First results of background simulation in CTD

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Main physical background sources:

1. Two-photon processes $e^+e^- \to \gamma^*\gamma^* \to e^+e^-e^+e^-$
2. Radiative Bha-Bha $e^+e^- \to e^+e^-\gamma(n\gamma)$

Generated:

1 mln. events with two-photon e+e- production, generator diag36, cross-section ~6 mb (F.Ignatov)

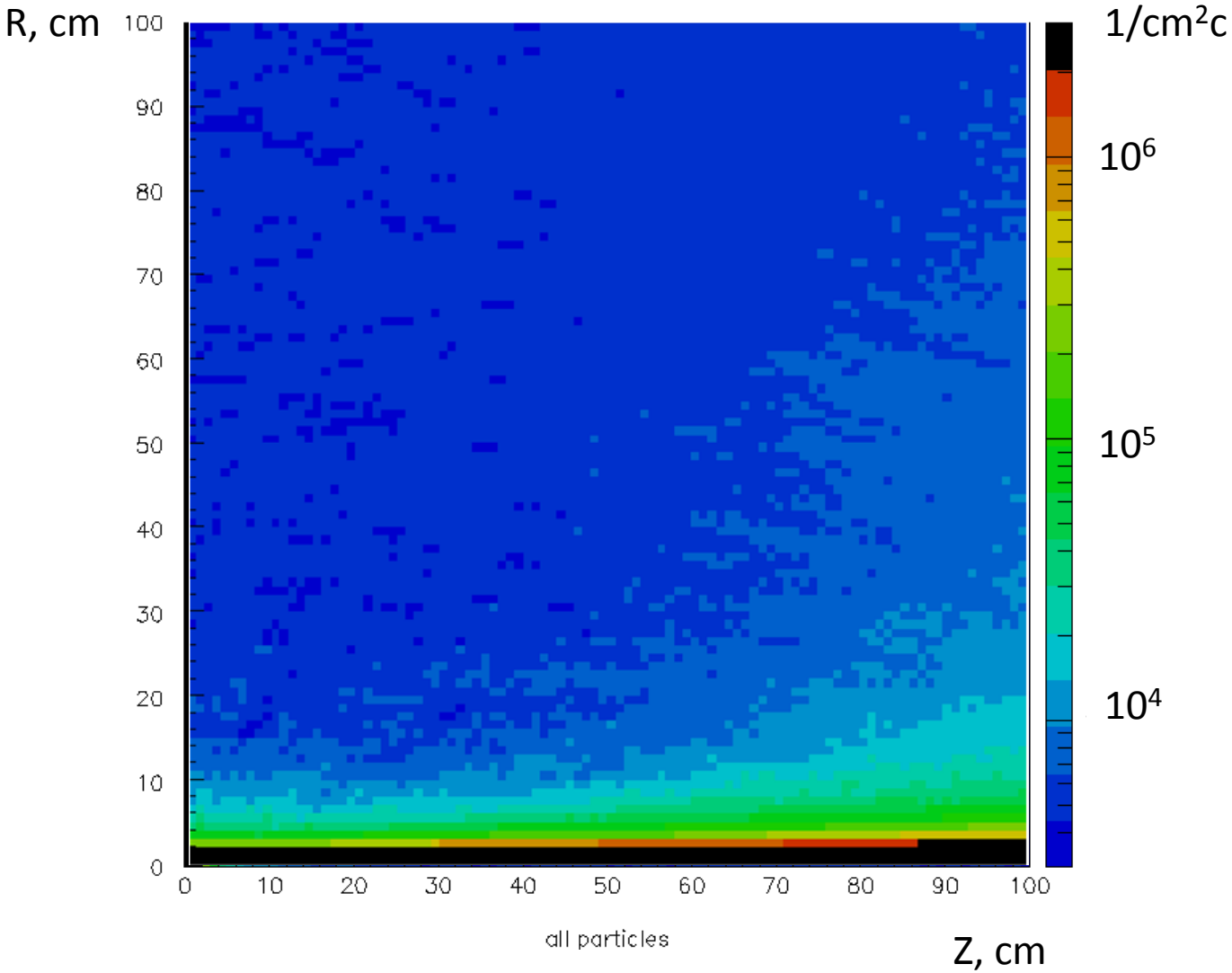
10^5 e+e-nγ, generator BHWIDE (LEP/SLC), сечение 1.7 mb (θ>5mrad, E_γ>3MeV) (help of V.Tayurskij)

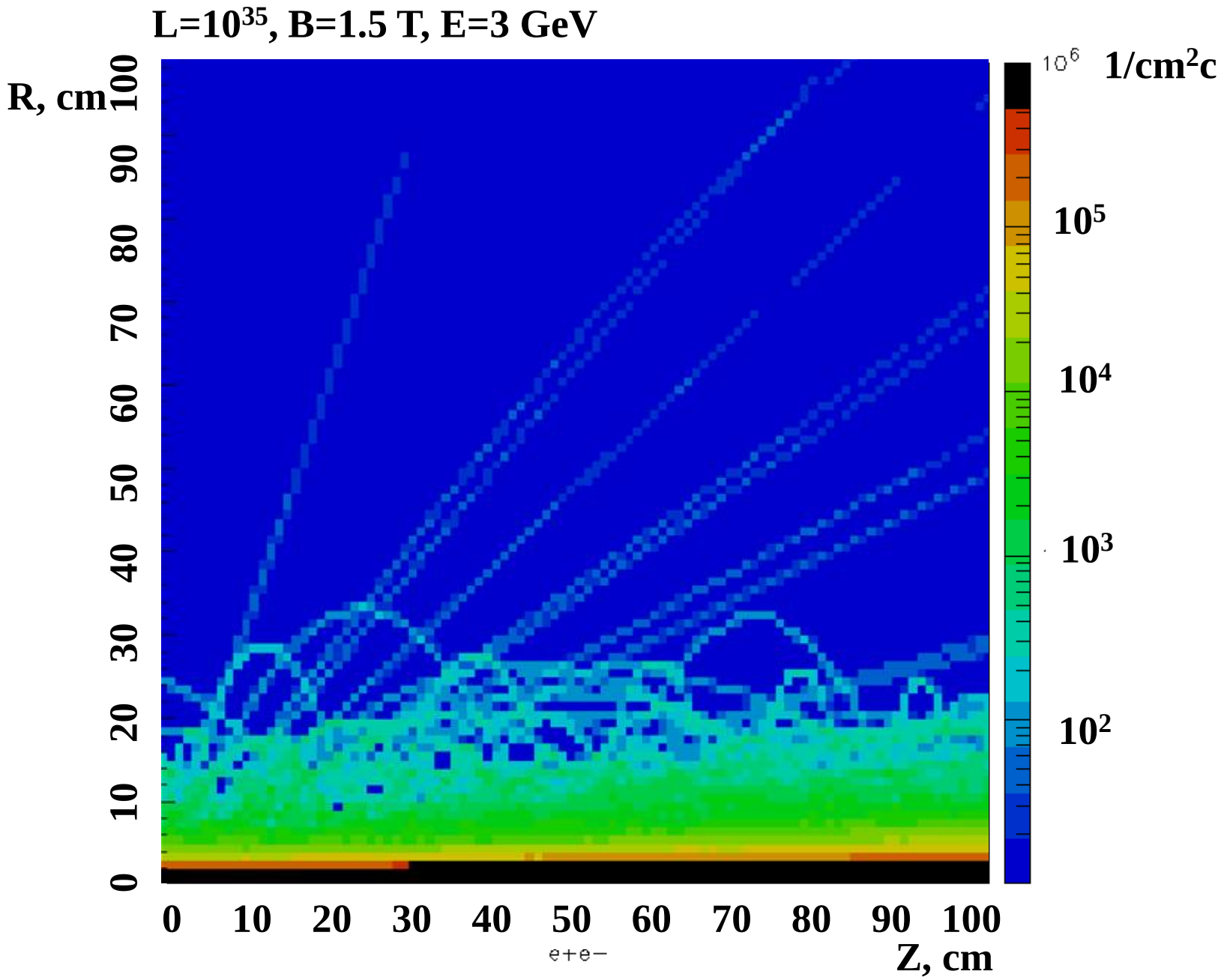
Background simulation, step 0:

Created “source” – particles from two processes are mixed in the necessary proportion, made the routine to “push” primary particles in FLUKA, compiled the executable

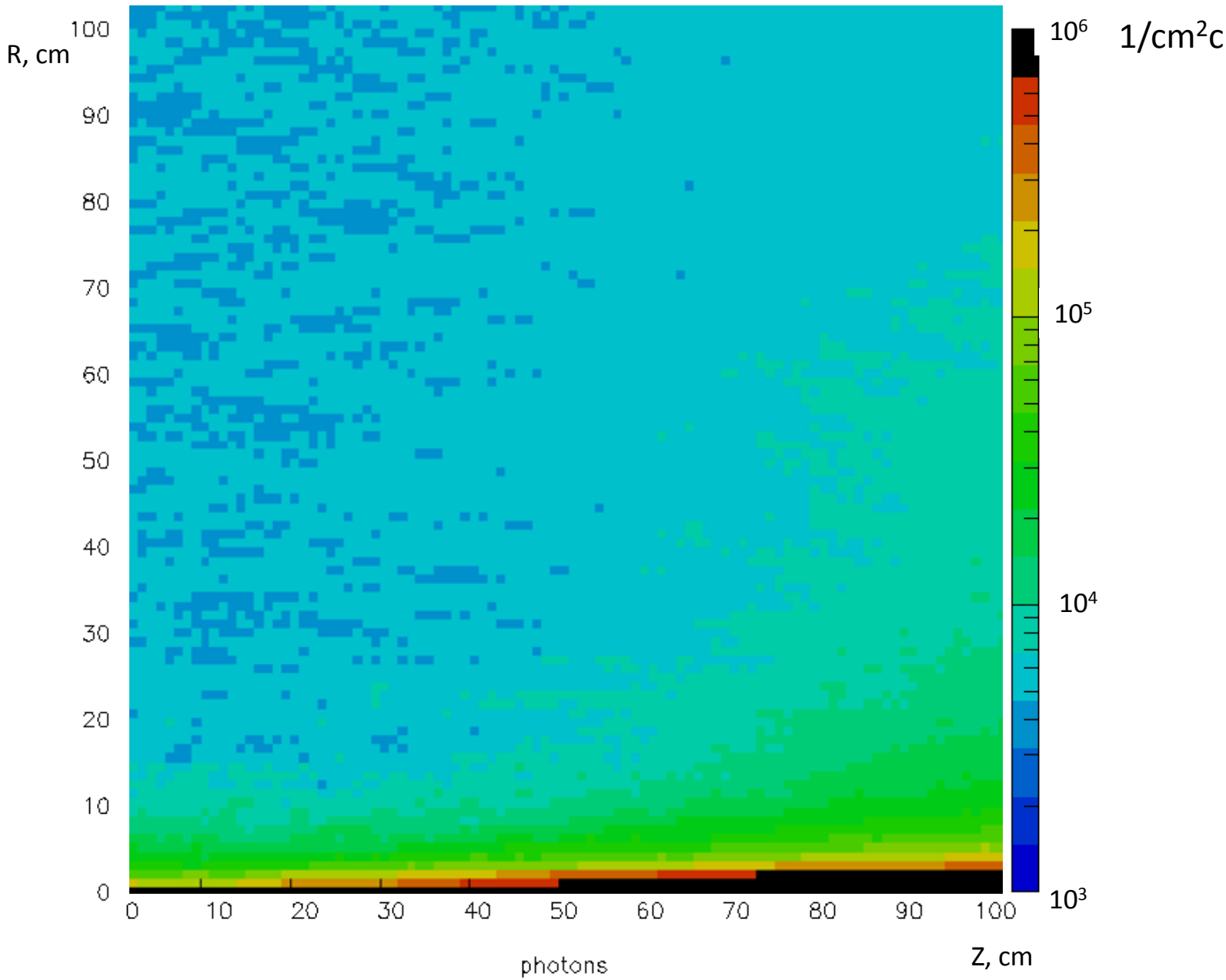
Created all infrastructure for simulation at stark. Geometry for testing the “source”– uniform vacuum pipe with 30 мм diameter and 3 mm thick wall, vacuum is everywhere.

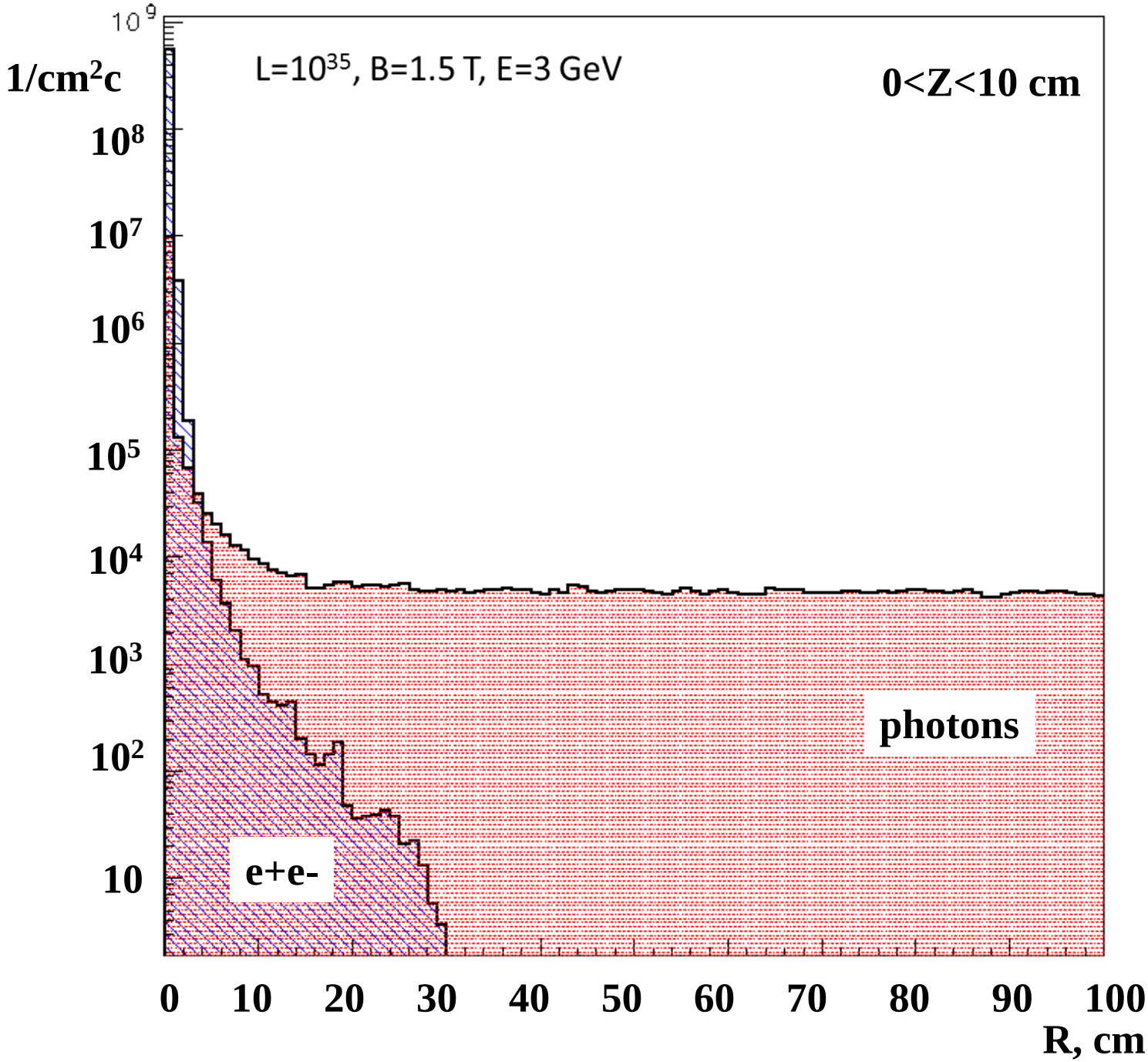
L=10^{35}, B=1.5 T, E=3 GeV



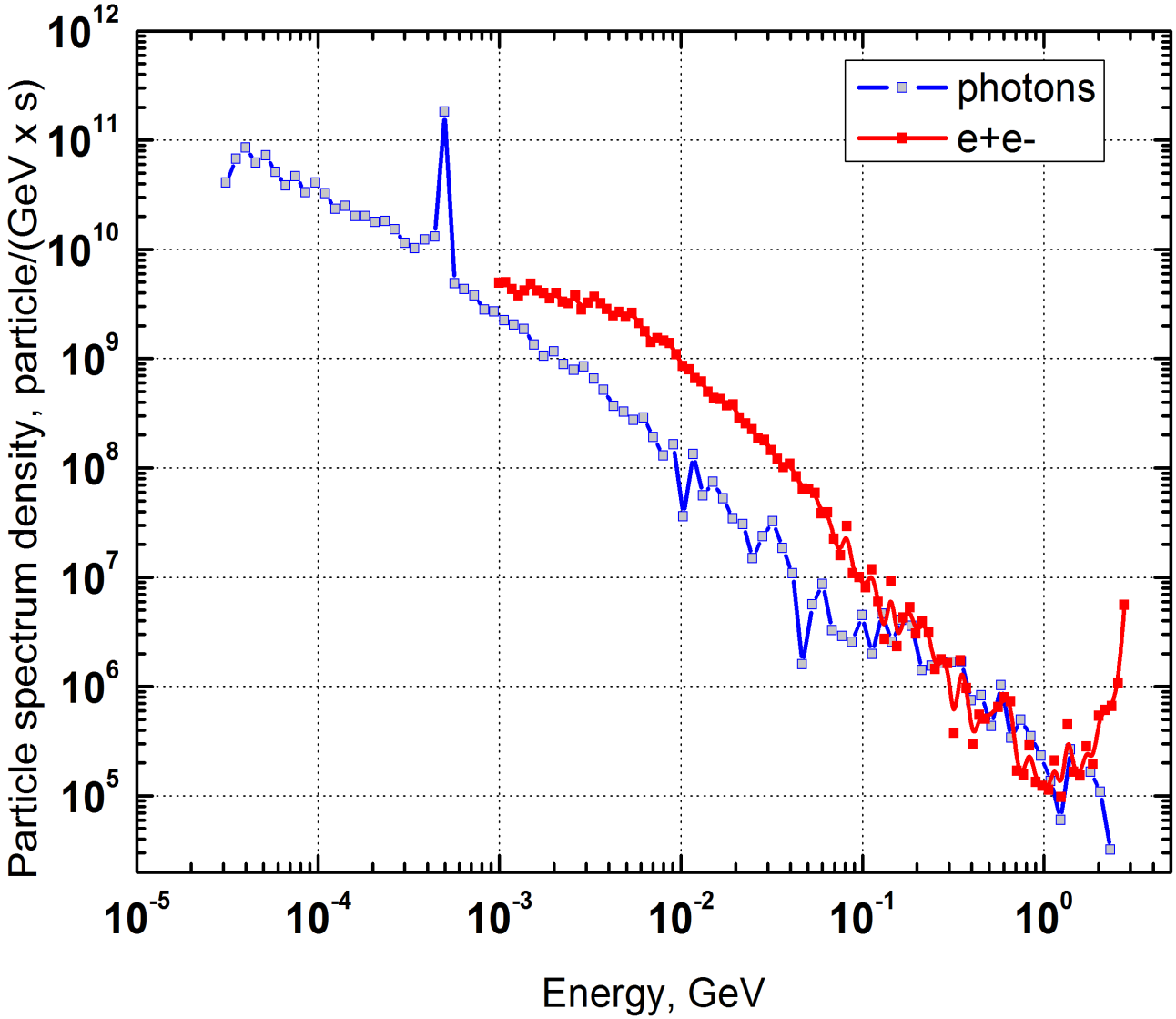

L=10^35, B=1.5 T, E=3 GeV
R, cm
0
10
20
30
40
50
60
70
80
90
100
Z, cm
e+e−
10^6
1/cm^2c
10^5
10^4
10^3
10^2

L=10^{35}, B=1.5 T, E=3 GeV




1/cm²c
L=10³⁵, B=1.5 T, E=3 GeV
0<Z<10 cm
10⁹
10⁸
10⁷
10⁶
10⁵
10⁴
10³
10²
10
photons
e+e-
0
10
20
30
40
50
60
70
80
90
100
R, cm

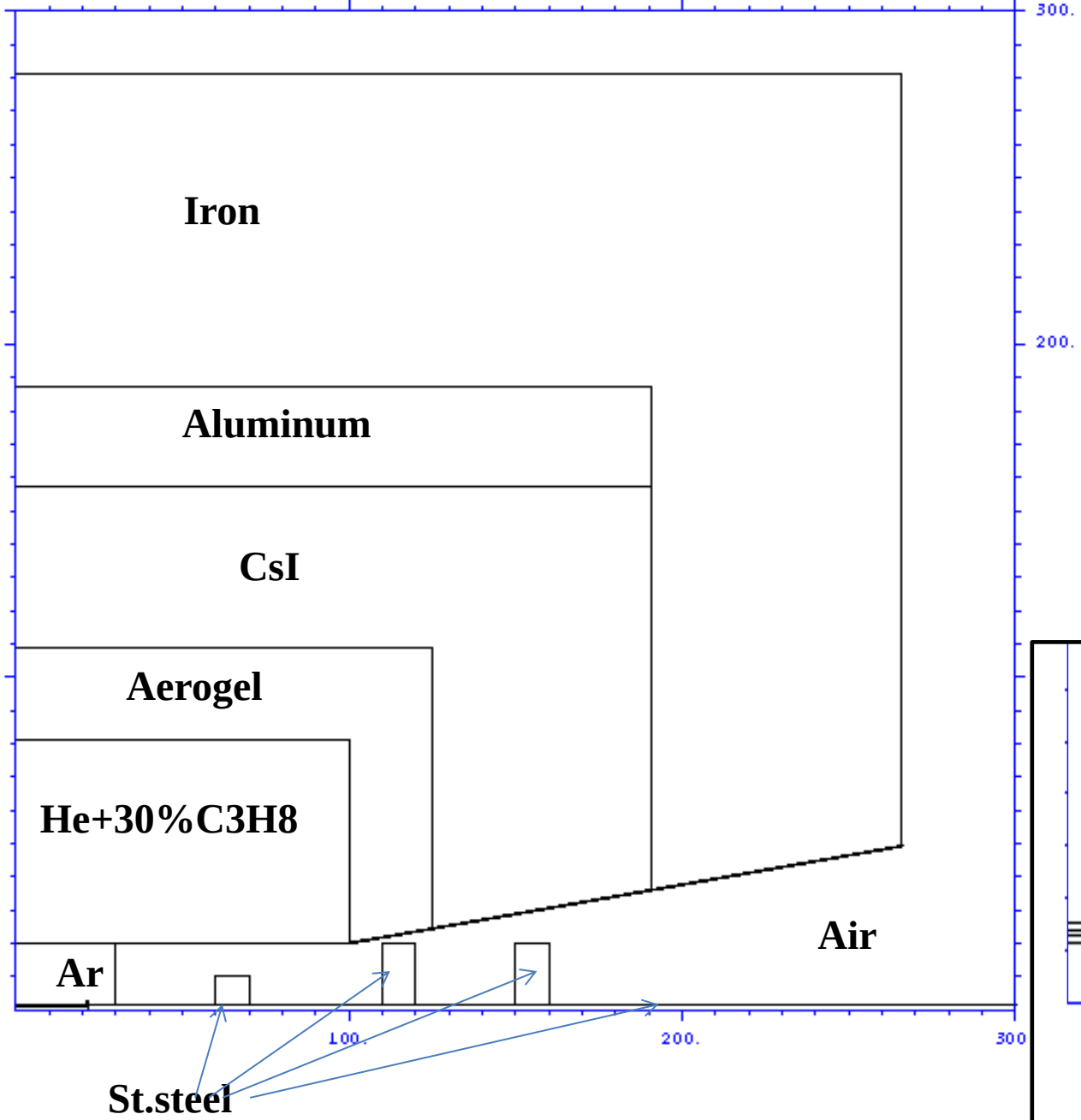
Background particles that exit VP and enter Inner Tracker (R=1.8 cm, -30cm<Z<30cm)
L=10^{35}, B=1.5 T, E=3 GeV

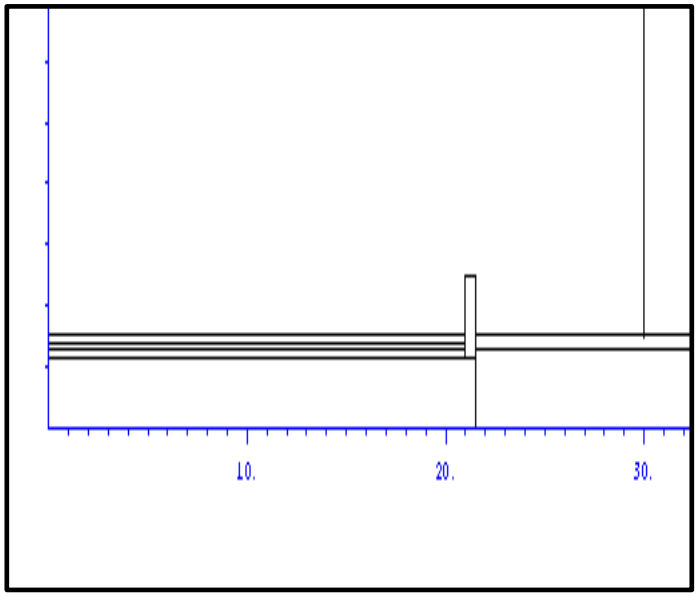


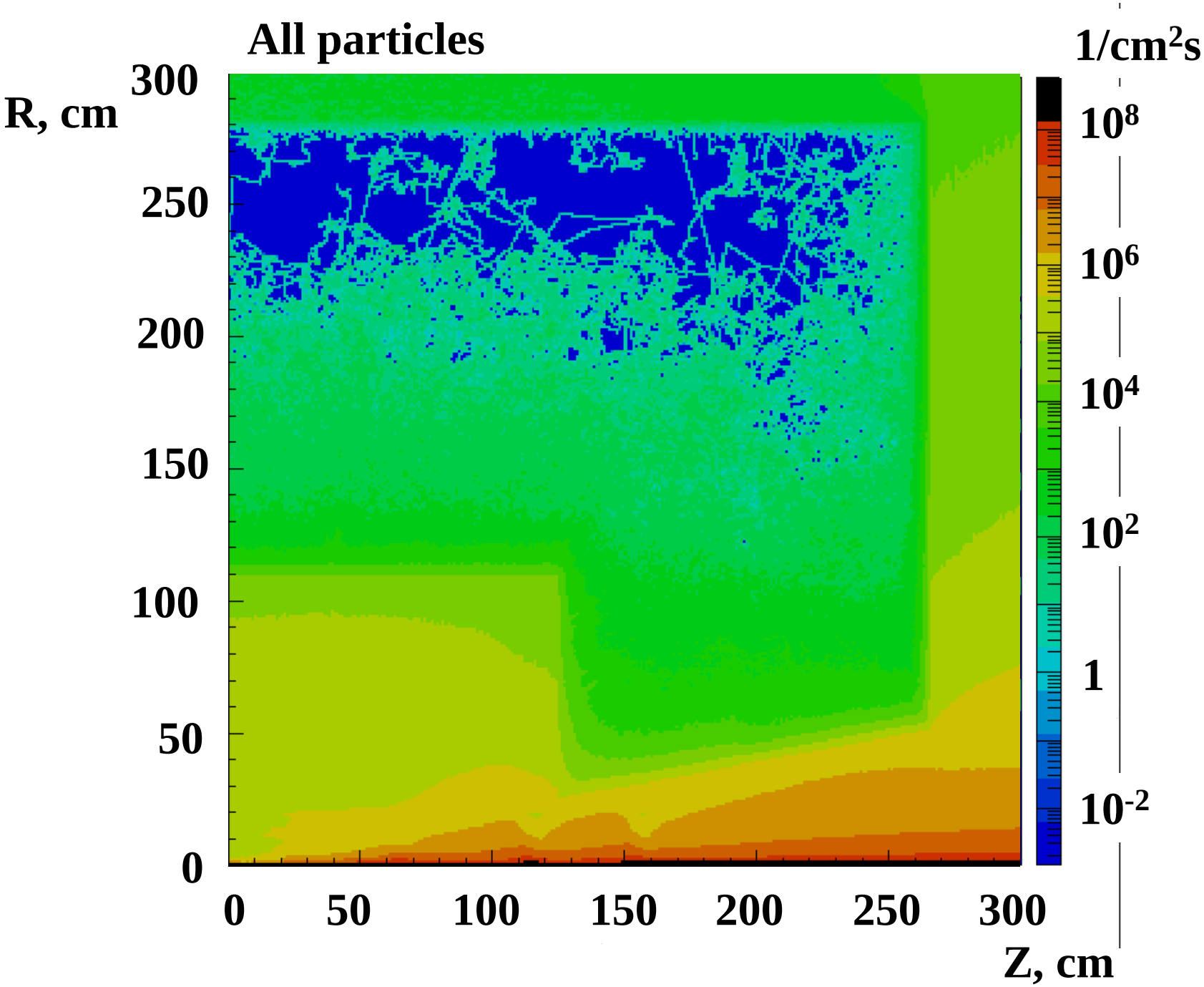
Background simulation, step 1:

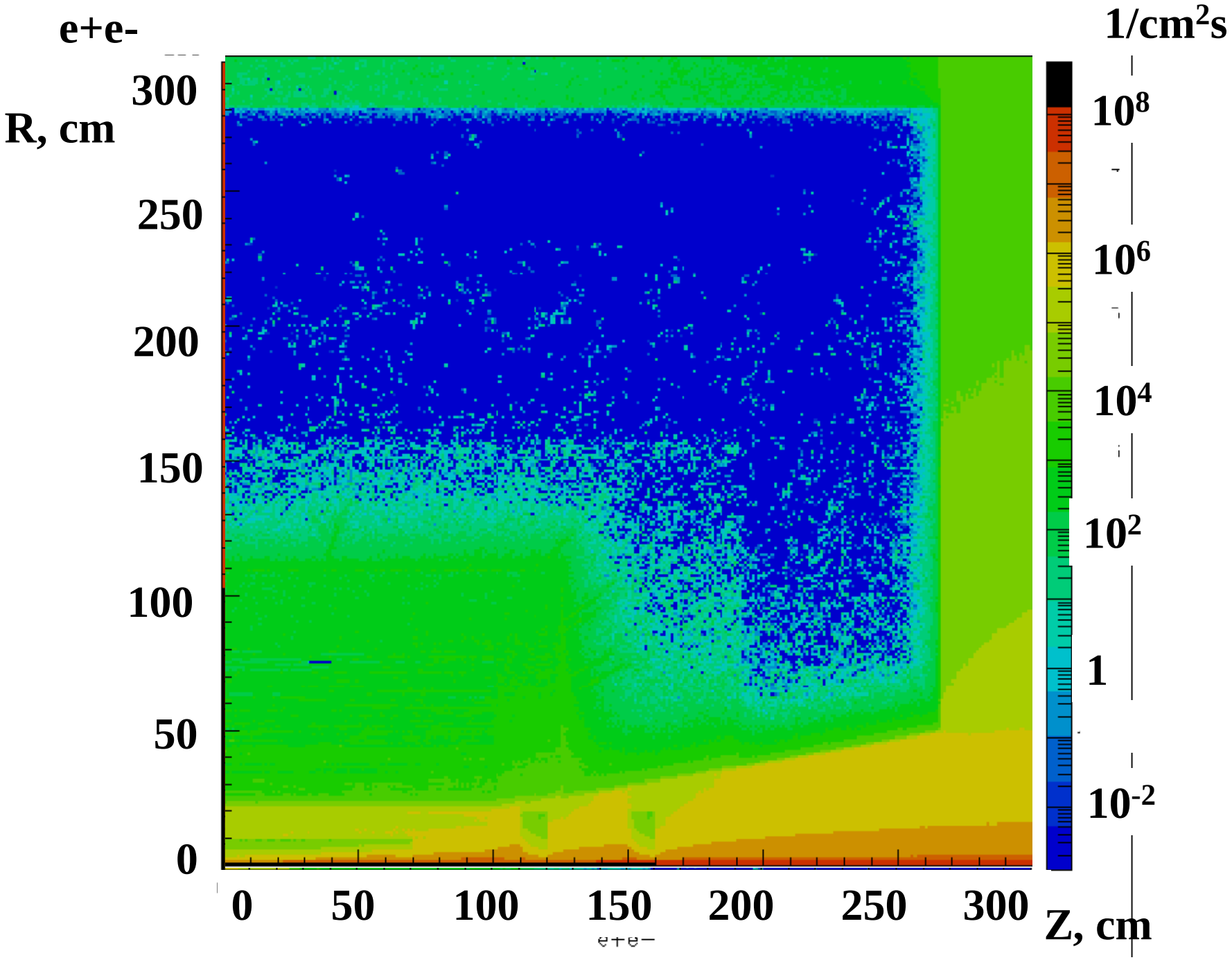
Make “reasonable” geometry and see what will happen:

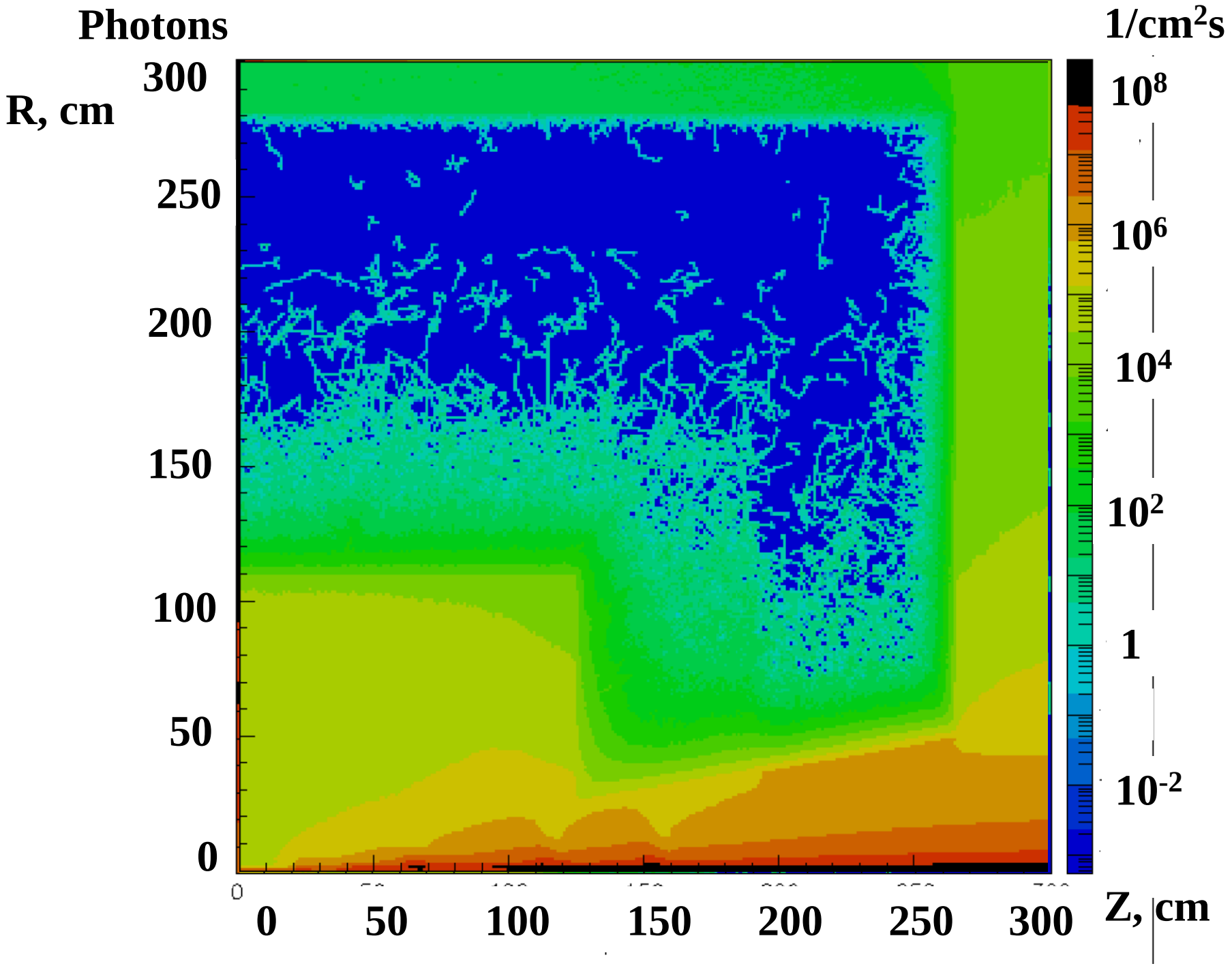
What fluxes we get in IT
Main sources of secondaries
Time to get reasonable statistics


Iron
Aluminum
CsI
Aerogel
He+30%C3H8
Ar
Air
St.steel
100.
200.
300
200.
300.

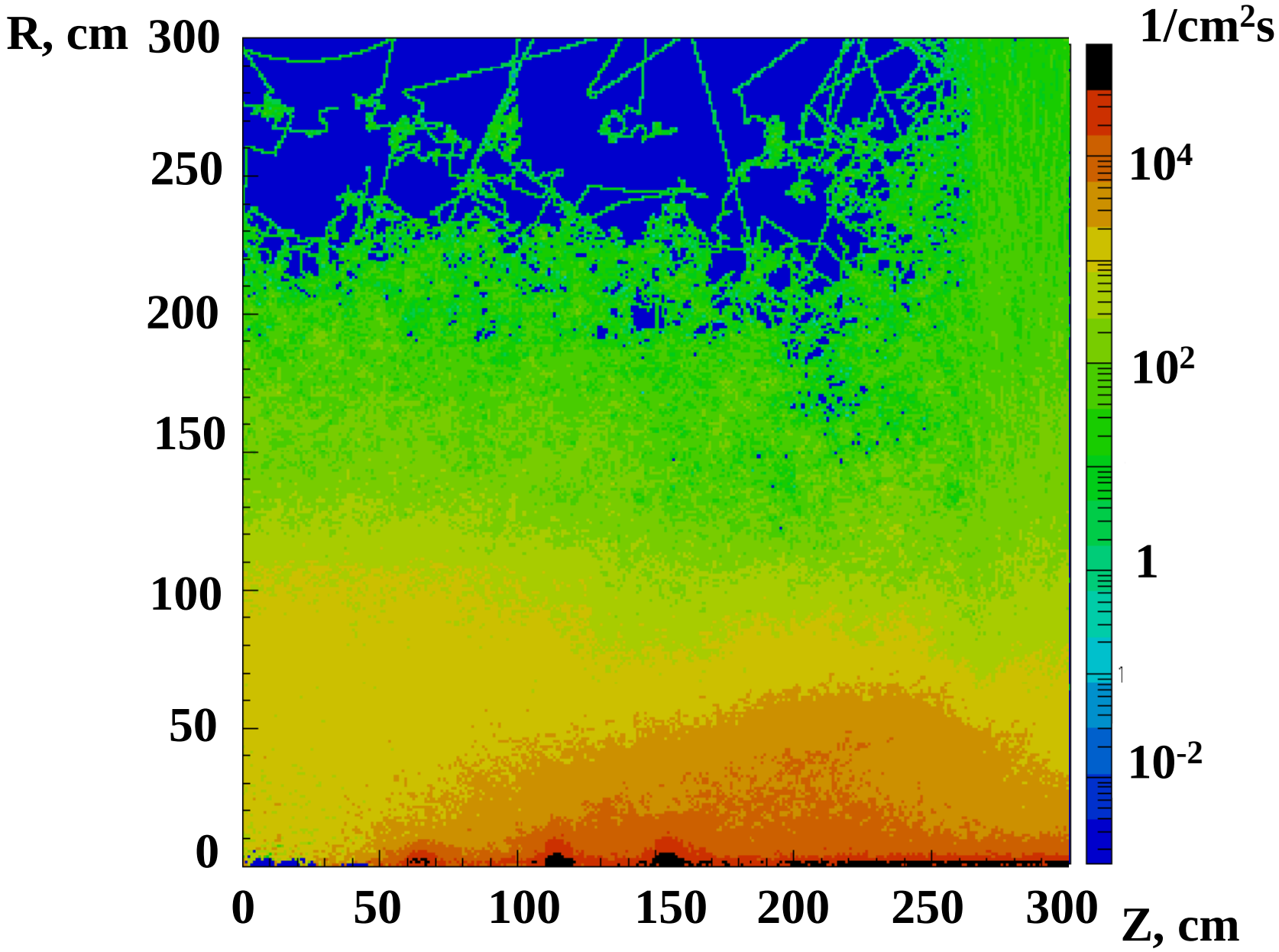

10.
20.
30.

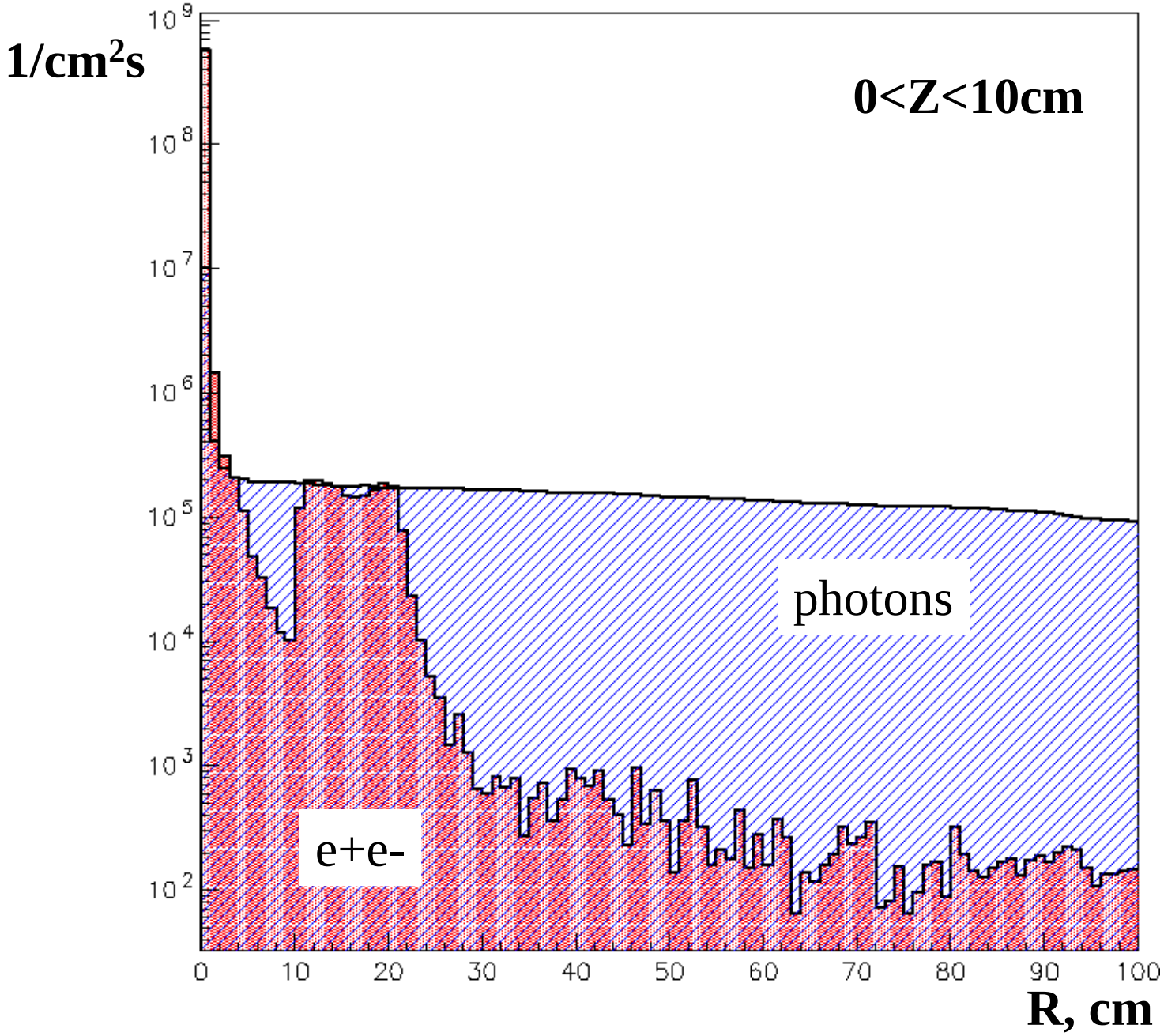

All particles
1/cm²s
R, cm
300
250
200
150
100
50
0
0
50
100
150
200
250
300
Z, cm
10⁸
10⁶
10⁴
10²
1
10⁻²


e+e-
1/cm2s
R, cm
300
250
200
150
100
50
0
0
50
100
150
200
250
300
Z, cm
10^8
10^6
10^4
10^2
1
10^-2


Photons
1/cm²s
R, cm
300
250
200
150
100
50
0
0
50
100
150
200
250
300
Z, cm
10⁸
10⁶
10⁴
10²
1
10⁻²

Neutrons


R, cm
300
250
200
150
100
50
0
0
50
100
150
200
250
300
Z, cm
1/cm²s
10⁴
10²
1
10⁻²


1/cm²s
0<Z<10cm
photons
e+e-
R, cm
10⁹
10⁸
10⁷
10⁶
10⁵
10⁴
10³
10²
0
10
20
30
40
50
60
70
80
90
100

Flux inside IT