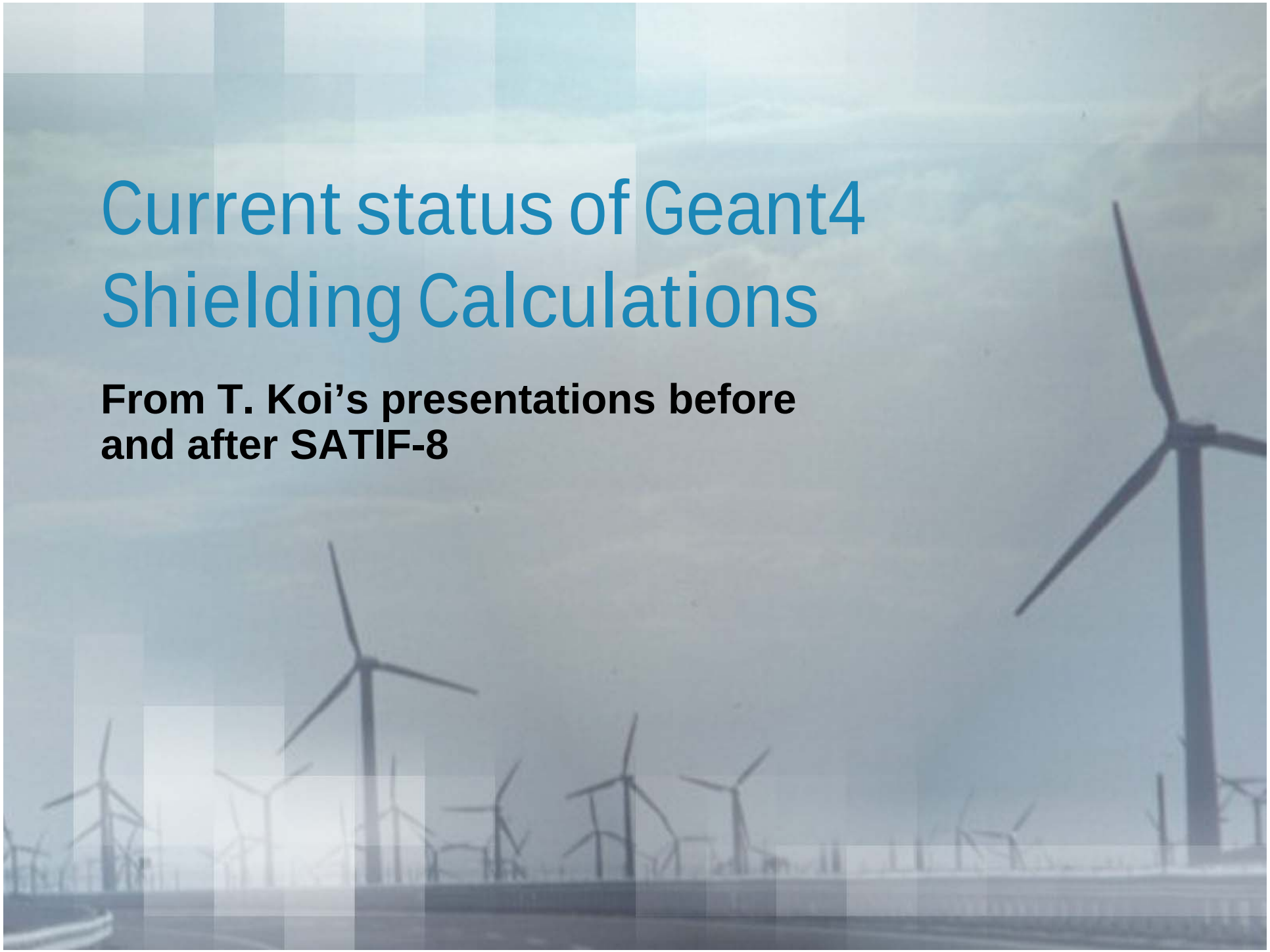


Current status of Geant4 Shielding Calculations

From T. Koi's presentations before and after SATIF-8

Changes

- **Run much more statistics (x100)**
- **Use Japanese Evaluated Nuclear Data Library (JENDL) for elastic, inelastic**
  - **High Energy Files (2004)**
    - **Neutron- and proton-induced reaction data up to 3 GeV for 66 nuclides.**
  - **New data available for iron, concrete, brass**
- **Use improved elastic final state generation**

Benchmarking

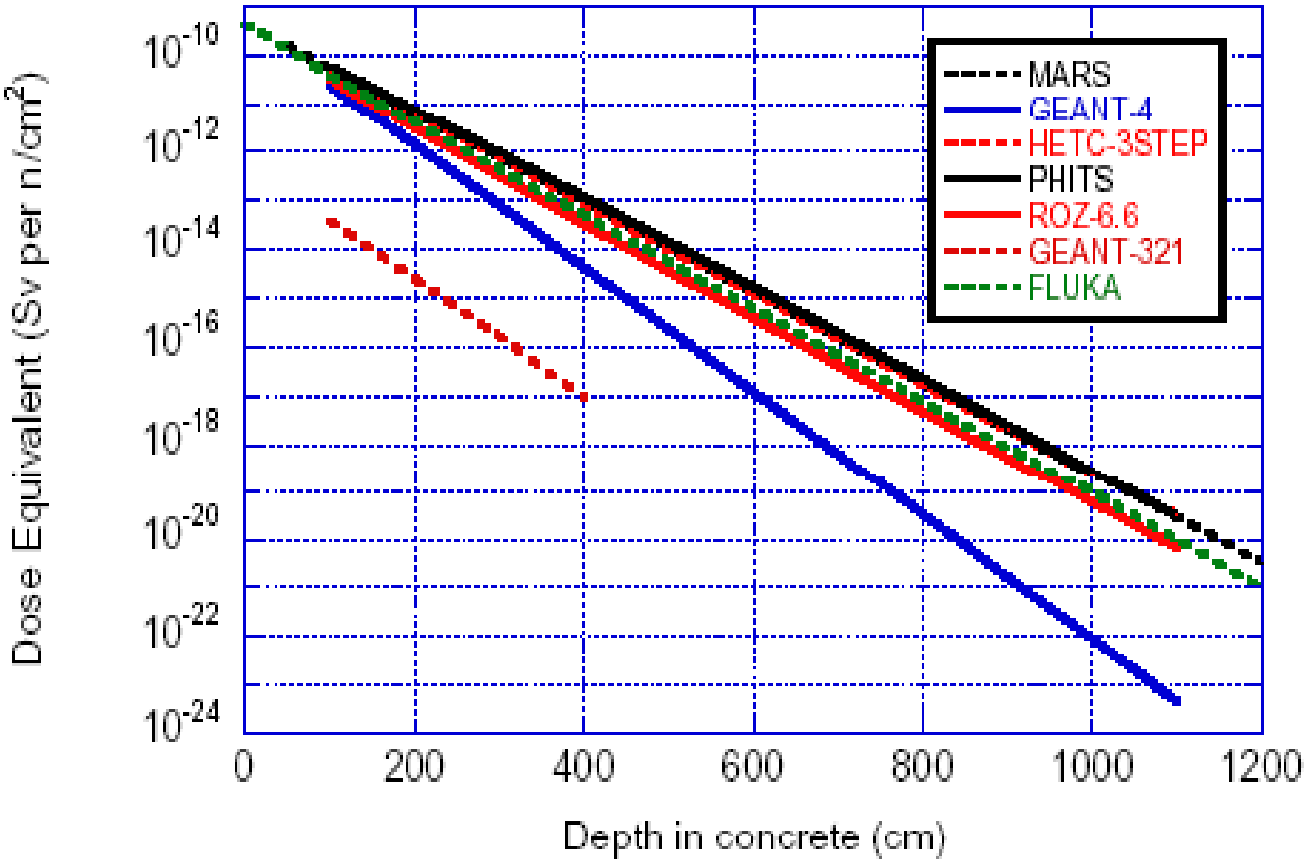
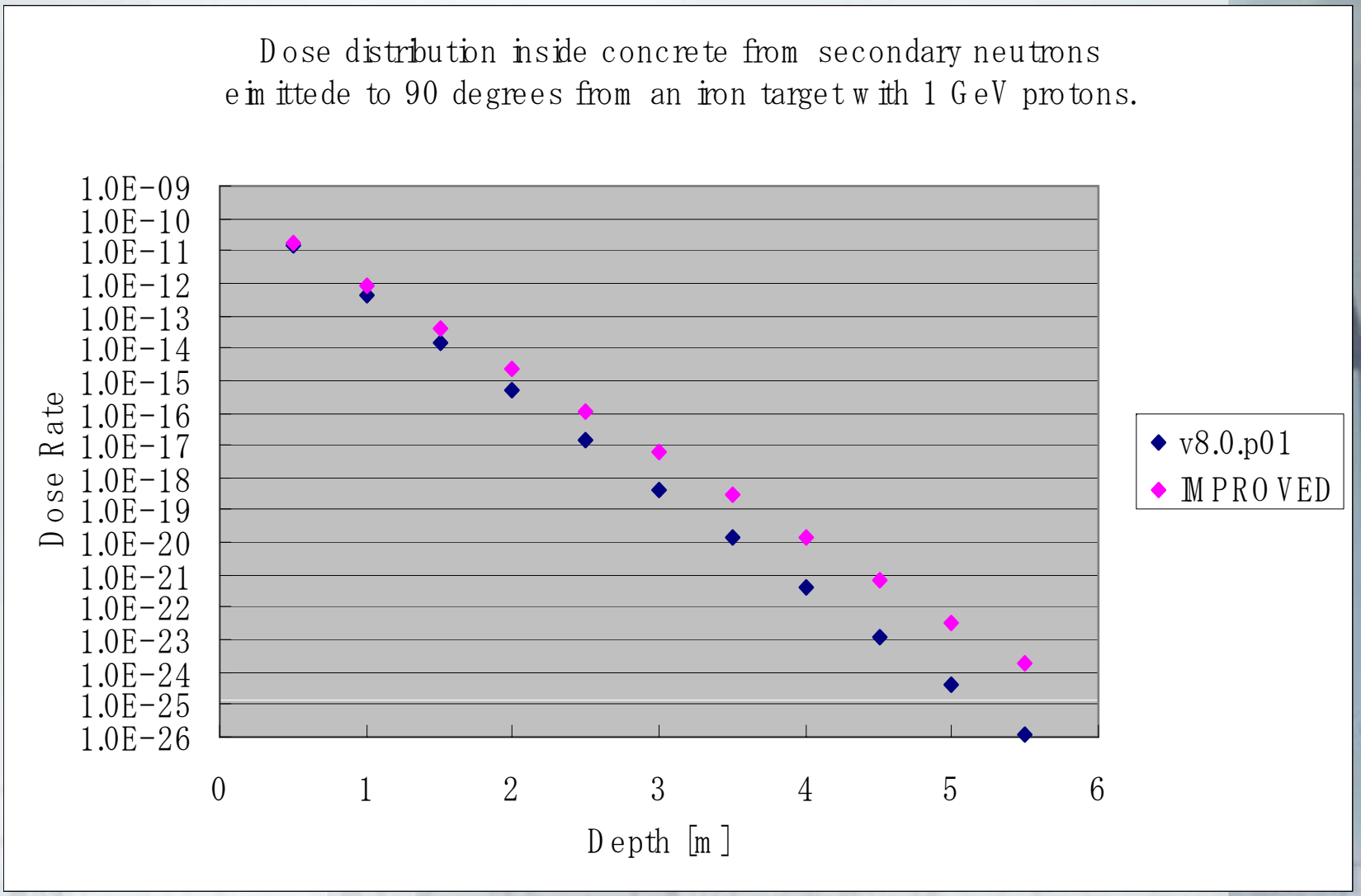


Fig. 18 Dose distribution inside concrete for secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

Improved Result



Benchmarking

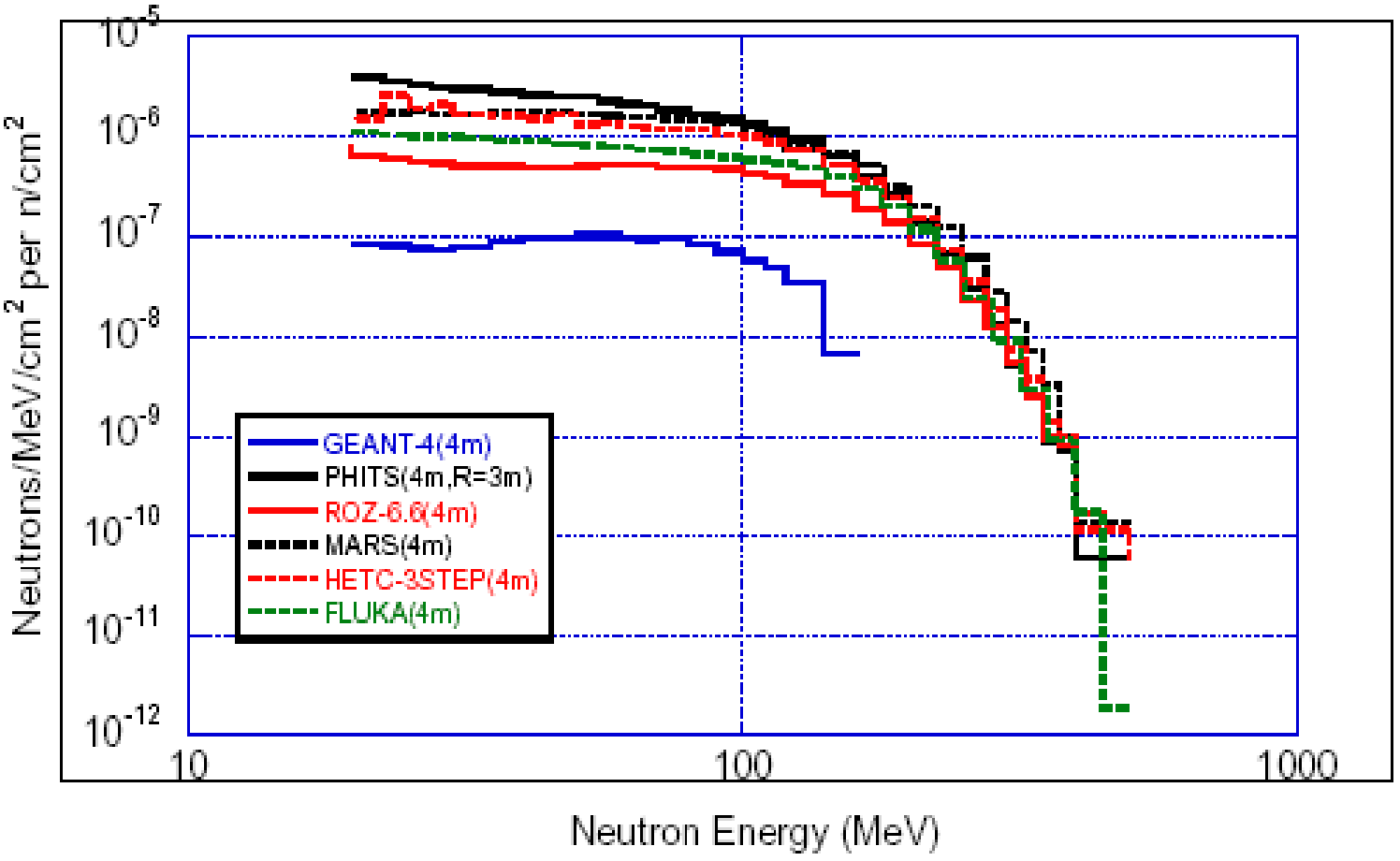
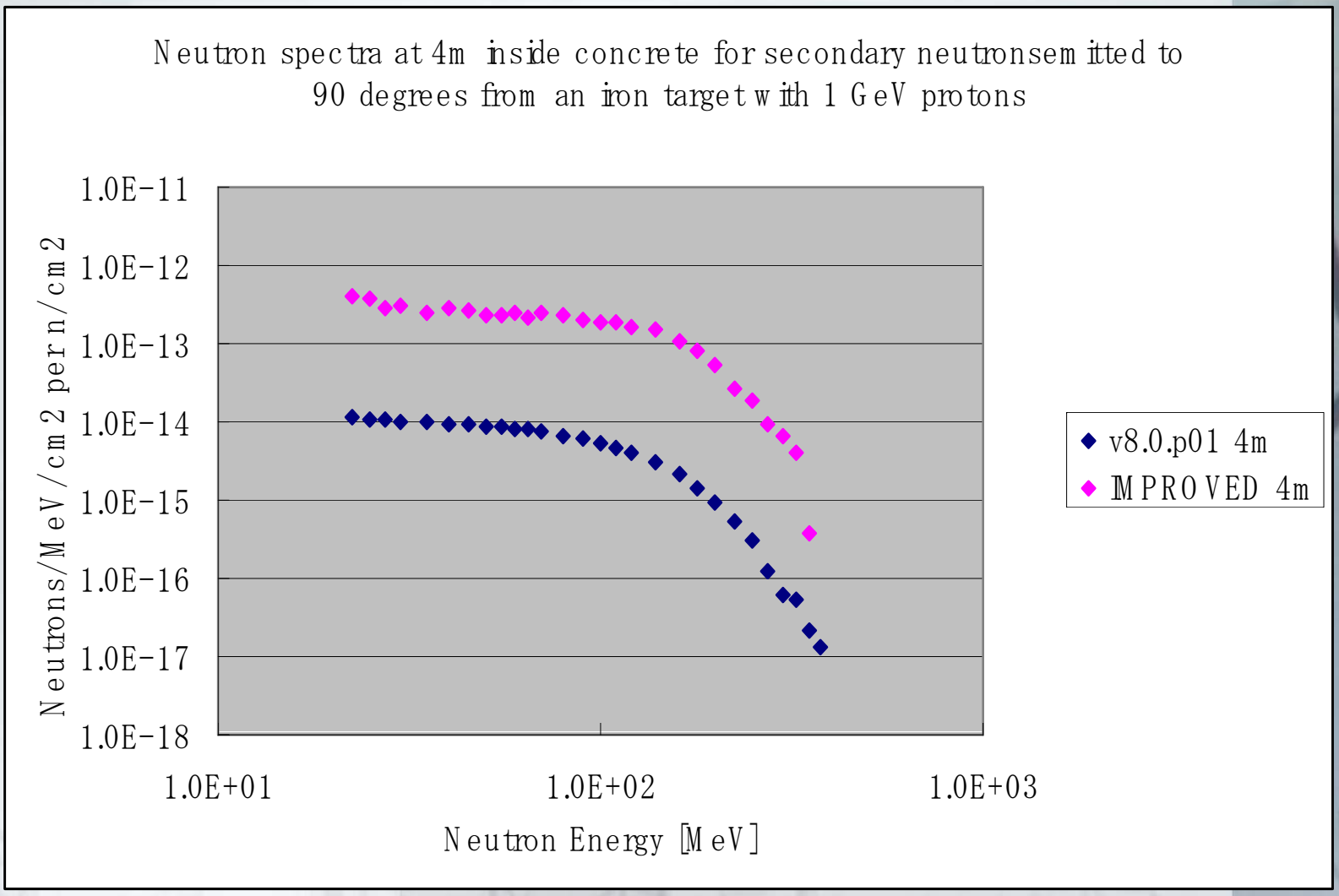


Fig. 20 Neutron spectraat 4m inside concrete for secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

Improved Result



neutron distribution inside iron from secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons

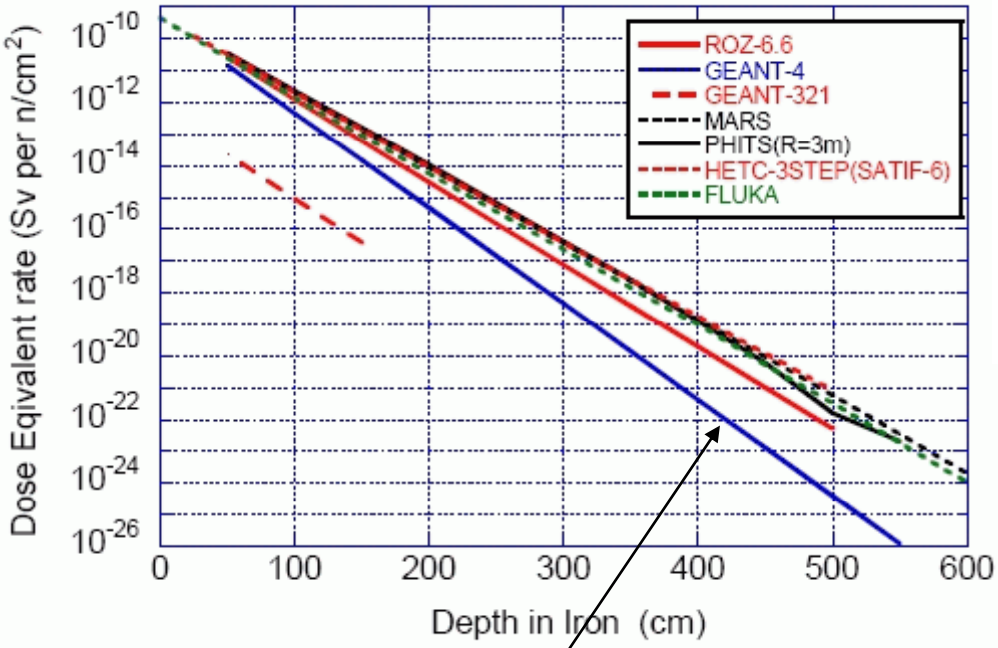


Fig. 17 Dose distribution inside iron from secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

Result of Geant4 is much lower than others

Results of Geant4

Blue Solid Line

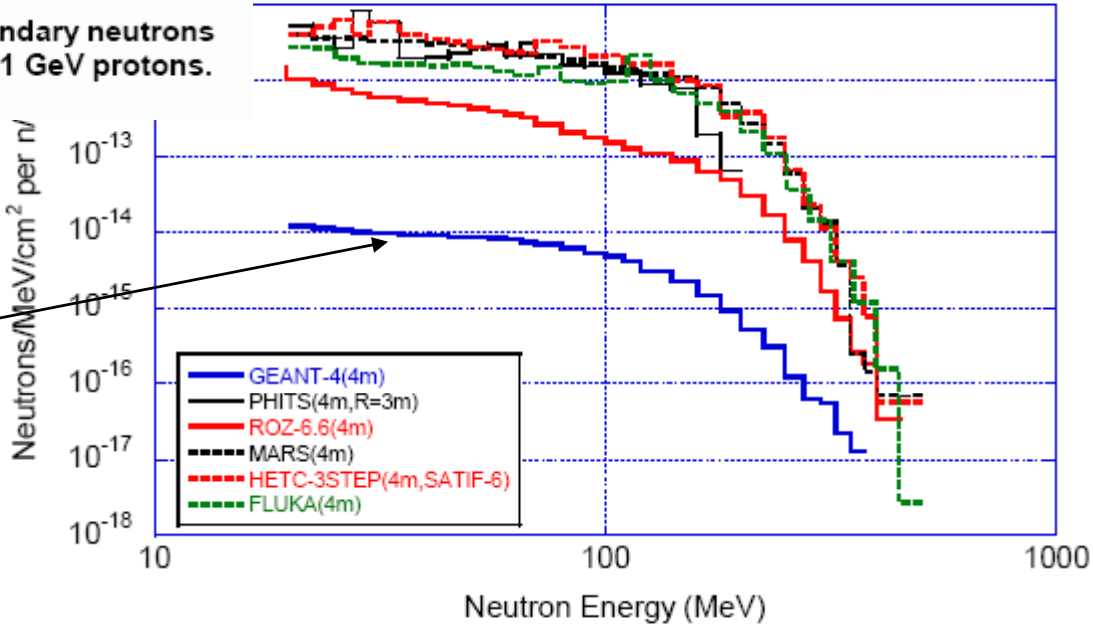


Fig. 19 Neutron spectra inside iron for secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

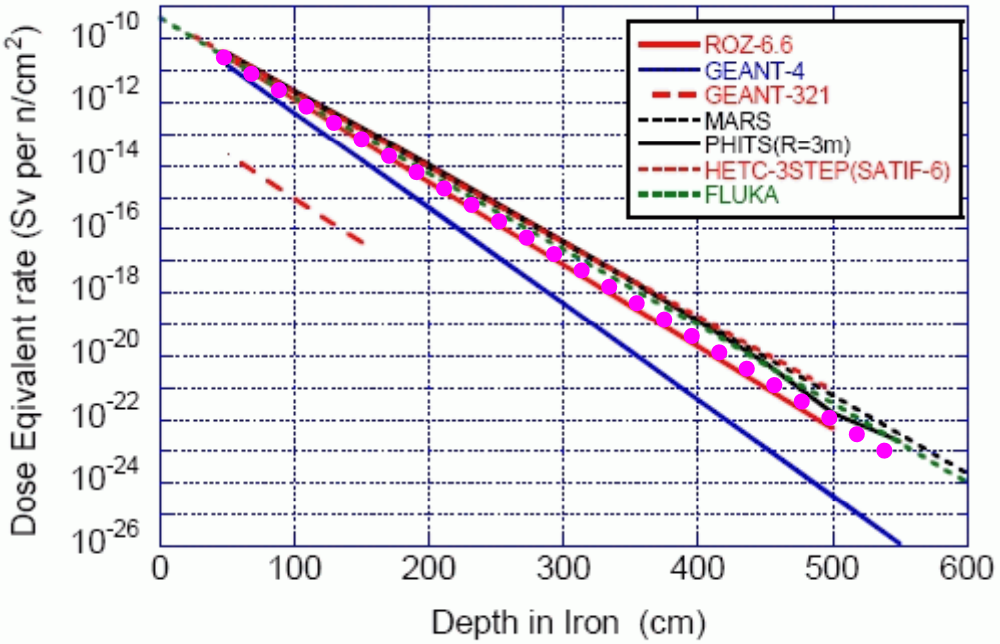


Fig. 17 Dose distribution inside iron from secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

Improved results

neutron distribution
inside iron
from secondary neutrons
emitted to 90 degrees
from an iron target
with 1 GeV protons

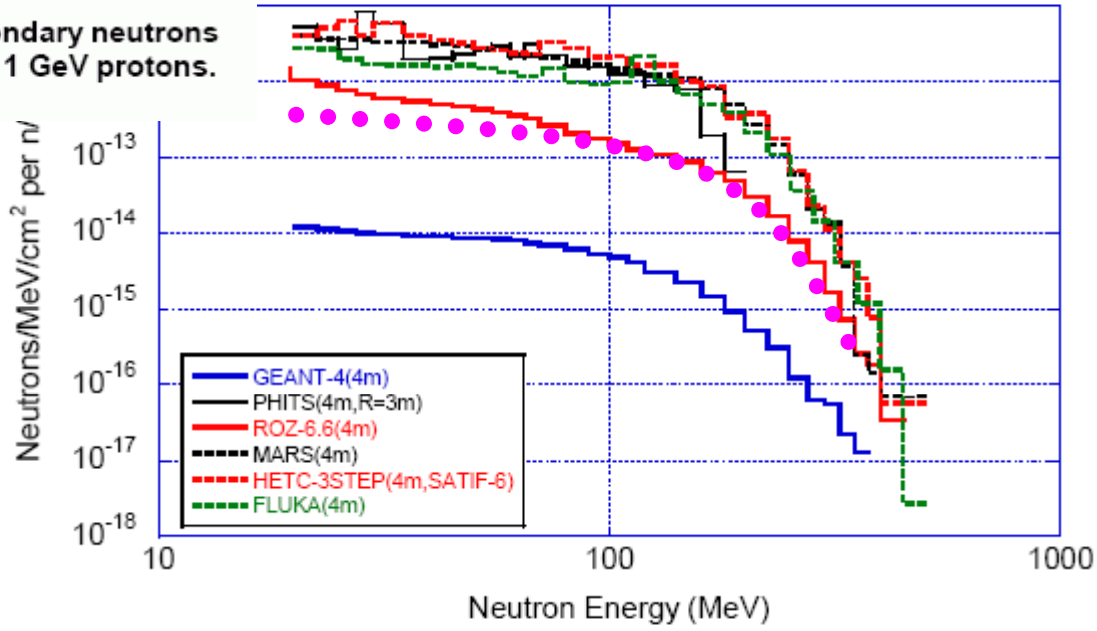


Fig. 19 Neutron spectra inside iron for secondary neutrons emitted to 90 degrees from an iron target with 1 GeV protons.

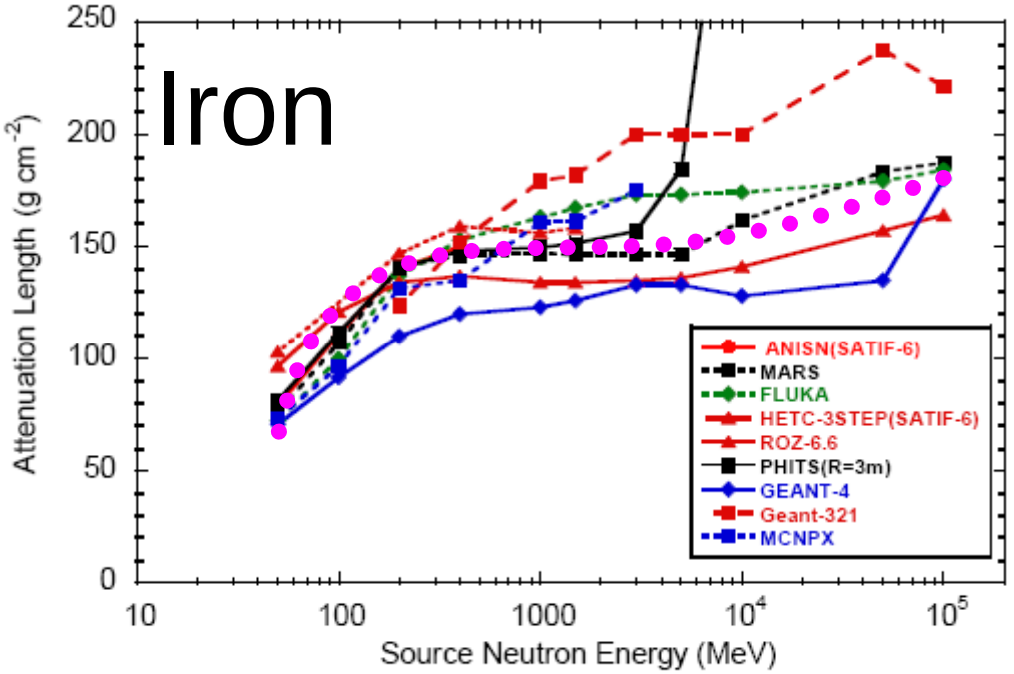


Fig. 3 Comparison of the neutron attenuation le

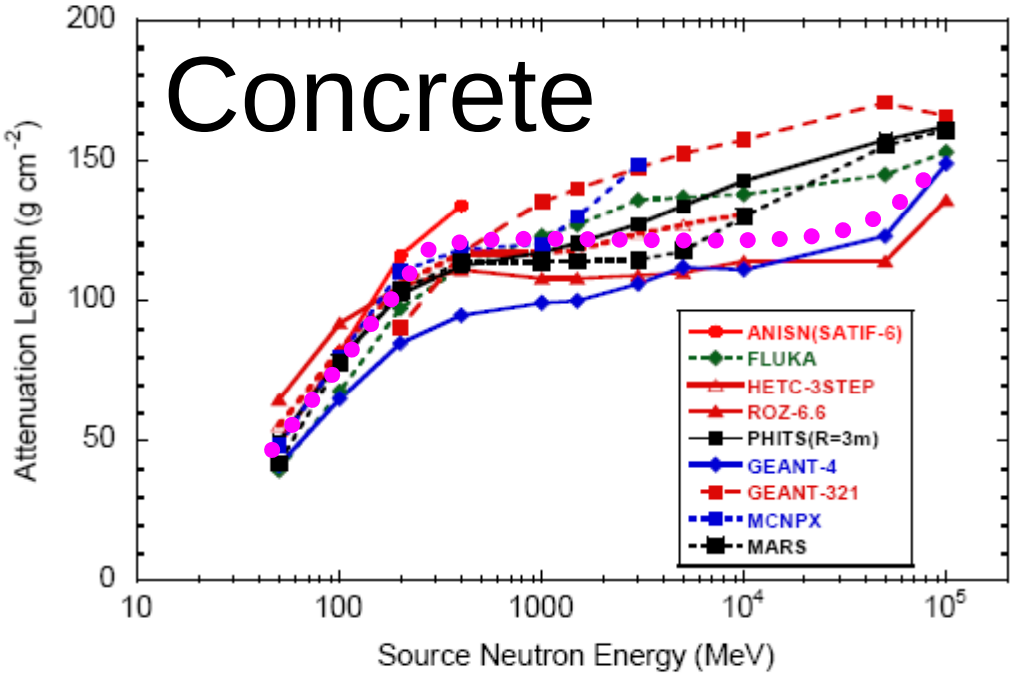


Fig. 6 Comparison of the neutron attenuation length of concrete.

Summary

- **Using new JENDL cross sections and final states increases neutron flux dramatically**
- **Higher statistics also raises flux from original value**
- **With these modifications, Geant4 prediction is much closer to that of other codes**
- **Still about one order of magnitude scatter among other simulation codes.**

Data

- **New data at 1 GeV (S. Rokni)**
- **Alex Howard pointed out data at other energies**
  - **TIARA shielding exp**
  - **LHC, SLAC beam dump**
  - **TARC**