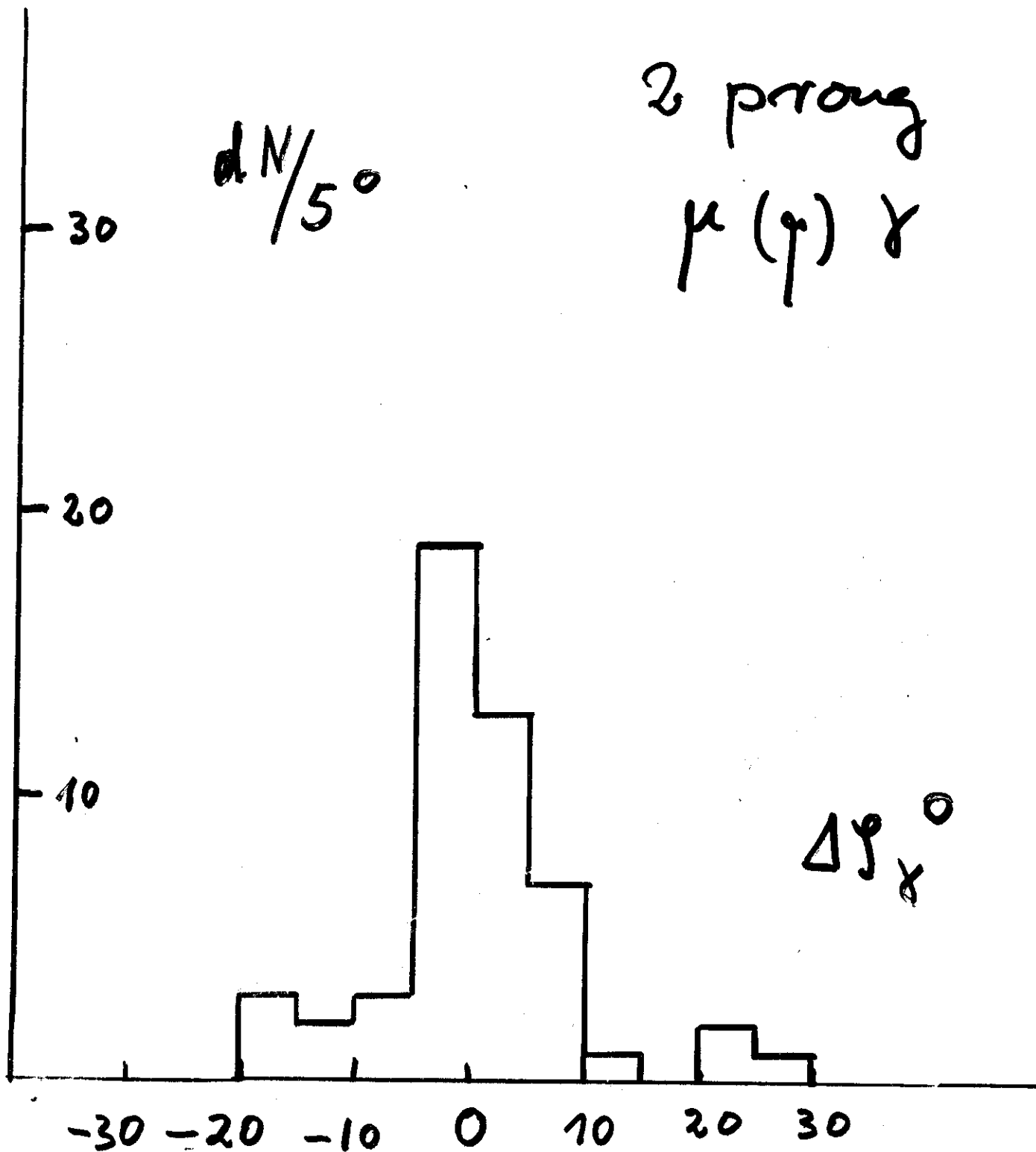
$p^+ p^- (\text{cm})$

$\text{cm}^2 \text{ GeV}^2$



2 prong
 $\mu(\gamma) \gamma$

$dN/5^\circ$



$\Delta \gamma^\circ$

$$e^+ e^- \rightarrow \mu^\pm + 1 \text{ prong}$$

tracks in
 μ acceptance

441

$p > 1.06 \text{ GeV}$

μ candi.

98

μe 4

$\mu\mu$ &

75

expected B.G.

12

Signal

7 ± 6

Upper limit (2 s.d.) for

$$e^+ e^- \rightarrow \mu^\pm + 1 \text{ prong}$$

80 pb