A Status of my Study on Geant4 Hadronics

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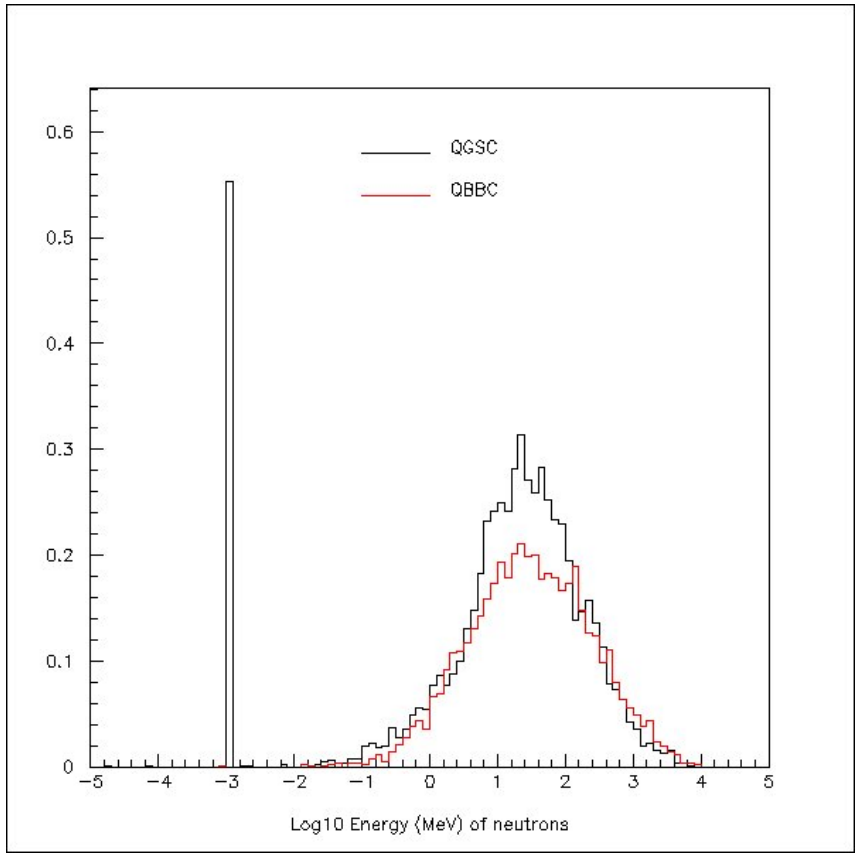
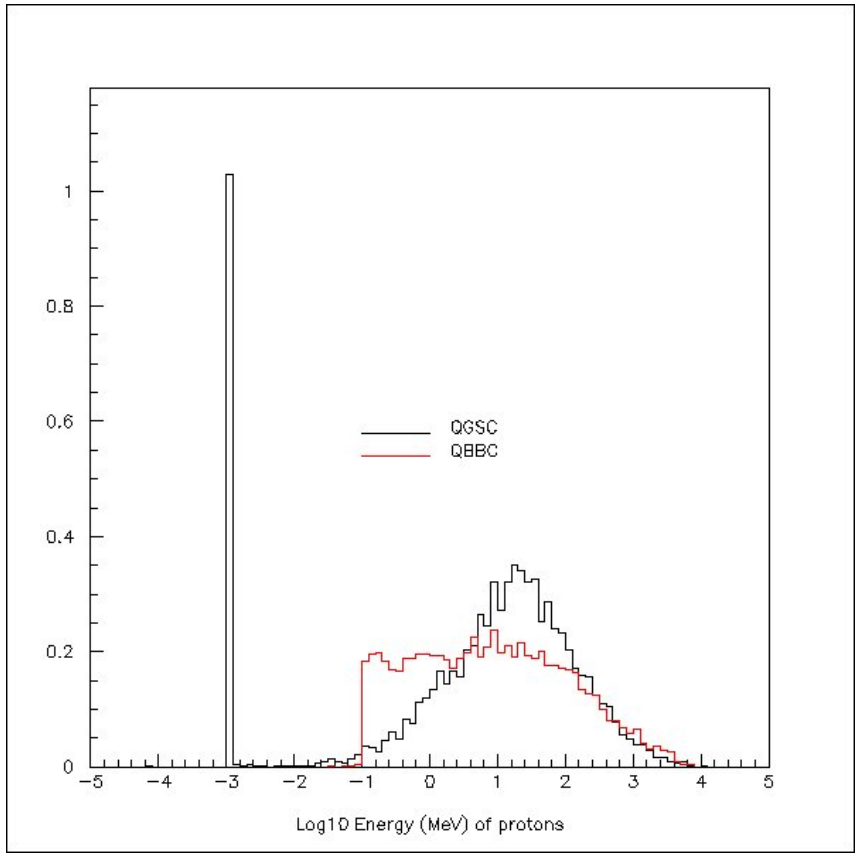
Neutron Yields Produced by 20 GeV pi- in Scintillator (26 April 2006)

- Artifact at 1 keV mainly due to K-absorption at rest
- No artifact at 100 keV
- More neutrons produced by QGSC than any other PL

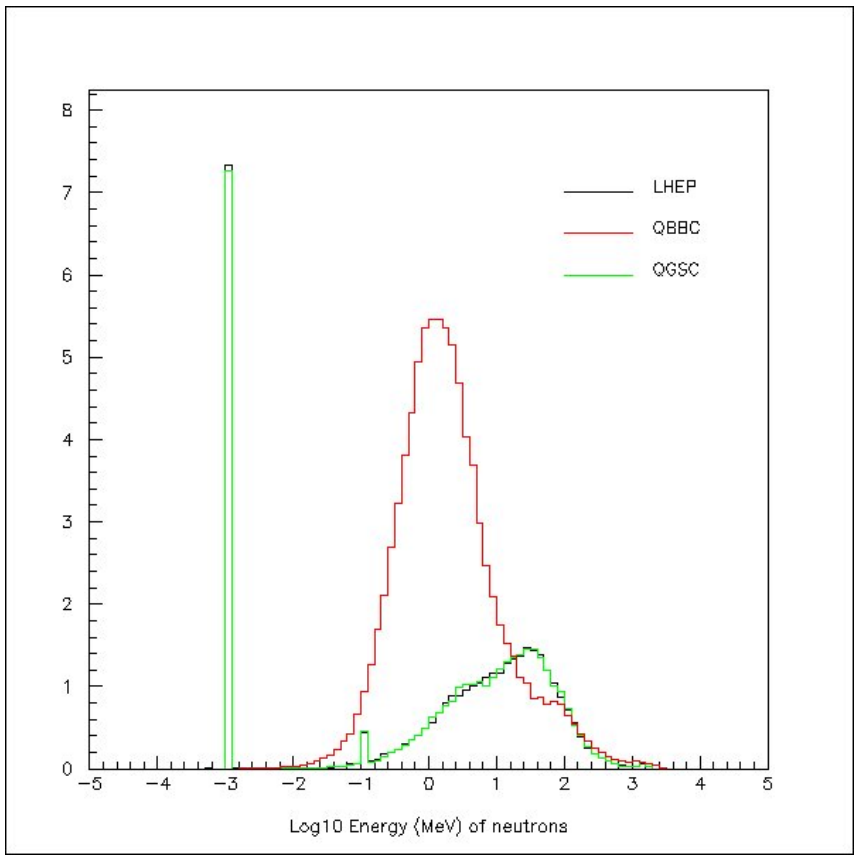


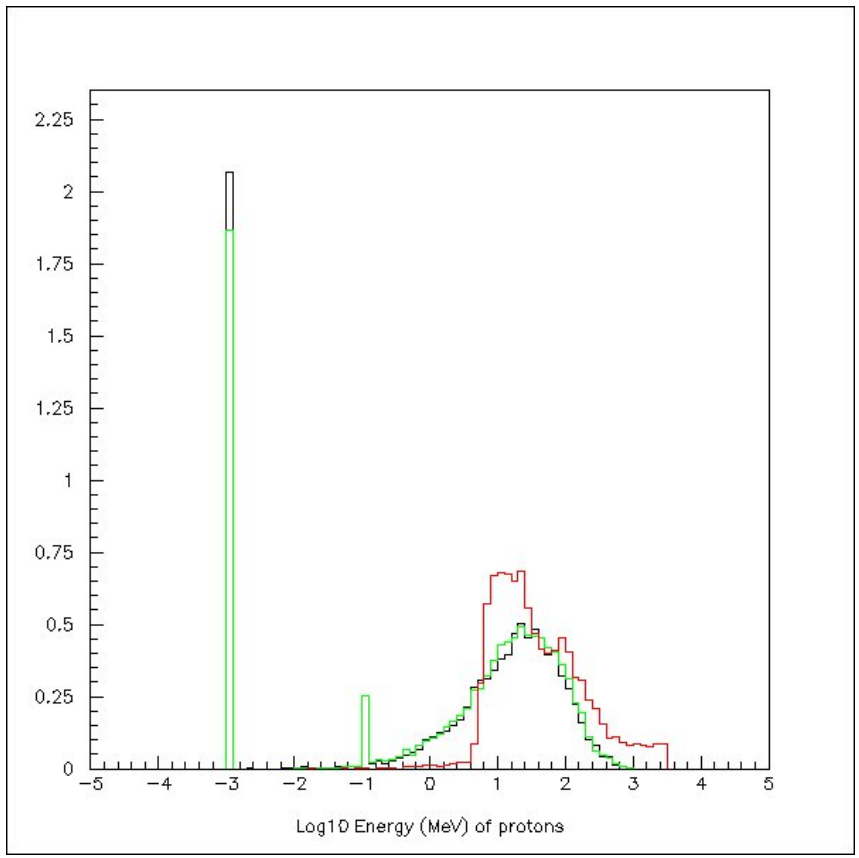
Proton Yields Produced by 20 GeV pi- in Scintillator (26 April 2006)

- Artifact at 1 keV mainly due to K-absorption at rest
- No artifact at 100 keV
- LHEP and PRECO provide wrong proton spectra



Neutron and Proton Yields Produced by 3 GeV Protons in Lead (26 April 2006)



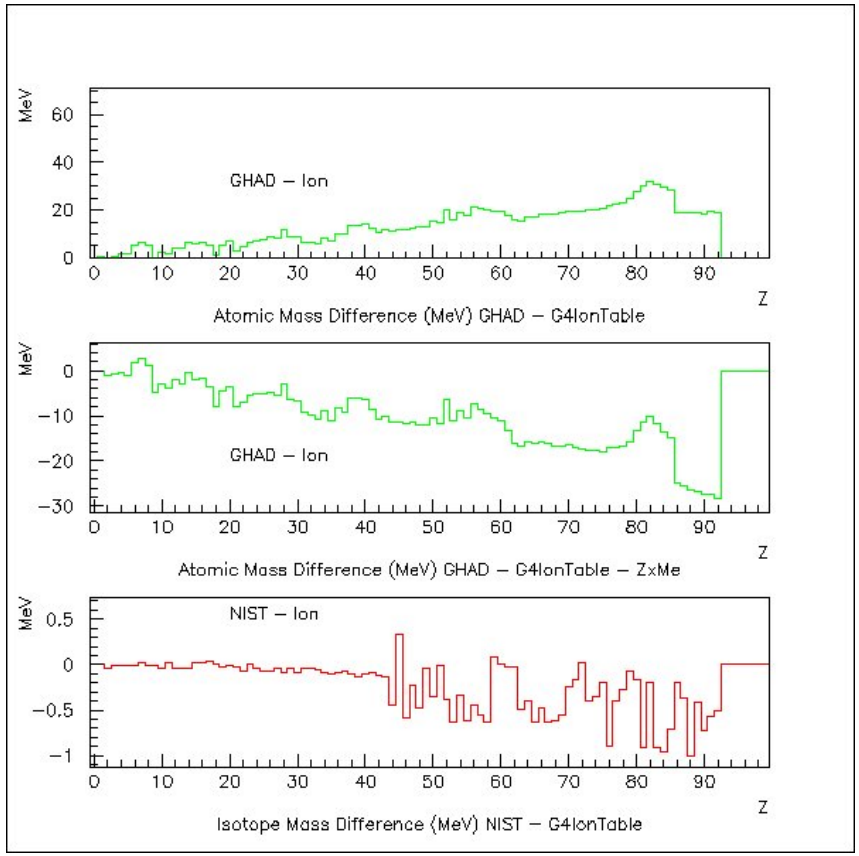


Artifacts

- 1 keV peaks in neutron and other particle spectra are coming from LHEP
- 100 keV neutron peak is coming from LHEP hadron inelastic process at any energy for heavy target (even for 99 keV incident)

Isotope Mass Difference

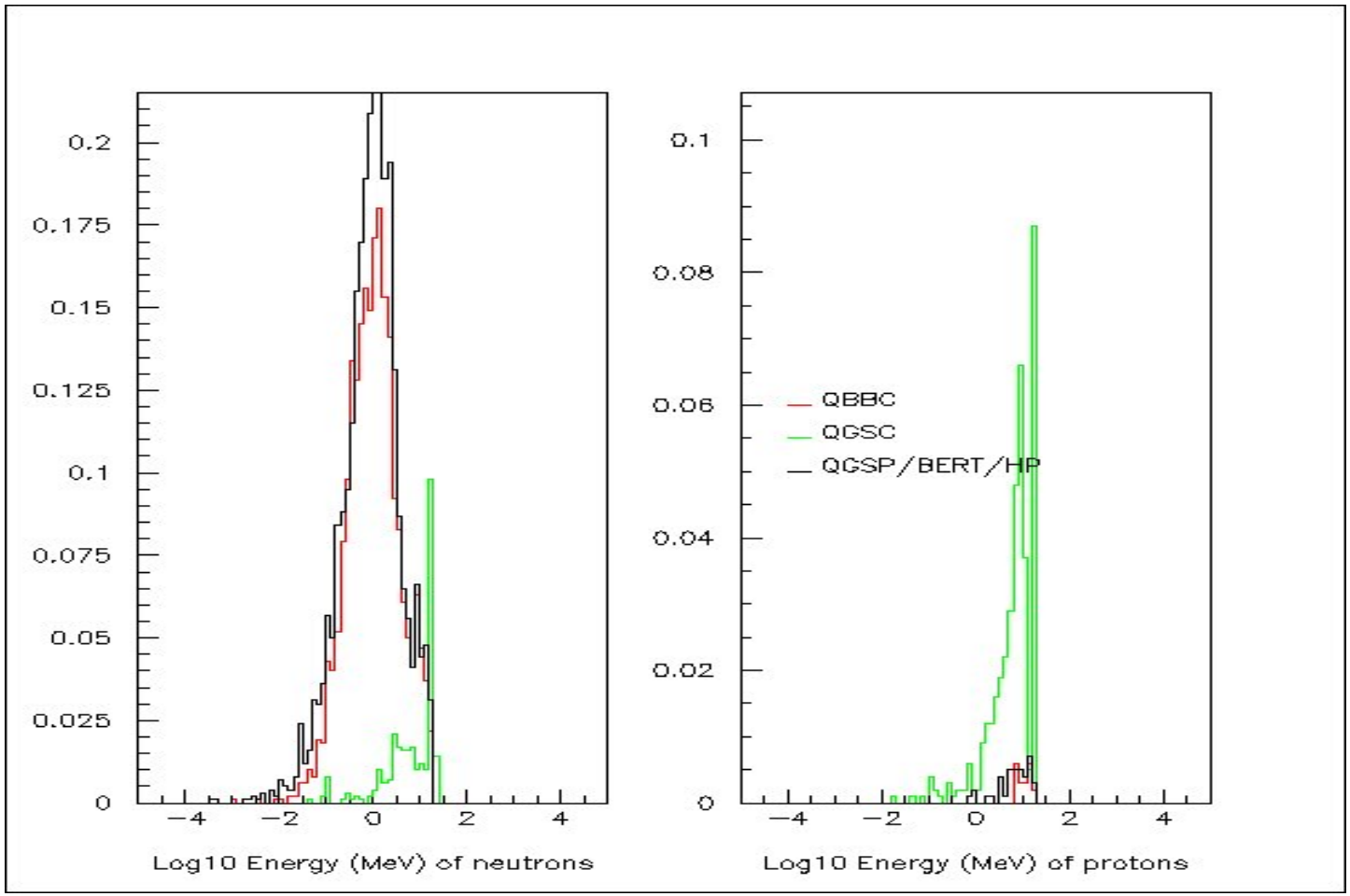
- Inside G4 there are different sources of isotope masses:
  - G4IonTable
  - G4NistManager
  - G4Nucleus
- NIST and G4IonTable are in agreement
- G4Nucleus mass is wrong!
  - Corresponding method should be substituted
  - Why Z and A are double inside G4Nucleus?



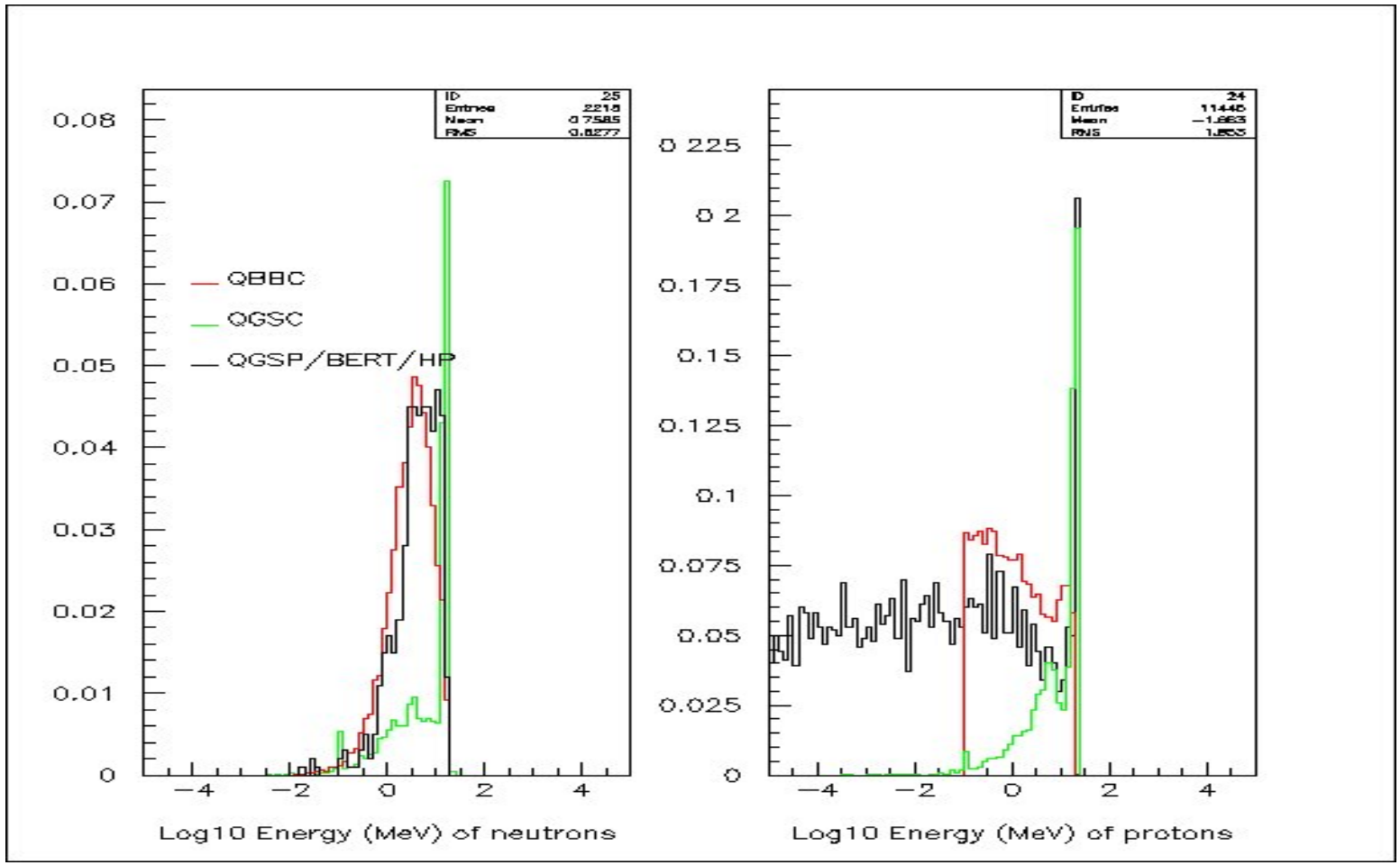
Recent Progress

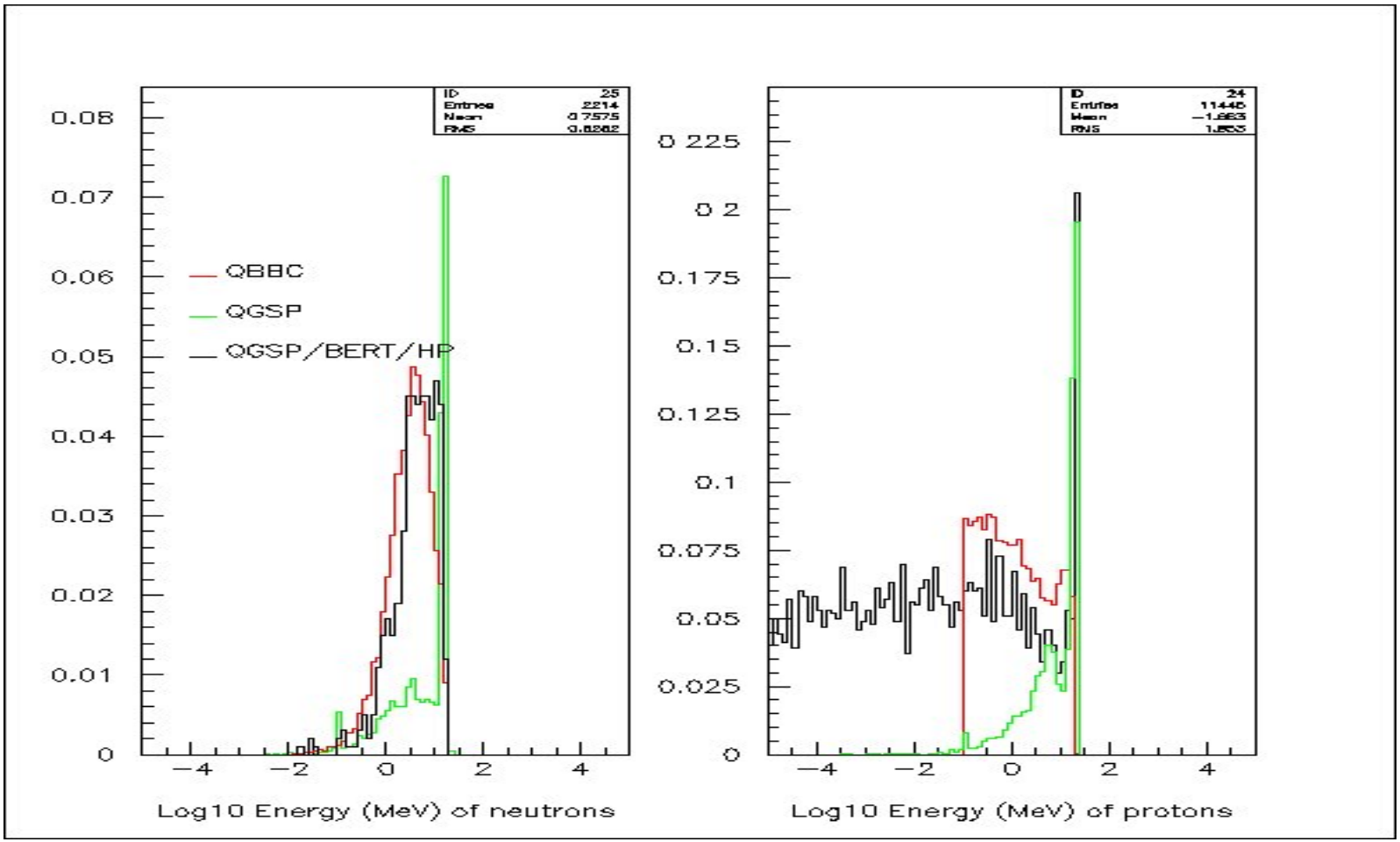
- G4LElasticB have been renamed to G4HadronElastic
  - Use CHIPS for p, n + P, d, α
- G4UHadronElasticProcess
  - Cross sections from CHIPS for p, n + P, d, α
  - Cross sections from HP for n E < 20 MeV
- QBBC Physics List
  - G4UHadronElasticProcess + G4LElasticB
  - Binary Cascade for ions
  - CHIPS Stopping
  - QGSC + FTFC for E > 8 GeV
  - Binary + Bertini + CHIPS for E < 10 GeV
- QBBC allows to maintain different combinations of hadronic components
  - QGSP and QGSP_EL are tested

20 MeV Neutrons in Lead



20 MeV Neutrons in Scintillator




QBBC
QGSP
QGSP/BERT/HP
Log10 Energy (MeV) of neutrons
Log10 Energy (MeV) of protons

20 MeV Neutrons in Scintillator