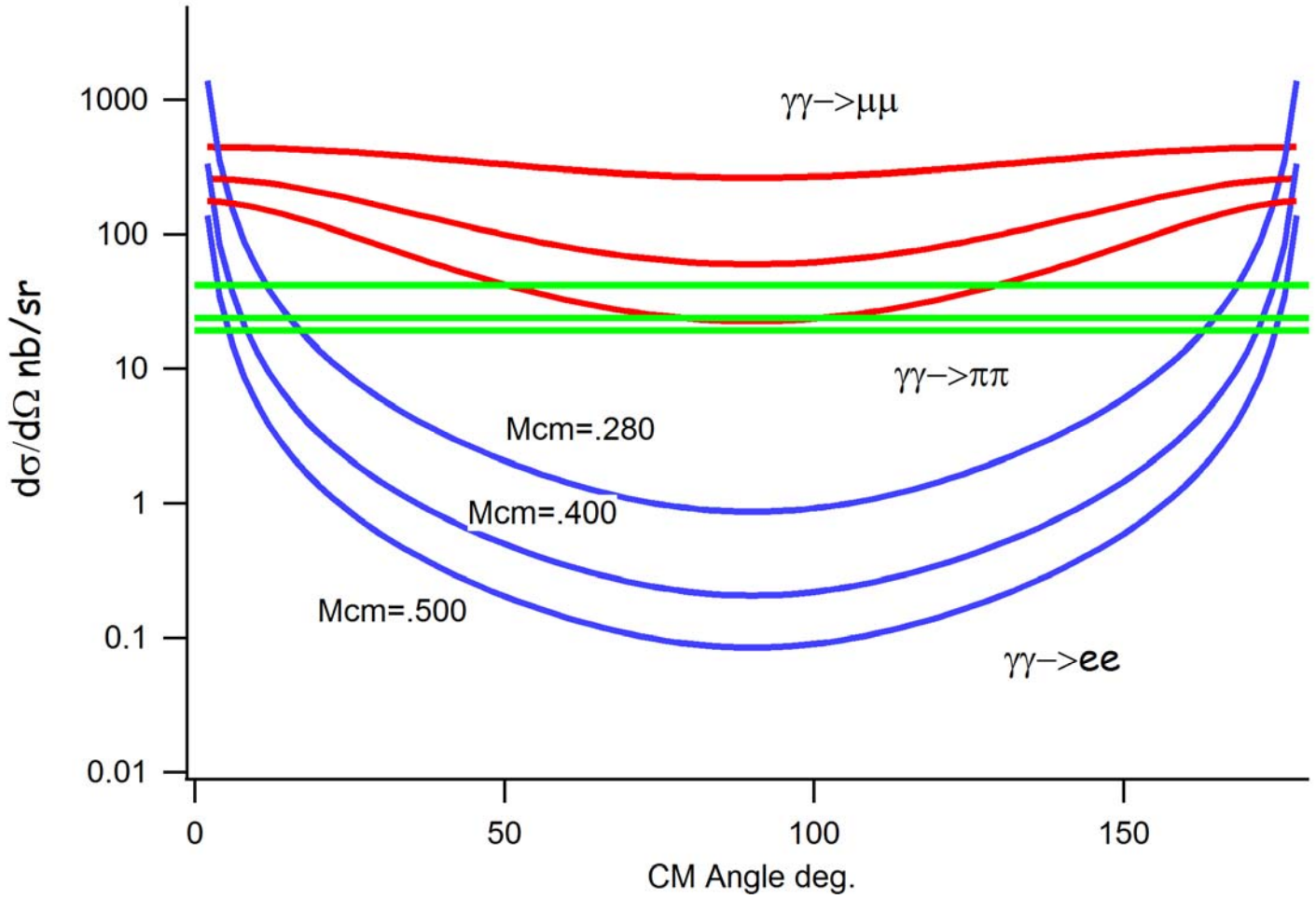
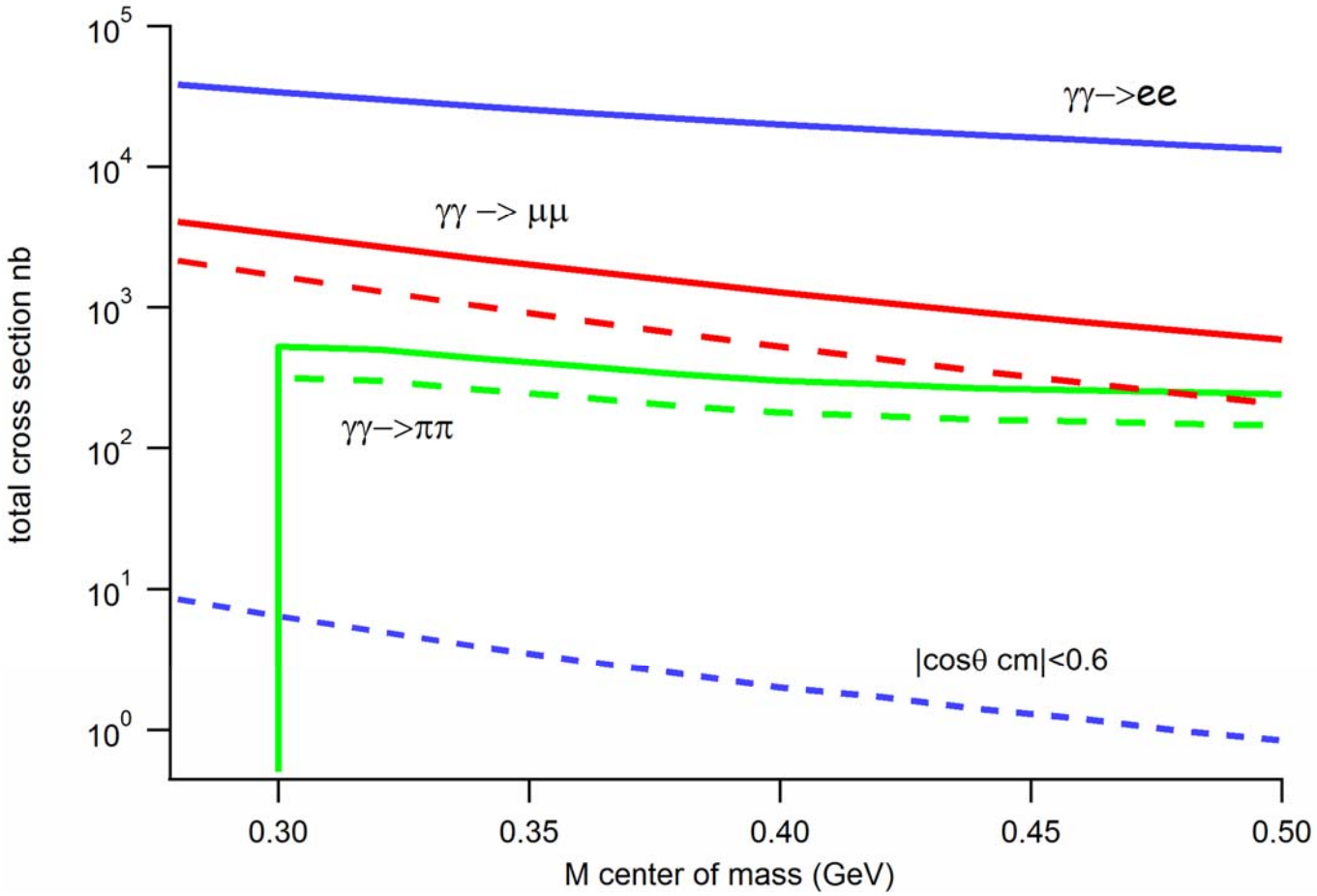
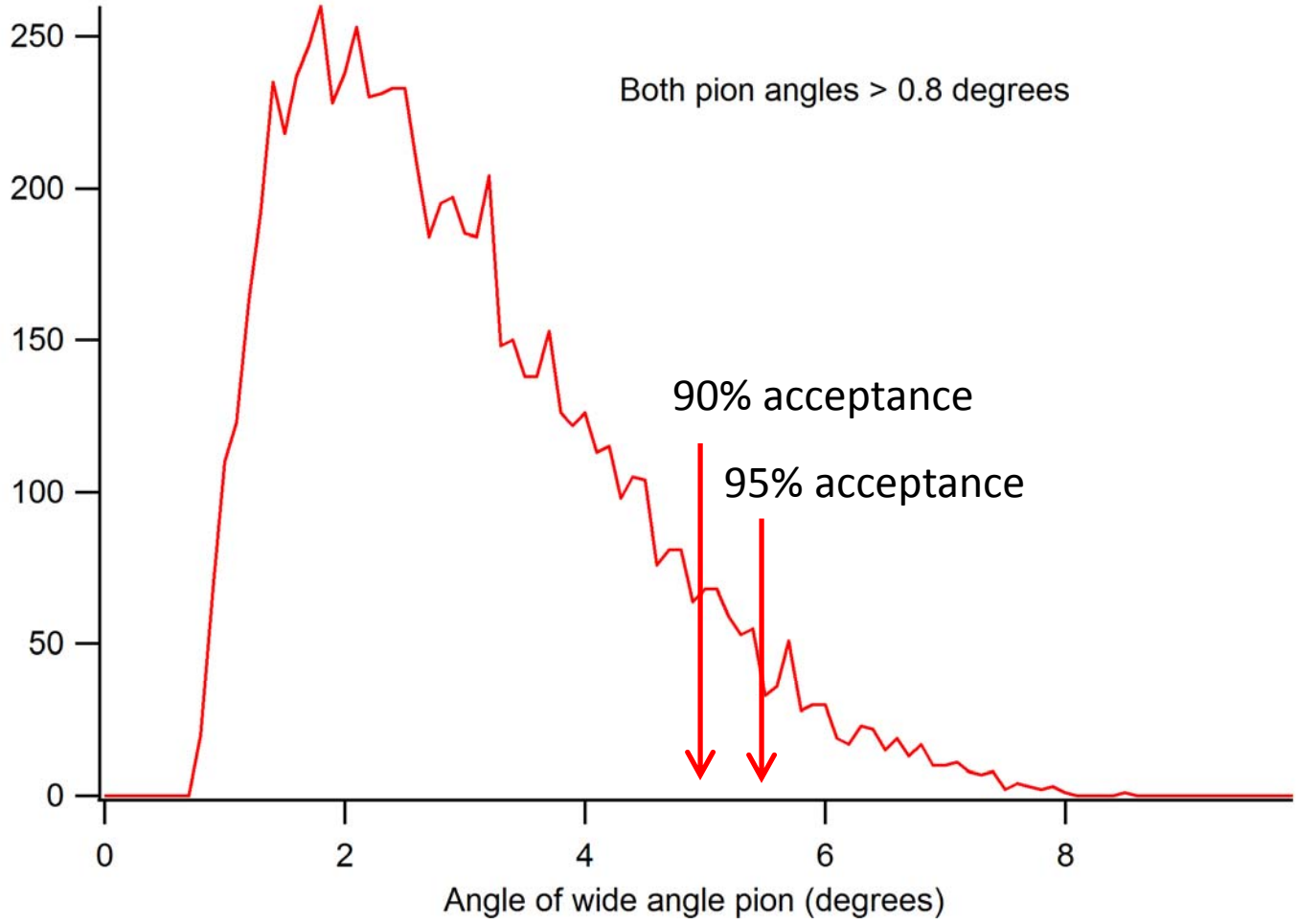

1000
100
10
1
0.1
0.01
dσ/dΩ nb/sr
0
50
100
150
CM Angle deg.
γγ–>μμ
γγ–>ππ
Mcm=.280
Mcm=.400
Mcm=.500
γγ–>ee


total cross section nb
10^5
10^4
10^3
10^2
10^1
10^0
γγ–>ee
γγ –> μμ
γγ–>ππ
|cosθ cm|<0.6
0.30
0.35
0.40
0.45
0.50
M center of mass (GeV)

Questions:

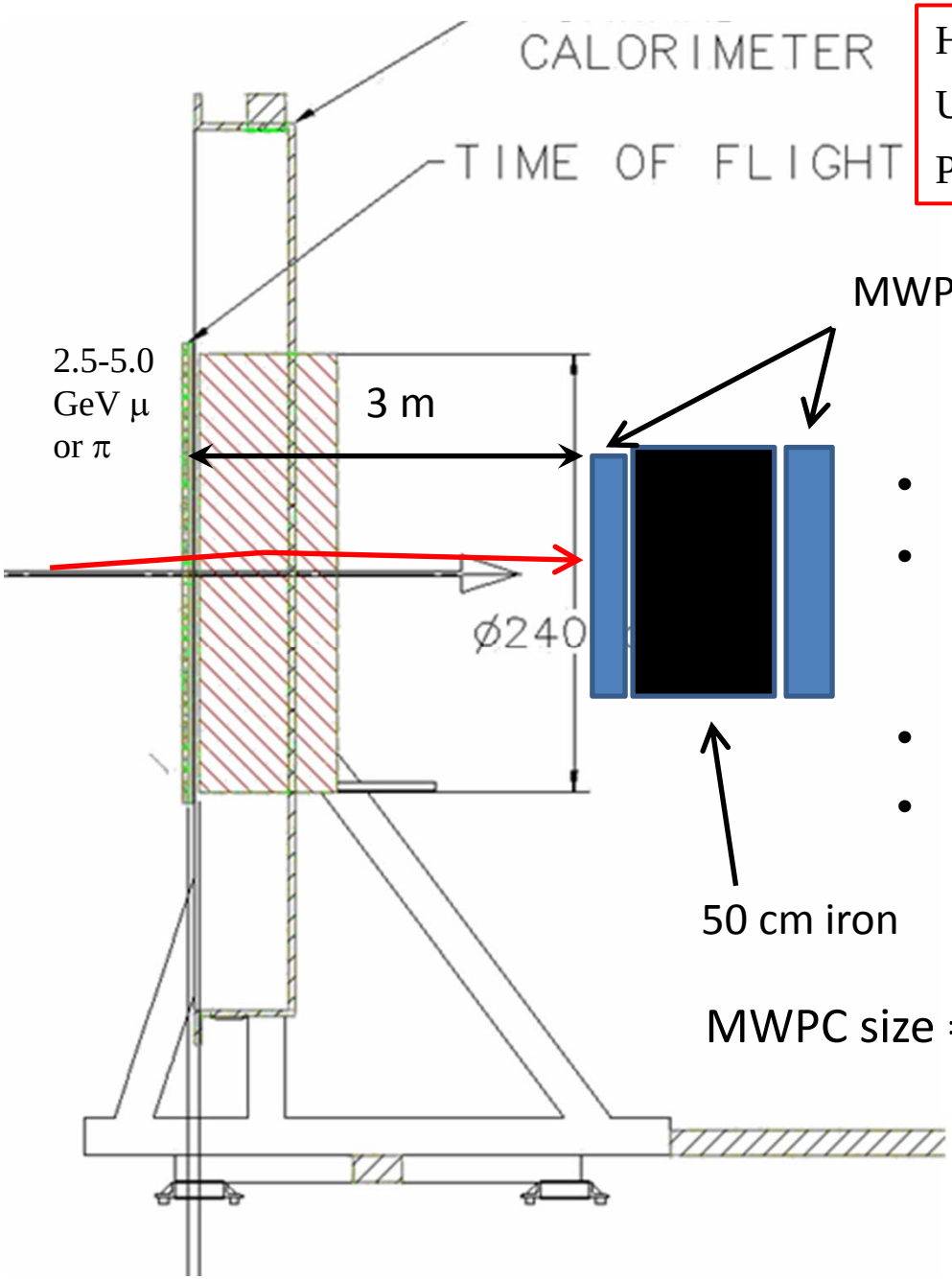
- Can we use FCAL to detect charged pions with reliable efficiency?
- How big do our detectors need to be to detect muons (pions)?



How efficient is $TOF \cdot FCAL$?

Use MWPC as pion detector

Pion signal = $TOF \cdot (FCAL + MWPC_1) \cdot \overline{MWPC_2}$



- FCAL efficiency for pions ~ 90%?
- Assume MWPC has u,v planes with cathode strip readout, each plane is 95% efficient for MIP
- MWPC efficiency for MIP =1-.05^2 = 99.8%
- (FCAL + MWPC$_1$) efficiency = 100.0%

MWPC size = 2 x (6.2 + 3 ?) x tan(5.5°) = 1.8 m

Muon identification

MUON = $TOF \cdot \left(FCAL + MWPC_1\right) \cdot MWPC_2$

Efficiency for single track identification = 99.8%

Efficiency for identifying one or both tracks as a muon = 100.0%

Pion identification:

PION = $TOF \cdot \left(FCAL + MWPC_1\right) \cdot \overline{MWPC_2}$

Efficiency for single track identification = 1 - .01 = 99%

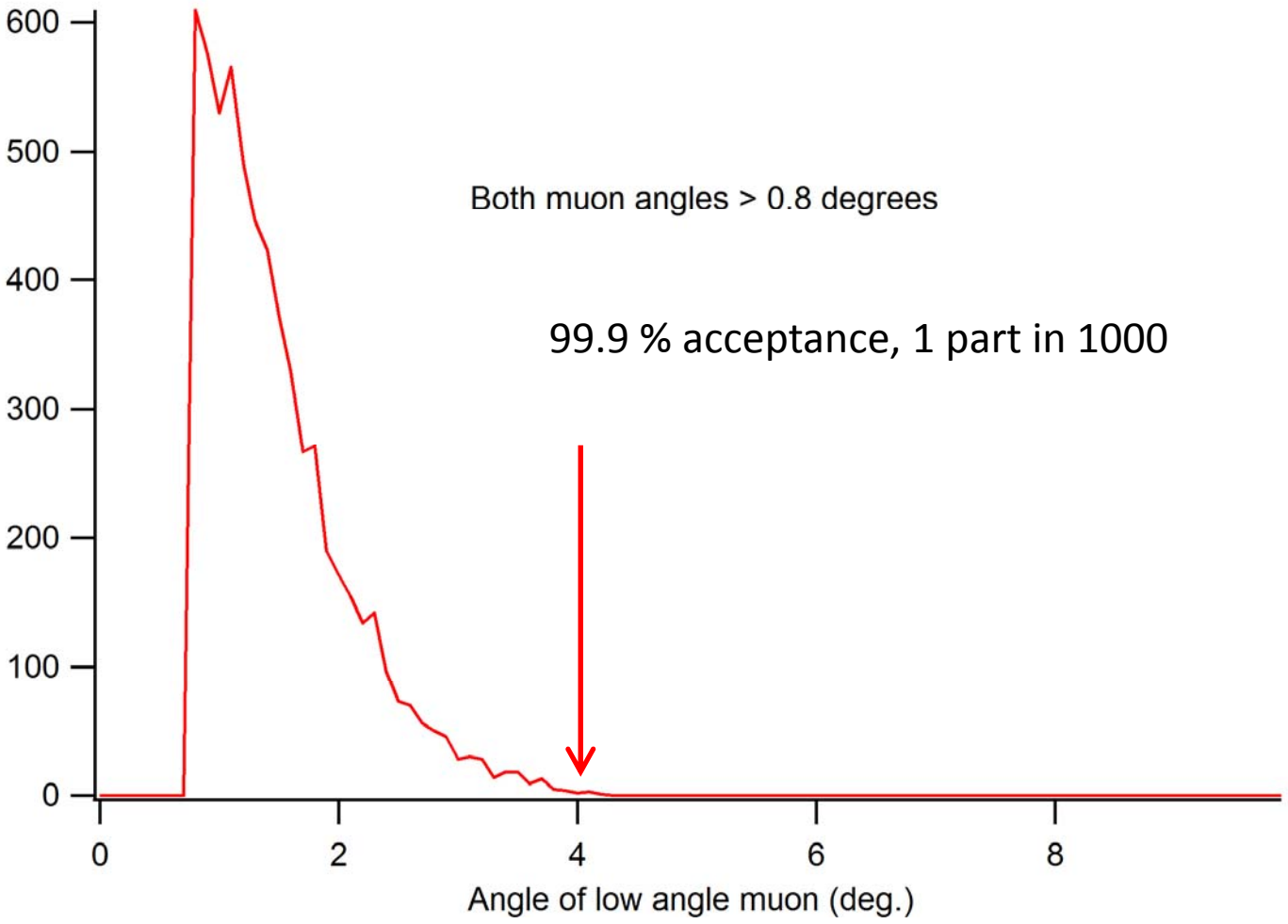
Efficiency for identifying both tracks as a pion = 98%

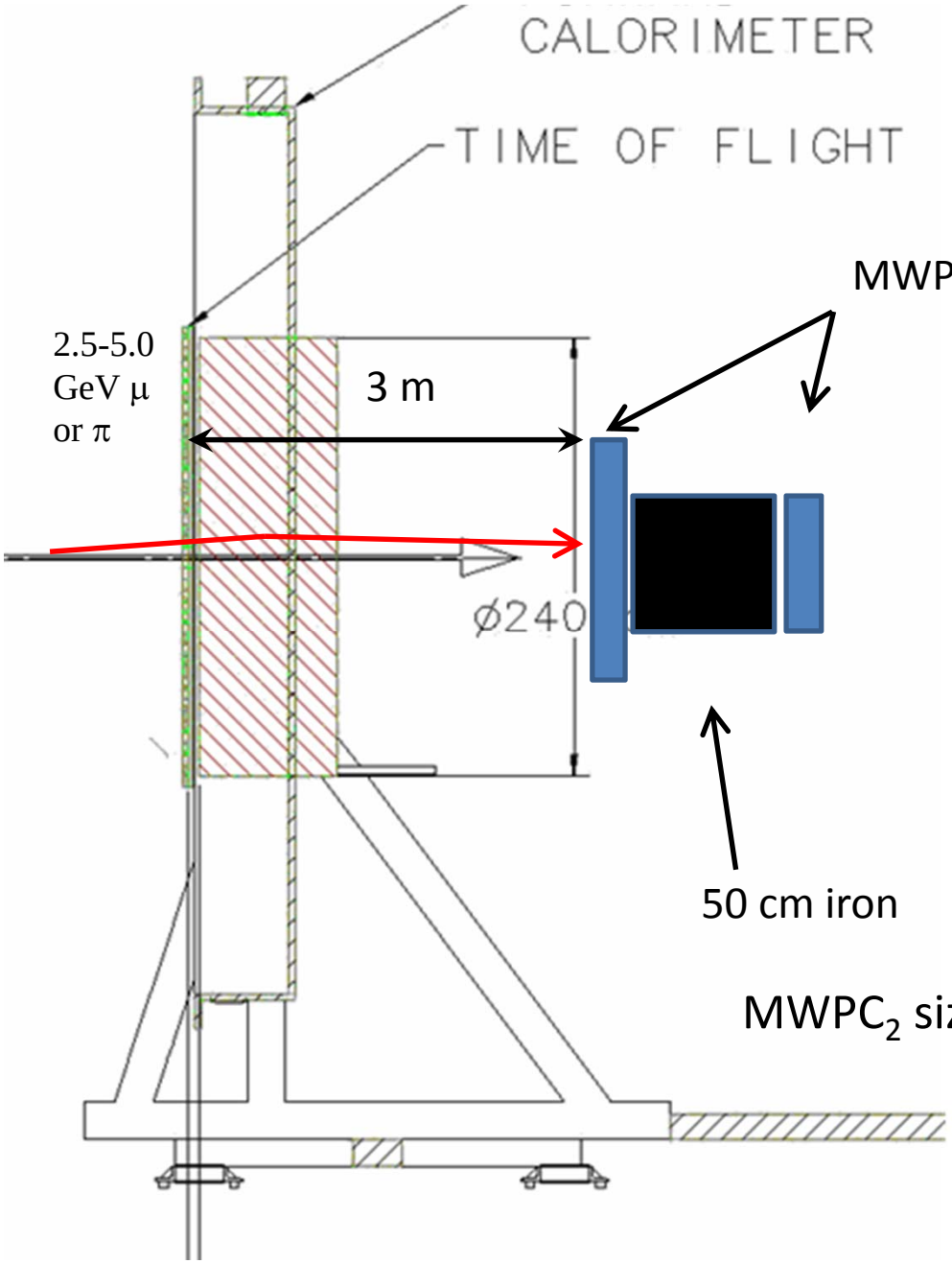
Event identification:

Pion event = $\mathrm{PION}_1 \cdot \mathrm{PION}_2$

Muon event = $\mathrm{MUON}_1 \cdot \mathrm{PION}_2 + \mathrm{PION}_1 \cdot \mathrm{MUON}_2 + \mathrm{MUON}_1 \cdot \mathrm{MUON}_2$

Detect only the low angle muon





$MWPC_2$ size = 2 x (6.2 + 3 ?) x tan(4°) = 1.3 m

Muon rejection:

MUON = $TOF \cdot \left(FCAL + MWPC_1\right) \cdot MWPC_2$

Efficiency for single track identification = 99.8%, 2 parts in 1000

Pion identification:

PION = $TOF \cdot \left(FCAL + MWPC_1\right) \cdot \overline{MWPC_2}$

Efficiency for single track identification = 1 - .01 = 99%

Event identification:

Pion event = NO TRACK + PION

Muon event = MUON

1. Revisiting the physics motivation in the LOI: Rory
2. Comparison of Compass measurement with Hall D: Rory
3. Acceptance, resolution, trigger and data rates: David
4. Statistical and systematic errors, and projected sensitivity to alpha-beta: Rory, David, Elton
5. Muon pair backgrounds: Rory
6. Muon counters: Rory, Elton
7. Primakoff pi0 calibration analysis: Sasha
8. Putting the Latex document together: David?

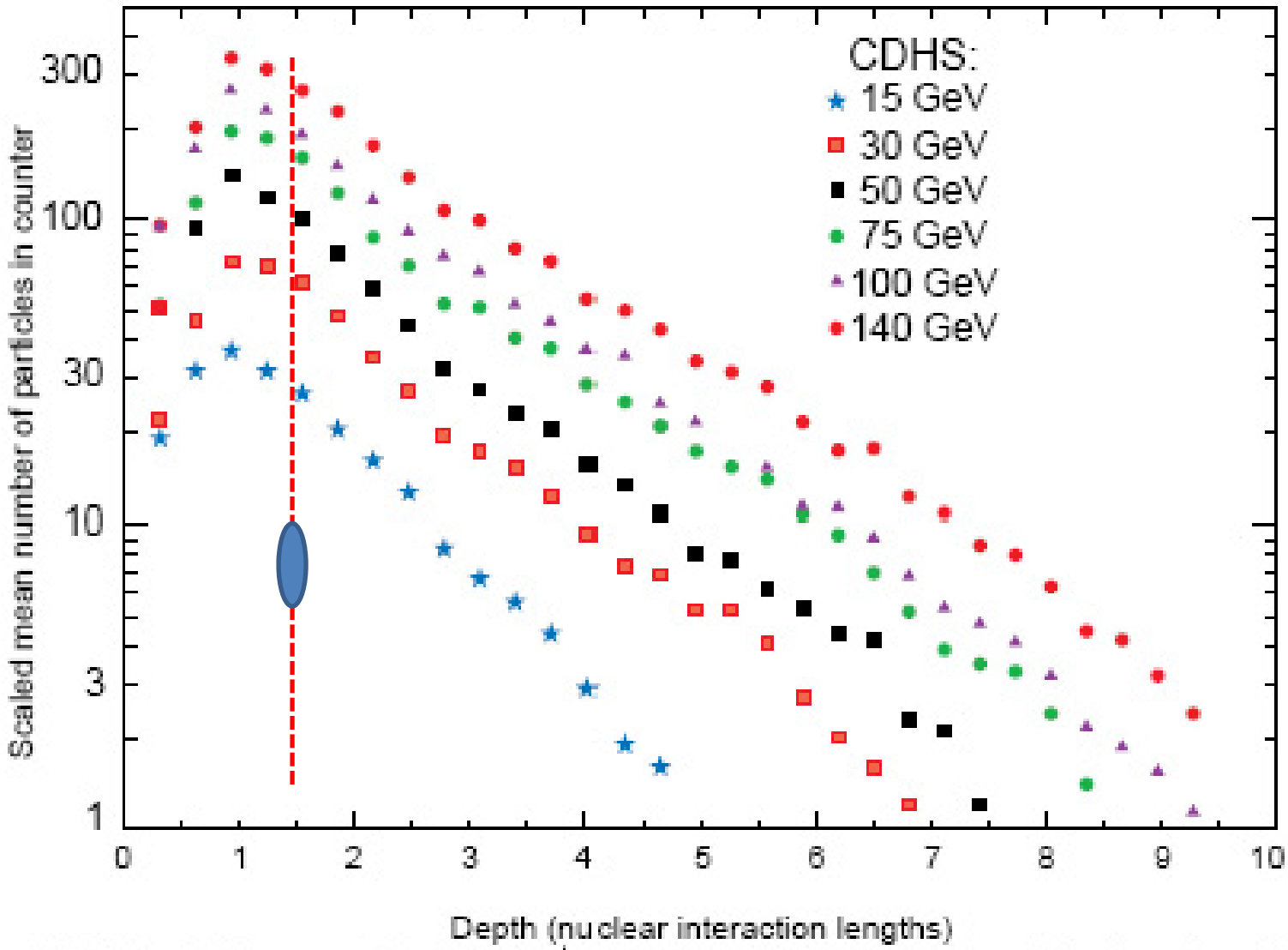


Figure 28.23: Mean profiles of π^+ (mostly) induced cascades in the CDHS neutrino detector [143]. See full-color version on color pages at end of book.