Front End Chicane Parameters

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Introduction

- Goal: optimize chicane parameters for high energy cutoff
- Not dealing with absorber for low energy protons
- Chicane field is 2 T
  - Could be done for other fields
- 25 cm radius aperture downstream of chicane
  - No aperture in chicane
- Scanned in chicane length and angle
Performance Parameters

- Look at fraction of muons at end of chicane that are captured in cooling
  - Depends on absorber thickness
  - Also depends on NBPR design
  - Also did for pions
- Call “transmission” muons within 80–260 MeV kinetic energy, pions 80–320 MeV
- Initially looked at proton power downstream
- Decided better criterion was energy beyond which all protons were lost
  - Came up with designs that removed more proton energy, but left many high energy protons.
Performance Parameters

Fraction of Accepted Muons vs. Kinetic Energy (MeV)

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Can find solutions with best transmission for a given proton energy cutoff

For higher proton energy cutoffs, two sets of optimal solutions
- One for shorter chicanes, but look less robust
- One for longer chicanes
- Need to analyze these a bit more
- Optimal clearer for lower proton energy cutoffs
Results
Results

![Chicane Transmission Plot]

- **Chicane Half Length (m)**: 0, 50, 100, 150, 200, 250, 300, 350, 400
- **Chicane angle (mrad)**: 88, 90, 92, 94, 96, 98, 100
- **Muon Transmission in Band (%)**

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Results

Muon Transmission in Band (%) vs. Proton Kinetic Energy Cutoff (MeV)

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Conclusions

- Can find best solutions (in terms of muon transmission) for various proton energy cutoffs
- Best cutoff will depend on downstream details
  - Lower cutoff energy requires less absorber
  - But some loss in muon transmission
    - More than indicated here: higher energy muons also transmitted
- Will need to optimize full system
- Need to understand best parameter regime
- Could look at other fields
- Could pass distributions at end of chicane to G4beamline