

GLAST LAT G4 simulation

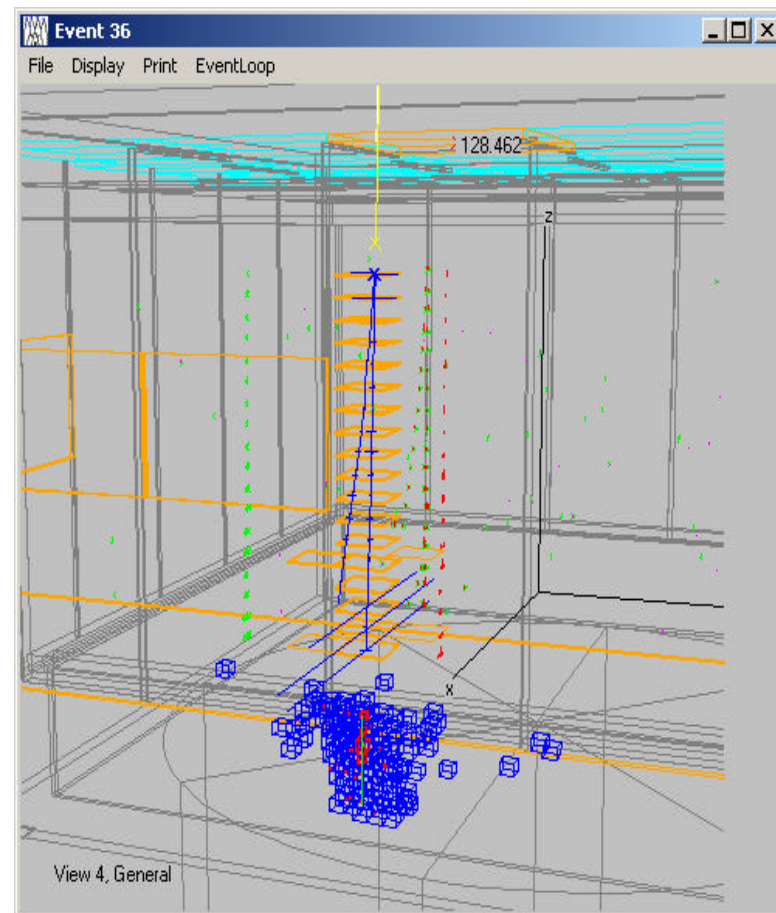
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thanks to R.Dubois, R. Giannitrapani, B.Lott, T.Koy,
R.Rando, T.Usher



Outline

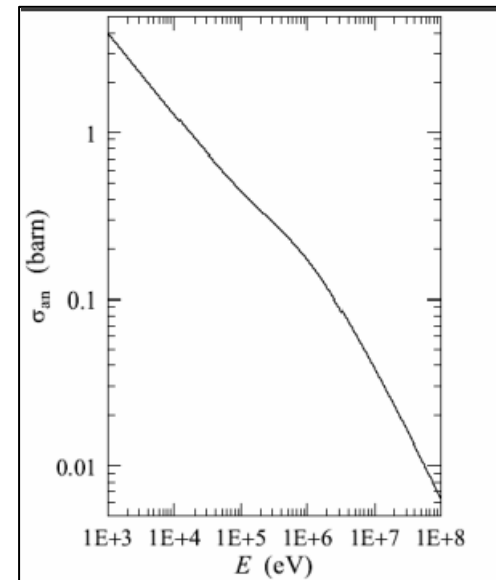
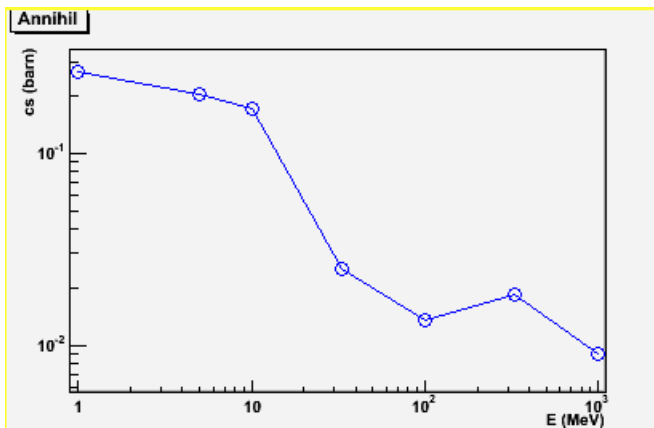
- Positron annihilation check
- Validation strategy for DC2
- Plans for G4 simulation upgrade





Positron Check

- The problem: High rate of Positron events in Residual Bkg
- Verifying the cross section: simple program in G4: fitting the number of events that remain after a certain distance in a thick slab of Aluminum with only annihilation activated
- See Riccardo Rando's description at http://sirad.pd.infn.it/glast/ground_sw/slab05/positrons/results.html
- Problem in Cross Section?



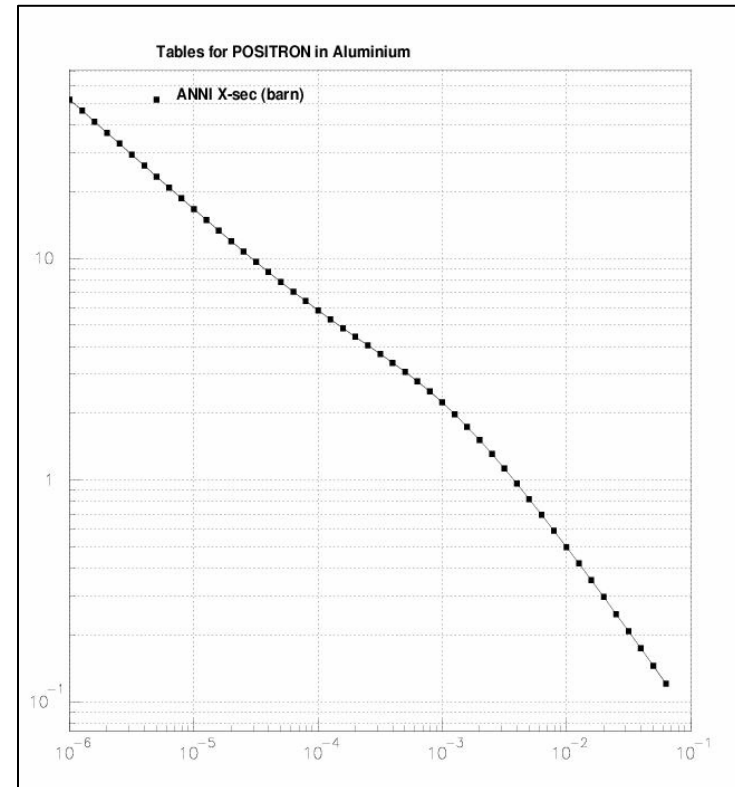
Annihilation cross section
(per electron)



Positron Check

- **Contact with G4 developers: “the annihilation cross section is one of the simplest ... should be the same in all MC ...”**
- **Verification against G3 cross section plots using G4 distributed test program**

- **Perfect agreement between G3 and G4**





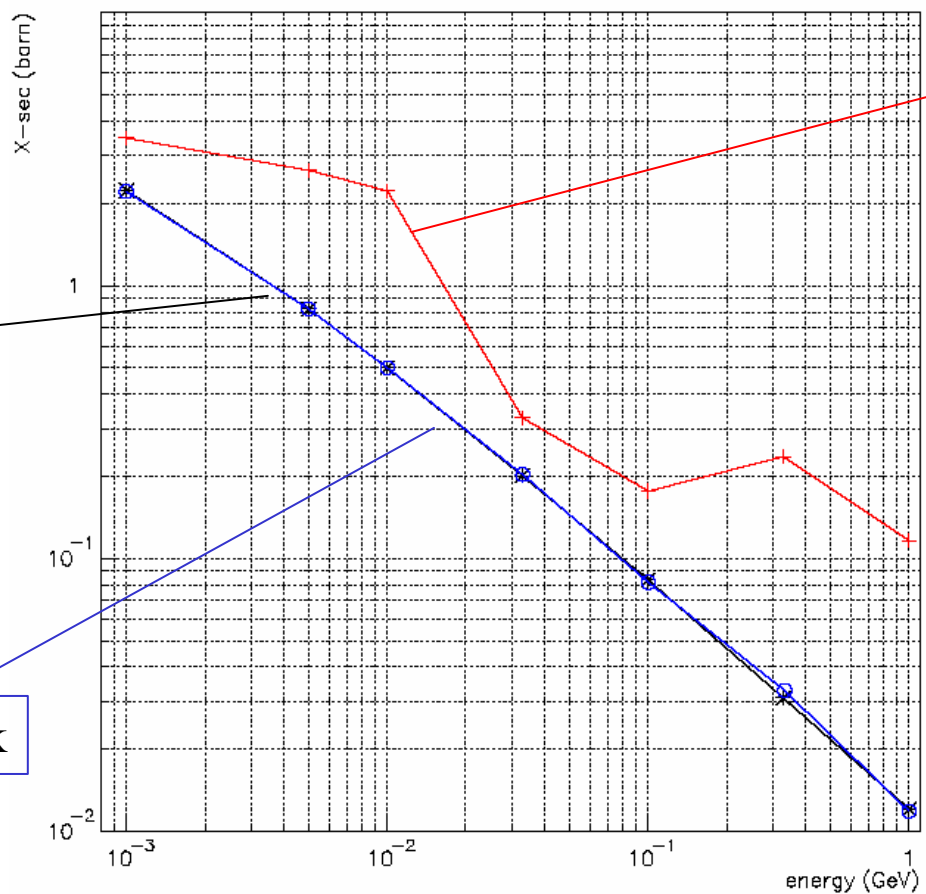
Positron Check

- The solution?: Bias in the number of events to too small thickness of layer
- Increasing Thickness of Material and redoing the fit

G4 test program

Previous check

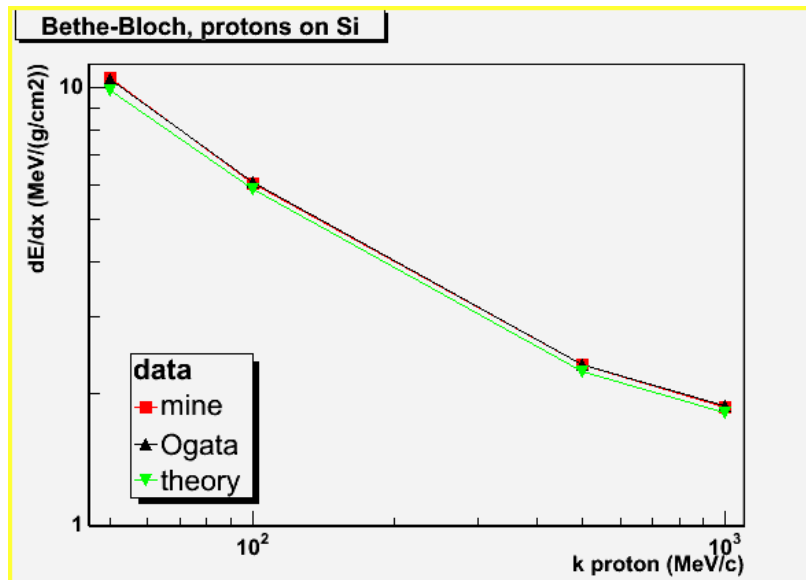
New check





Validation strategy

- Development of [GEANT4TEST](#) package in cvs
- Inclusion of ROOT scripts for tests developed by Riccardo Rando (see [this web page](#))
- Structure of GEANT4TEST root trees powerful for the validation: 3 trees (Primary Info, Secondary Info, Step info for the primary event)
- Preliminary plot (produced using [bethe.mac](#) and [bethe.C](#))





Validation Strategy

- Meet regularly each week until the collaboration meeting
- This week: reproduce RiccardoR's results in GEANT4TEST
http://sirad.pd.infn.it/glast/ground_sw/slab05/em_results.html
- Friday 10 september: inclusion of hadronics tests
- Friday 17 september: discussion for inclusion of EM tests in systests



Upgrade to G4 new version

- Upgrade of G4 related packages (already done by Tracy and verified under Windows and Linux)
- Build of G4 libraries (shared and compound) under Windows and Linux by this week
- Update of G4 related packages in cvs HEAD
- Tests at three levels:
 - Physics level check (GEANT4TEST)
 - G4Generator level check (G4TestAlg (originally developed by Johan))
 - System tests
- Tag of G4 new version after tests and discussion in Analysis Group after collaboration meeting
- Using of G4 new version for DC2?



Advantages

- **New models for Hadronics Processes**
- **Heavy Ion ionisation bug fix**
- **Availability of data (Cal test beams) for cross check**
- **Support from G4 team**