Geant4-PHITS/JQMD interface

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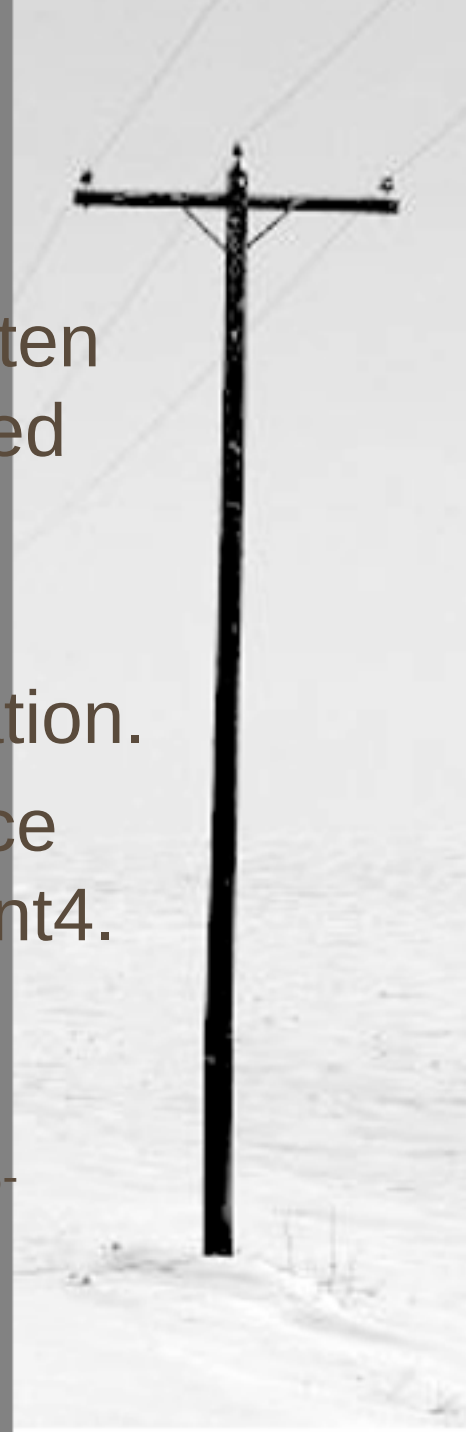
History

- Interfacing reaction codes those are often written in Fortran to Geant4 was initiated by joint activity of SLAC, KEK, RIST, JAERI and other institutes.
- That was not work of Geant4 collaboration.
- We successfully developed the interface which connect JQMD and JAM to Geant4.



–**INTERFACING THE JQMD AND JAM NUCLEAR REACTION CODES TO GEANT4.** T. Koi et al. SLAC-PUB-9978, CHEP-2003-Published in eConf C0303241:THMT005,2003 e-Print Archive: physics/0306115

We connected Fortran nuclear reaction codes to Geant4 which is written in C++.

Advantages of this method are

- There are already many well-established reaction codes and these codes are often written in Fortran.
- It is more convenient to interface to Fortran code directly than re-writing the code in C++.
- In the process of re-writing, new bugs may enter into the code. We can avoid this situation.
- Once the interface is established, the Fortran code and Geant4 can be updated independently.
- No copyright problems associated with C++ re-writes.

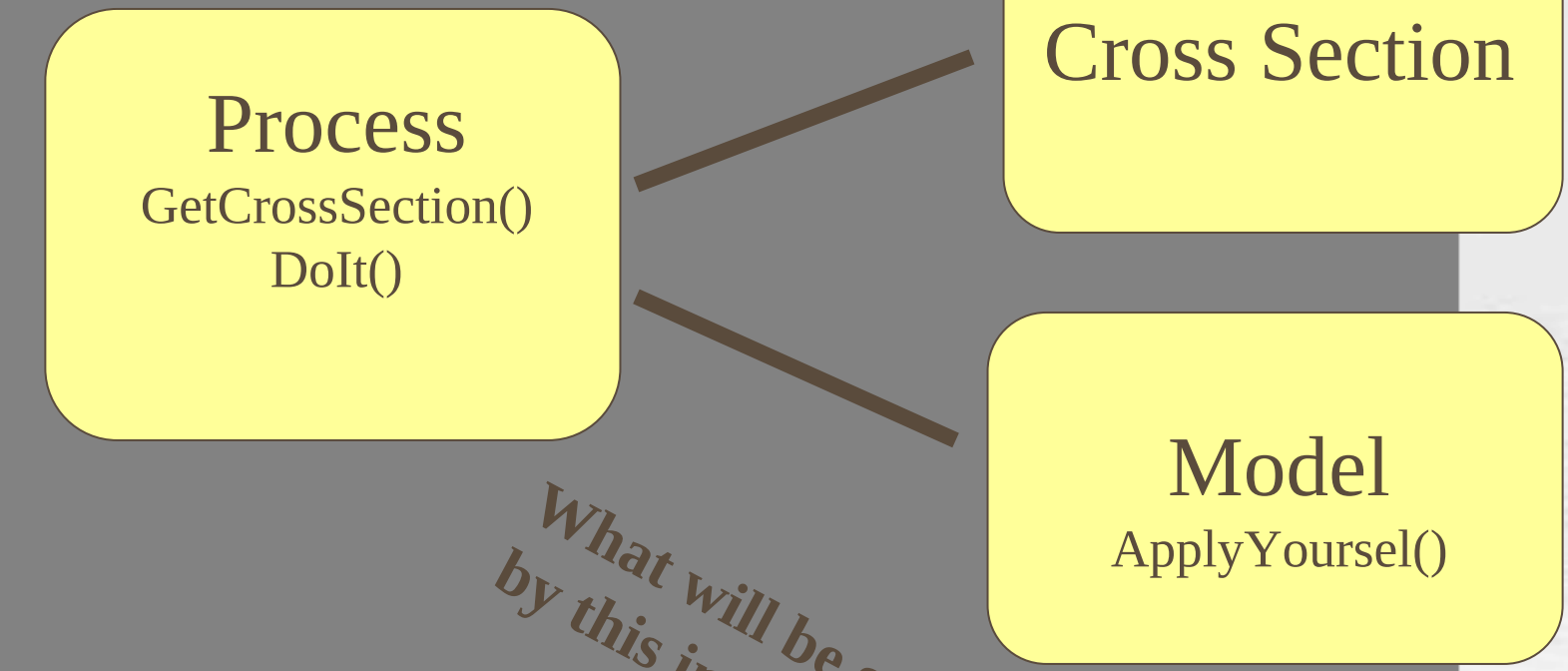
G4-PHITS interface

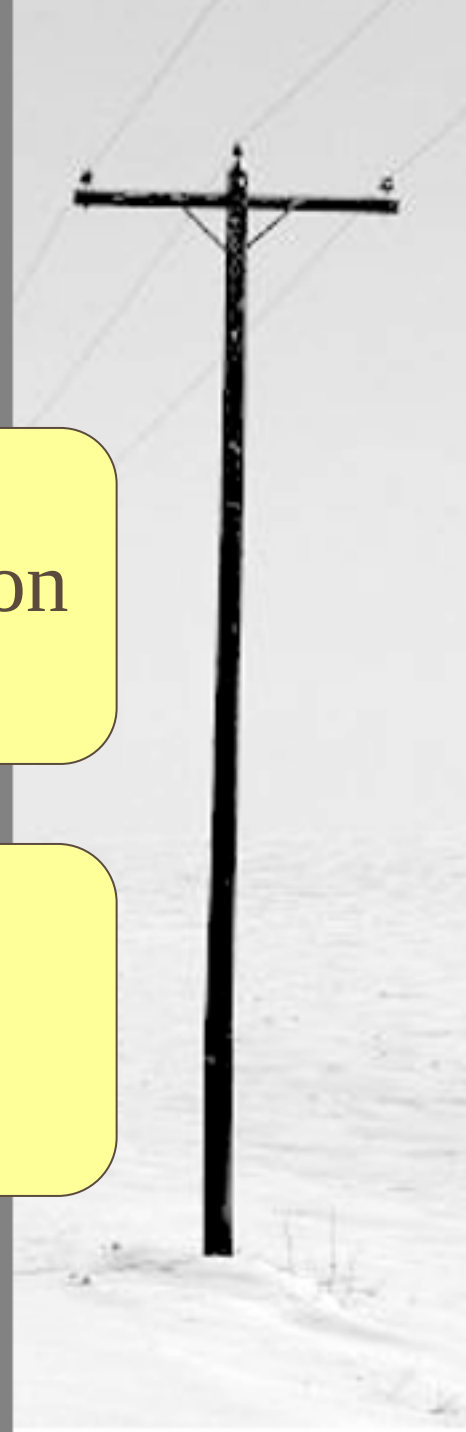
- Interface to PHITS nucleus reaction model (JAMQMD) as a kind of Geant4 Hadronic Model.
  - Note: Geant4 Cross Sections between particles and materials are used in transportation
- User needs to register as beta tester of PHITS code. (PHITS code is not open to public)
- Interface available through T. K. (not included in Geant4 release)

What Does a Process Do in Geant4

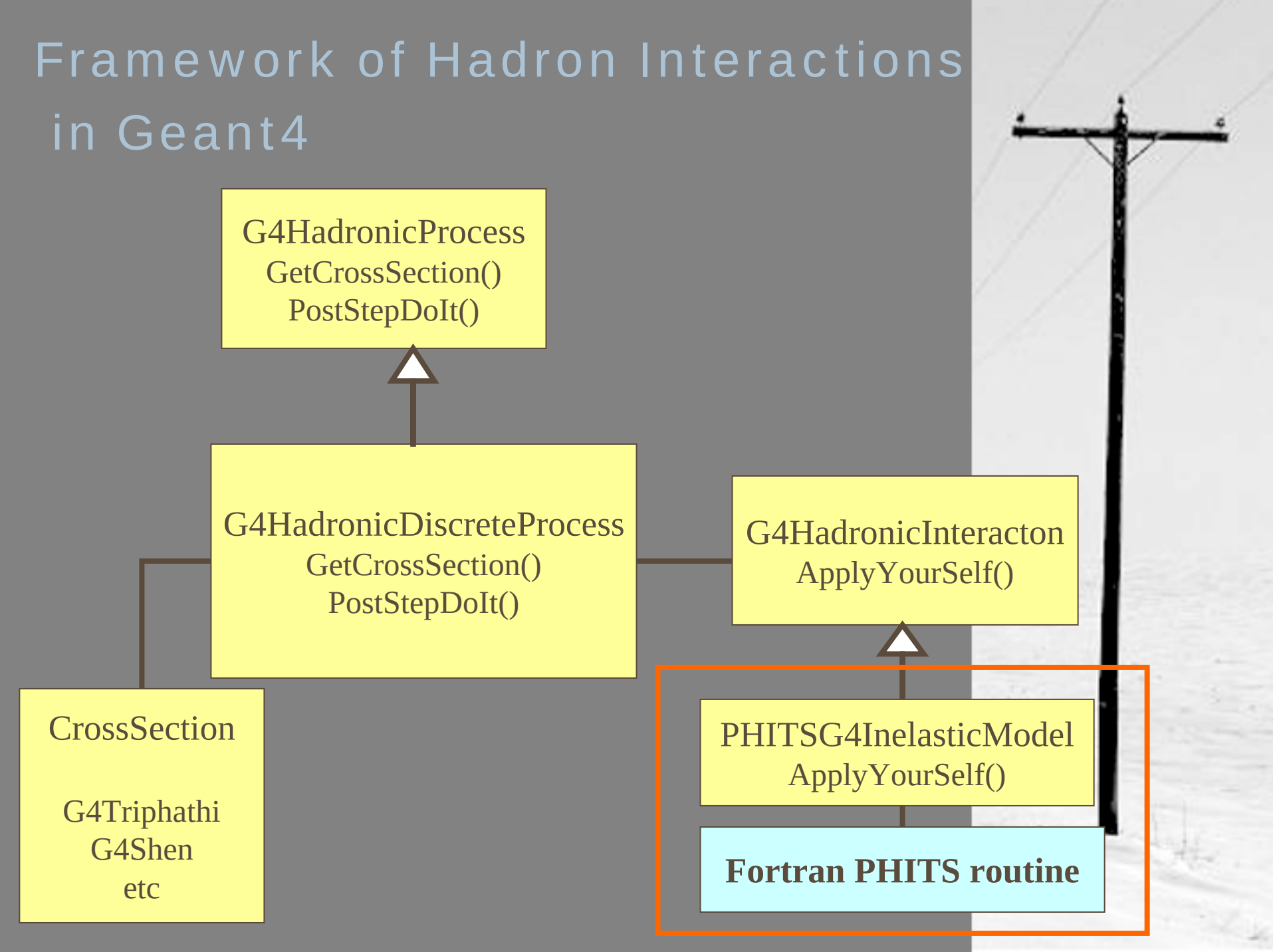
When and where an interaction will occur?

What will be generated by this interaction?

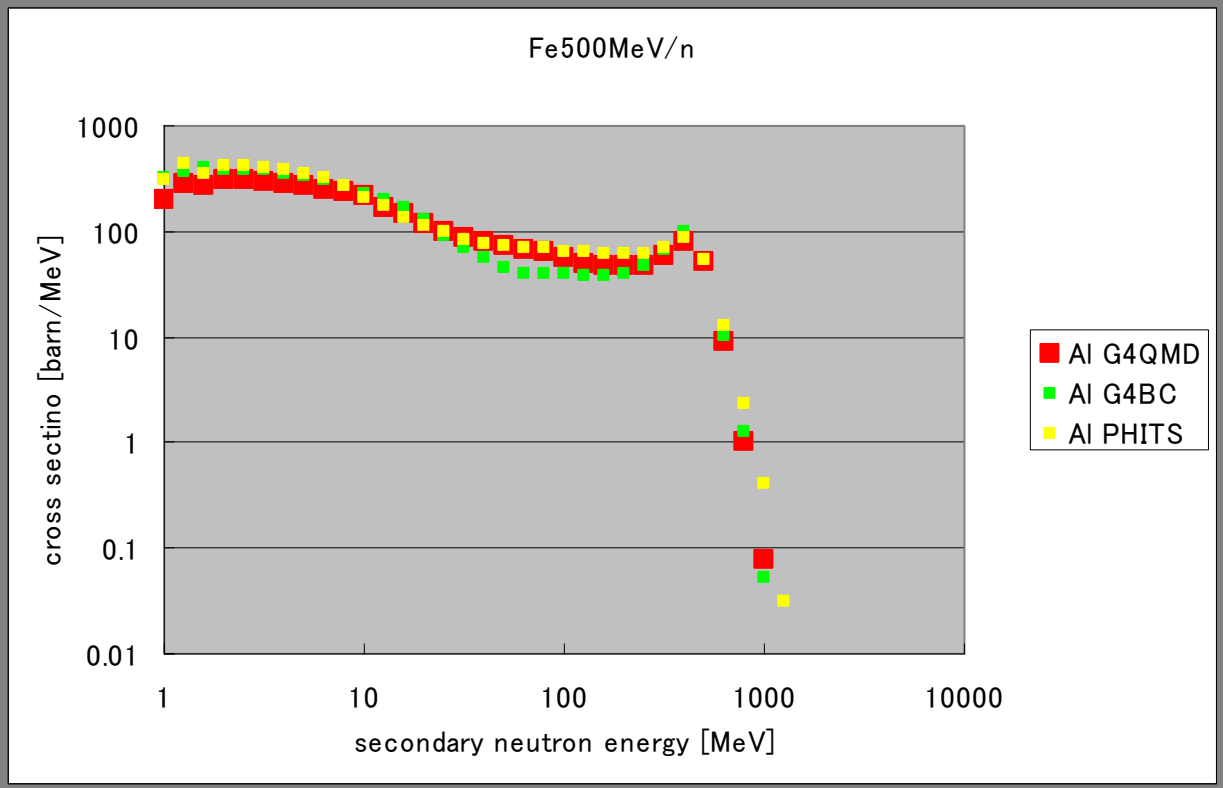




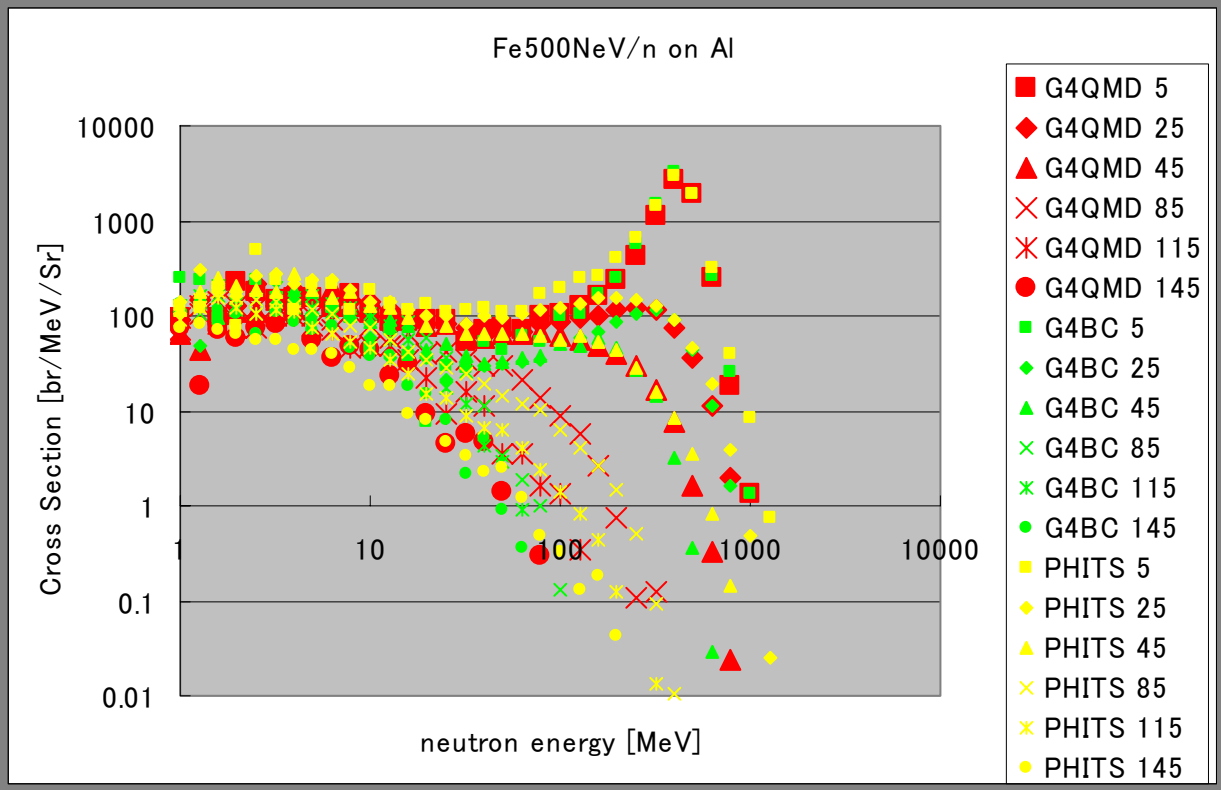
Framework of Hadron Interactions in Geant4



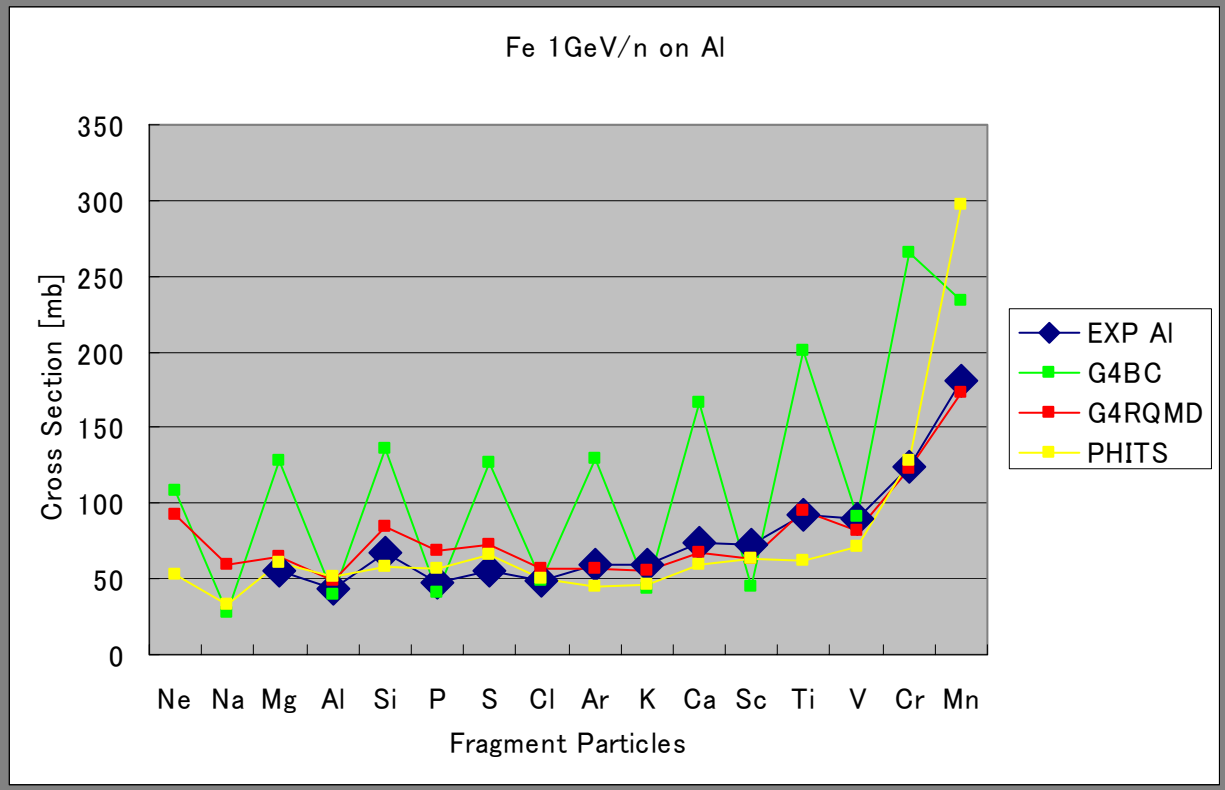
Neutron Production Cross Sections
Fe56 500MeV/n on Al (no data)



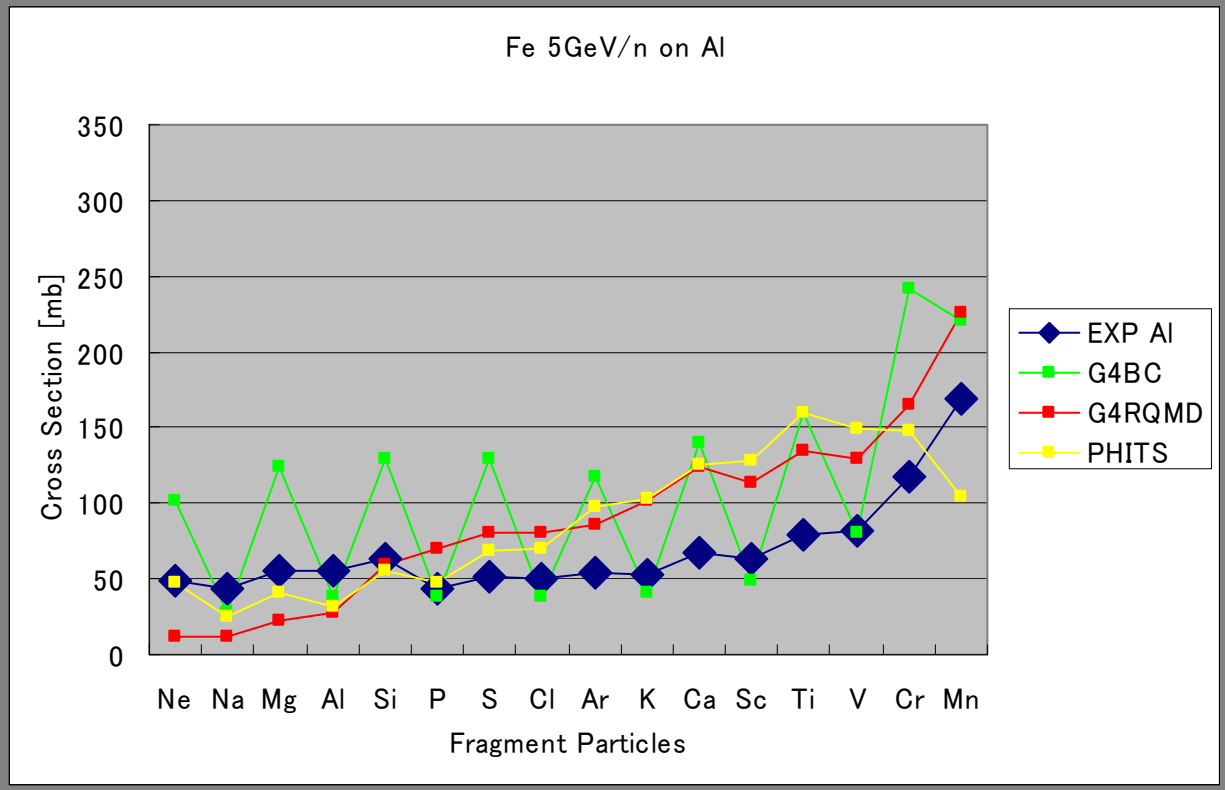
Double Differential Cross Sections Neutrons from 0.5 GeV/n Fe on Al (no data)



Fragment production cross sections Fe56 1 GeV/n on Al



Fragment production cross sections Fe56 5 GeV/n on Al



Summary

- Interface between Geant4 and PHITS nucleus reaction model (JAMQMD) is already developed and tested.
- This is not collaboration work of Geant4, therefore the interface is not included in Geant4 release.
- We only tested the interface under Linux(32/64) with g++ and g77 and already confirmed it does not work with Mac with g++ and g95