

MUON KICKER

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CERN $\bar{p}$

$$\frac{\Delta p}{p} \sim 1.5\% \text{ full width}$$

$$p = 3.560 \text{ GeV/c} \quad (670 \text{ m ring})$$

$$p = \gamma \beta m$$

$$\gamma \beta = \frac{3.5}{0.938} = 3.7$$

$$10^{-4} \pi \text{-rad-m in } x$$

$$10^{-4} \pi \text{-rad-m in } y$$

250mm x 100mm aperture

60mm diameter beam

880 gauss-meter kick

$$\theta_{\text{kick}} = 0.4^\circ \text{ kick}$$

Neutrino Fact. Muons

$$\epsilon_z = 3 \times 10^{-2} \text{ m-rad}$$

$$\epsilon_z = 2 \frac{\Delta p}{p} z$$

$$z = \frac{\epsilon_z}{2 \frac{\Delta p}{p}} \frac{3 \times 10^{-2}}{2 (0.0075)}$$

$$= 2 \text{ meters long}$$

$$\text{same } \frac{\Delta p}{p} \text{ as CERN } \bar{p}$$

$$0.0075 (250 \text{ mm})$$

$$= 2 \text{ mm}$$

so kick independent of momentum

$$2 \times 10^{-3} \text{ m-rad in } x$$

$$2 \times 10^{-3} \text{ m-rad in } y$$

10x worse than CERN $\bar{p}$

choose 3cm radius beam

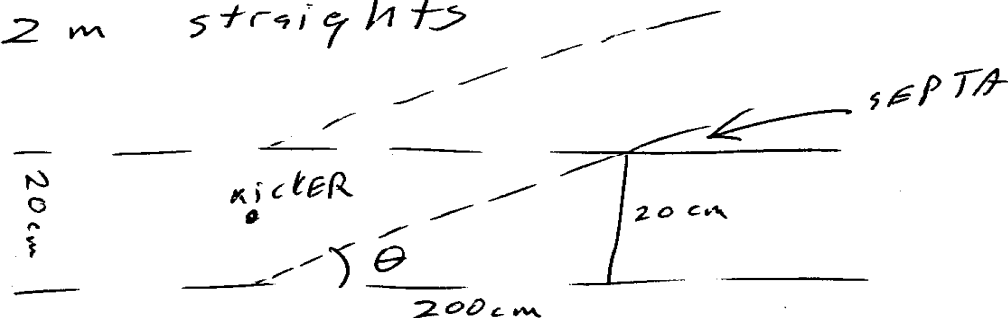
$$\theta_{\text{kick}} = \frac{57^\circ}{15} = 4^\circ$$

$$\text{but } \gamma \beta = 2 \text{ so } 2^\circ \text{ in } 1 \text{ kb}$$

$$0.4^\circ \text{ kick @ } 3.560 \text{ GeV/c}$$

$$7^\circ \text{ kick @ } 200 \text{ MeV/c}$$

5 meter diameter ring
 15 meters arcing plus a pair of (2)
 2 m straights



$$\theta = \frac{20}{200} = \frac{1}{10} = 6^\circ$$

add 2° for beam angular emittance

5m diameter ring
 must move in 0.2 m in first orbit
 to get inside Bo shield

$$\frac{0.4\text{m}}{5\text{m}} = 8\%$$

$$200\text{ MeV/c} \rightarrow 184\text{ MeV/c}$$

$$E_i = \sqrt{200^2 + 106^2} = 226\text{ MeV}$$

$$E_f = \sqrt{184^2 + 106^2} = \frac{212\text{ MeV}}{14\text{ MeV to lose}}$$