Radiator Optimization for Bubble Chamber Engineering Run – FLUKA Modeling Results

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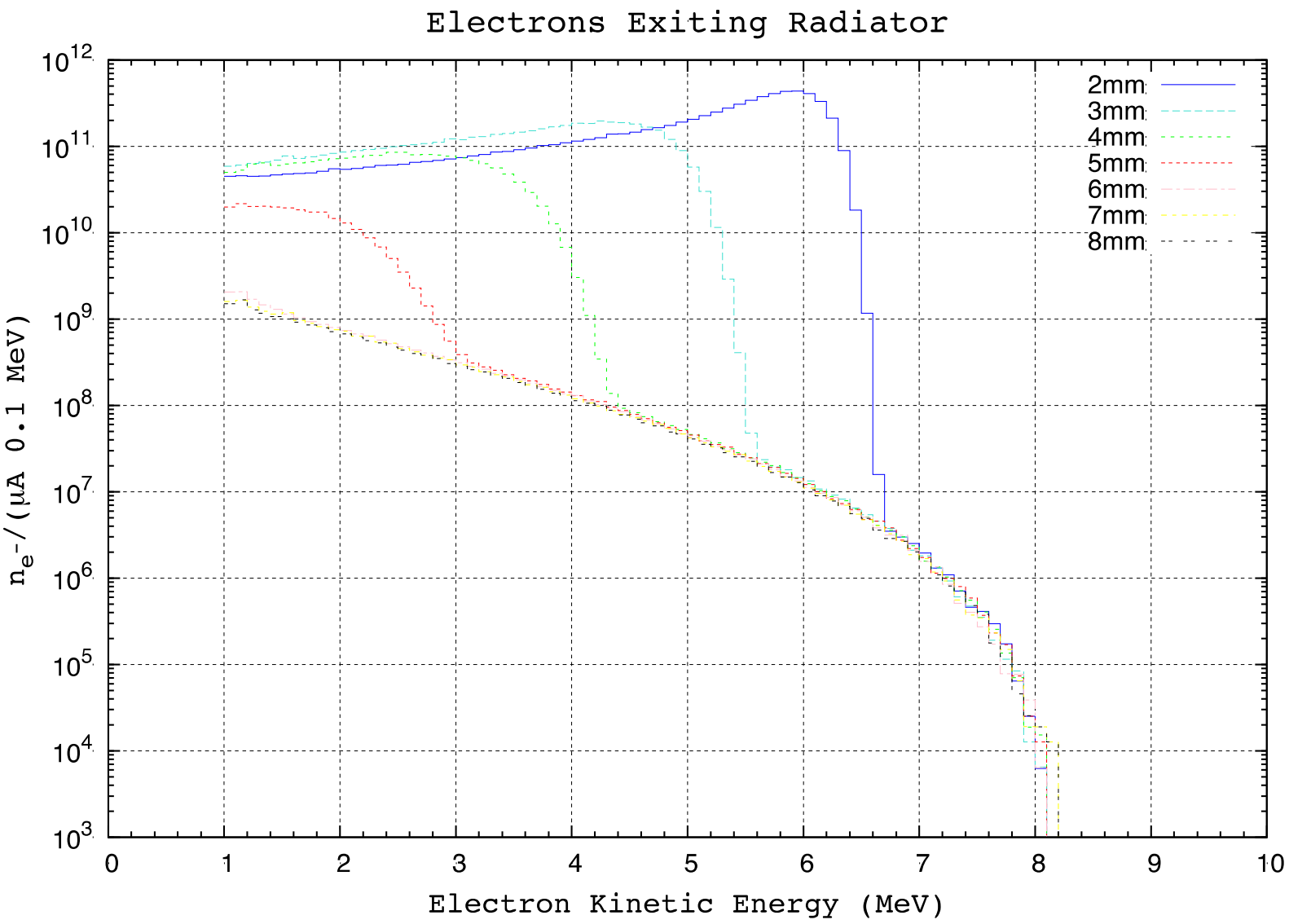
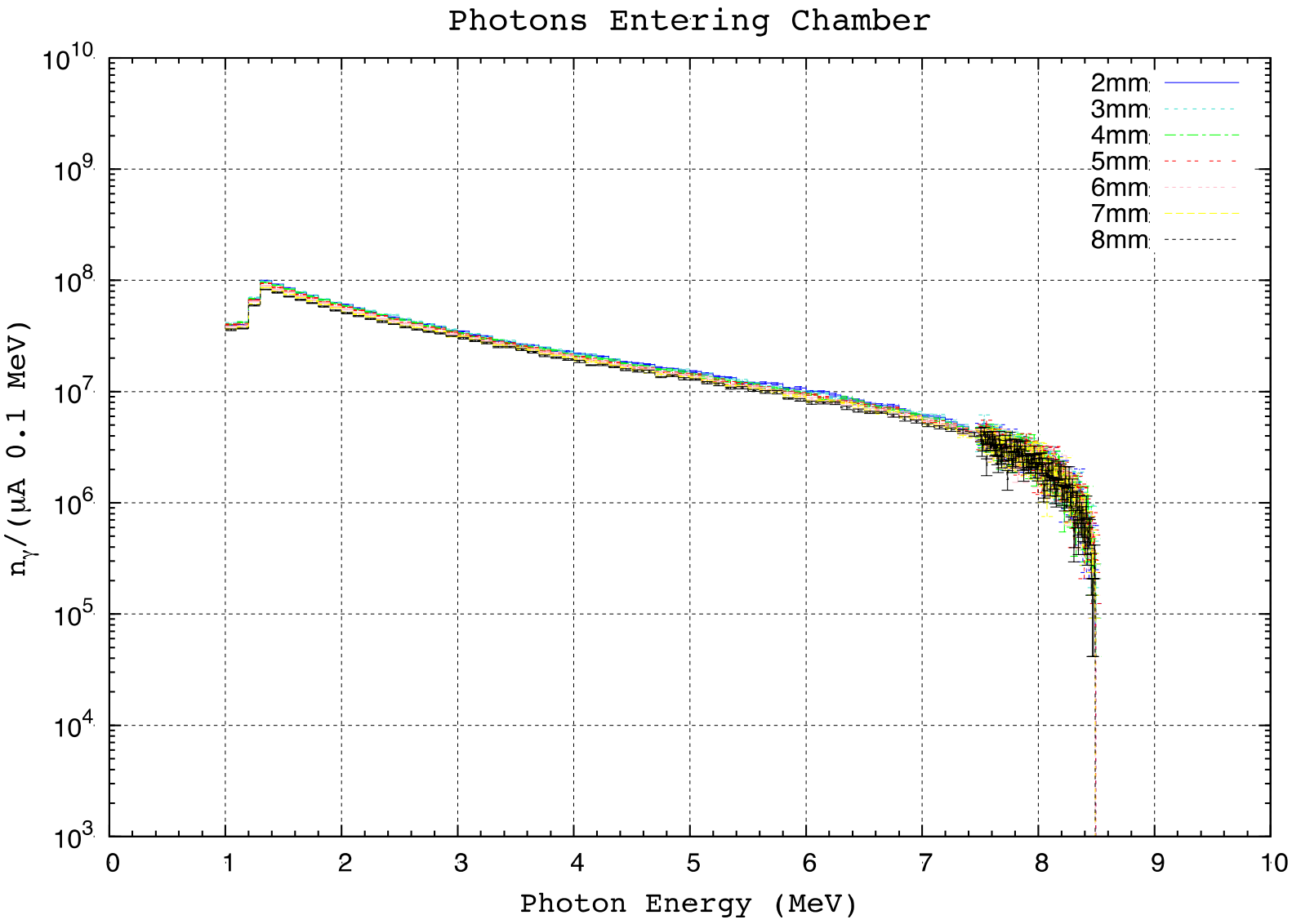
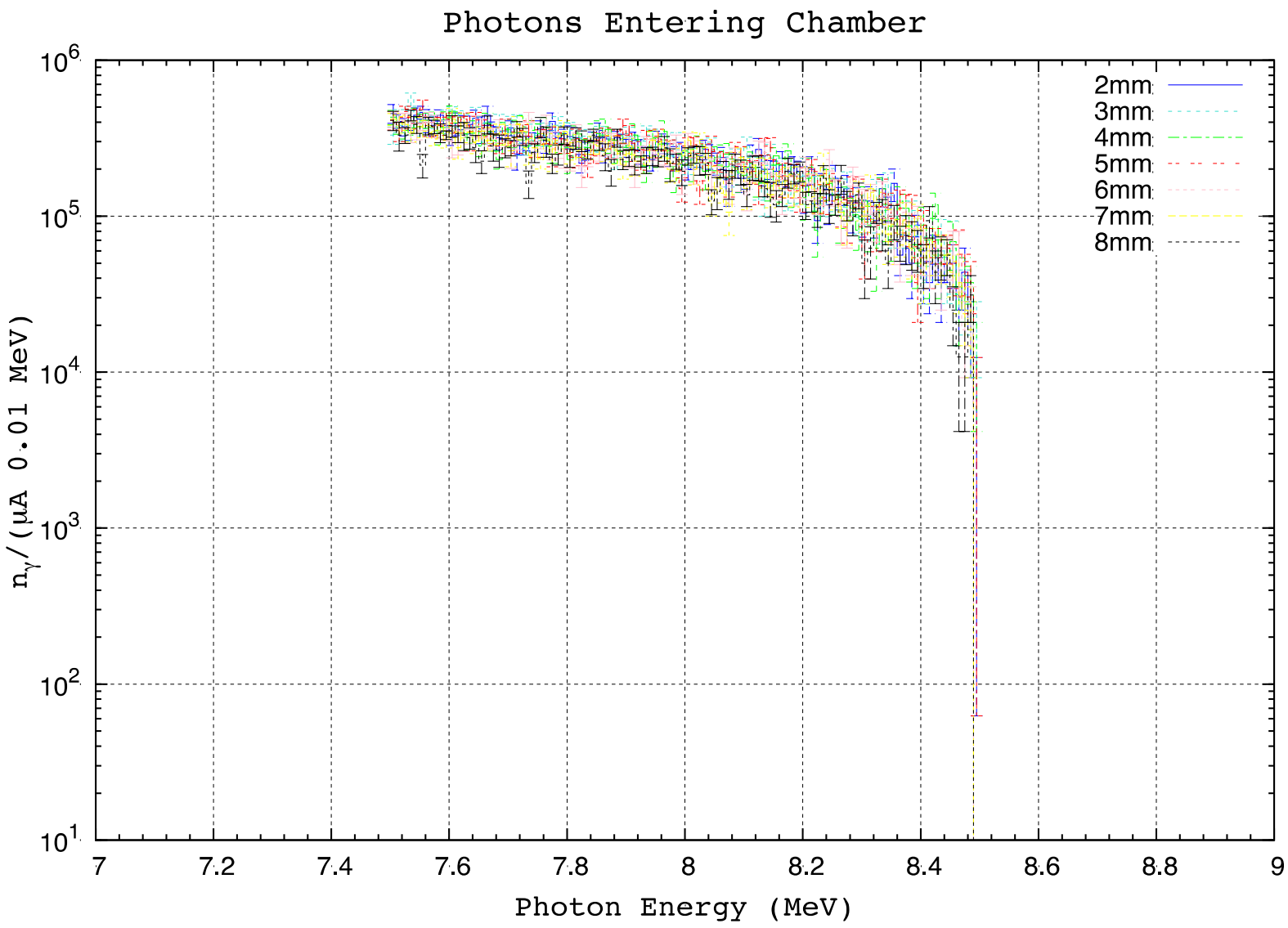
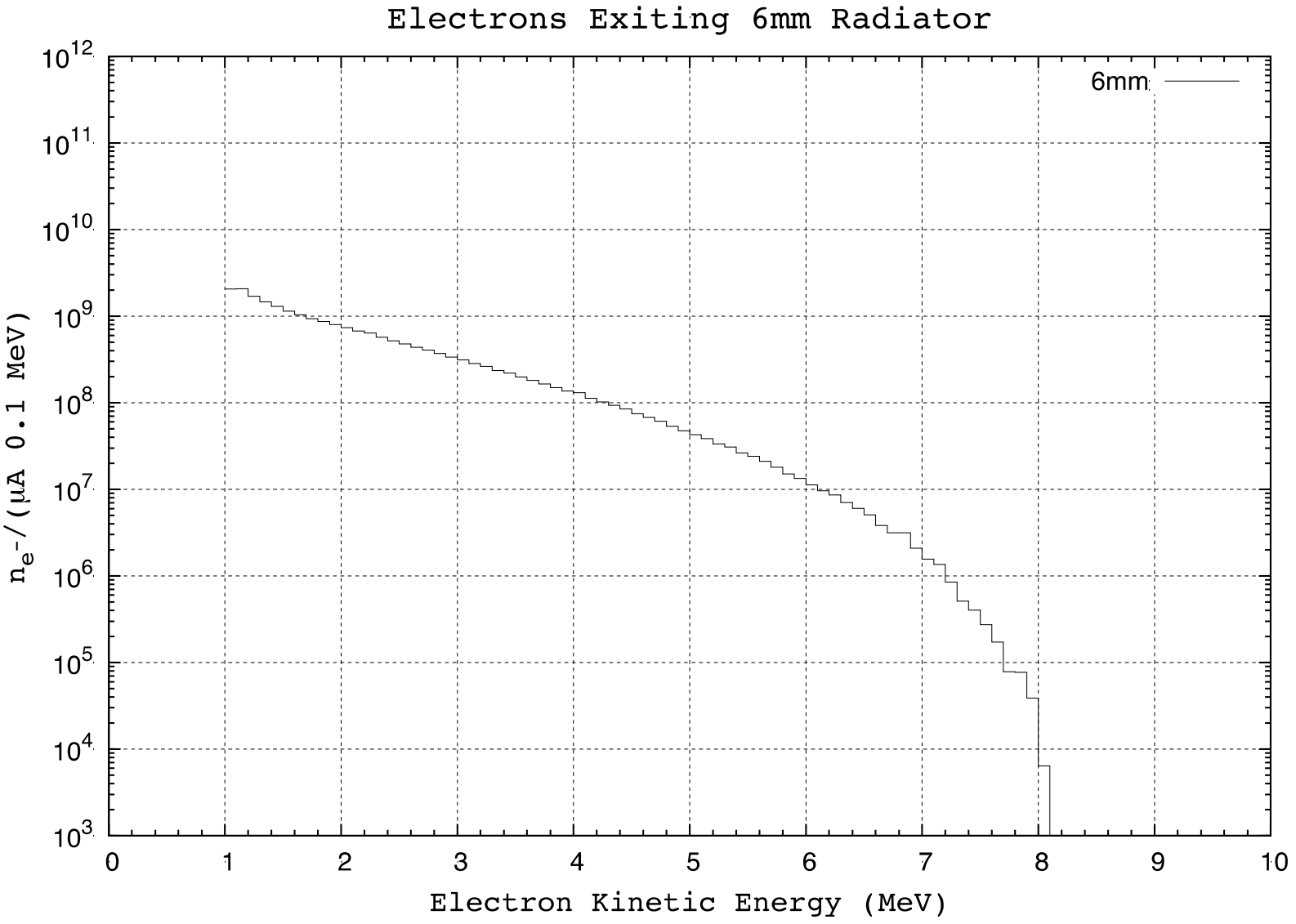
Model Description

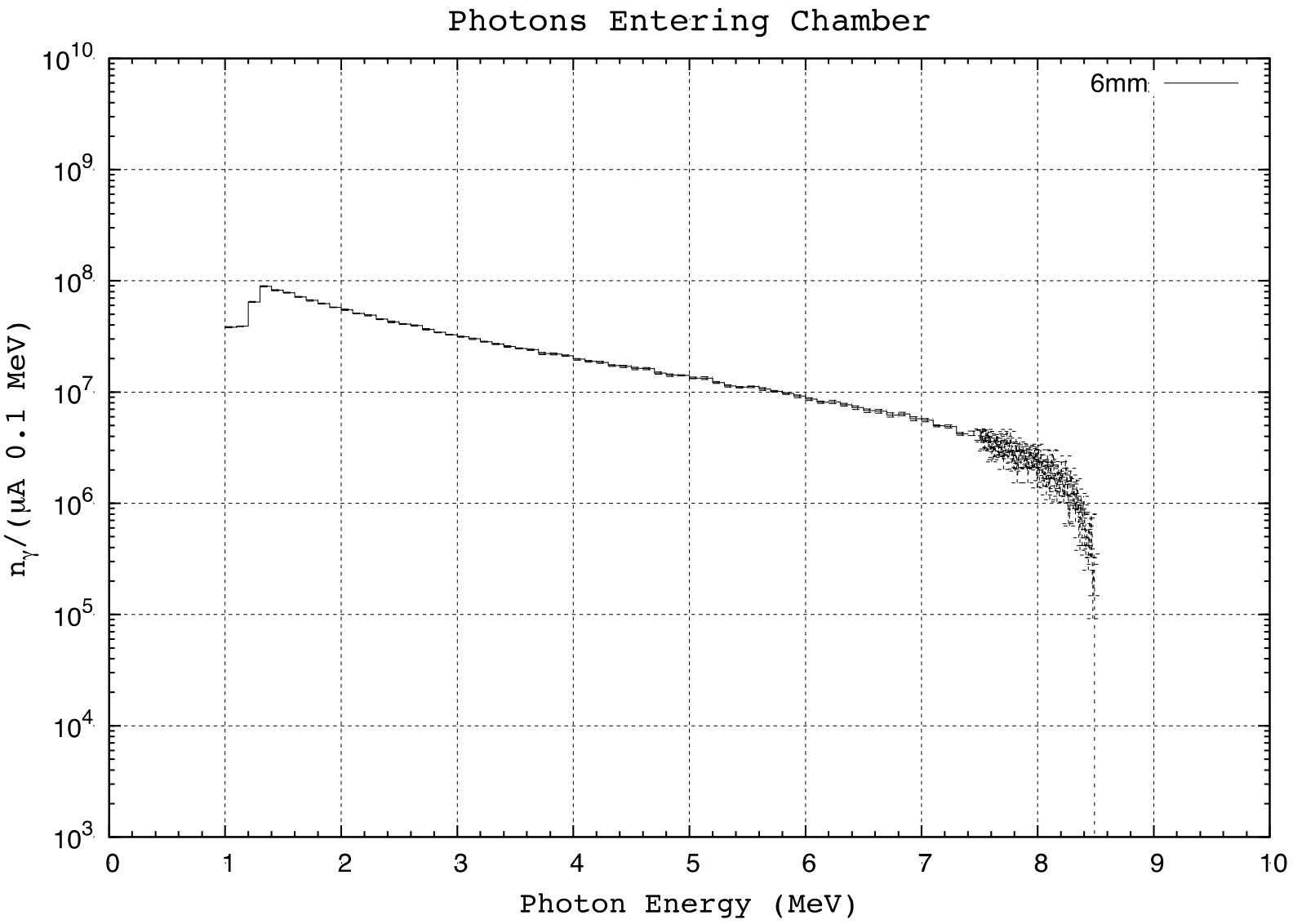
- FLUKA version 2011.2b.6
- Simplified geometry
  - Copper radiator
    - 5cm radius disk
    - Thickness from 2mm to 8mm
  - Placed in vacuum
  - Control volume representing bubble chamber
    - 5 mm radius, 3 cm long (along beam axis) cylinder
    - 40 cm downstream from radiator
- 8.5 MeV kinetic energy e^- beam
- e^-, e^+, Υ production and transport threshold = 1 MeV

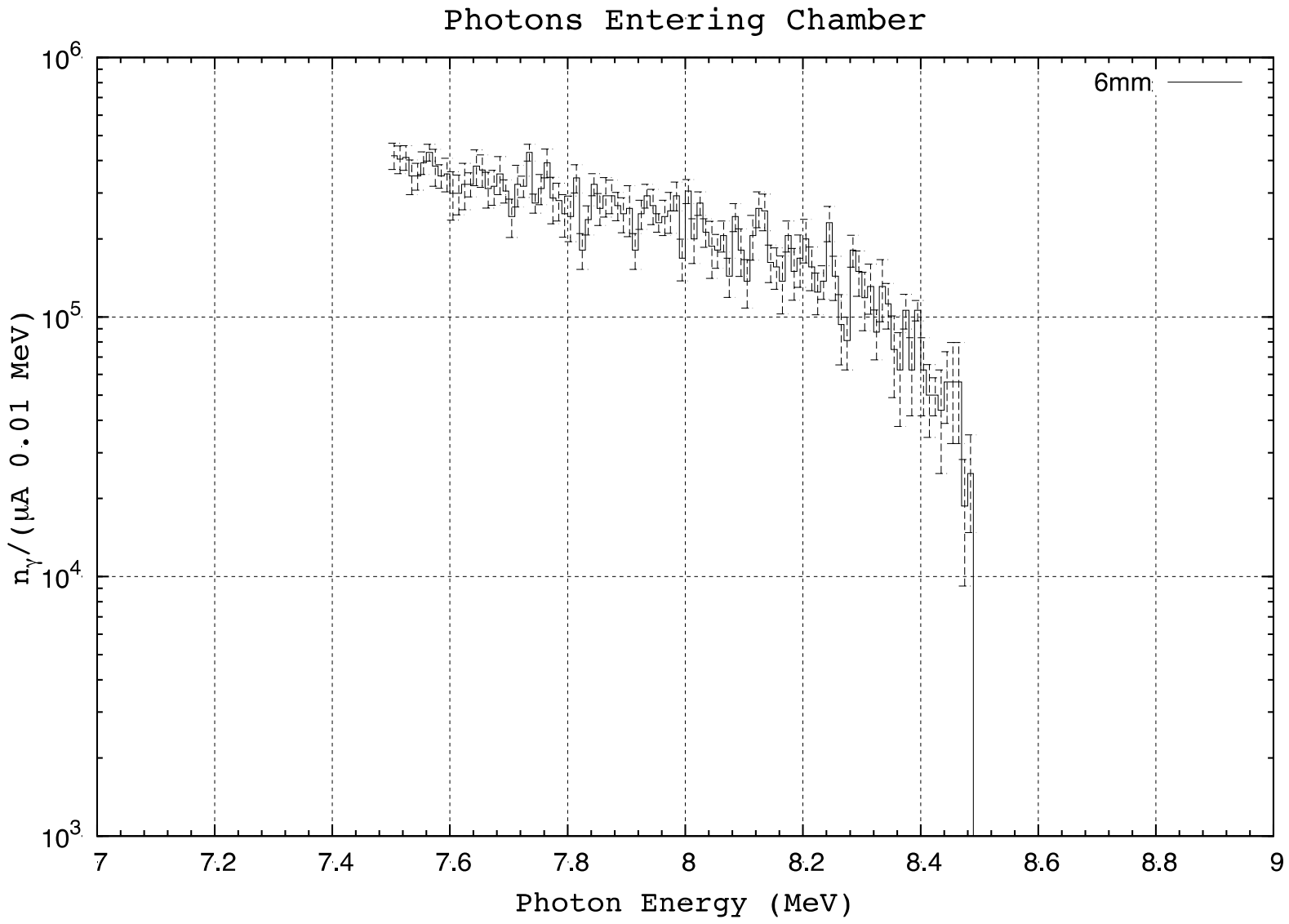

Electrons Exiting Radiator
2mm
3mm
4mm
5mm
6mm
7mm
8mm
10^{12}
10^{11}
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
$n_{e^-}/(\mu A\ 0.1\ MeV)$
0
1
2
3
4
5
6
7
8
9
10
Electron Kinetic Energy (MeV)


Photons Entering Chamber
2mm
3mm
4mm
5mm
6mm
7mm
8mm
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
n_γ/(μA 0.1 MeV)
0
1
2
3
4
5
6
7
8
9
10
Photon Energy (MeV)


Photons Entering Chamber
2mm
3mm
4mm
5mm
6mm
7mm
8mm
10^6
10^5
10^4
10^3
10^2
10^1
n_γ/(μA 0.01 MeV)
7
7.2
7.4
7.6
7.8
8
8.2
8.4
8.6
8.8
9
Photon Energy (MeV)


Electrons Exiting 6mm Radiator
6mm
10^{12}
10^{11}
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
$n_{e^-}/(\mu A\ 0.1\ MeV)$
0
1
2
3
4
5
6
7
8
9
10
Electron Kinetic Energy (MeV)


Photons Entering Chamber
6mm
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
$n_\gamma/(\mu A\ 0.1\ MeV)$
0
1
2
3
4
5
6
7
8
9
10
Photon Energy (MeV)


Photons Entering Chamber
6mm
10^6
10^5
10^4
10^3
n_γ/(μA 0.01 MeV)
7
7.2
7.4
7.6
7.8
8
8.2
8.4
8.6
8.8
9
Photon Energy (MeV)