

ν Interaction Rates

April, 2000 Neutrino Factory Study

E_{μ} (GeV) Muon Ring	Baseline (km)	$E_{\nu_{\mu}}$	E_{ν_e}	$N(\nu_{\mu} \text{ CC})$ (per kt-yr)	$N(\nu_e \text{ CC})$ (per kt-yr)
10 _{FNAL-SOU}	732	7.5	6.6	1400	620
20 _{FNAL-SOU}	732	15	13	12,000	5000
50 _{FNAL-SOU}	732	38	33	1.8×10^5	7.7×10^4
10_{BNL-SOU}	1700	7.5	6.5	260	120
20_{BNL-SOU}	1700	15	13	2150	960
50 _{BNL-SOU}	1700	38	33	3.2×10^4	1.4×10^4
10 _{BNL-WHIP}	2900	7.5	6.4	91	41
20 _{BNL-WHIP}	2900	15	13	740	330
50 _{BNL-WHIP}	2900	38	33	11,000	4900

Detectors for a Neutrino Factory

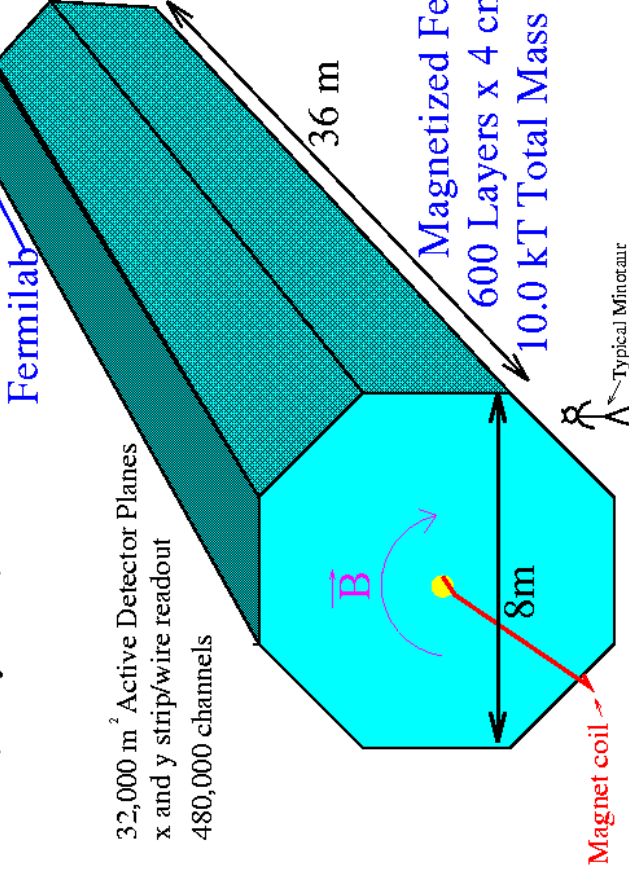
μ Beams $\rightarrow \nu_{\mu}, \bar{\nu}_{e}$

- **Optimize L/E**
- **Need to distinguish sign of muon---** Magnet
- **Timing will come in handy**
- **Detector should be massive but inexpensive.**
Steel or Water
- **Practical**

What size detector can you put at Soudan?

MINOS (Main Injector Neutrino Oscillation Search)

Far (Labyrinth) Detector



Minos:

Will be built in 3 Sections.

~ 40% steel by volume.

Upgrade:

2 sections 40/60 Steel/Scint

2 sections 80/20 Steel/Scint

Up to 15 kT active volume

--- 15 cm Steel plates

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10 _{BNL-SOU}	1700	7.5	6.5	260 (3900)	120 (1800)
20 _{BNL-SOU}	1700	15	13	2150 (3.2x10 ⁴)	960 (1.4x10 ⁴)