**Run Conditions for “New” Final Focus - March ‘00**

1. No IP stretch
2. 9.42 mrad big bend (right), 10.96 mrad total bend.
3. Bored tunnel (4.27 m diam.), 3 m floor width.
4. Beam position: 75 cm high, 100 cm from right wall.
5. Small detector:
   a. End door: 370 cm outer radius, 20 cm inner radius
   b. Calorimeter:
      Barrel: 90 cm outer radius, 55 cm inner radius
      Endcap: 55 cm outer radius, 20 cm inner radius
6. Beam losses:
   10**9/pulse train on first stage collimators
   10**7/pulse train on second stage collimators
   10**4/pulse train on final focus collimators
7. Spoilers:
   a. 5 m long, 70 cm radius doughnut immediately downstream from each absorber in the collimation section, 10 m long, 70 cm radius doughnut downstream from the final focus collimators.
   b. 9 m long rectangular “tunnel fillers” at z = 271 m and 1091 m.
8. Muons must penetrate 1 m of iron in end door to be counted as a hit in the muon endcap or the EM calorimeter.
$E_{\text{beam}} = 250 \text{ GeV}$

No spoilers, beam left side of tunnel.
$E_{\text{beam}} = 250$ GeV

No spoilers, beam right side of tunnel.

For this source point: 5x better than beam on left side of tunnel.
Two Side-by-Side Magnetic Spoilers Fill Tunnel
(9 m along z)
MUON ENDCAP (Small Detector)
E_beam = 250 GeV

- • No Magnetic Spoilers
- + 9m Full Tunnel Spoilers at z = -271m, -1091m

(beam lost)/(muon reaching muon endcap)

(source location (meters from IP))

Collimation Section
BigBend
Final
Focus
MUON ENDCAP (Small Detector)
E_beam = 500 GeV

- ◇ No Magnetic Spoilers
- + 9m Full Tunnel Spoilers at z = -271m, -1091m

Why?
(see next figure)
Marty's Upper Limit - Muon Endcap

- E_beam = 250 GeV
- E_beam = 500 GeV

240 μs/pulse train with 10^9 e^+ on absorber

No Spoilers
MUON ENDCAP (Small Detector)

$E_{\text{beam}} = 250 \text{ GeV}$

◊ 1999 Final Focus

+ March 2000 Final Focus

No Magnetic Spoilers

(BEAM LOST) / (MUON REACHING MUON ENDCAP)

$\begin{array}{c}
10^{10} \\
10^{8} \\
10^{6} \\
10^{4} \\
10^{2} \\
1 \\
\end{array}$

SOURCE LOCATION (METERS)
$E_{\text{beam}} = 500 \text{ GeV}$

All of these have $p_{\mu} > 250 \text{ GeV/c}$

Source at 1550 m
EM CALORIMETER (Small Detector)

E_{beam} = 250 \text{ GeV}

(\text{BEAM LOST}) / (\text{MUON REACHING MUON ENDCAP})

$10^{12}$

$10^{10}$

$10^{8}$

$10^{6}$

$10^{4}$

-3000 -2500 -2000 -1500 -1000 -500 0

SOURCE LOCATION (METERS FROM IP)

- No Magnetic Spoilers
- + 9m Full Tunnel Spoilers at $z = -271m, -1091m$

beam loss
EM CALORIMETER (Small Detector)
E_{beam} = 500 \text{ GeV}

- Beam loss
- No Magnetic Spoilers
- + 9m Full Tunnel Spoilers
  at z = -271m, -1091m

Collimation Section

Source Location (Meters From IP)
Marty's Upper Limit - EM Calorimeter

+ E_beam = 250 GeV

◊ E_beam = 500 GeV

No Spoilers

18 μs/pulse train with 10^9 e^+ on absorber

AVERAGE HIT DENSITY IN CALORIMETER (MUONS/CM**2)

COLLIMATION SECTION  BIGBEND  FINAL  FOCUS

SOURCE LOCATION (METERS FROM IP)

3/22/00
Summary - “New” Final Focus - March ‘00

1. For sources in the collimation section and no spoilers in the beam tunnel, the muon rate is about 30 times worse in the new, short final focus than in the longer 1999 final focus.

2. Adding 9 meter long tunnel filling rectangular spoilers just outboard of big bend and just outboard of the new final focus keeps the muon rate below one/pulse train in the small detector EM calorimeter and the muon endcap, except for one source in the collimation section where the rate is 10 muons/pulse train for a beam energy of 500 GeV.

3. For the source at 1388 m:
   a) the ratio, spoilers/no spoilers is 2120 at $E_{\text{beam}} = 250$ GeV and 460 at $E_{\text{beam}} = 500$ GeV.
   b) removing the spoilers outboard of big bend makes the muon rate 150X worse.
   c) removing the spoilers outboard of the new final focus makes the muon rate 22X worse.
   d) removing the doughnut spoiler near the source makes the muon rate 1.5X worse.