

TestBeam BeamLine Design: Brief Summary and Ratio Analysis

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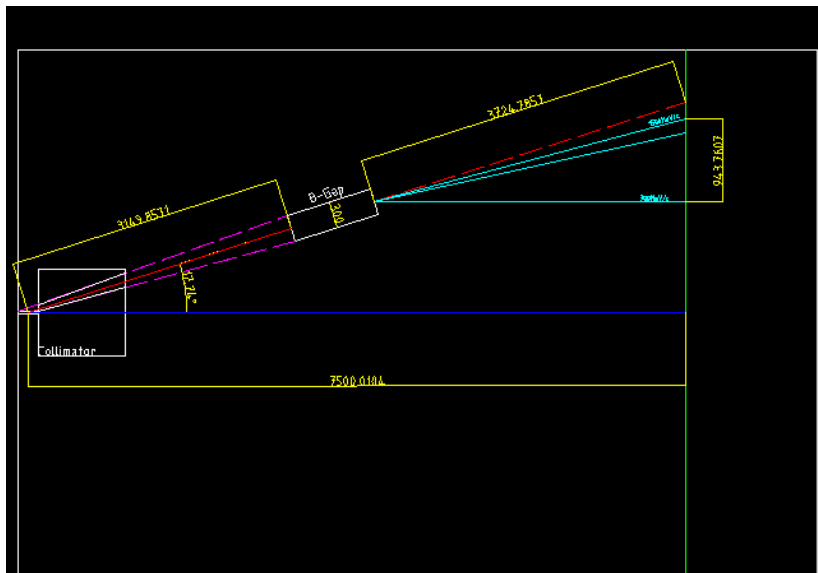
Elements List

- $10^5 - 10^6$ 8GeV π^+ on Target;
Spill 2x1sec or 1x4sec (1 π^+ each μs or 1 π^+ each $40\mu\text{s}$)
- $1.5\lambda_I$ $5 \times 5 \text{cm}^2$ Copper Target
- Collimator 1m^3
 - Type A Channel (fixed) $5 \times 5 \text{cm}^2$ upstream and $5 \times 6.5 \text{cm}^2$ downstream, 5cm height
 - Type B Channel (variable) matching apertures, 5cm height
- Two P-analyzer 12VI20 magnets: $50 \times 35 \times 50 \text{cm}^3$, 50MeV/c each



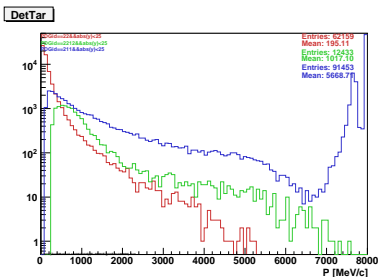
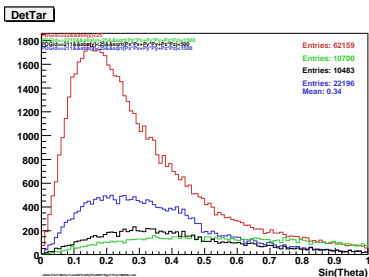
Reference Drawing

Type B channel, 96cm magnet's offset



Tertiary Production at the Target

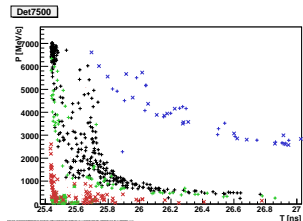
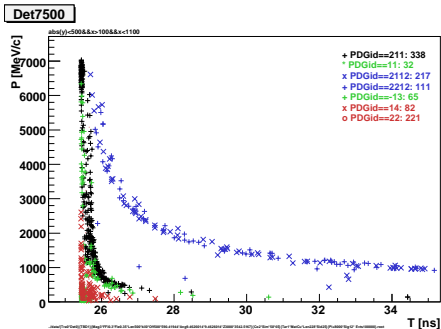
Distribution per Specie





Time Selection

Hits 750cm downstream of the target



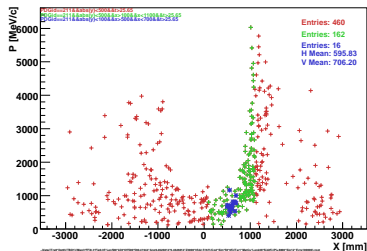
9.5deg: Pions

Hits at Detector

Channel A

$5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

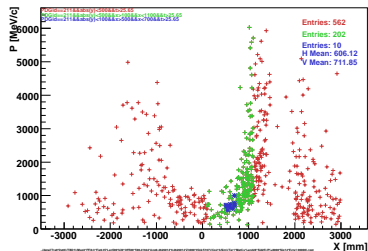
Det7500



Channel B

$5 \times (4.7 - 13.5) \text{ cm}^2$ (hwx)

Det7500



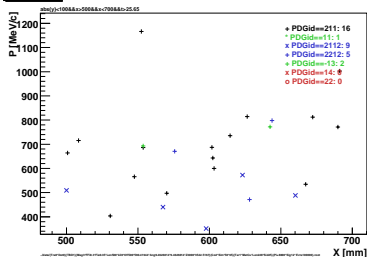
9.5deg: Species Content

Hits at TOF2

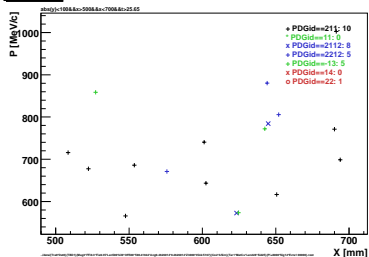
Channel A
 $5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

Channel B
 $5 \times (4.7 - 13.5) \text{ cm}^2$ (hwx)

Det7500



Det7500





9.5deg: Species Content

Hits at the Detector

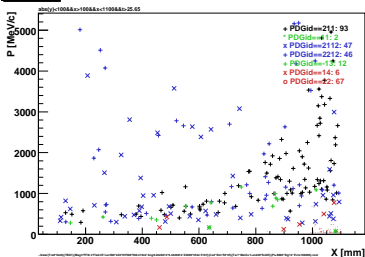
Channel A

$5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

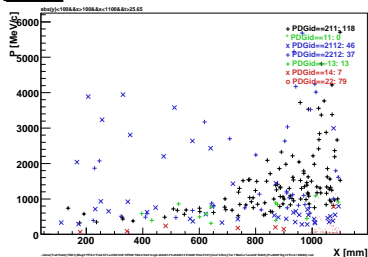
Channel B

$5 \times (4.7 - 13.5) \text{ cm}^2$ (hwx)

Det7500



Det7500



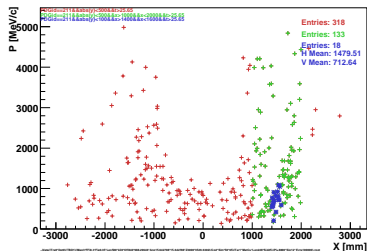
15.6deg: Pions

Hits at Detector

Channel A

$5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

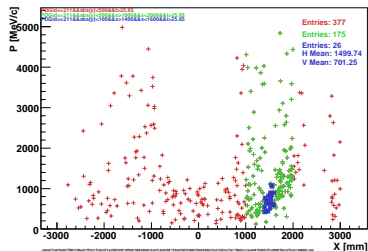
Det7500



Channel B

$5 \times (7.2 - 15.4) \text{ cm}^2$ (hwx)

Det7500

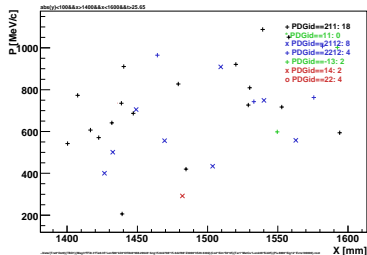


15.6deg: Species Content

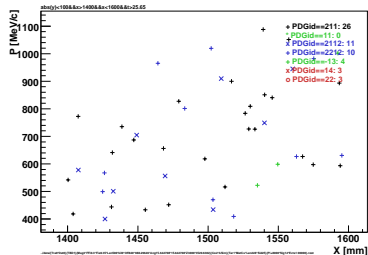
Hits at TOF2

Channel A $5 \times (5 - 6.5) \text{cm}^2$ (hwx) | Channel B $5 \times (7.2 - 15.4) \text{cm}^2$ (hwx)

Det7500



Det7500



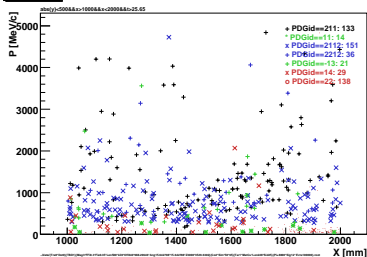
15.6deg: Species Content

Hits at the Detector

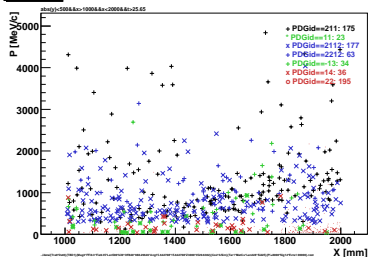
Channel A
 $5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

Channel B
 $5 \times (7.2 - 15.4) \text{ cm}^2$ (hwx)

Det7500



Det7500



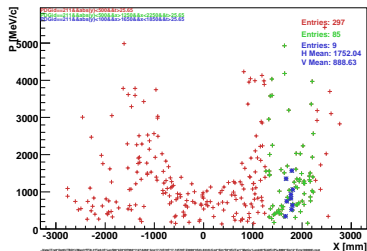
17.7deg: Pions

Hits at Detector

Channel A

$5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

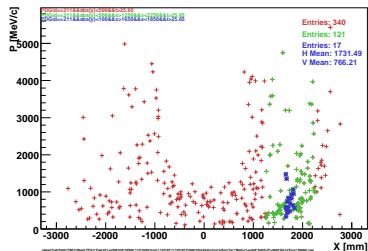
Det7500



Channel B

$5 \times (8.1 - 16.1) \text{ cm}^2$ (hwx)

Det7500



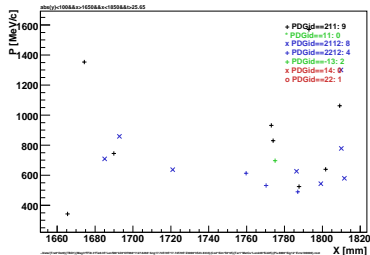
17.7deg: Species Content

Hits at TOF2

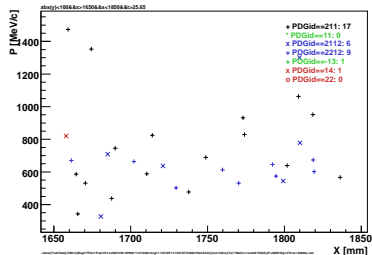
Channel A
 $5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

Channel B
 $5 \times (8.1 - 16.1) \text{ cm}^2$ (hwx)

Det7500



Det7500



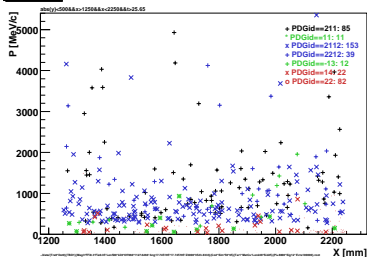
17.7deg: Species Content

Hits at the Detector

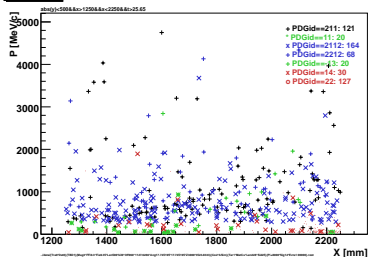
Channel A
 $5 \times (5 - 6.5) \text{ cm}^2$ (hwx)

Channel B
 $5 \times (8.1 - 16.1) \text{ cm}^2$ (hwx)

Det7500



Det7500



Summary

Hits at TOF₂ (20x20cm²)

	Channel A			Channel B		
	π^+	p	$\frac{\pi^+}{\pi^++\gamma}$	π^+	p	$\frac{\pi^+}{\pi^++\gamma}$
	<0.3,1.5> GeV/c		P < 1.5	<0.3,1.5> GeV/c		P < 1.5
9.5deg	16	3	16/16 = 1.00	10	4	10/11 = 0.91
15.6deg	17	4	18/22 = 0.82	26	10	26/29 = 0.89
17.7deg	8	3	8/9 = 0.89	17	9	17/17 = 1.00

Hits at TestBeam Detector (100x100cm²) not seen by TOF₂

	Channel A				Channel B			
	π^+	p	γ	R	π^+	p	γ	R
9.5deg	146	106	100	5.1%	192	86	124	3.4%
15.6deg	115	32	134	7.0%	149	53	192	8.5%
17.7deg	76	35	81	5.4%	104	59	127	8.2%

R means $\frac{\sum \pi^+, p_{TOF < sign0 >}}{\sum \pi^+, p, \gamma}$

$10^5 \pi^+$ on target

Outlook

- Simple Design chosen
- High angle pros
 - Uniform Low-P content
 - Less γ background
 - Residual secondary beam evasion
- Channel B useful at high angle
- Next steps
 - Refine ratio analysis
 - Begin timming analysis