Validation of Stopping Physics

Krzysztof Genser, Julia Yarba
Fermilab
Geant4 HAD Group meeting
10/23/2011

Outline

- ## Geant4.9.4.ref10

  - Particle + Target (1M events each):
    - pi- on C, N, O, Al, Cu, Ta, Pb
    - K⁻ on H
    - pbar on H

  - ## Models:
    - Traditional (Geisha) and CHIPS – all particles
    - Bertini, Bertini+Precompound – pi-, K-
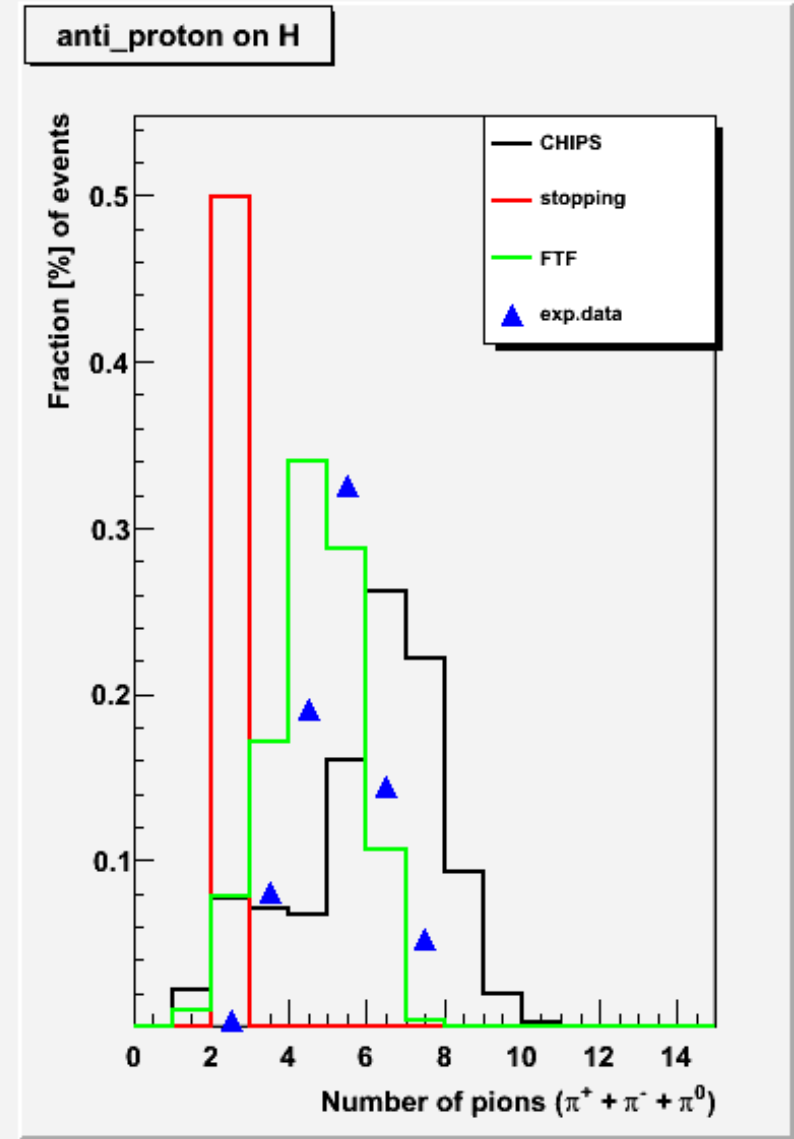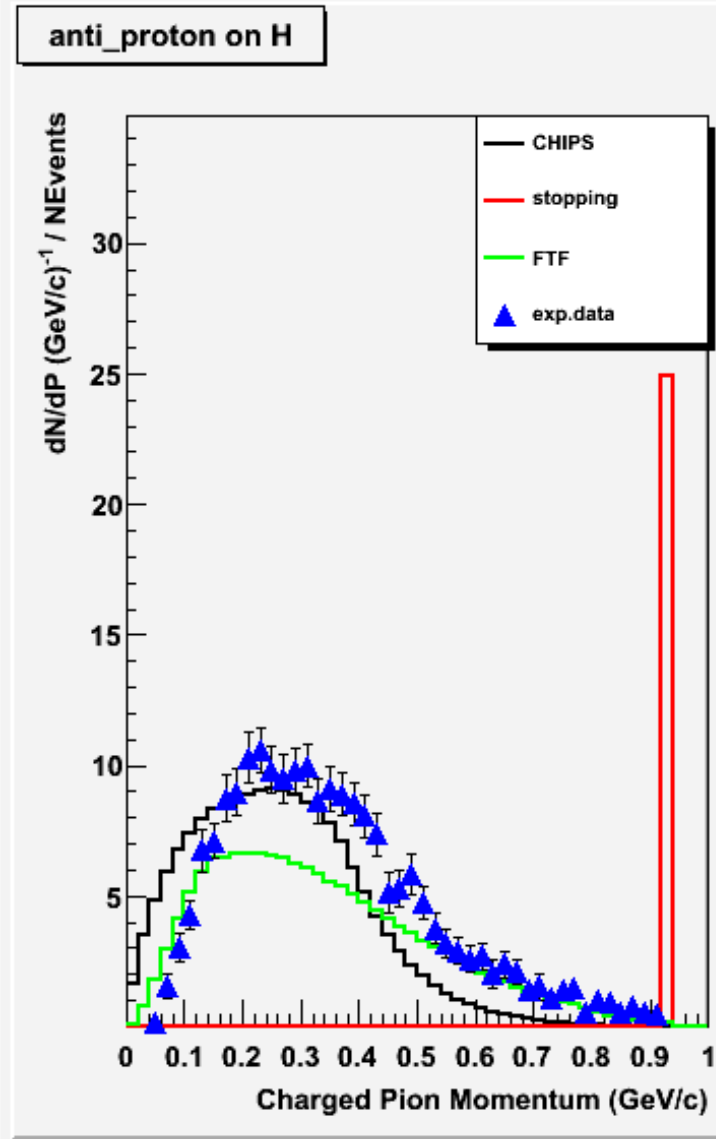   - FTF – pbar

- ## Remarks on stopping muons

pi- and K-

- **Data sets:**
  - R.Madey et al.,Phys.Rev.C25,3050(1982)
  - K.Larson et al., Phys.Rev.D47,799(1993)
- **No changes vs ref09+V04-09-38 (talk on 10/26/11):**
  - **Bertini at least as good as CHIPS, BertiniPreCo is even better**
  - **Bertini and BertiniPreCo are substantially faster than CHIPS**
- **Results uploaded in G4 Val Fwk/DB:** http://g4validation.fnal.gov:8080/G4HadronicValidation/G4ValHAD.jsp?WGROUP=hadronic
  Note: used multiple upload utility (by Hans W.)
- **Changes to validation packages (/test48) in SVN,**
  incl. "toy" interface to Bertini
  Note: please make /test48 part of ref release(s)

FTF - pbar on H

- **Data sets:**
  - C. Amsler, Rev. Mod. Phys. 70, 1293 (1998)
  - C.B. Dover et al., Prog. Part. Nucl. Phys., Vol.29, pp.87-173 (1992)
- **Other exp.data exist, need to be added to the test**
- **First official test of FTF interface (also next slide)**
  - **In general, good performance, 20x faster than CHIPS**
  - **Slightly underestimates overal pion mult**
  - **Charged pion momentum somewhat off vs exp.data**
- **Results uploaded in G4 Val Fwk/DB:** http://g4validation.fnal.gov:8080/G4HadronicValidation/G4ValHAD.jsp?WGROUP=hadronic
- **Changes to validation packages (/test48) in SVN**

4

Remarks on Stopping Muons

- **Communicating with the mu2e experiment regarding validation and possible enhancements to the muon stopping physics code**

- **Expect to receive validation data and suggestions what needs to be validated monitored (regression tested)**

- **Received proposed muon stopping code from Kevin Lynch**
  - **His idea was to make the existing geant4 code more modularized and configurable**

- **Started to add muon related code/histograms to test48**