Validation of cand01

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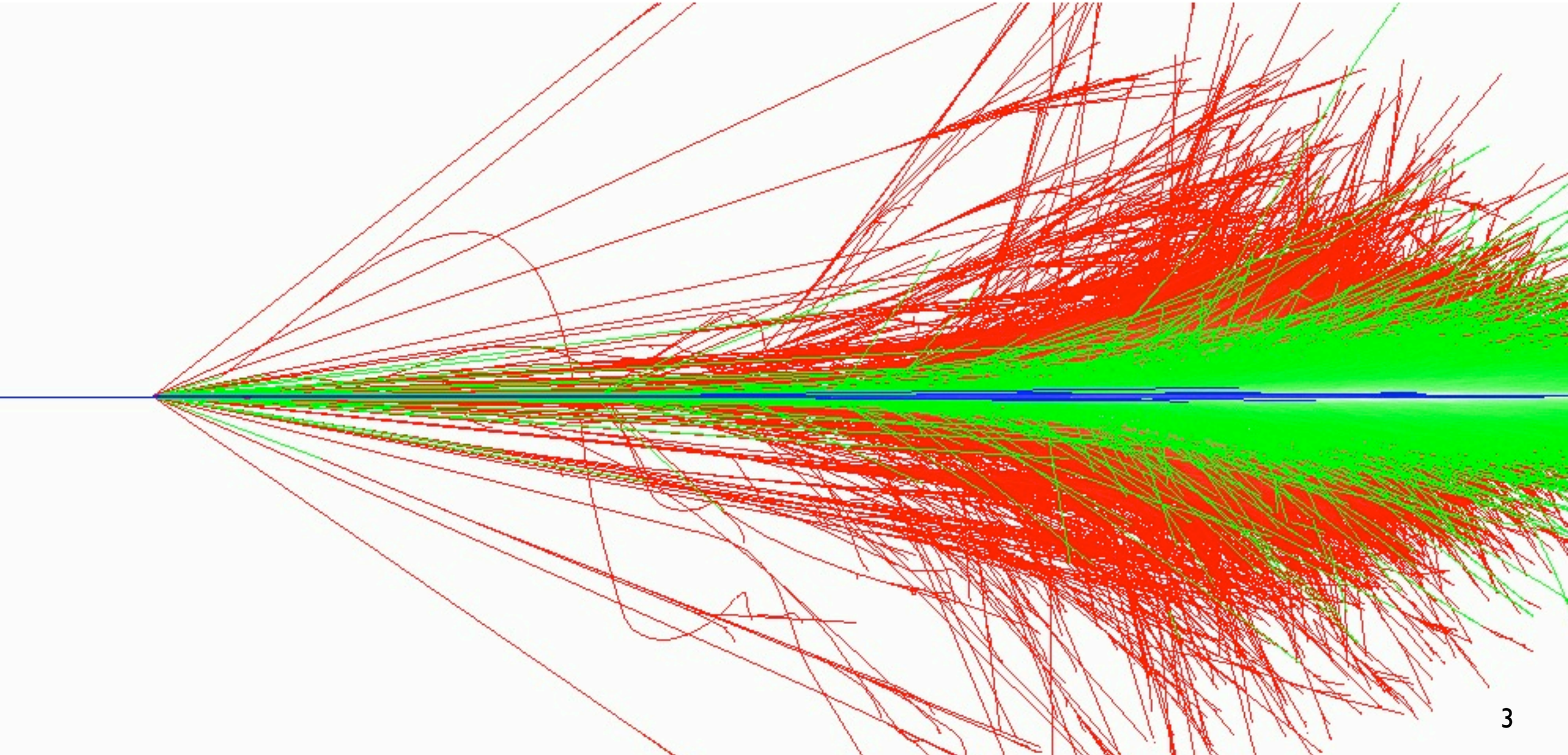
Status

- Testing:
  - Beam types: pi-, protons, e-, anti_protons, K0L, K+, K- beam
  - Beam energies: 1-20,25,30,50,100,200,500 GeV
  - Calorimeters: Fe/Sci, Pb/LAr, Cu/LAr, W/LAr, PbWO4
  - Physics Lists: LHEP, QGSP_BERT, FTFP_BERT, QGSP_FTFP_BERT, QGSP_BIC, QSGP_BERT_EMV, QGSP_BERT_CHIPS, FTFP_BERT_TRV, LHCbPhysicsList
- Each run: 5000 events (for E>99GeV only1250)
- Tested cand00 (only pi-) and cand01

Technical results



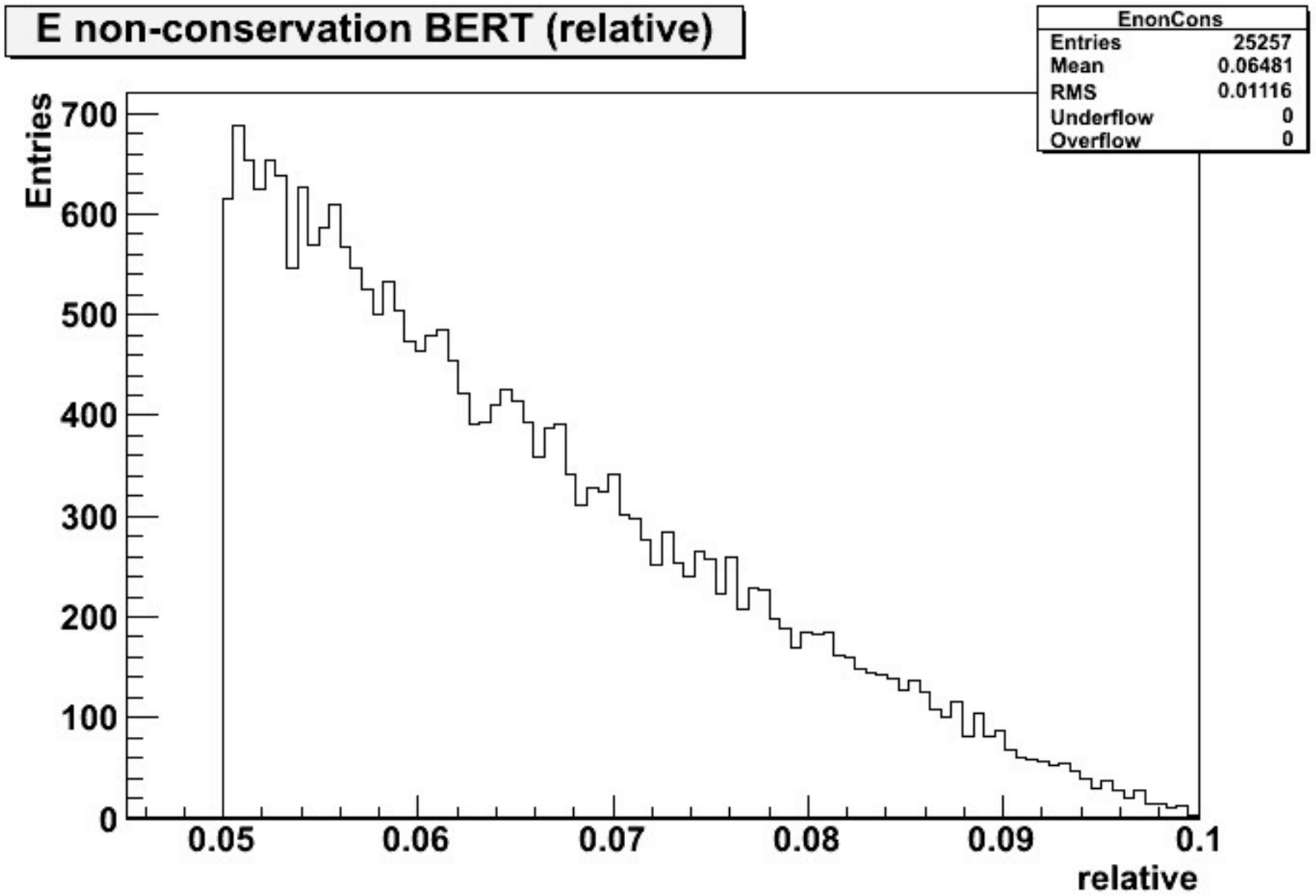
Crashes

- **Candidate 00 and 01 are stable**
- Few crashes observed
  - proton beam: **4 crashes in CHIPS**@{1,3,16}GeV physics list
  - **anti_proton beam**: 9 crashes in QGSP_BERT@{1,7}GeV, QGSP_FTFP_BERT@500GeV, FTFP_BERT_TRV@200GeV, FTFP_BERT@{20,200}GeV, QGSP_BIC@{7,13}GeV
    - Due to FPE crashes in G4ComponentAntiNuclNuclearXS::GetAntiHadronNucleonTotCrSc(...) and G4AntiNuclElastic::SampleInvariantT(...)
    - The first case (obserbed only once) is strange: it seems due to a particle with 0 kinetic energy (to be investigated)

Warnings

- **Bertini E-non conservation**. See next slide (turned on hadronic E/p checking), only relative test fails
- Still visible **FTF "Wrong Excitation energy" (U<~0)**
- Usual CHIPS warnings/messages

Hadronic E/p imbalance



E-non conservation

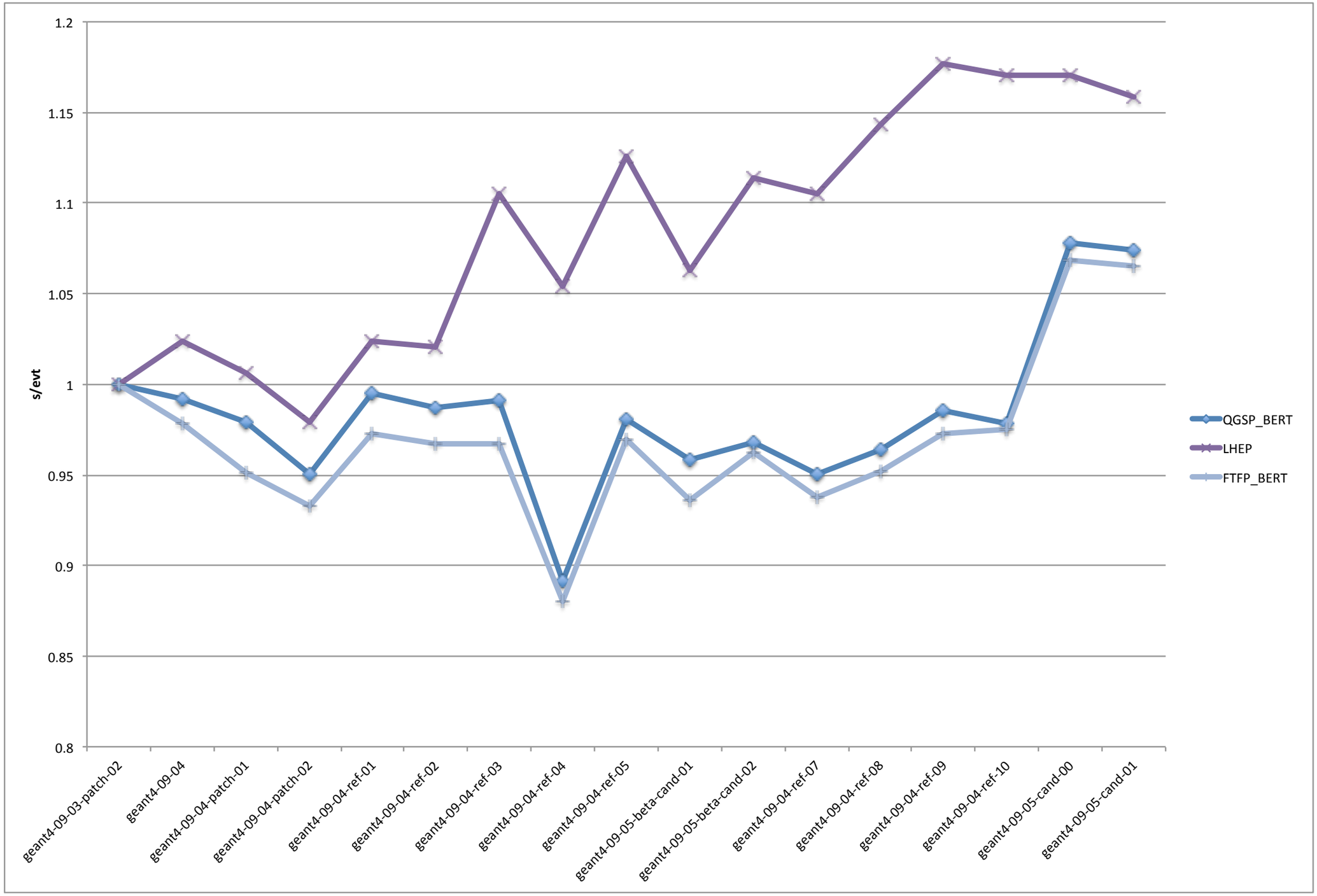
- **Observed several cases of E_dep > E_beam in cand00**
- Tag phys-lists-V09-04-74 (cand01) fixes majority and gives results similar to 9.4
- Actually two cases with large deviation observed, but this was also true in 9.4

E-non conservation II

- **Similar bug (but not related): rare cases of deuteron,trition "accelerating"** (E_postStep-E_preStep ~ 1-3MeV), fix (hadr-lep-V09-04-05) to be tested

- **Seen also 27 cases with proton accelerating**: in CHIPS (x22) and LHEP (x1), QGSP_BERT_CHIPS (x1), LHCbPhysicsList (x3) physics lists
  - Non-CHIPS cases: all "violations" between 0.3-0.8 MeV (proton has E_kin=32-258 MeV)
  - **QGSP_BERT_CHIPS case: 2.2GeV violation with E_kin=13957MeV**
  - CHIPS cases: violation between 0.1 and 1.3 MeV
- **Seen 26 cases with K0L accelerating** (still investigating): seems related to LEP models
- For the moment will not fix: too much work, problem was there also in the past

Performances

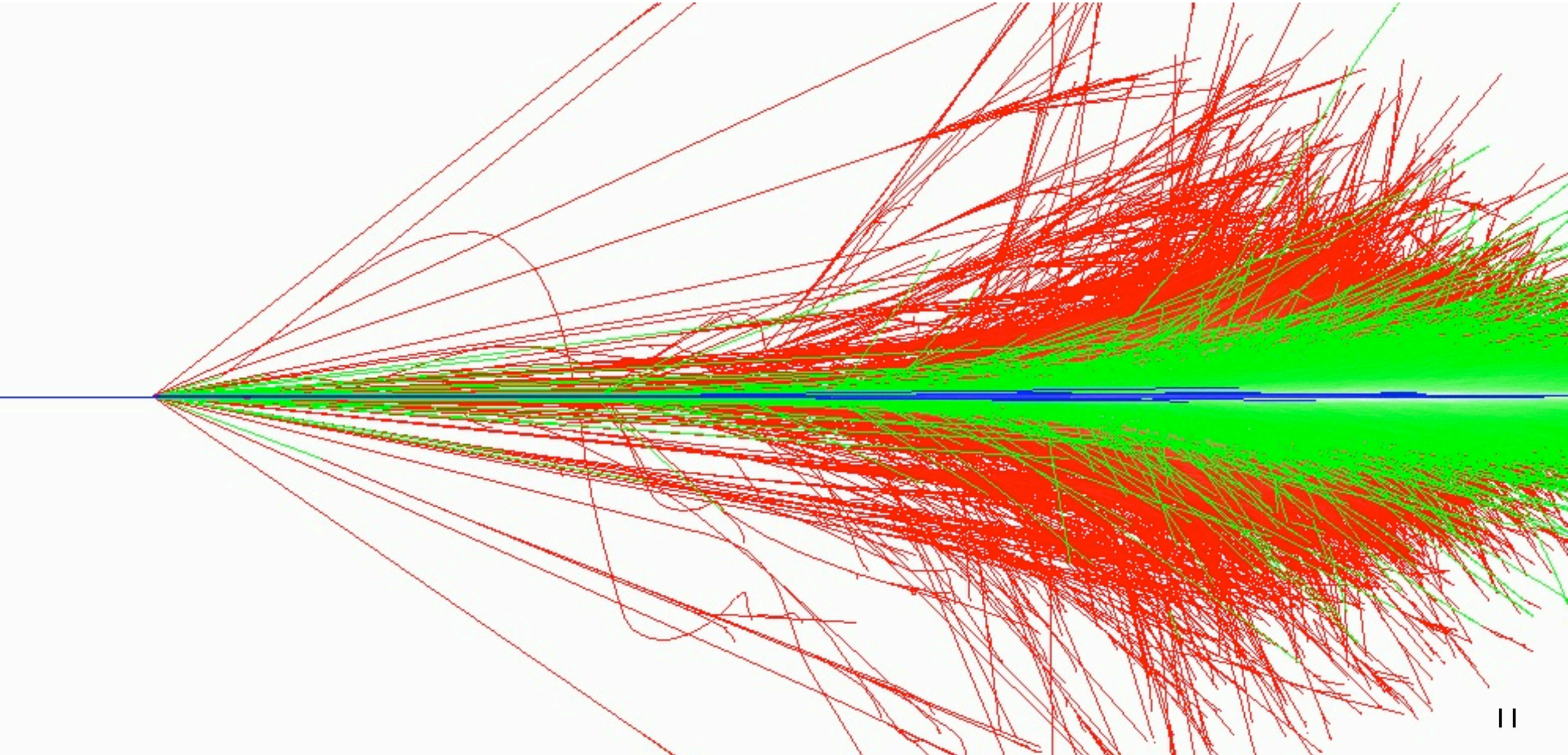


Performances: comments

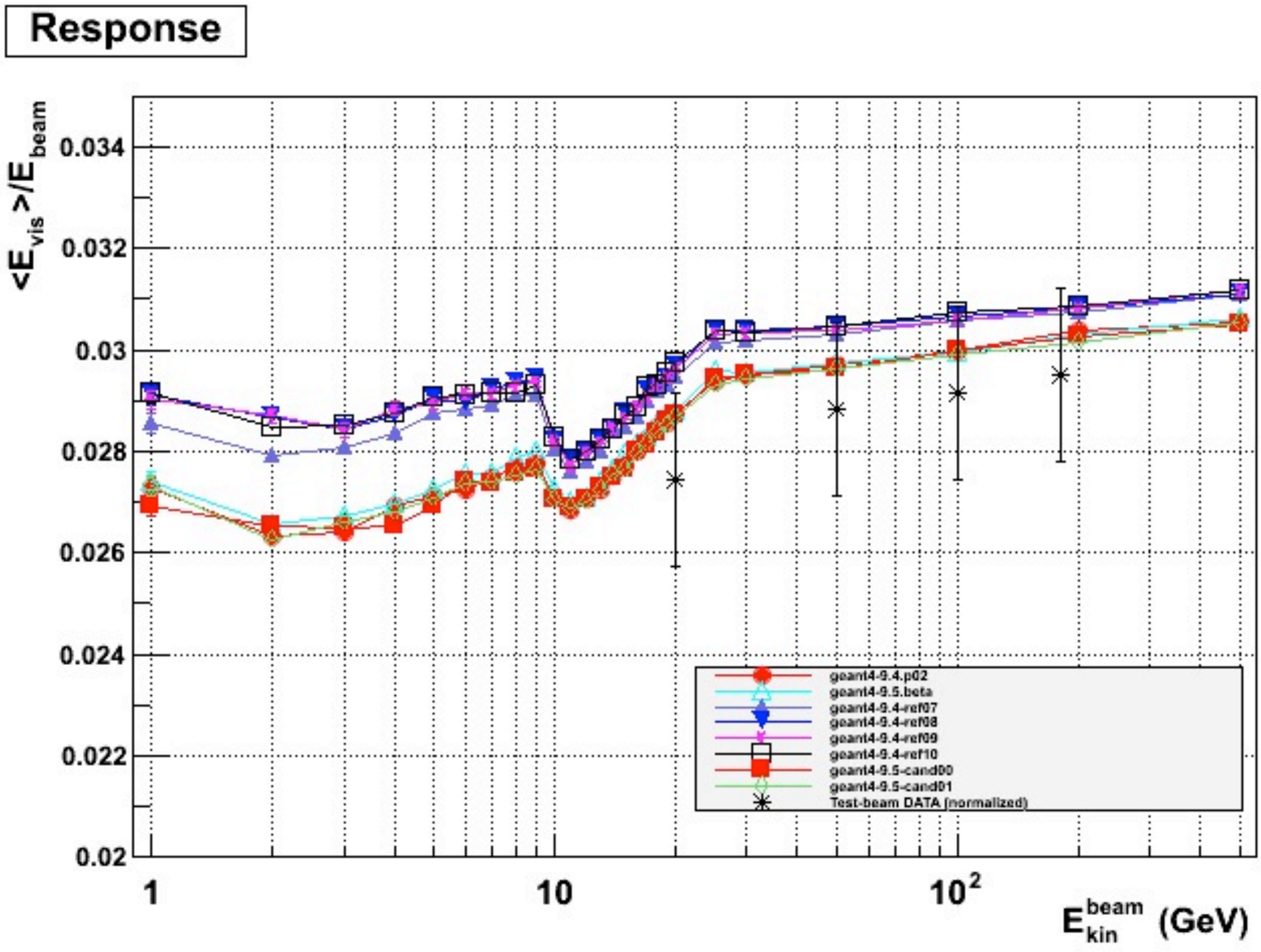
- **LHEP is constant w.r.t. recent reference tags (however worsening w.r.t. 9.4)**
- **After removing trailing effect in BERT**:
  - Observed large CPU penalty (waiting comment from authors)
  - Observed large consumption of memory on large statistics test, memory leaks?
- Coordinating with Performance Task Force ongoing
  - Profiling does not show penalty with "default" physics list (QGSP_BERT?) up to ref10 (confirming simple results)
  - High priority given to profiling of candidate

Selected results here, complete list of plots available at:
http://dl.dropbox.com/u/1786758/SimplifiedCalorimeterValidation/95cand00.zip
http://dl.dropbox.com/u/1786758/SimplifiedCalorimeterValidation/95cand01.zip

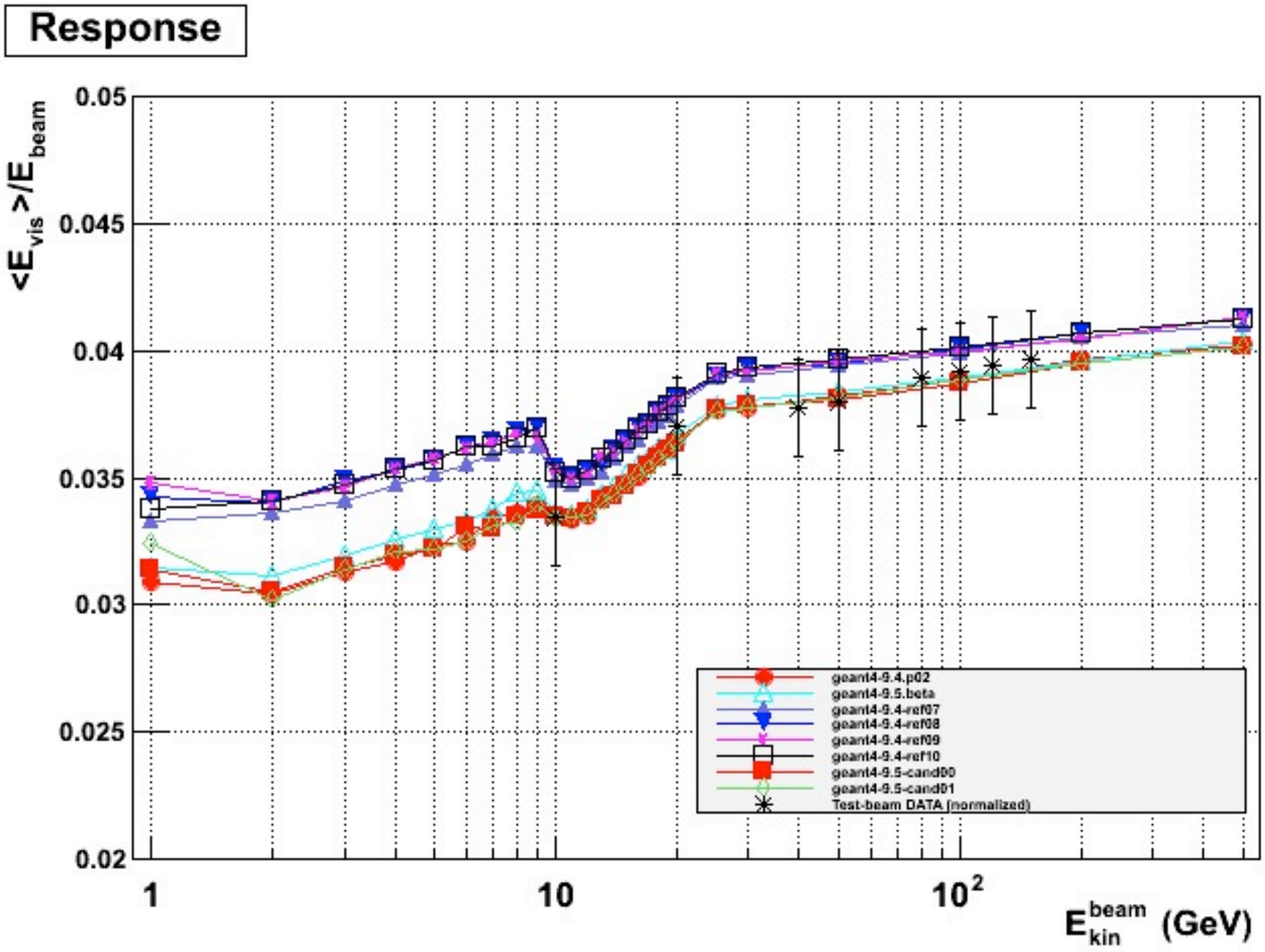
Physics Results



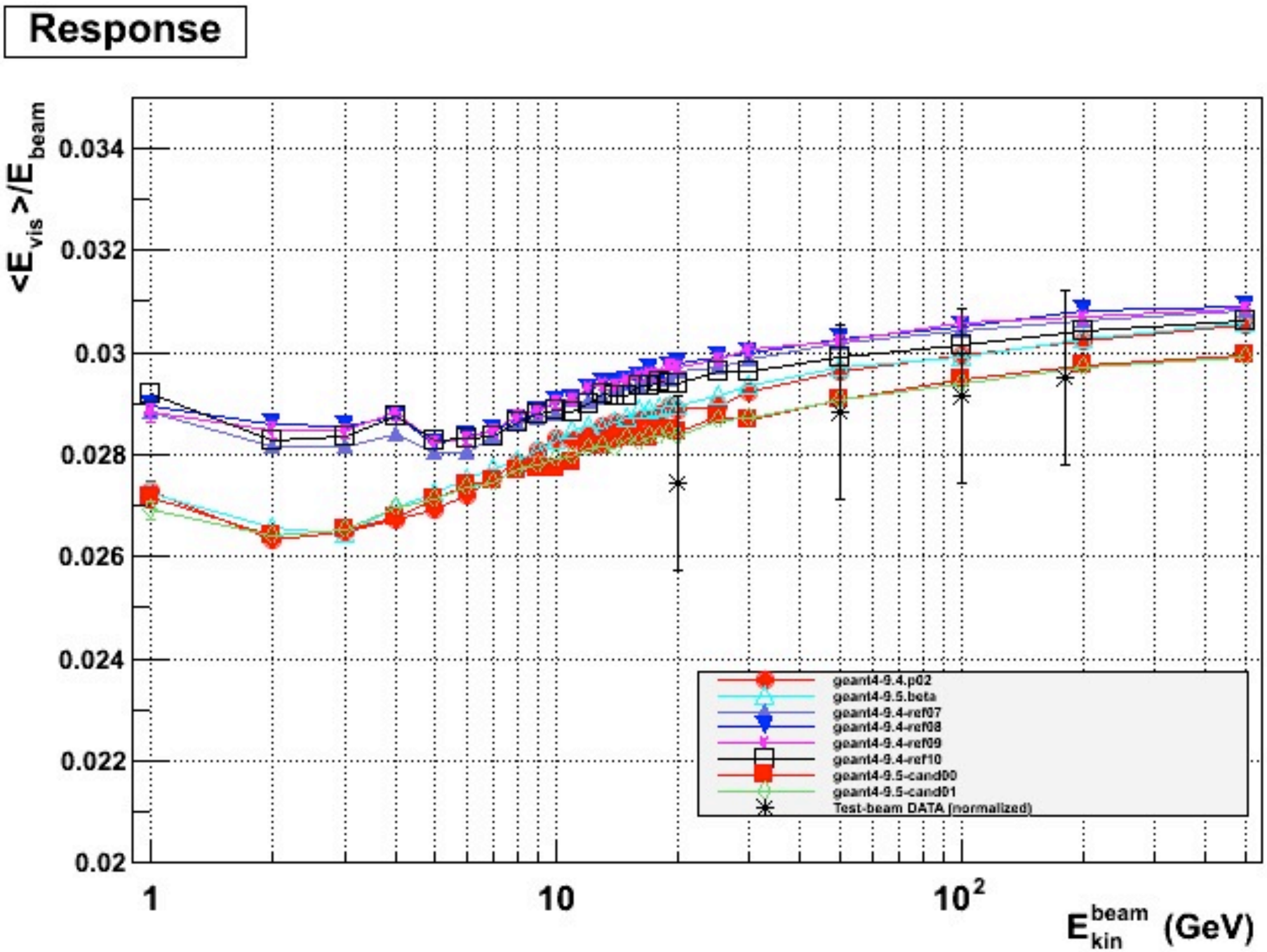
QGSP_BERT: Fe/Sci



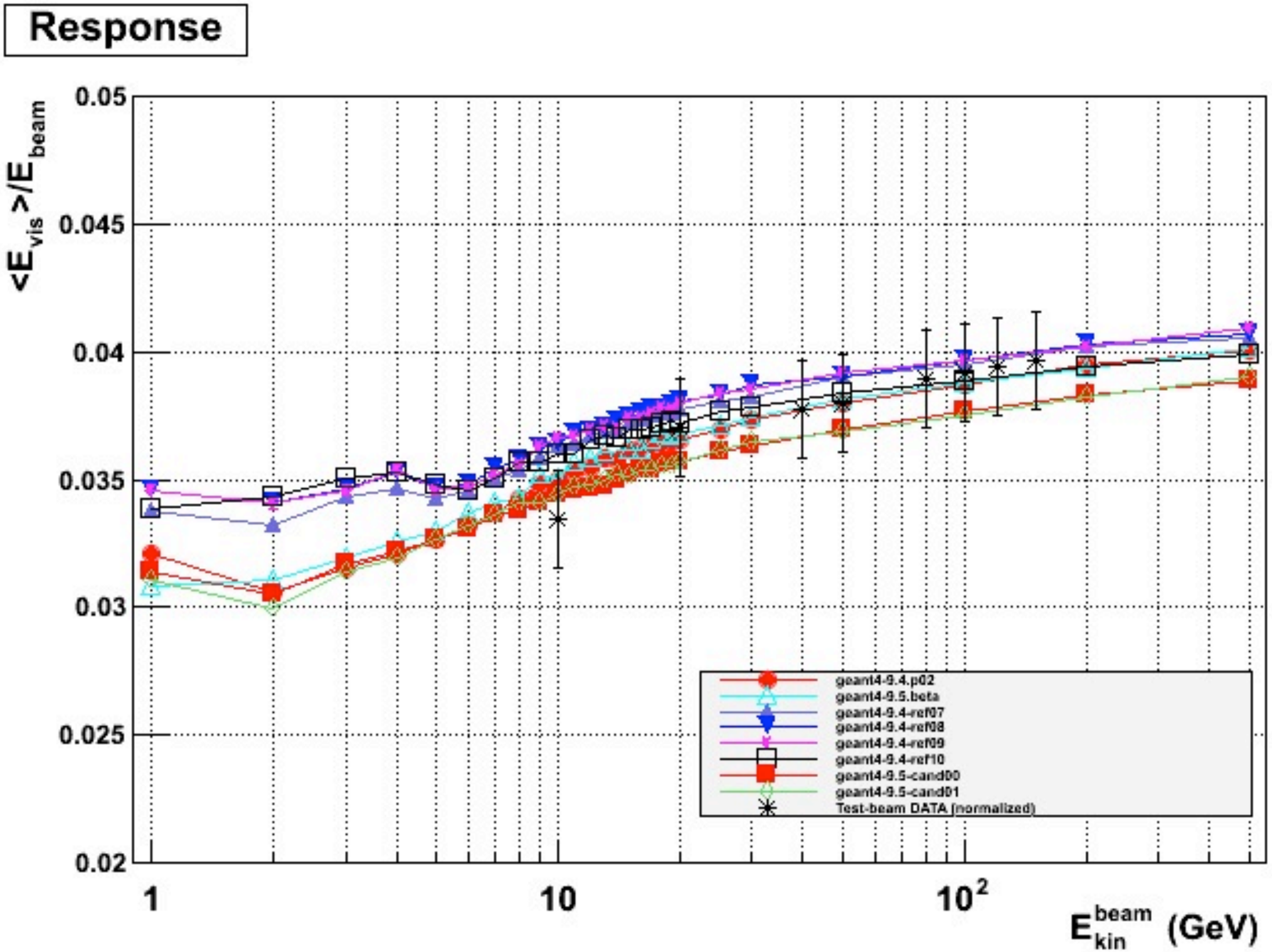
QGSP_BERT: Cu/LAr



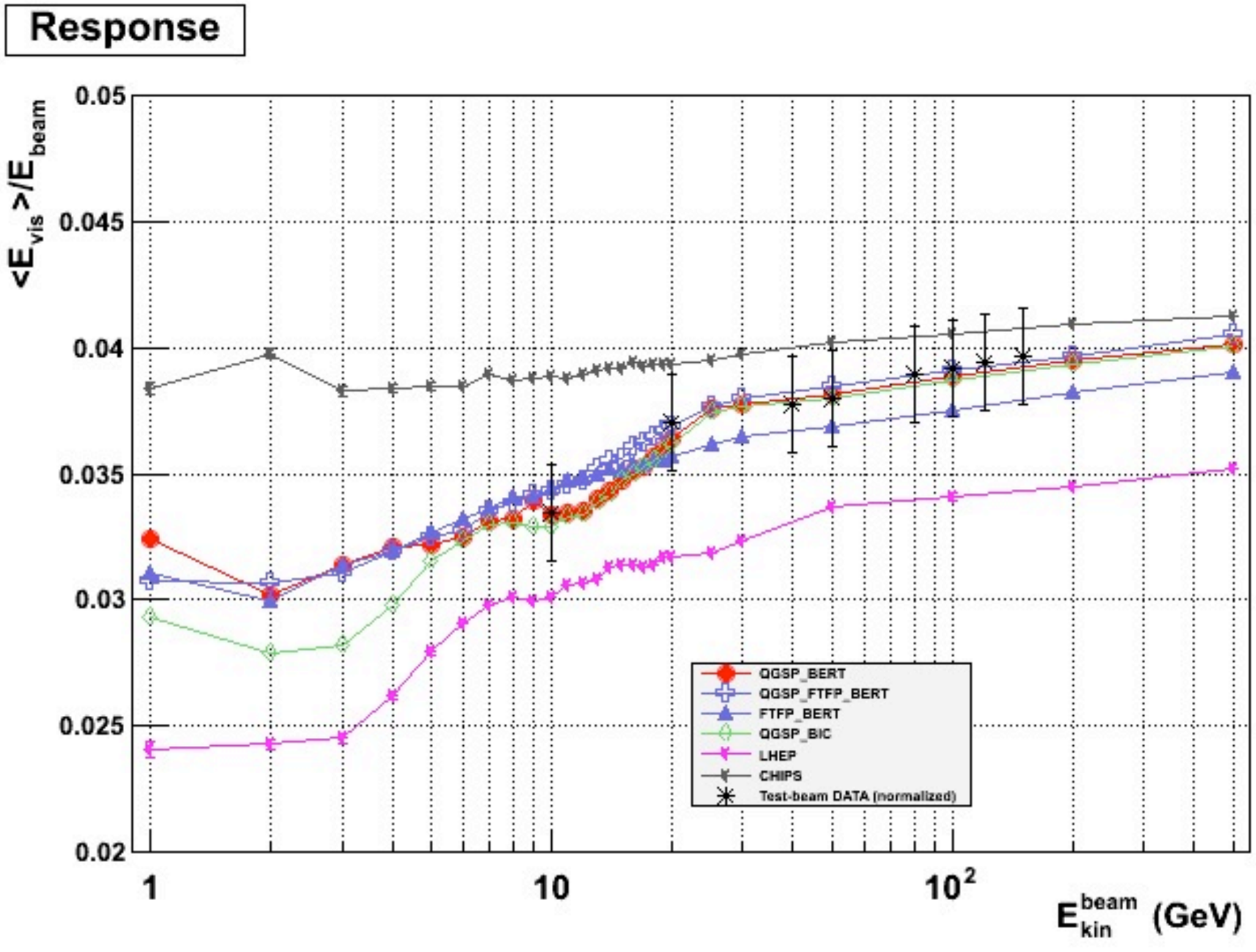
FTFP_BERT: Fe/Sci



FTFP_BERT: Cu/LAr



Compare: Cu/LAr



Comments

- **BERT: restored 9.4 results**
- **FTF: reduced response**

- Results very stable w.r.t. 9.4 and 9.5.beta
  - Expected differences in FTF based physics lists

- Only pi- beams shown here: analysis of other beams to be done