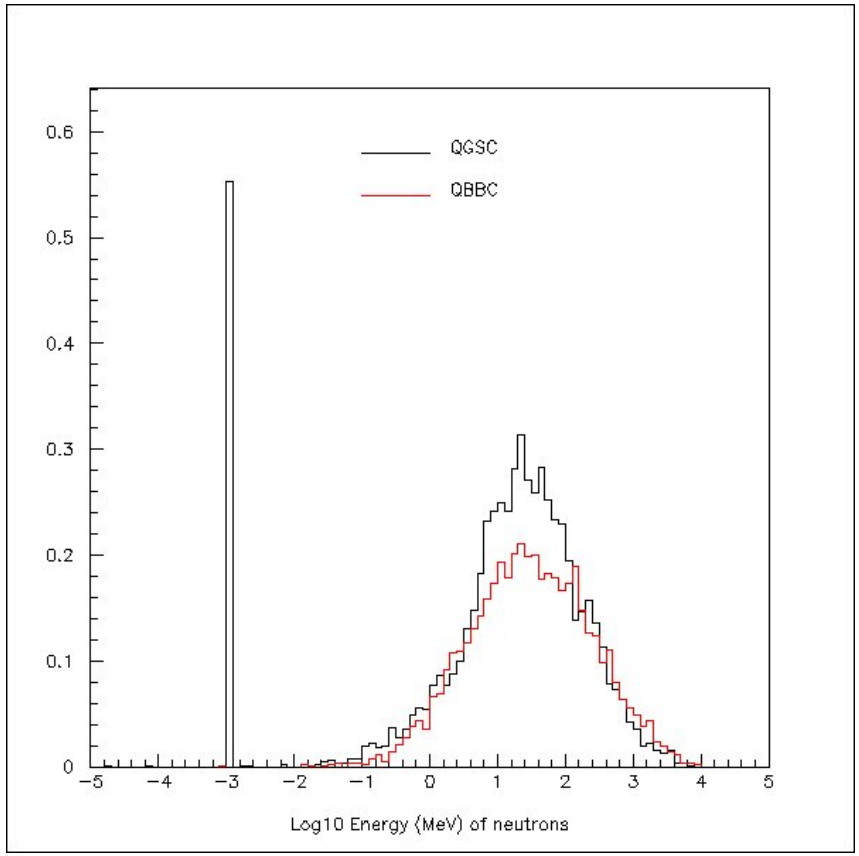
Status of Hadronics Study

V.Ivanchenko

2 May 2006

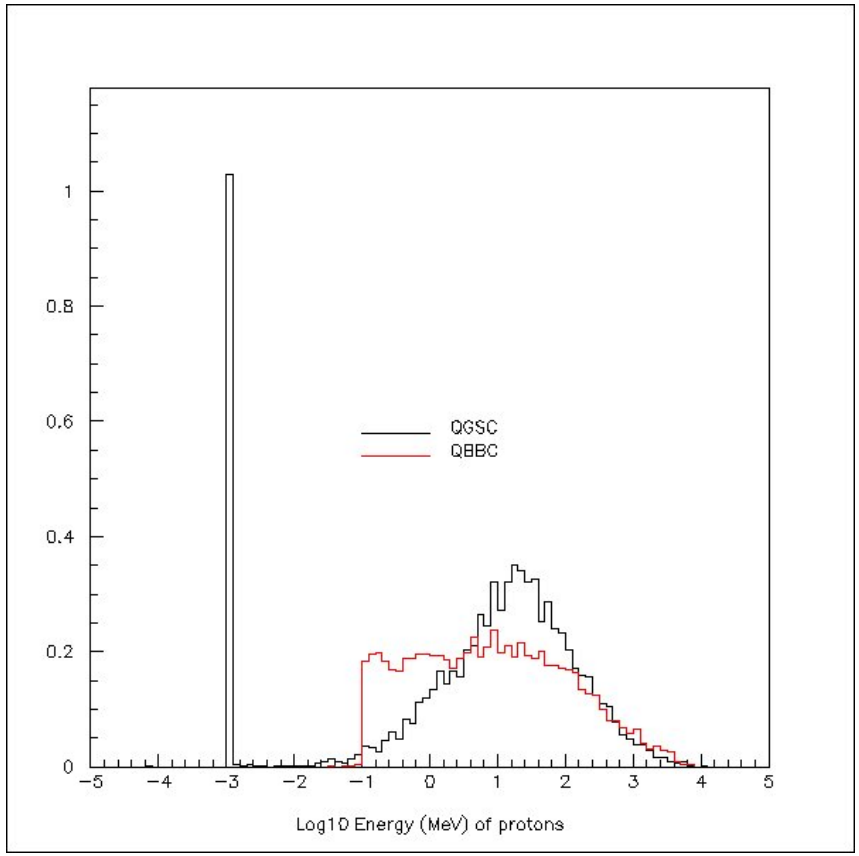
Neutron Yields Produced by 20 GeV pi- in Scintillator (26 April 2006)

- 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

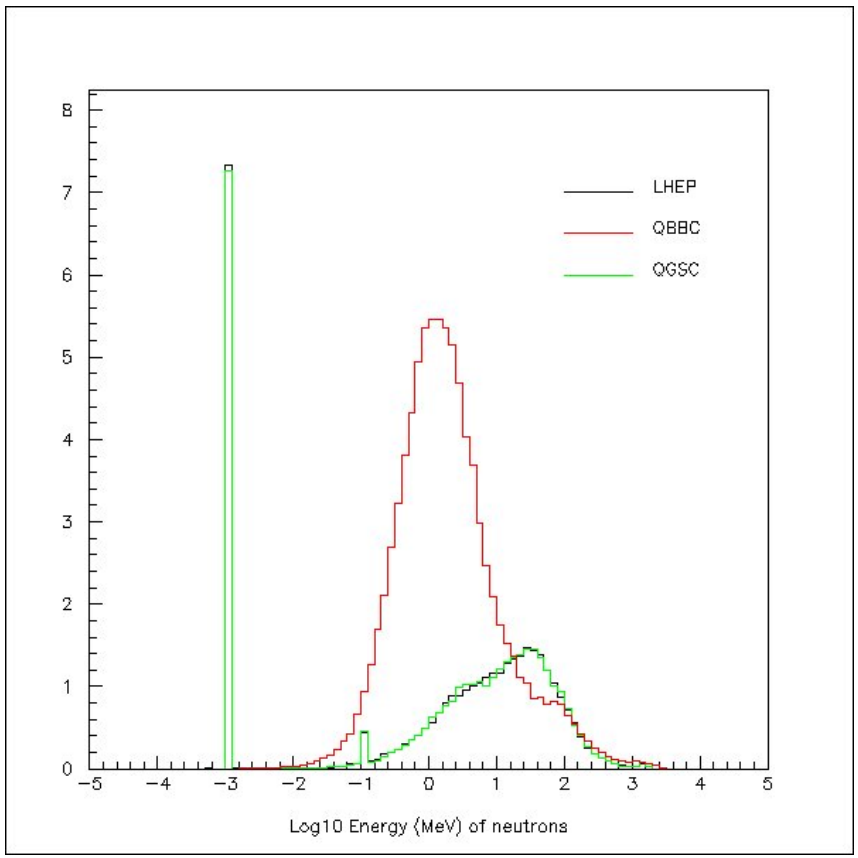


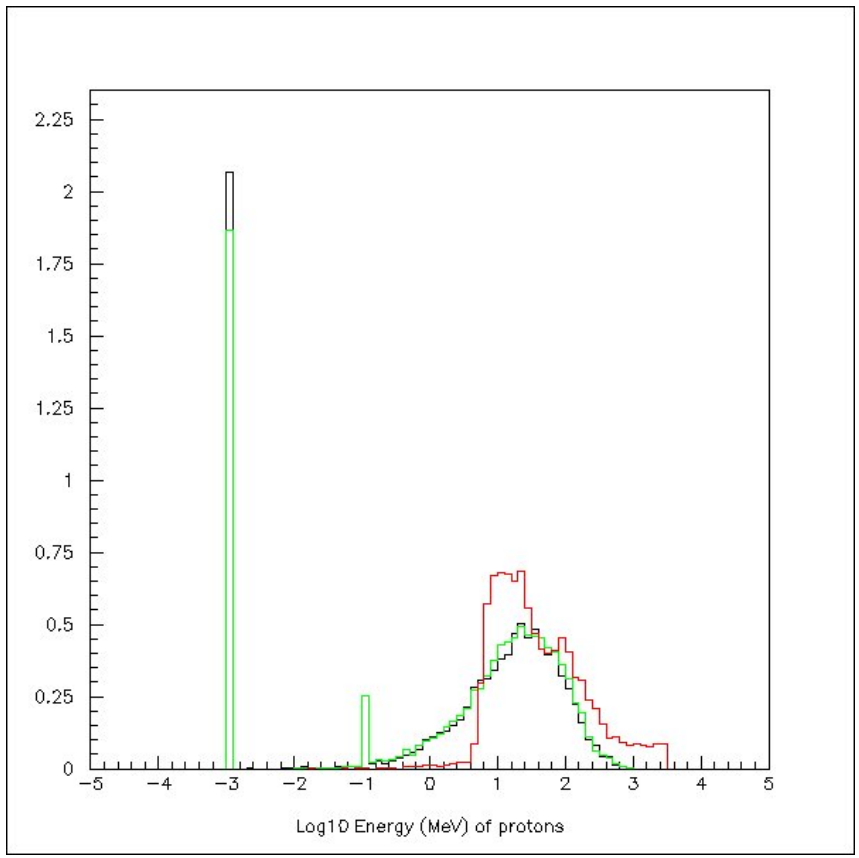
Proton Yields Produced by 20 GeV pi- in Scintillator (26 April 2006)

- 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)





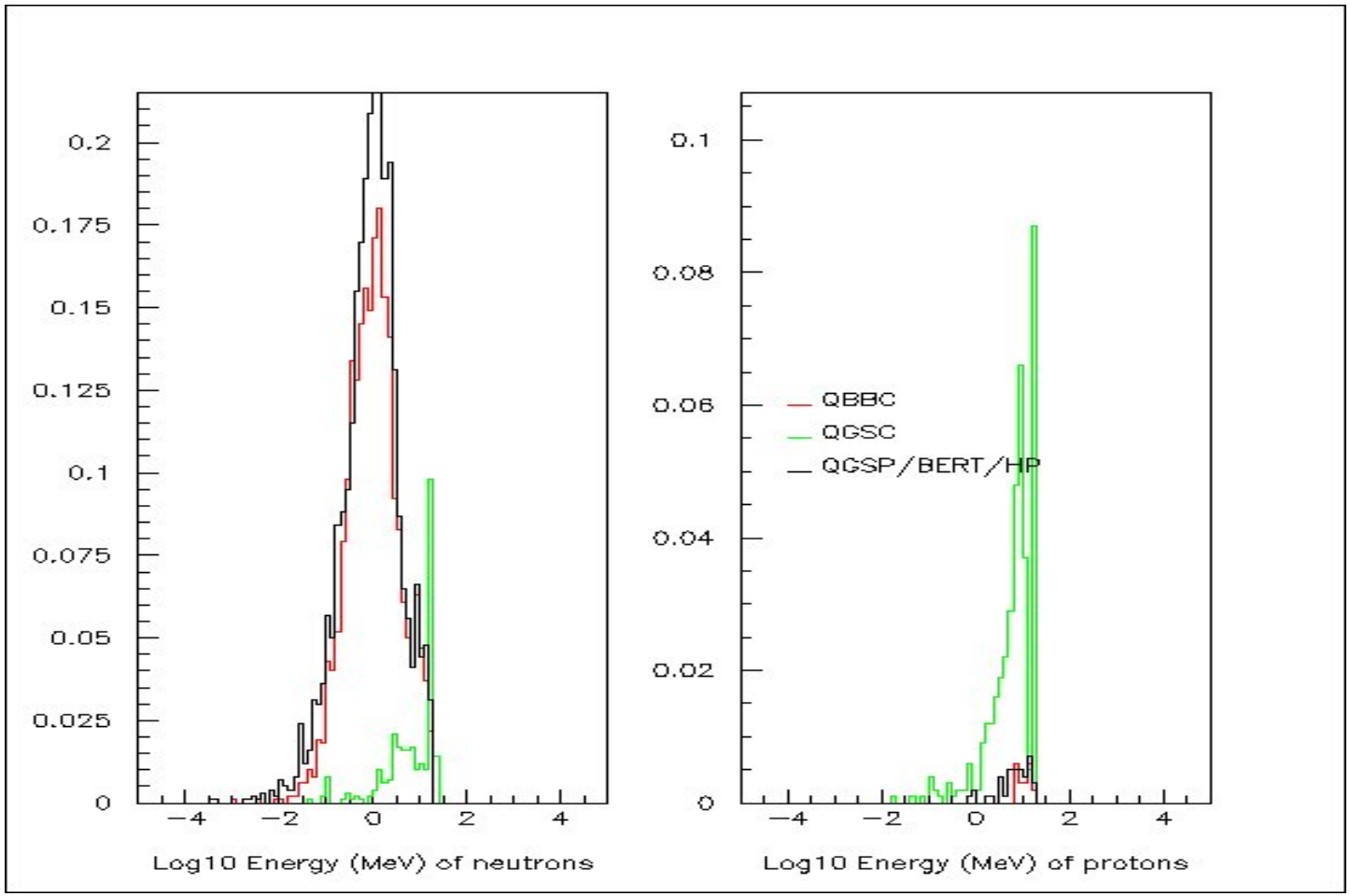
Recent Progress

- G4LElasticB have been renamed to G4HadronElastic
  - Use CHIPS for p + P, d, α and n + p
- G4UHadronElasticProcess
  - Cross sections from CHIPS for p + P, d, α and n + p
  - 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

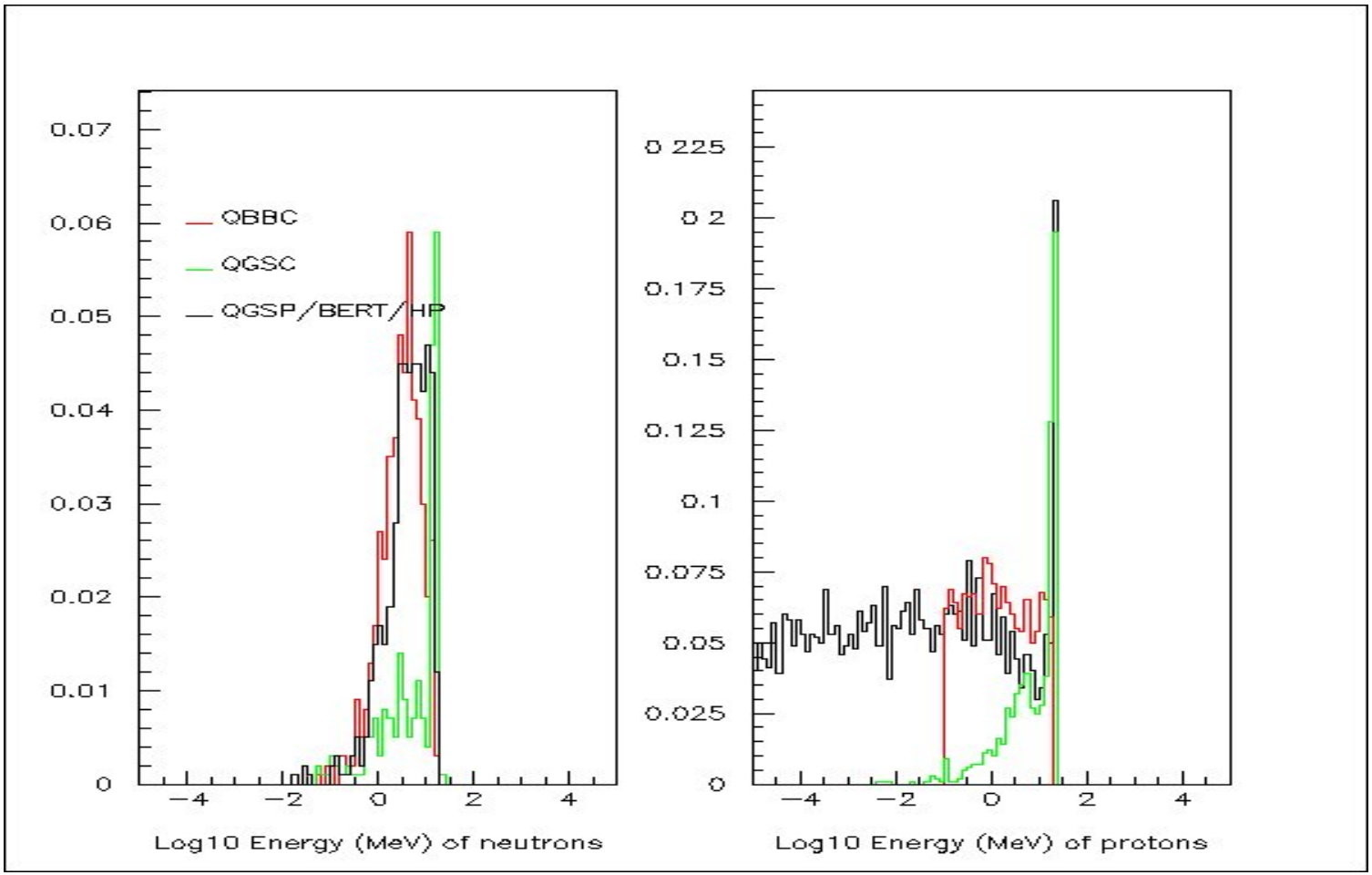
Artifacts

- 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)

20 MeV Neutrons in Lead



20 MeV Neutrons in Scintillator



Isotope Mass Difference

- Inside G4 there are different sources of isotope masses:
  - G4IonTable
  - G4NistManager
  - G4Nucleus
  - CHIPS (hidden)
- NIST and G4IonTable are in agreement
- G4Nucleus mass is wrong!