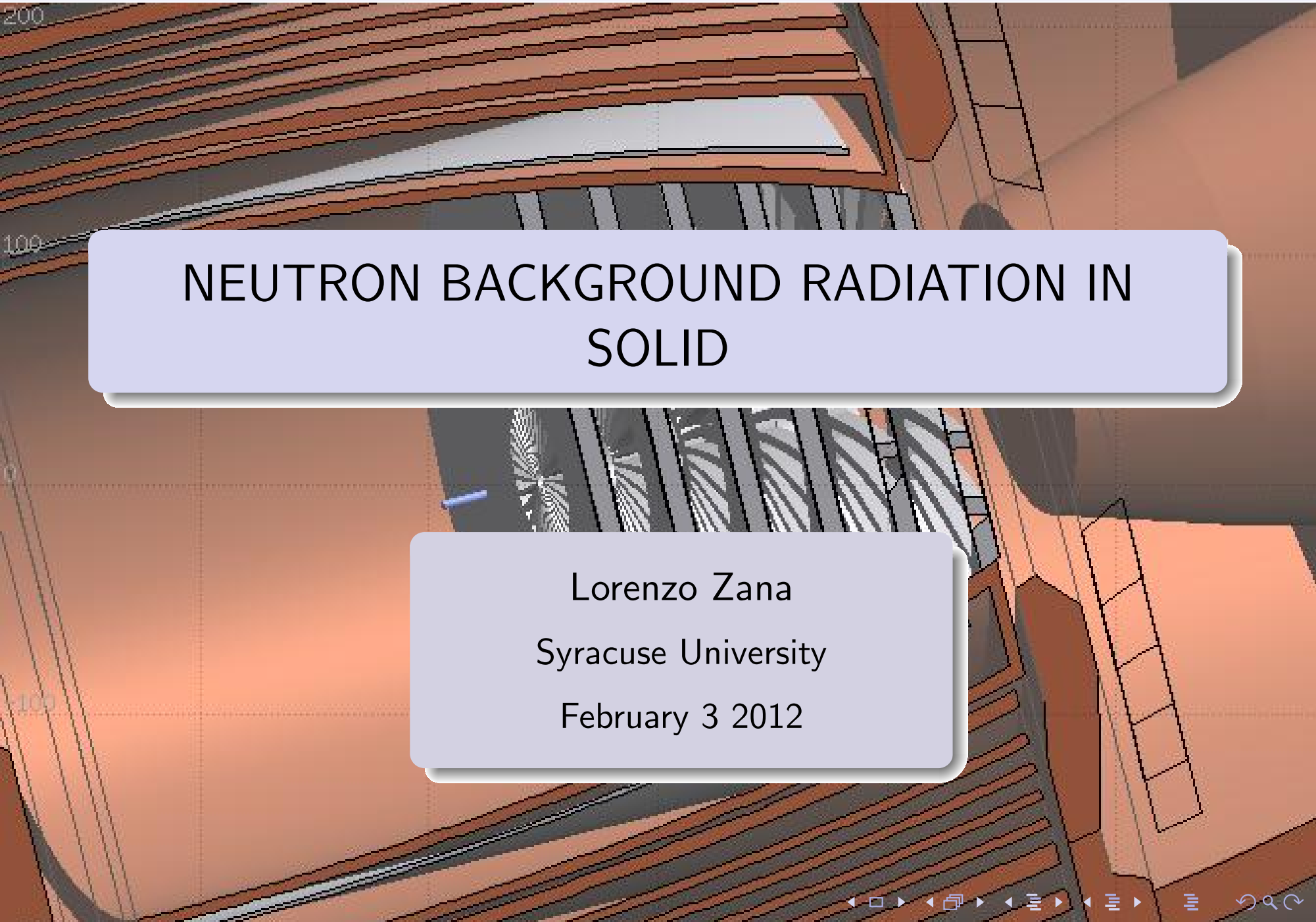

NEUTRON BACKGROUND RADIATION IN SOLID

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February 3 2012

Situation

Different Simulation packages used for SoLID

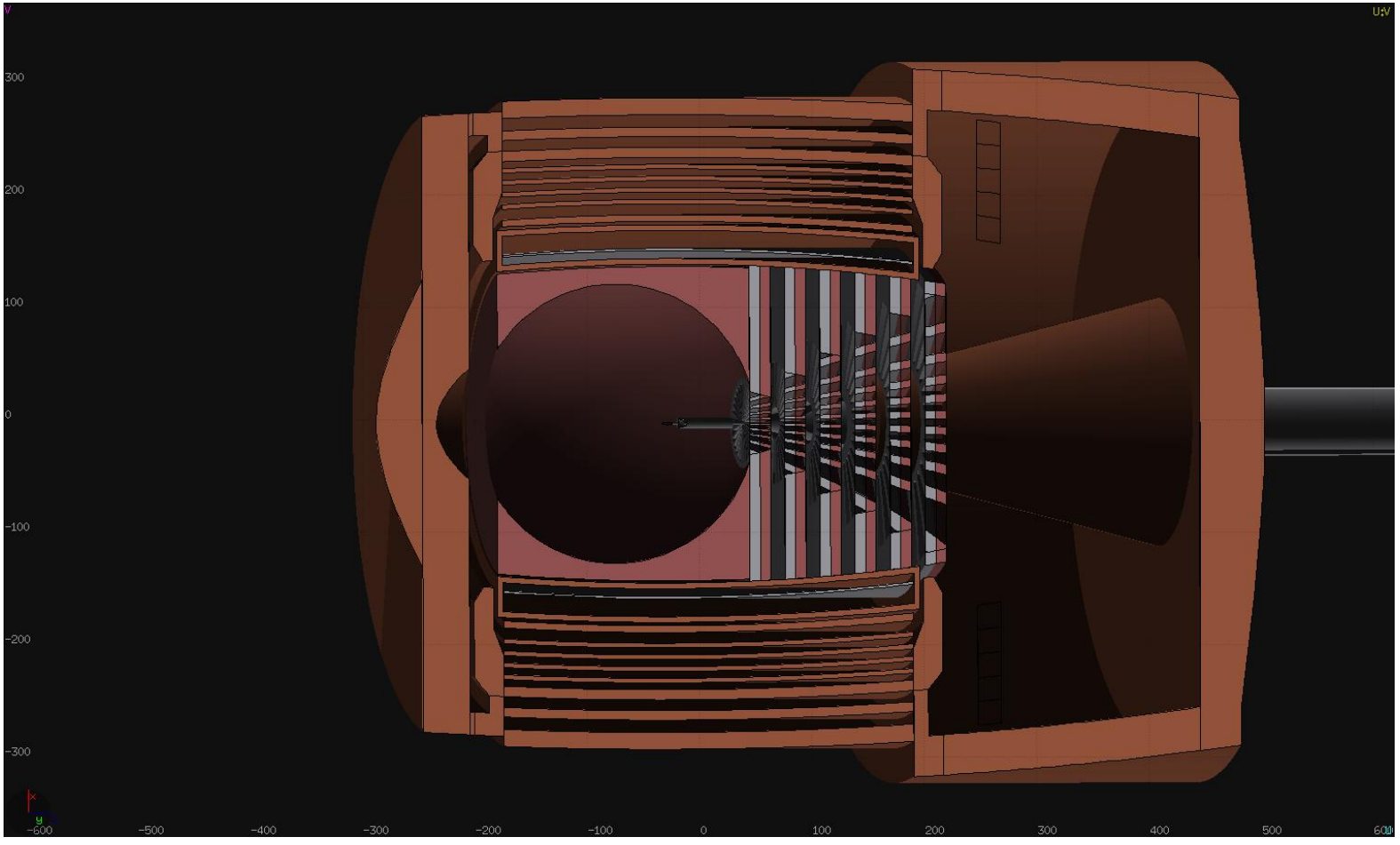
- GEANT3 (comgeant)
- GEANT4 (gemc, solgemc, standalone single-purpose)
- FLUKA

Goal

Goal for background studies

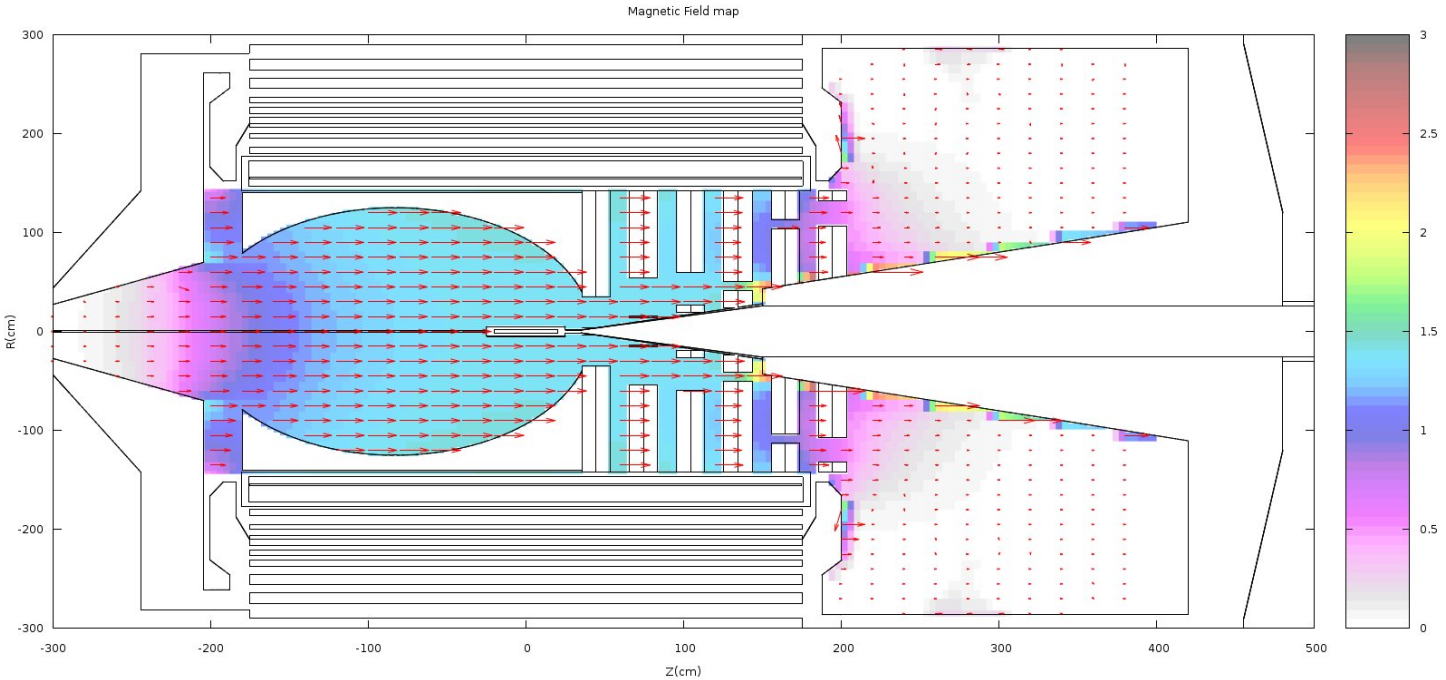
- Replicate the results obtained with GEANT3 with the new simulations.
- Understand the reason for the differences.
- Have a benchmark with a different simulation for the results.

Done (update from previous Collaboration meeting)



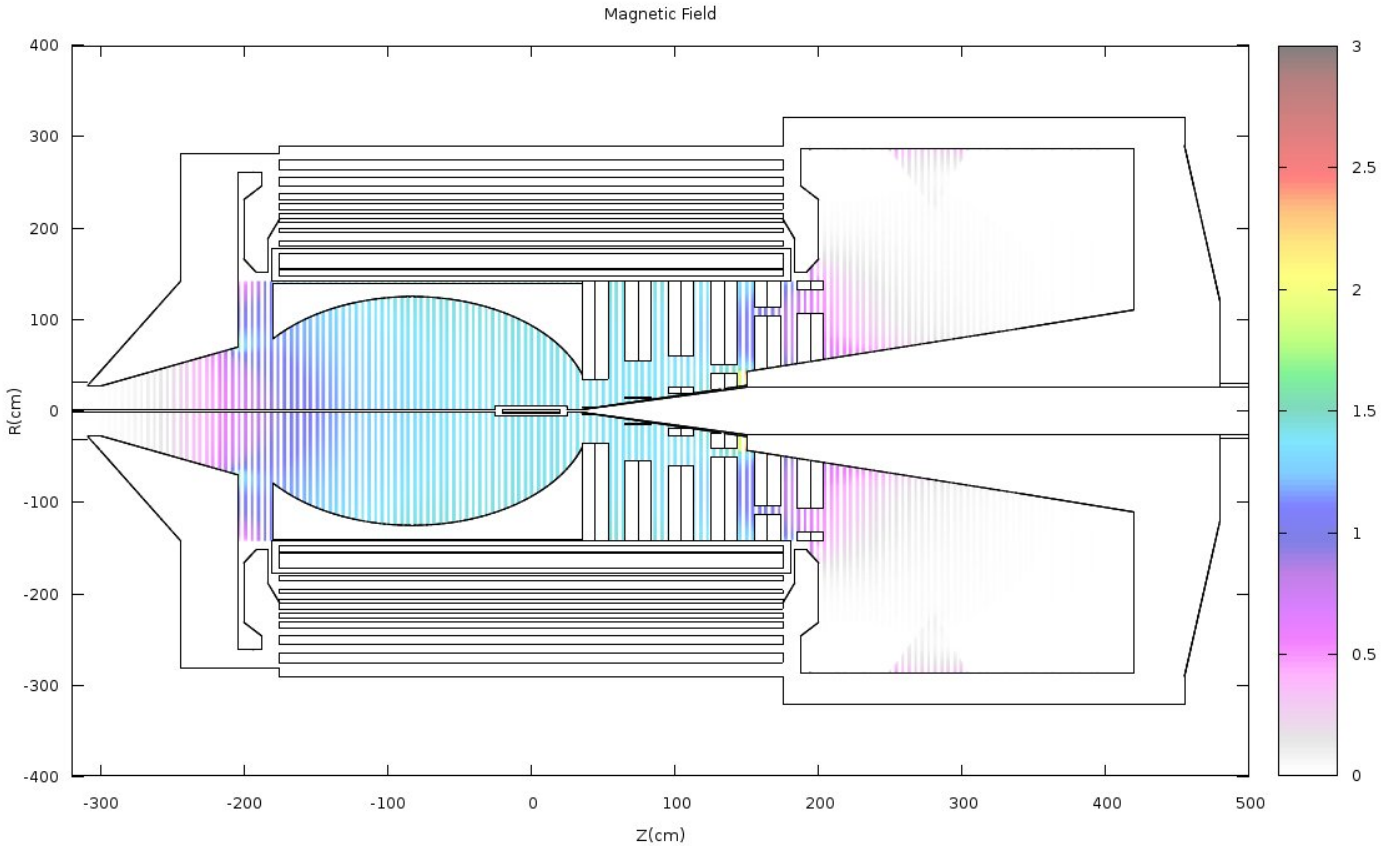
- New Magnet design

Done (update from previous Collaboration meeting)



- New Magnet design
- Magnetic Field implementation

Done (update from previous Collaboration meeting)



- New Magnet design
- Magnetic Field implementation

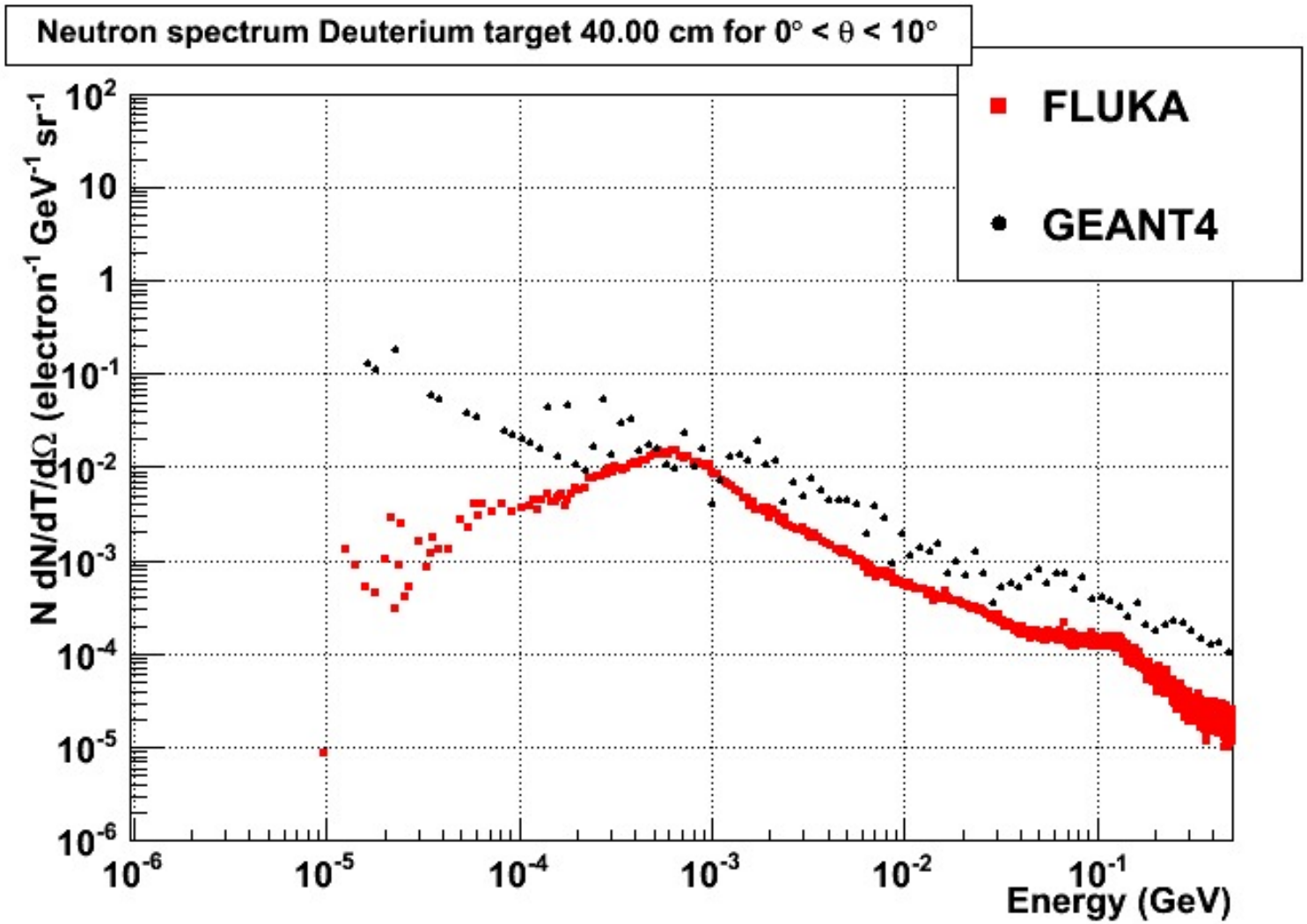
Source term

Problem with Deuterium and FLUKA

- In FLUKA for e- all hadron production is then the result of real gammas produced in electromagnetic interactions interacting with target nuclei.
- Well known problem, implementation is underway from FLUKA develpers
- Really important for Deuterium target.

Source term

Source Comparison at different angles, GEANT4 vs FLUKA



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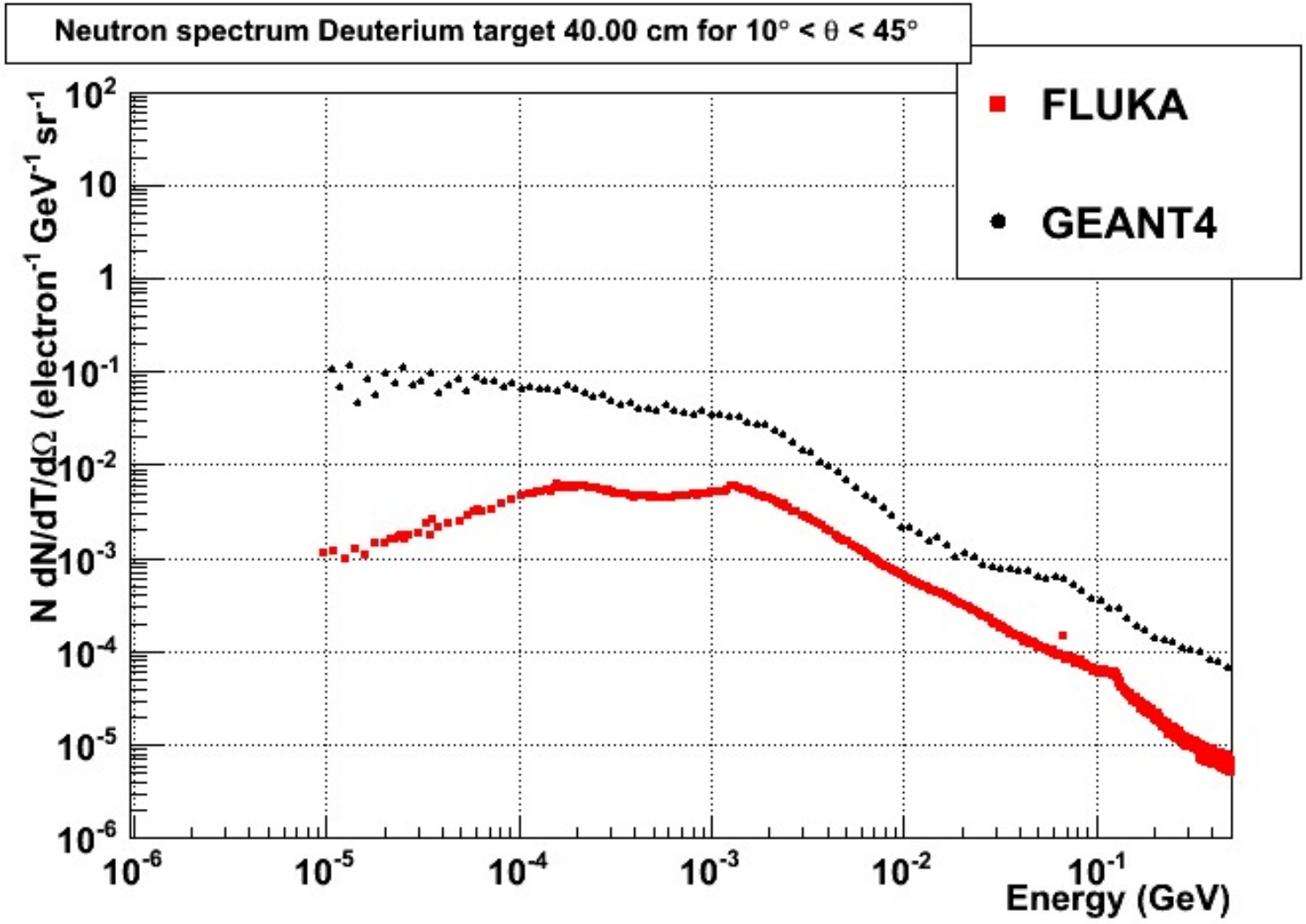

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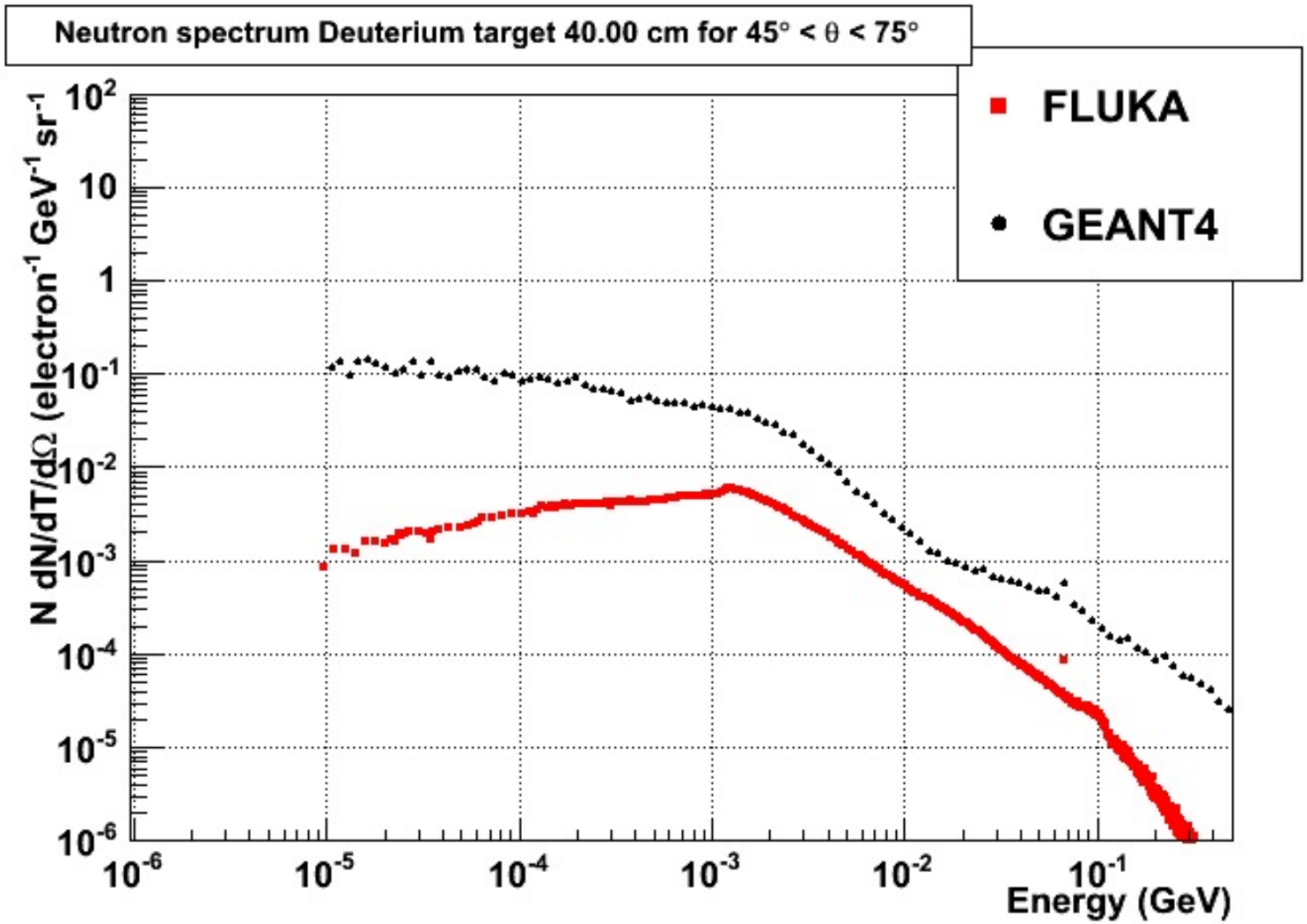

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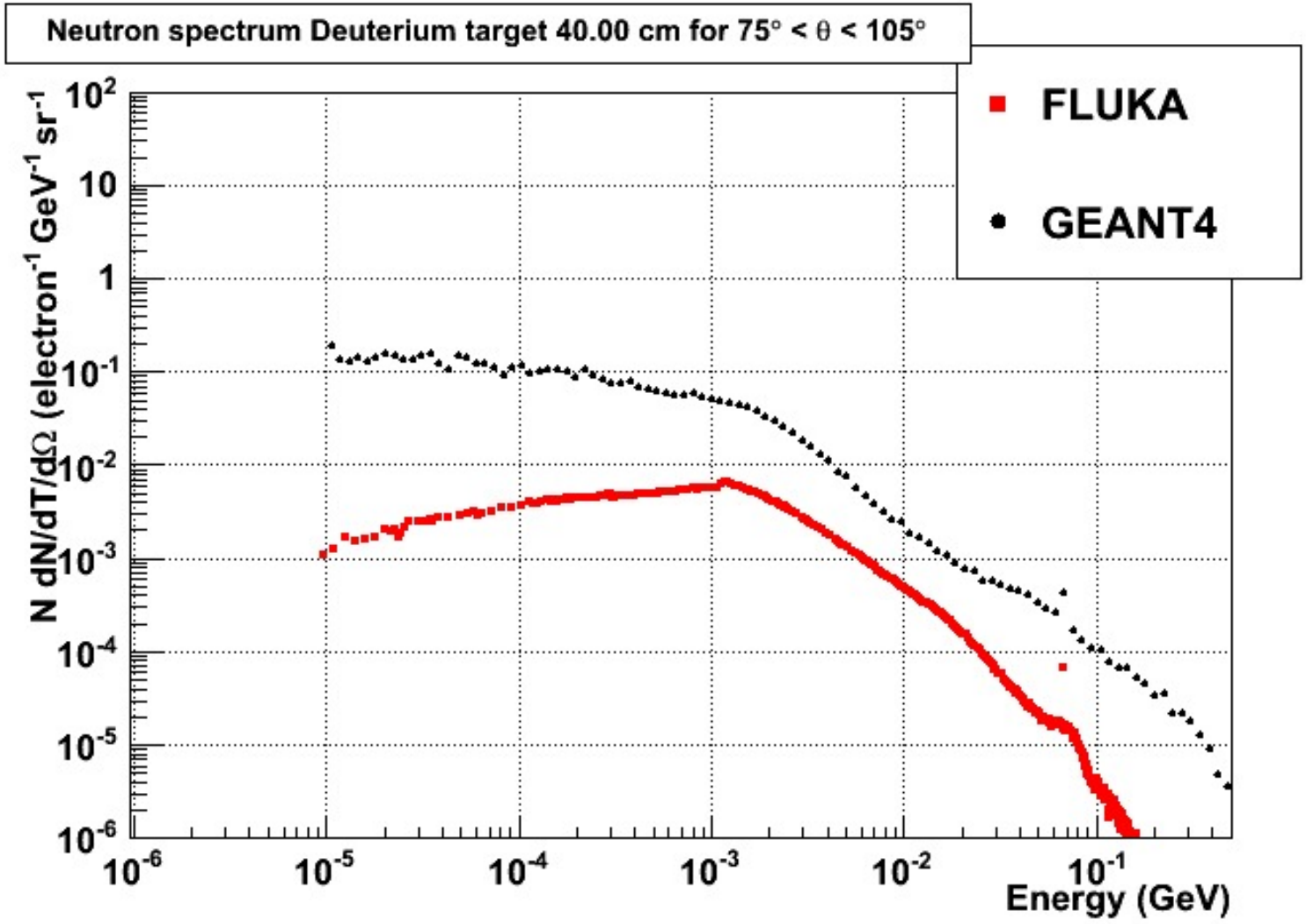
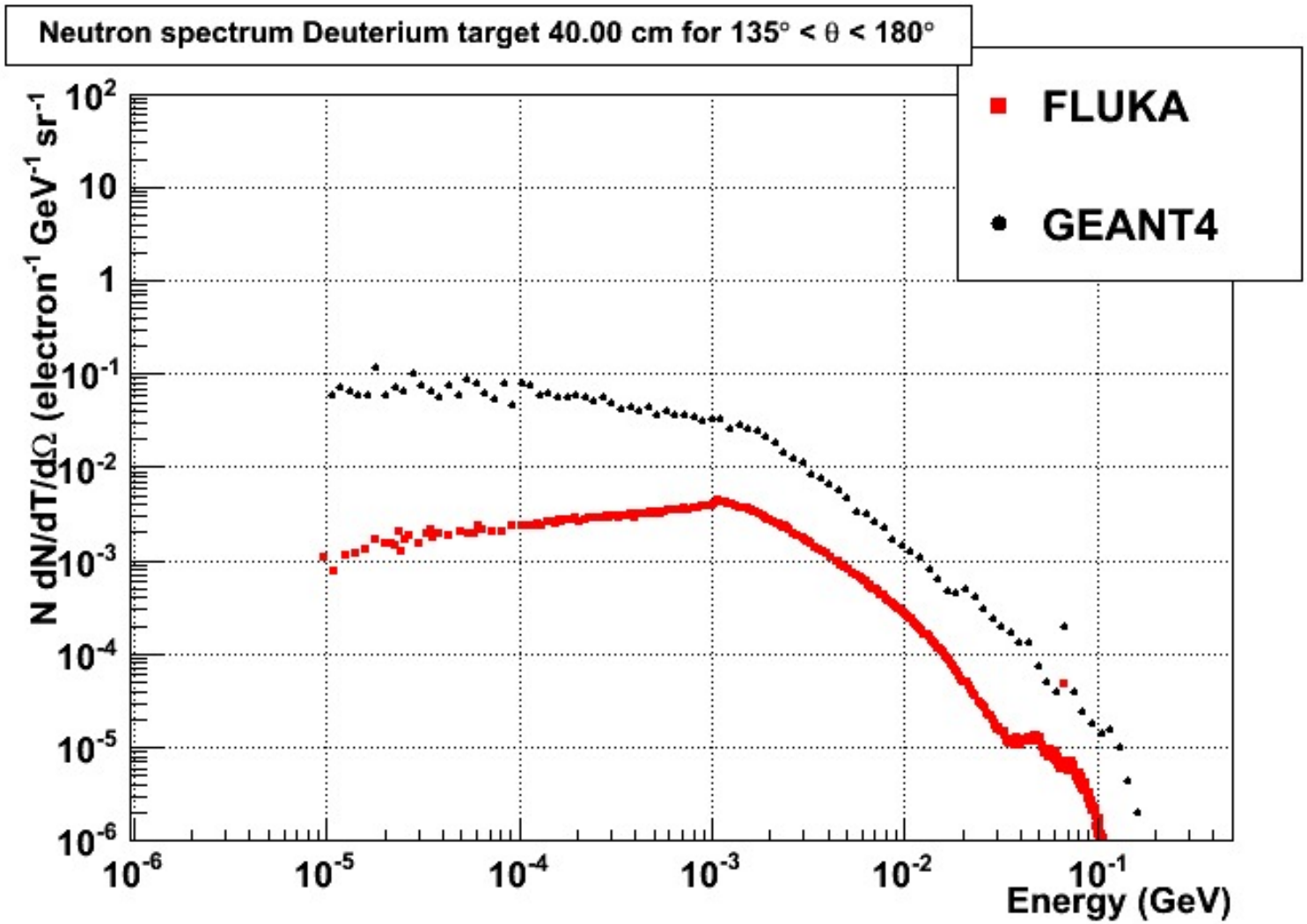


Source term

Source Comparison at different angles, GEANT4 vs FLUKA



Is GEANT4 reliable for Neutron background studies?

RADCON group at JLAB

uses DINREG/GEANT3 combination model

Is GEANT4 reliable for Neutron background studies?

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GEANT4 CHIPS model

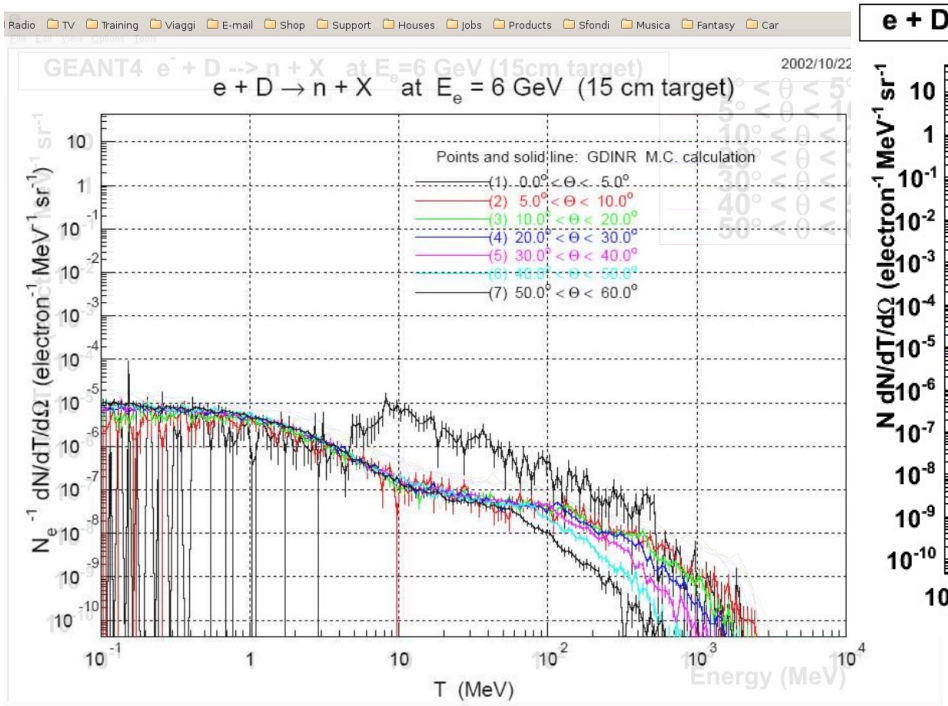
better results since patch 4.9.2p01 (at now release at 4.9.5)

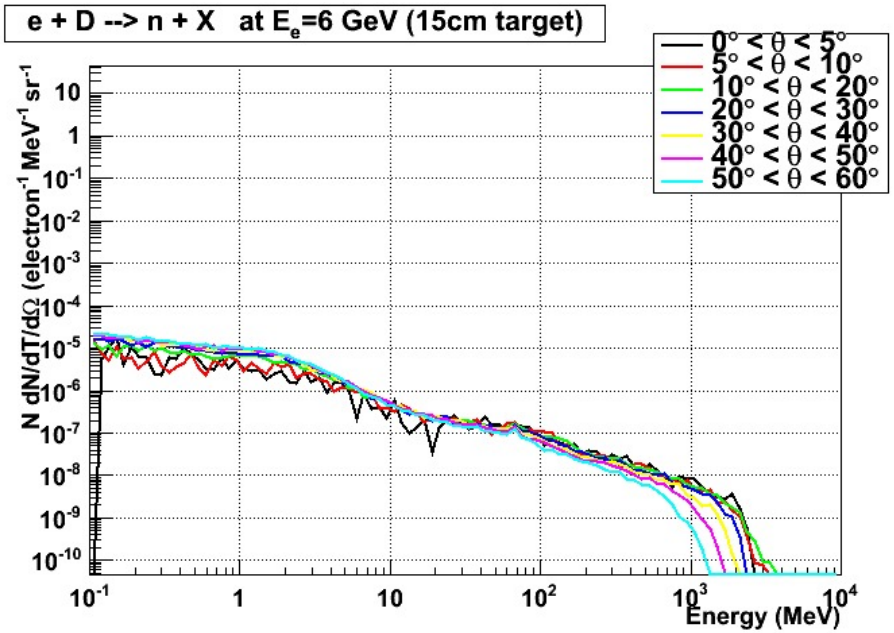
Is GEANT4 reliable for Neutron background studies?

Comparison for 15cm Deuterium target $E_e = 6.0 GeV$

DINREG/GEANT3

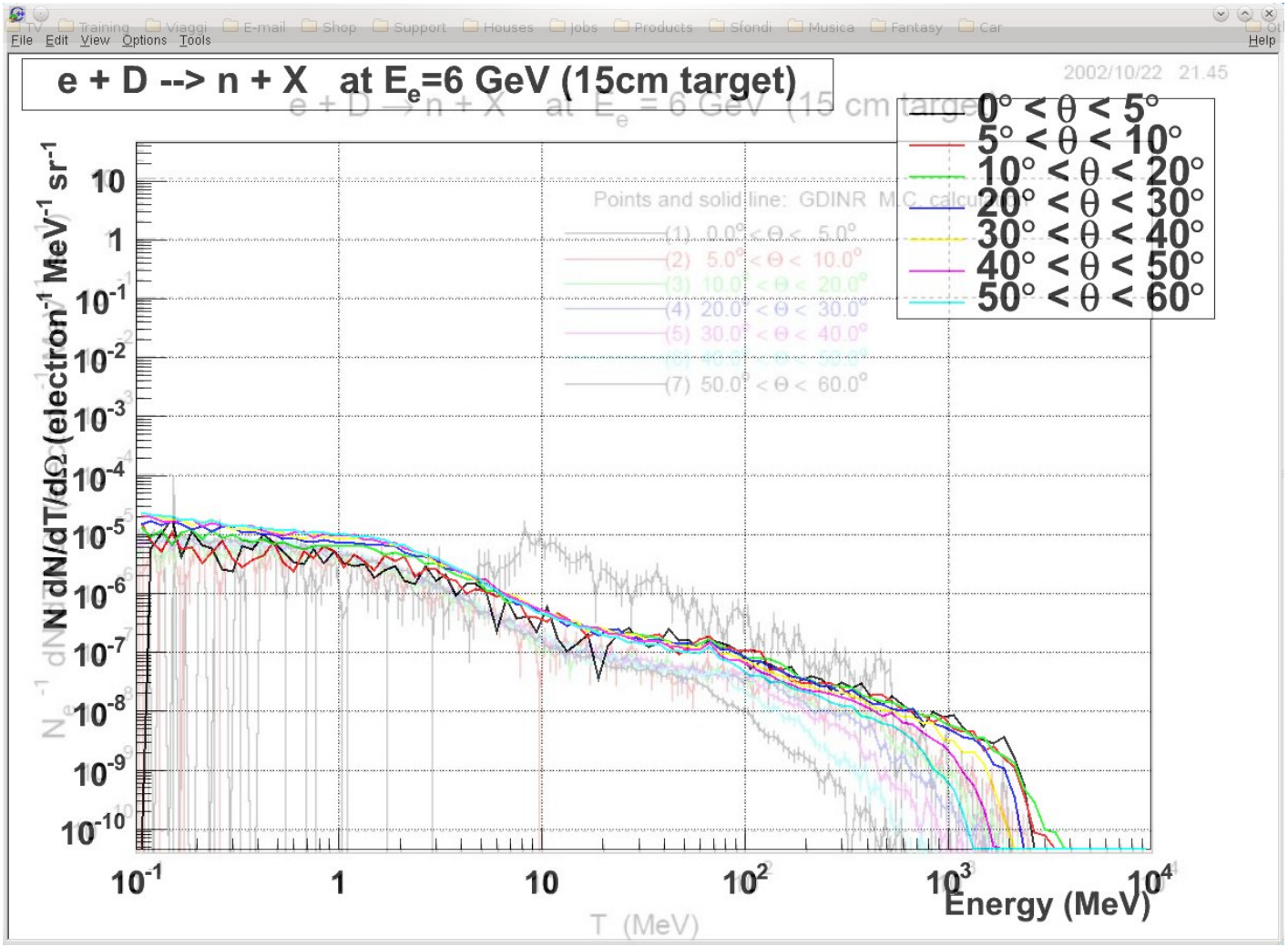
GEANT4





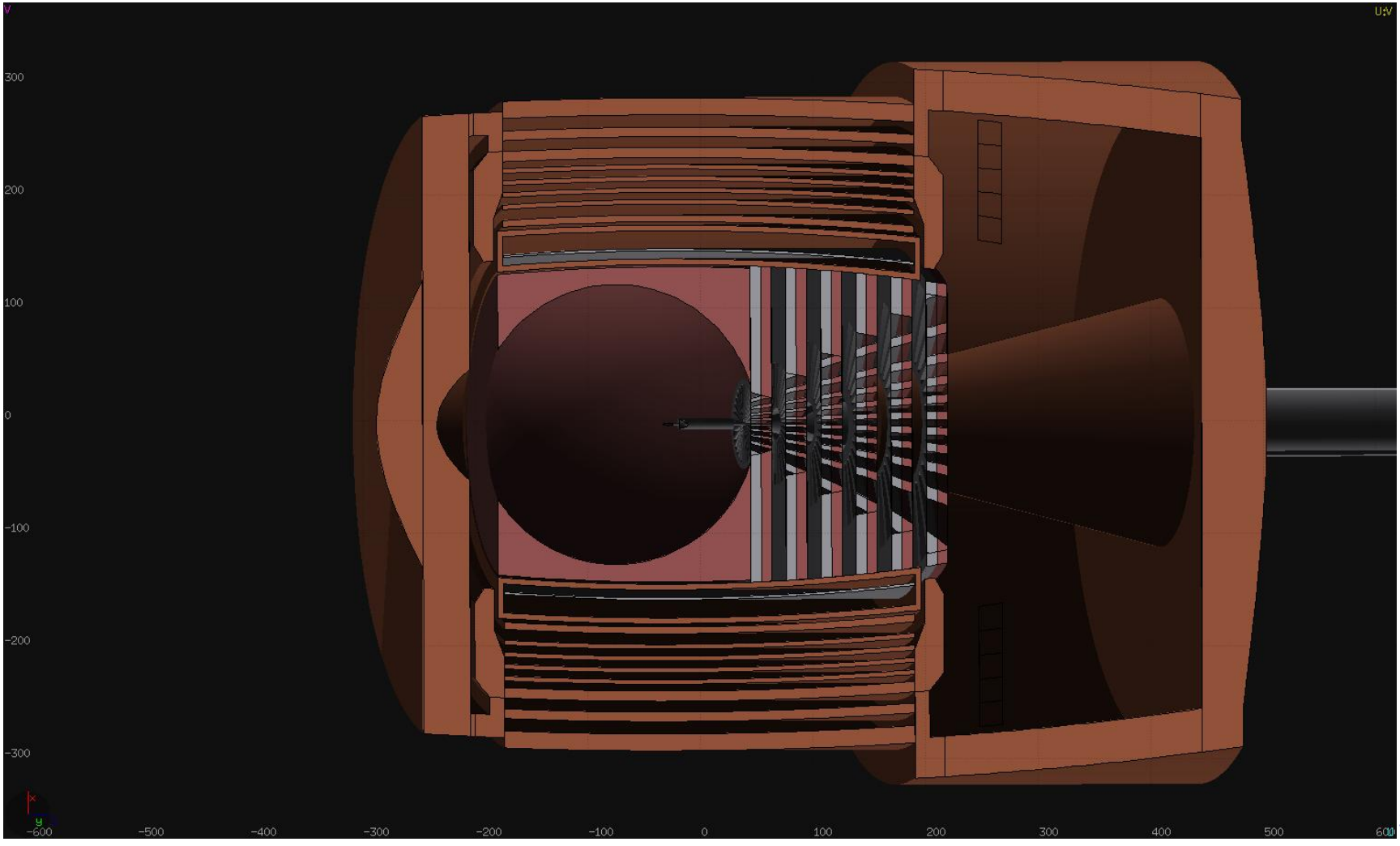
Is GEANT4 reliable for Neutron background studies?

Comparison for 15cm Deuterium target $E_e = 6.0 GeV$



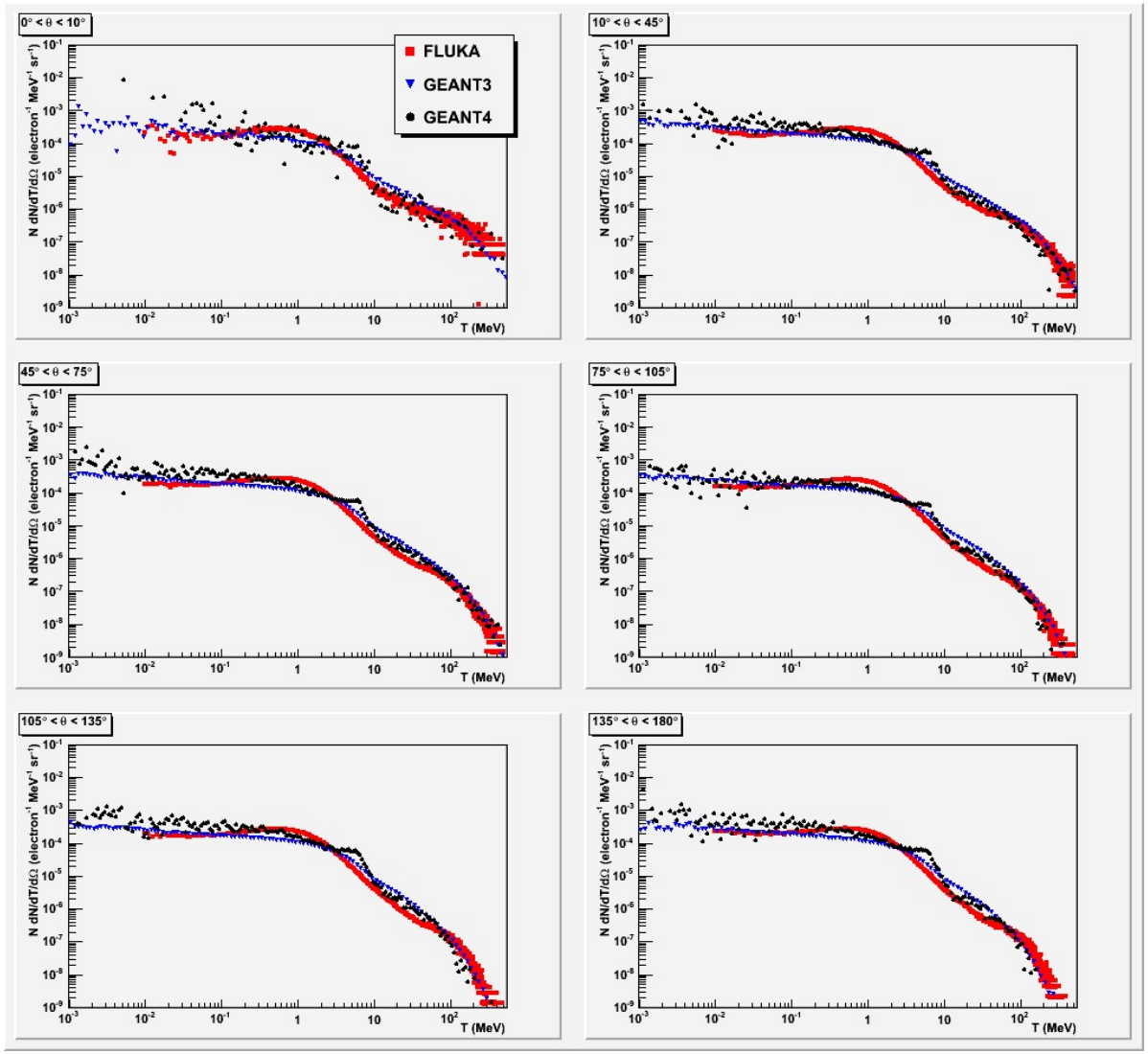
Comparison Target to other Sources

Baffles



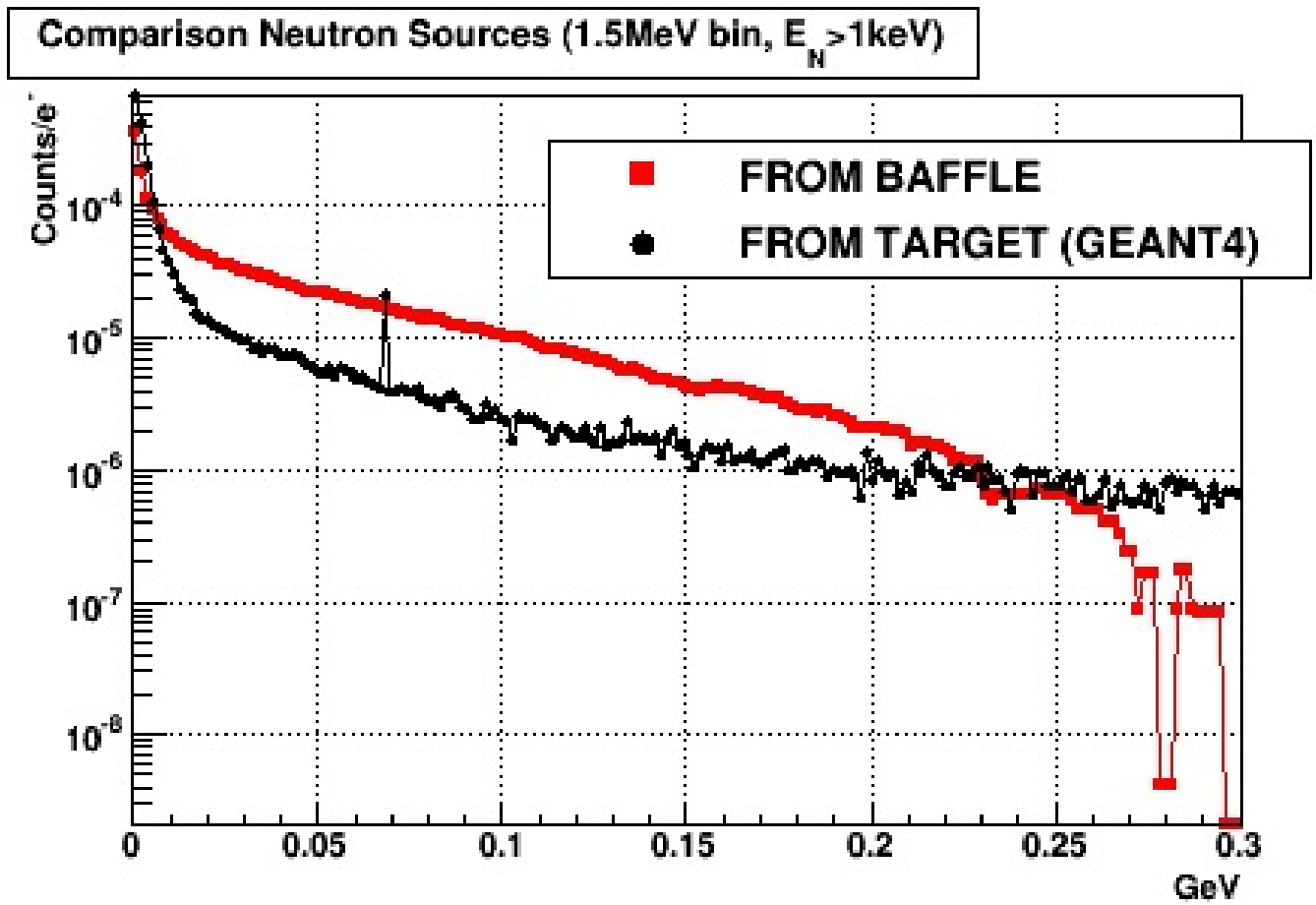
Comparison Target to other Sources

Lead, good comparison 3 codes since 5mm thickness



Comparison Target to other Sources

Baffles vs Target(Geant4)



Conclusions

DONE (since last meeting)

- New Magnet design
- Full Magnetic field map
- Started Comparison different simulation packages for target source term

TO DO

- Contacted radcon group that will provide us with simulation results with the DINREG/GEANT3 model for 40cm Deuterium tg with 11GeV beam
- Implementation of source term
- See impact on radiation background inside SoLID
- Comparison FLUKA - GEANT4 for bakgrounds studies.