Mary Tsagri

Home Country: Greece

1. [redacted] Physics Degree
[redacted]t September 2008 – University of Patras, Greece

2. [redacted]esis on Astroparticle Physics:
[redacted]hysical Signatures For Axion or Axion-like Particles – A
Sum[redacted]

3. [redacted]mer Student, June - September 2008

4. [redacted]tudent at Max-Planck-Institut für Plasmaphysik (IPP),
[redacted] 2008

5. [redacted]riment at CERN since July 2007

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1. [redacted] December 2008
2. [redacted]te: CERN
3. [redacted]oject: P12 (ESR)
[redacted]on of Monte Carlo Tools and Comparison with Benchmark

Introduction:

Geant4 / Garfield: An Interface

- Simulation of neutrons (Geant4) and the deposit of
  secondary γ's and charged particles (Garfield)

- Significant neutron background in many LHC and sLHC detector experiments

- Need to model the impact of neutrons on the performance of gaseous detectors

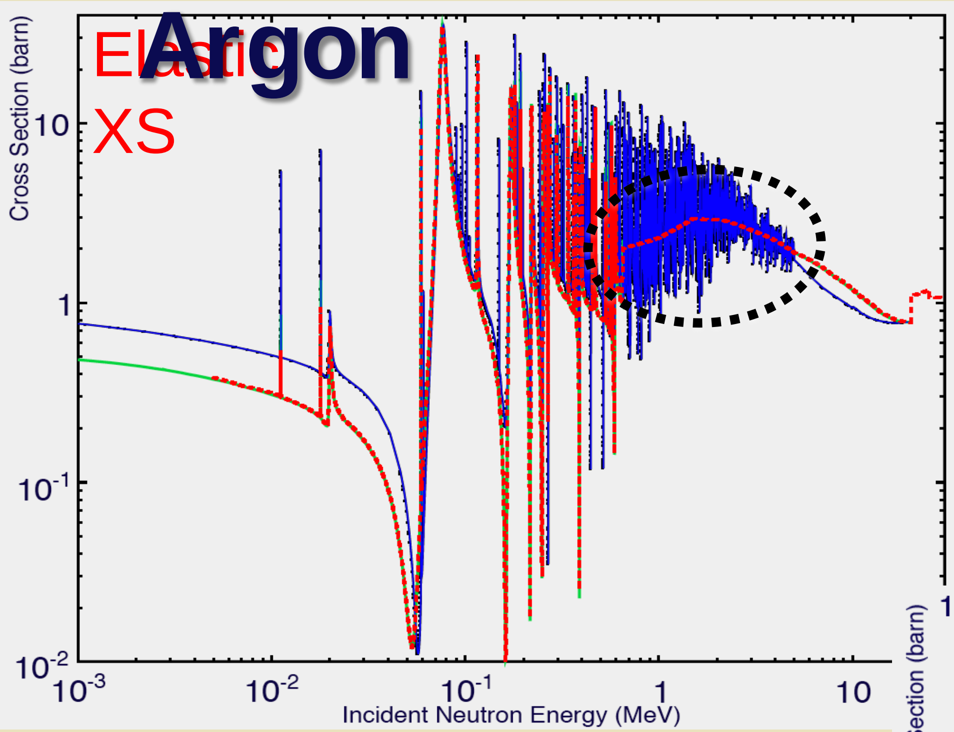
Technical Progress

A. Validation of neutron cross sections in noble gases

- Aim: Improve the performance and reliability of Geant
- Comparison of Geant4 and established databases

B. Validation of Low Energy EM physics models

Natural composition of Argon



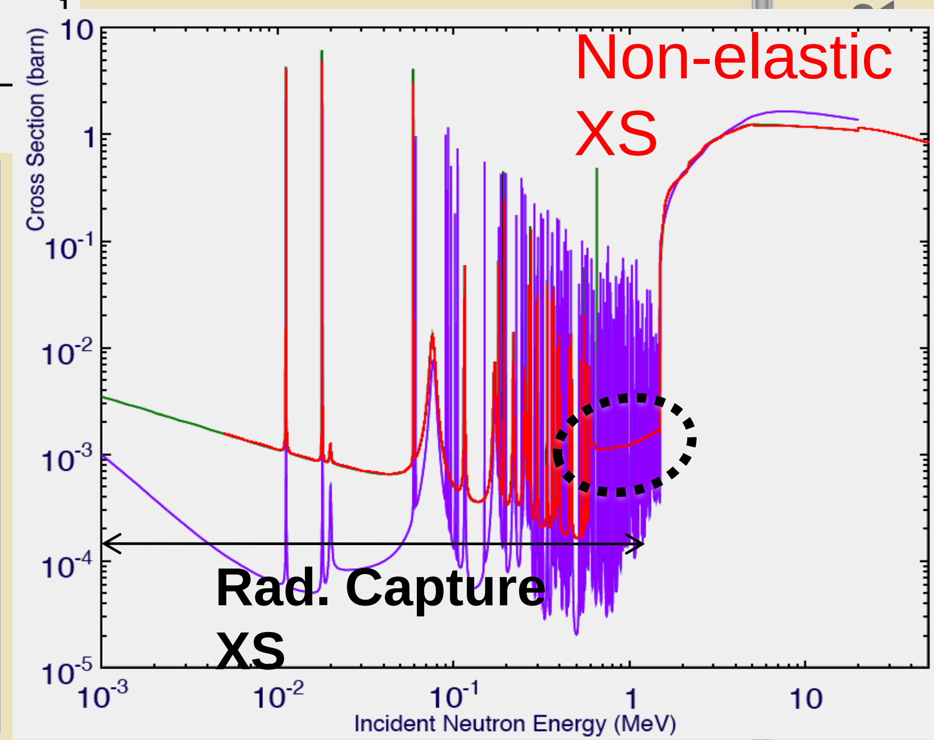
Geant4 : Red

JEF-2.2 : Black

JEFF-3.0 : Green

ENDF/ B-VII.0 : Blue

JEFF-3.1 : Purple



- Agreement between **Geant4** and the: **JEF 2.2** / **JEFF 3.0** libraries at all energy regions. Differences of the factor 2-20 with "new" libraries

- Results are available also for: Ca, He, H, Kr, O and Xe. Geant4 follows JEF-2.2 library for most elements.

- Moreover neutron cross sections

Technical Progress

A. Validation of neutron cross sections in noble gases

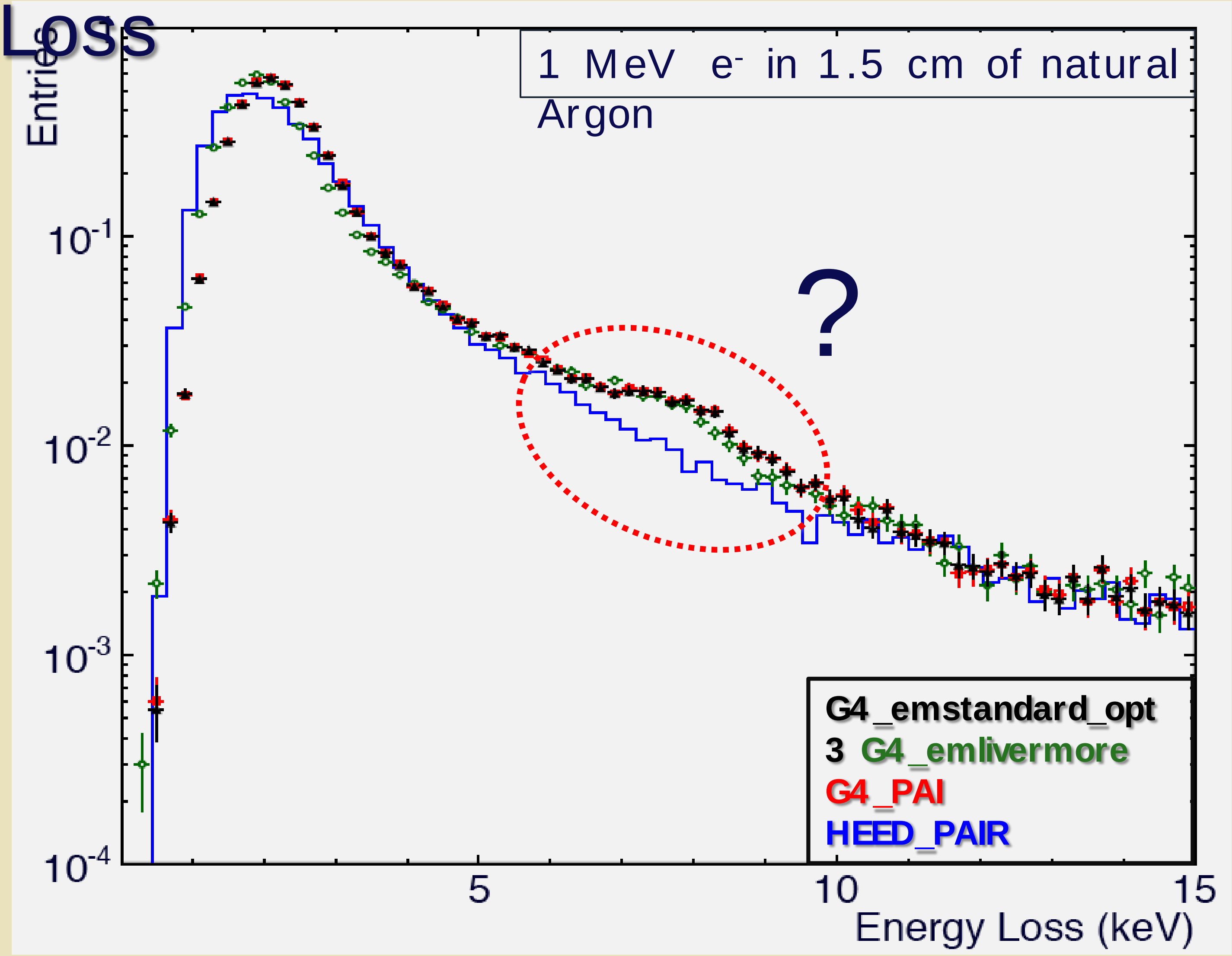
B. Validation of Low Energy EM Physics Models in gaseous detectors (Geant4, HEED & FLUKA)

- Non Elastic Scattering of neutrons emits γ's and charged particles.

- Standard EM in Geant4 emits no secondaries < ~1 keV

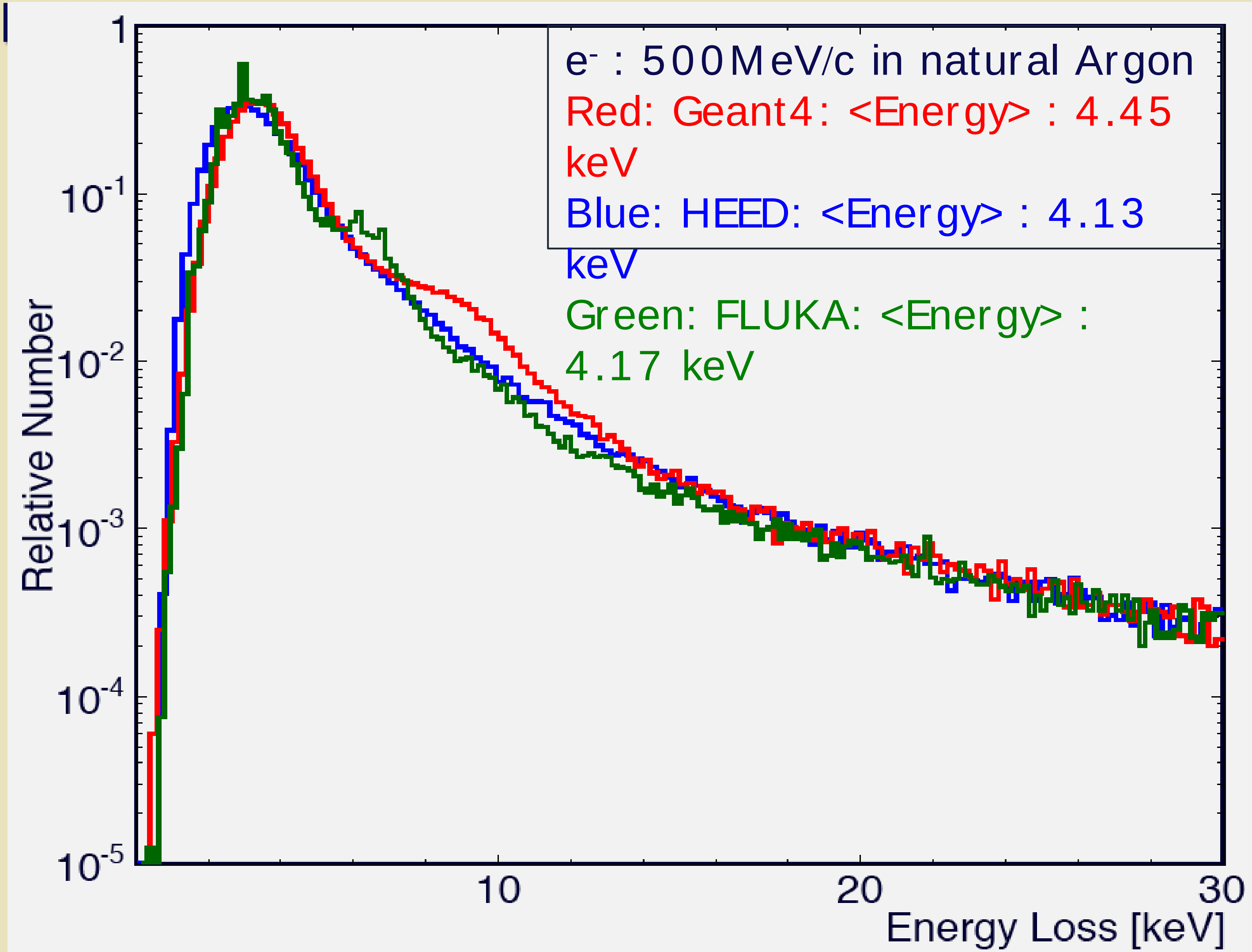
- Low energy EM in Geant4 include: atomic/molecular quantum effects
  (inner shell ionization, emission of Auger e- and fluorescence γ, etc.)

Ionization Energy Loss



- Overall shape of the ionization loss spectra is in good agreement
- Livermore model should not be used in the energy range 1MeV - 5GeV, due to lack of data
- Found a shoulder in Geant4 and we are investigating it together with experts

Comparison between Geant4, HEED and



- ➢ General features: rather similar making the identification of the "shoulder" mandatory
- ➢ In search of beam data (a micromegas detector with appropriate thickness and good

Attended Trainings / Meetings:

- [redacted]**tronics**, AGH Cracow - September 2009

- [redacted]**etector Simulation and Data Analysis**, DESY [redacted]

- [redacted]nt on **Processing and Radiation Hardness of** [redacted]ubljana - September 2010

- [redacted]ng, CERN - January 2

Attended Trainings / Meetings:

[redacted]

- [redacted]cy, France, November 2008
- [redacted]emokritos, Athens, Greece, March 2009
- [redacted] **SUSY models**, Nikhef, Amsterdam, December [redacted]
- [redacted]-On Introduction, CERN, October 2009
- [redacted]bject-Oriented & Generic Programming, CERN, [redacted]
- [redacted]**l on Instrumentation**, CERN, May 2009
- [redacted]ional **French Courses**, Geneva

[redacted]

- [redacted]**Workshop**, Madrid, Spain, May 2009
- [redacted]February 2010

Dissemination:

- Internal note for university of Amsterdam, December 2009
- ~ 20 reports/updates in team meetings
- Presentation in RD51 Mini Week at CERN, February 2010
- Posters (Uploaded in Activity Log):
  1. 1st Training Event on Electronics, AGH Cracow – September 2009
  2. Marie Curie Poster Exhibition "Training for Europe", CERN, September 2010

Milestones/deliverables:

no.	Milestone name	WP no	Lead beneficiary	Delivery Date	Comment
P12-M1	First version of generic MC code application(s) for neutrons on calorimeters with Geant4/Fluka	12	INFN	m22	Software
P12-M2	Initial version of coupled MC application for simulation of neutrons in gas detectors	12	INFN	m27	Software
P12-M3	Results of comparisons of MC application against available data for electrons in calorimeter setup and for neutrons in calorimeter and gas setups	12	CERN	m24	Report
P12-M4	Improved Geant4/Garfield application for gas detector simulation	12	CERN	m36	Software

Thank you

Backup Slides

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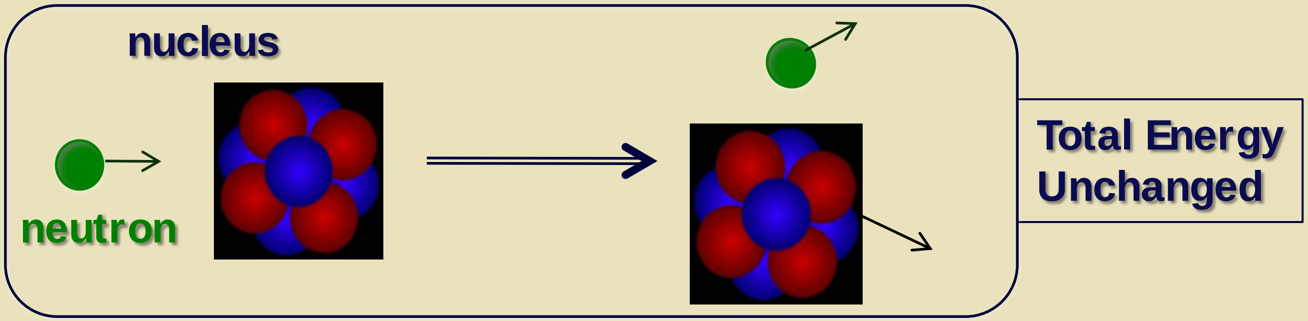
Interaction of neutrons with matter

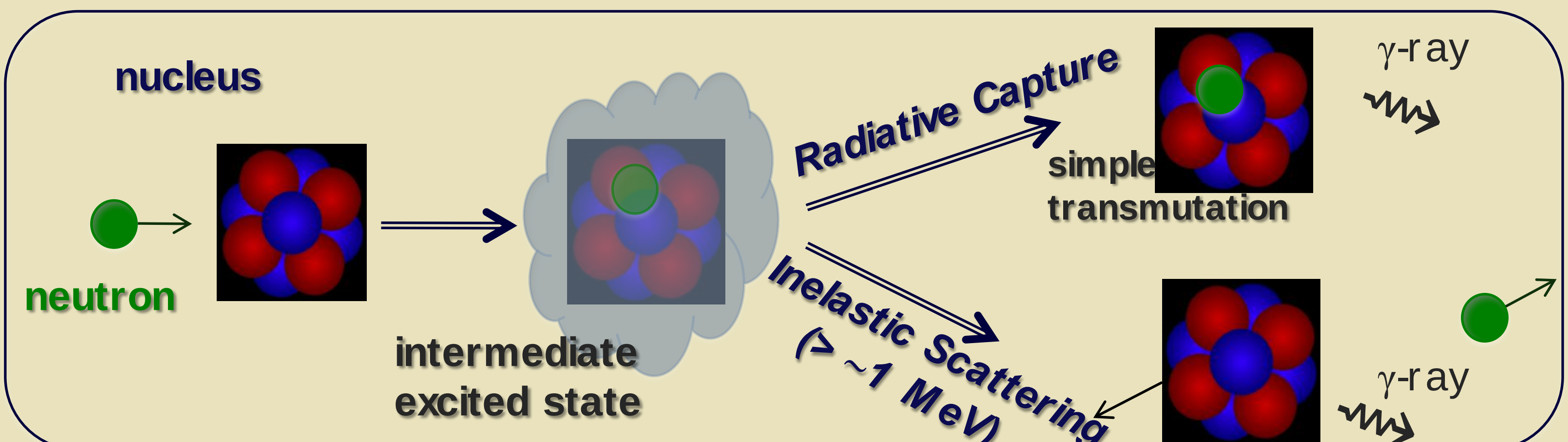
A. Elastic Scattering

- Energy of recoiling nucleus absorbed by medium.



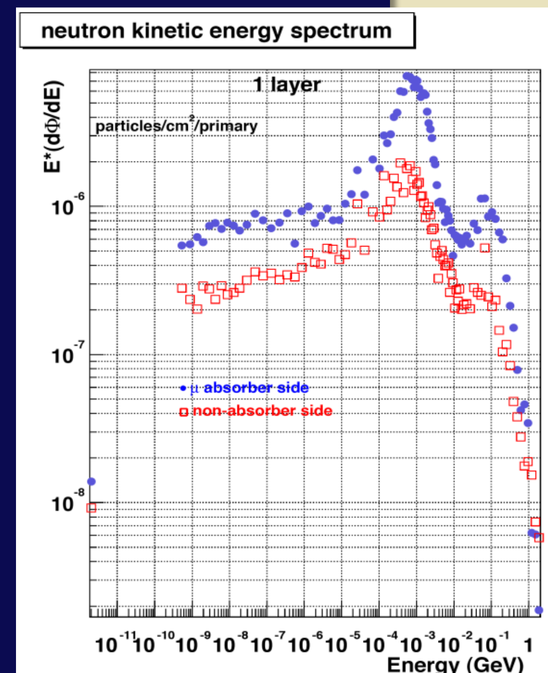
B. Non Elastic Scattering

- Energy of recoiling nucleus absorbed by medium.



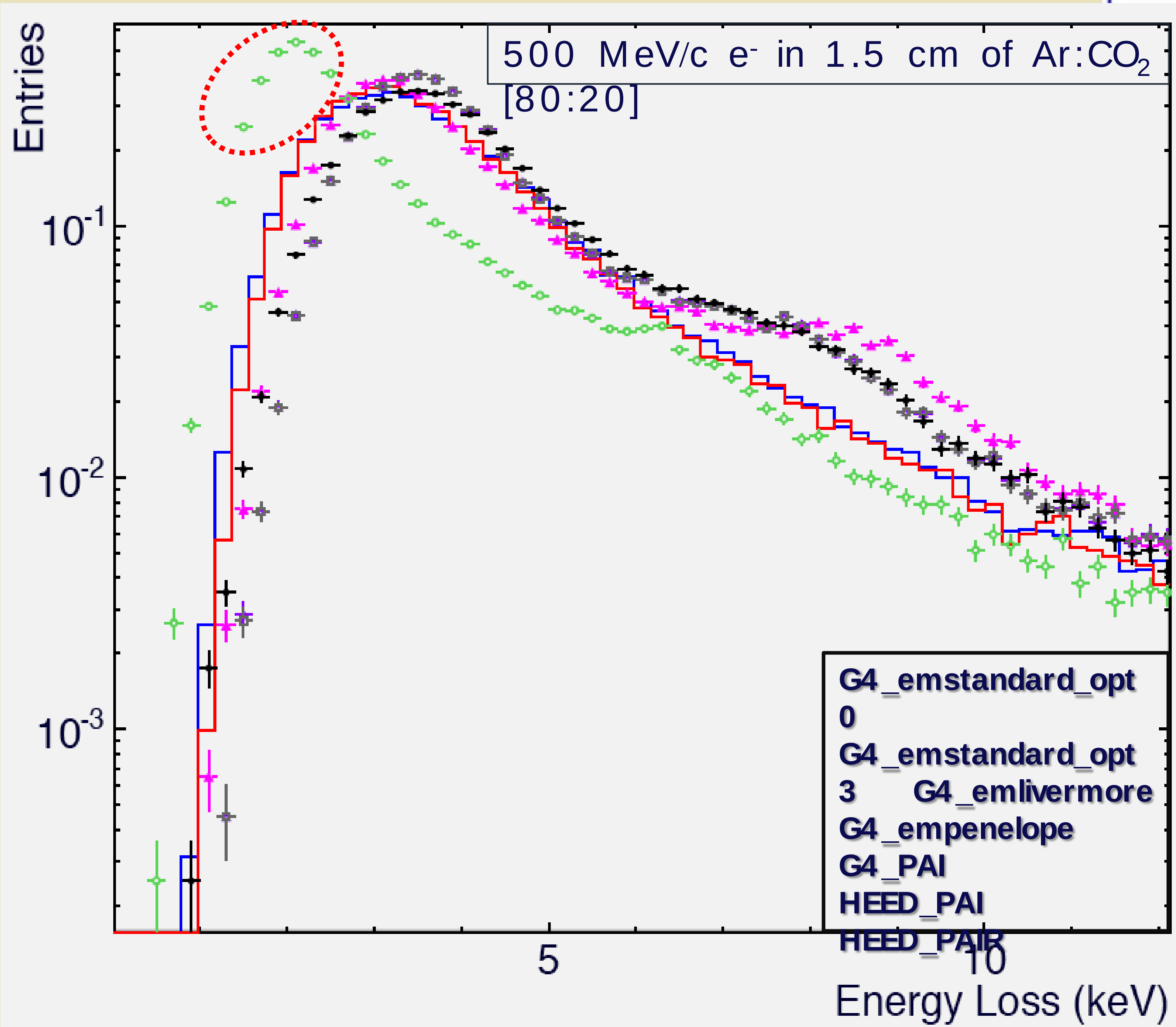
A. [redacted] C

➢ [redacted]

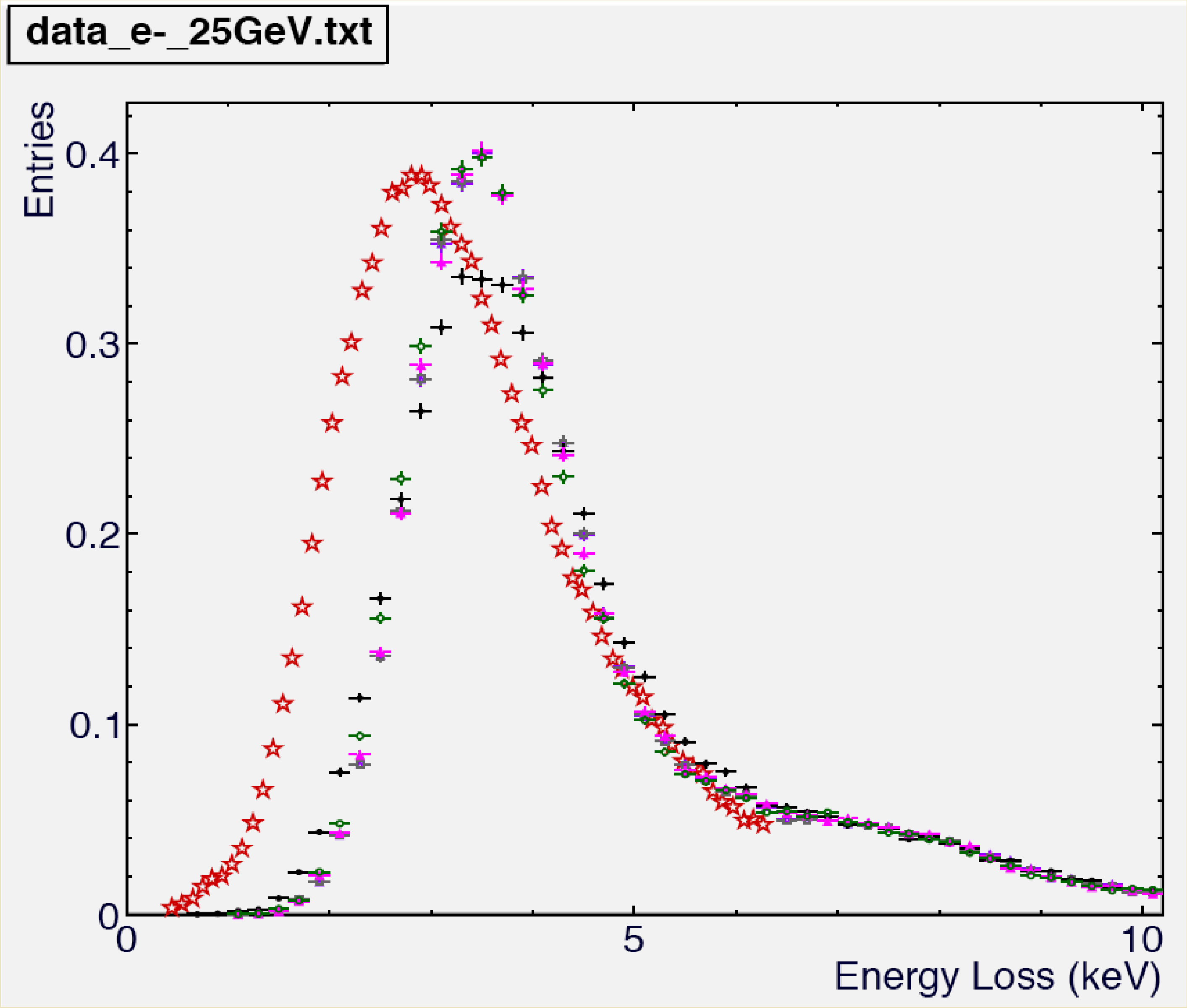


[redacted] like

➢ [redacted]



Entries
500 MeV/c e- in 1.5 cm of Ar:CO2 [80:20]
10^{-1}
10^{-2}
10^{-3}
5
10
Energy Loss (keV)
G4_emstandard_opt 0
G4_emstandard_opt 3
G4_emlivermore
G4_empenelope
G4_PAI
HEED_PAI
HEED_PAIR


data_e-_25GeV.txt
Entries
0.4
0.3
0.2
0.1
0
0
5
10
Energy Loss (keV)

[redacted] 28-37, 41-42, 102-116

[redacted] residual.
[redacted] MT=50-91.

[redacted] in the ground state.

[redacted] MT number.

[redacted] continuum reactions and

[redacted]