



CM-P00071529

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E-6

ISR PERFORMANCE REPORTTransverse intra-beam scattering in Run 305P

CONCLUSION: TRANSVERSE INTRA-BEAM SCATTERING  
EXPLAINS THE OBSERVED INCREASE IN EFFECTIVE  
HEIGHT TO BETTER THAN 20 PERCENT

Formulae etc. from my report of 19.4.1973. Numbers from the physics run form.

Effective height at 15:30, 2.5.1973: 6.4 mm

" " " 23:30, 2.5.1973: 8.1 mm

Average effective height 7.25 mm

Diffusion constant  $a = 2h_{\text{eff}} \dot{h}_{\text{eff}} = 8.6 \times 10^{-4} \text{ mm}^2\text{s}^{-1}$

$\langle x^2 \rangle^{\frac{1}{2}} = 4.2 \text{ mm}$  (just scaled up by  $\sqrt{2}$  from 22 GeV/c)

$\gamma = 12.5$

7.6 A from 12 to 45 mm, hence  $4.6 \times 10^{12}/\text{mm}$

$\langle z^2 \rangle^{\frac{1}{2}} = 2.28 \text{ mm}$  (just scaled as the effective heights)

$\langle x'^2 \rangle^{\frac{1}{2}} = 0.245 \times 10^{-3}$  (formula)

$N = 3.9 \times 10^{13}$  (density times  $2 \langle x^2 \rangle^{\frac{1}{2}}$ )

$V = 0.113 \text{ m}^3$  (formula)

$\lambda_V = 9.3 \times 10^{-17} \text{ m}$  (formula)

$F = 50$  (graph)

$\dot{\theta}^2 = 2.9 \times 10^{-13} \text{ s}^{-1}$  (formula)

$a = 6.9 \times 10^{-4} \text{ mm}^2\text{s}^{-1}$  ( $4\pi \cdot 13.8^2 \cdot \dot{\theta}^2$ )

Calculated value for  $a$  is 80% of the observed value.

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