FLUKA Simulations Update 15/09/20

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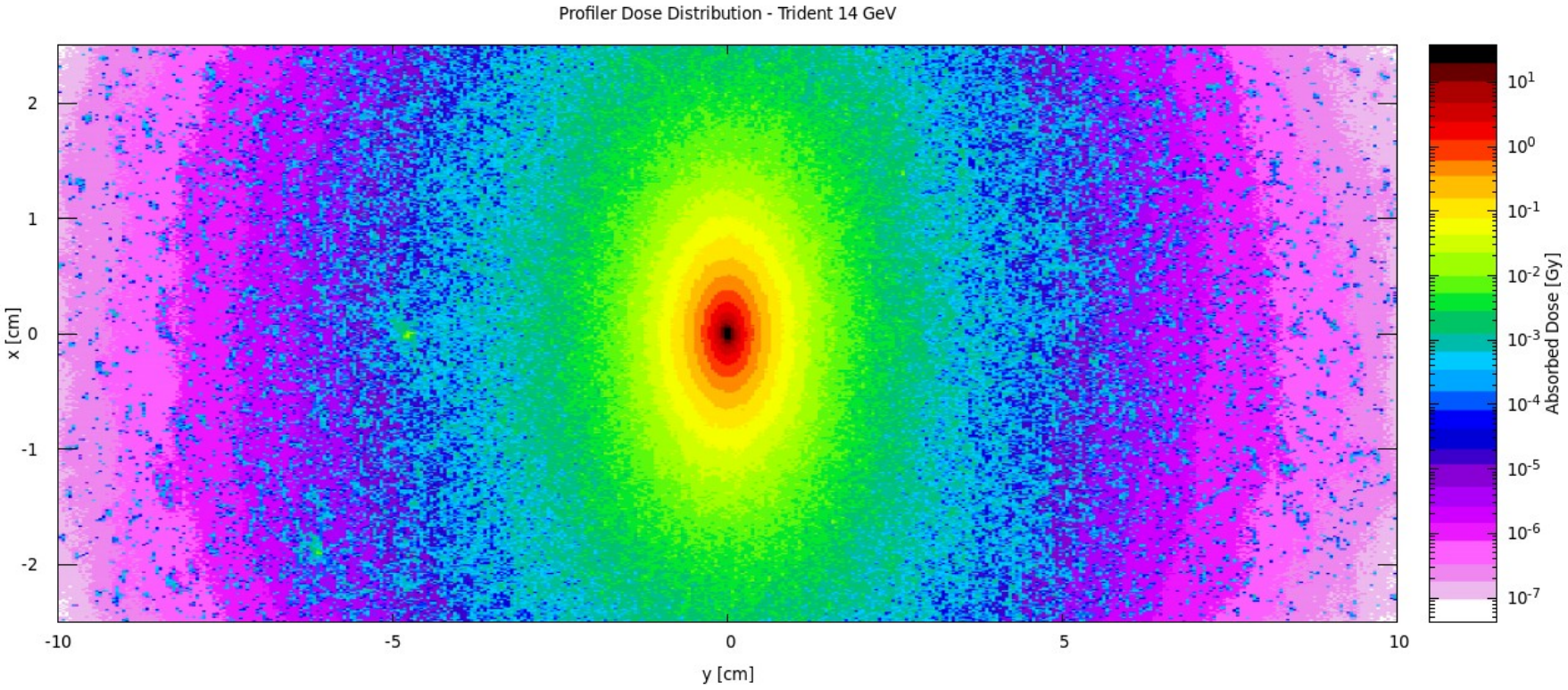
Forward Spectrometer - General

- New estimate of radiation hardness of LANEX (GadOx) of ~10^8 Gy (thanks to John and Matthew)
- For per bunch dose of ~10^-2 Gy, this gives a lifetime of ~316 days
- In hindsight, underestimation of LYSO radiation hardness likely from manufacturers

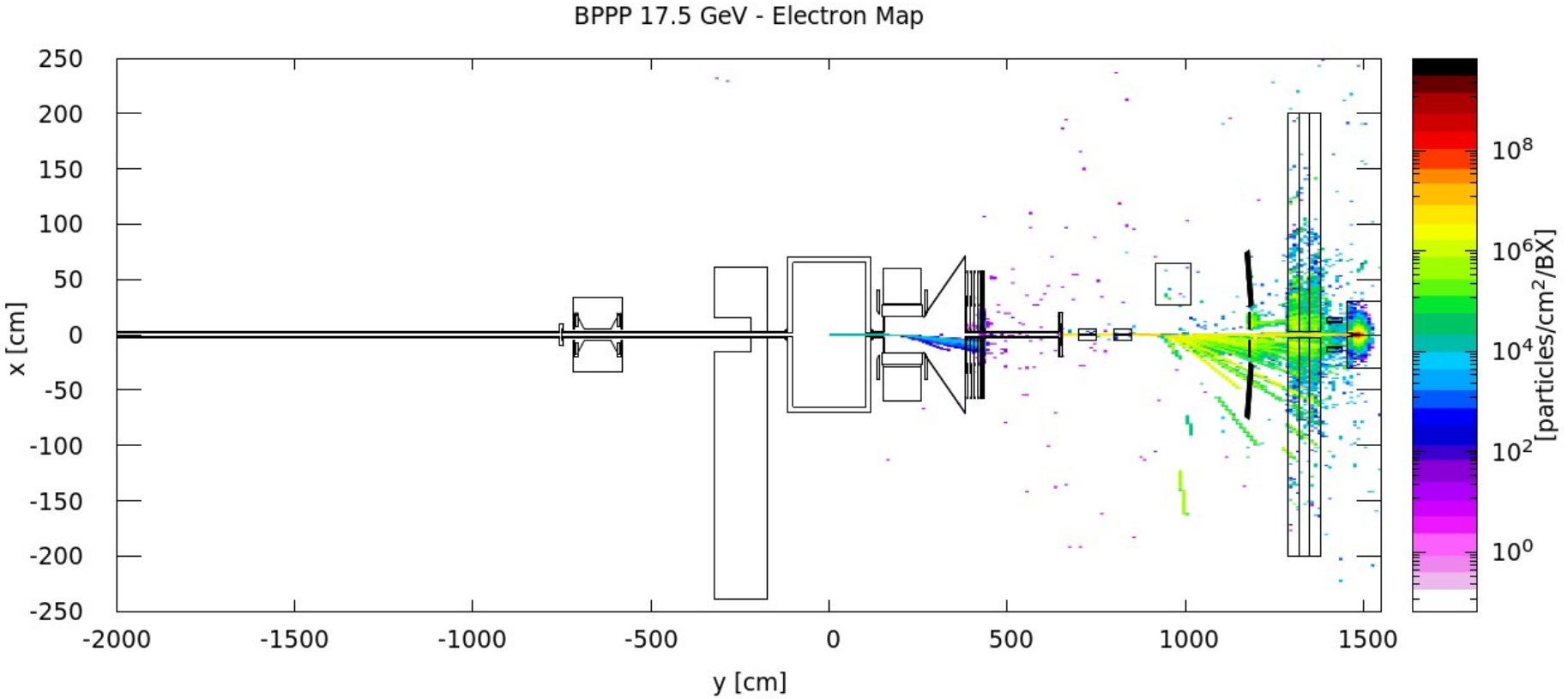
Forward Spectrometer - Profiler

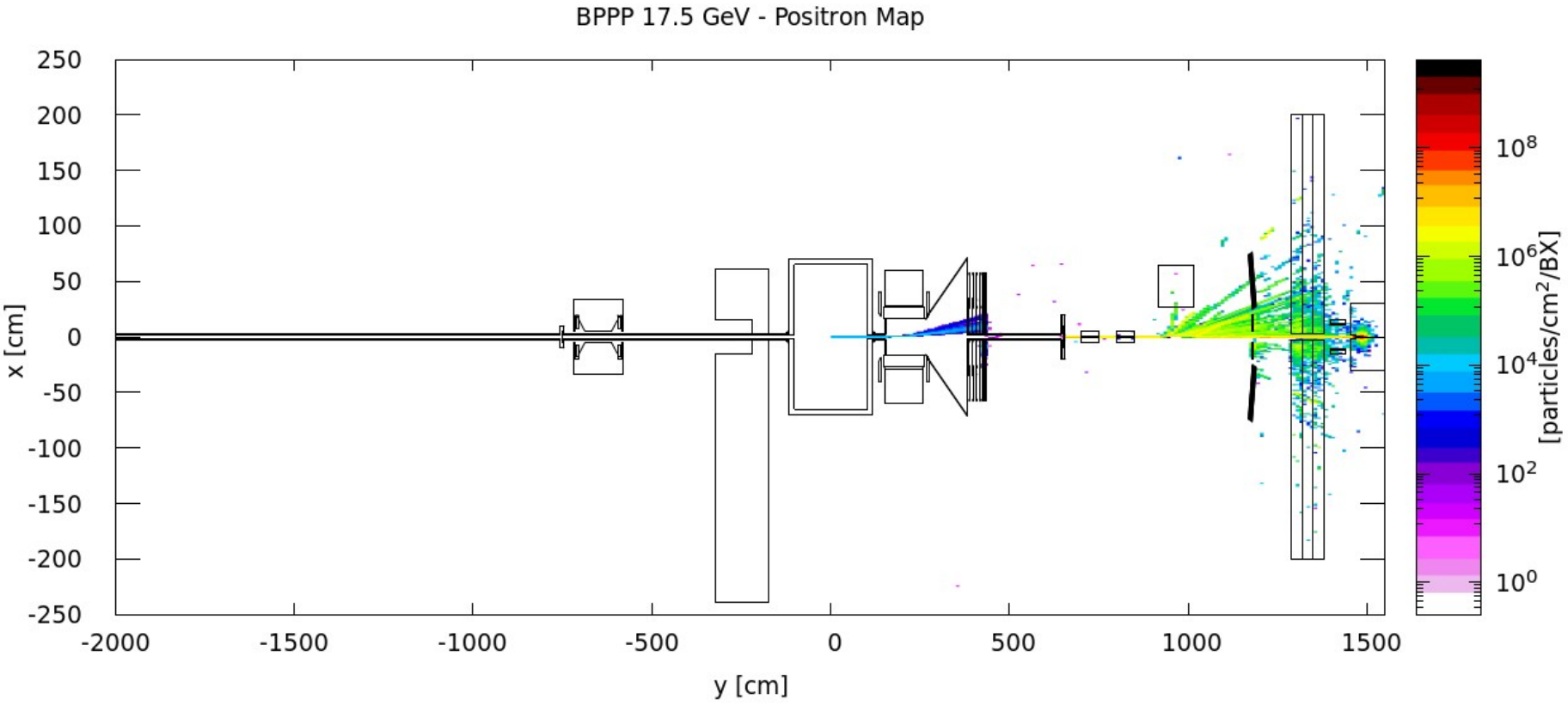


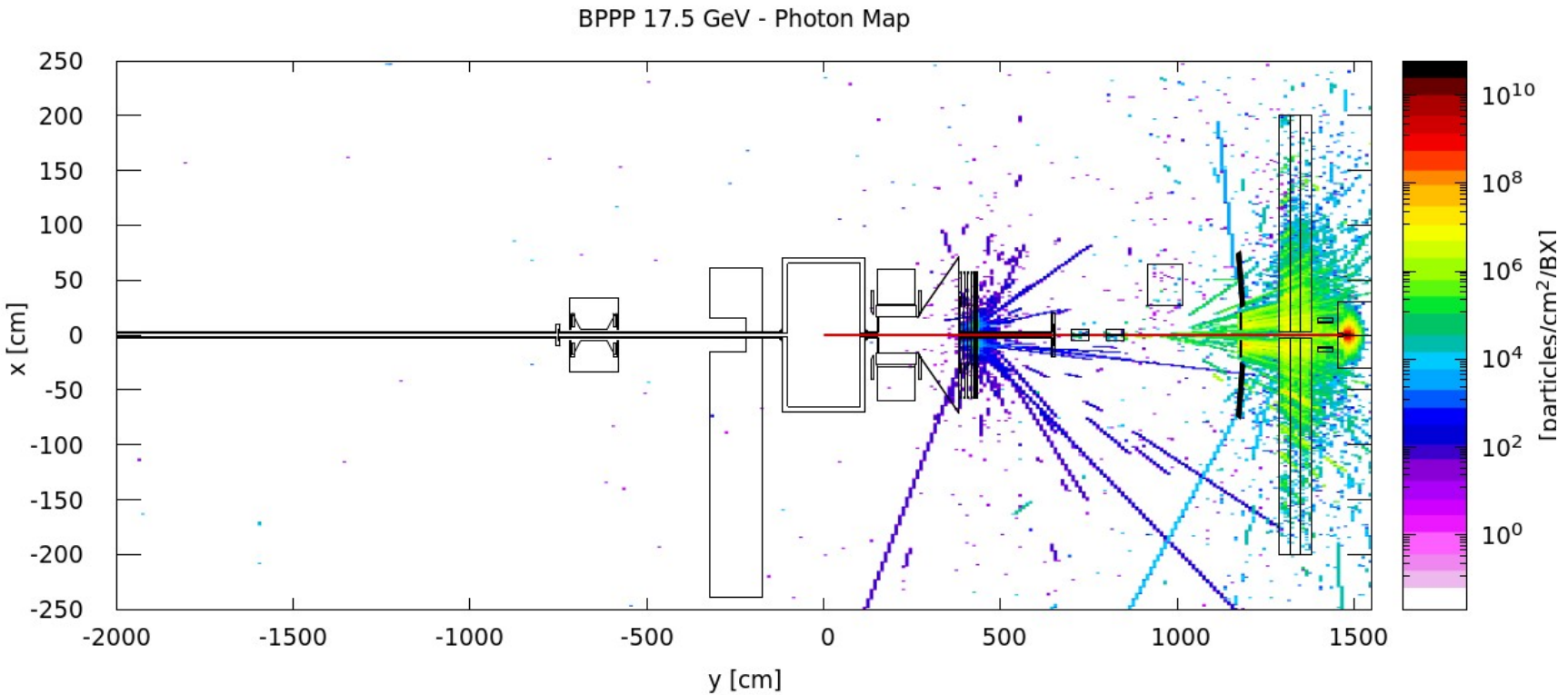
Forward Spectrometer - Profiler

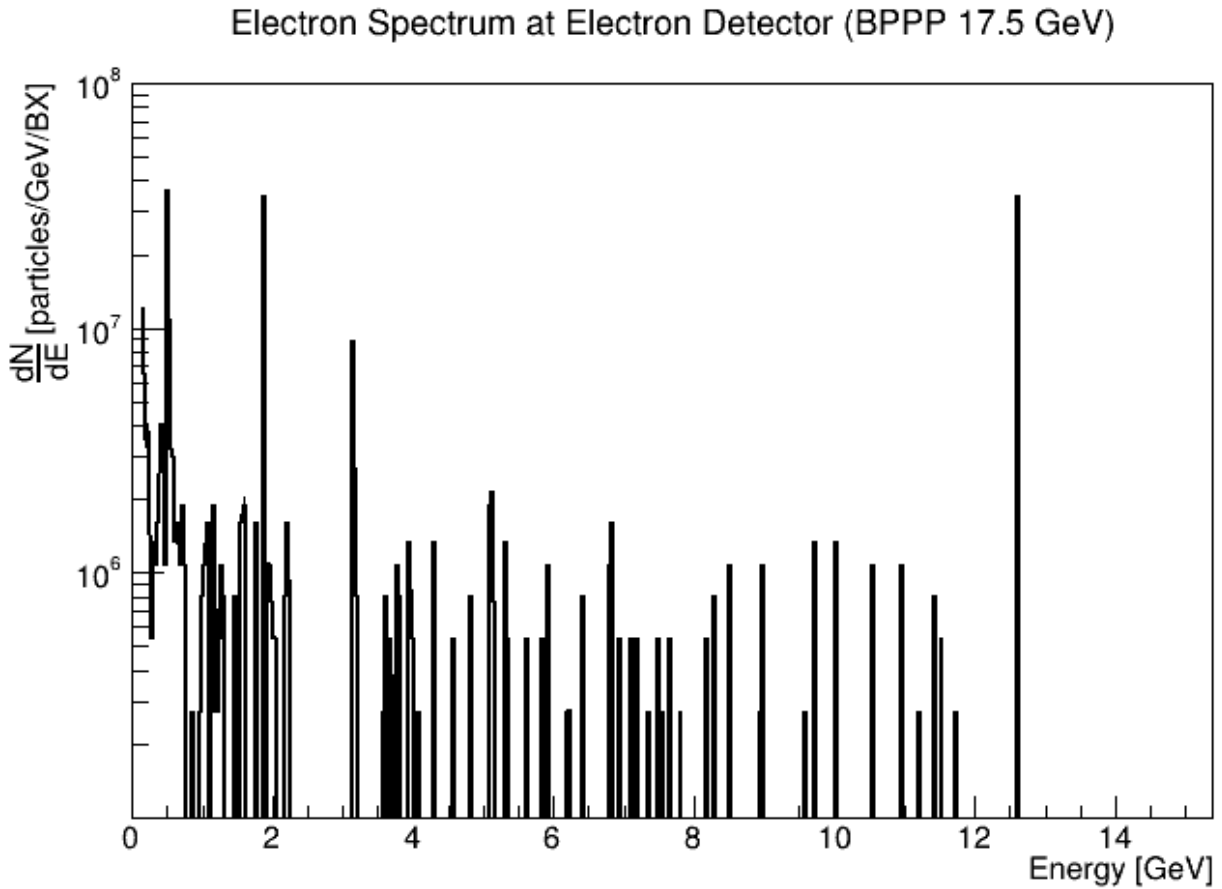
- Not feasible removing centre of detector – divergence of photon beam ~ 10 urad, over a distance of 1300 cm → diameter of beam at profiler is ~0.01 cm
- Maybe be better to use a ‘consumable’ detector – allows measurements to be taken and reduces distortion of photon beam for backscattering spectrometer

Full Scale Simulations - BPPP




BPPP 17.5 GeV - Positron Map
x [cm]
y [cm]
250
200
150
100
50
0
-50
-100
-150
-200
-250
-2000
-1500
-1000
-500
0
500
1000
1500
10^8
10^6
10^4
10^2
10^0
[particles/cm^2/BX]

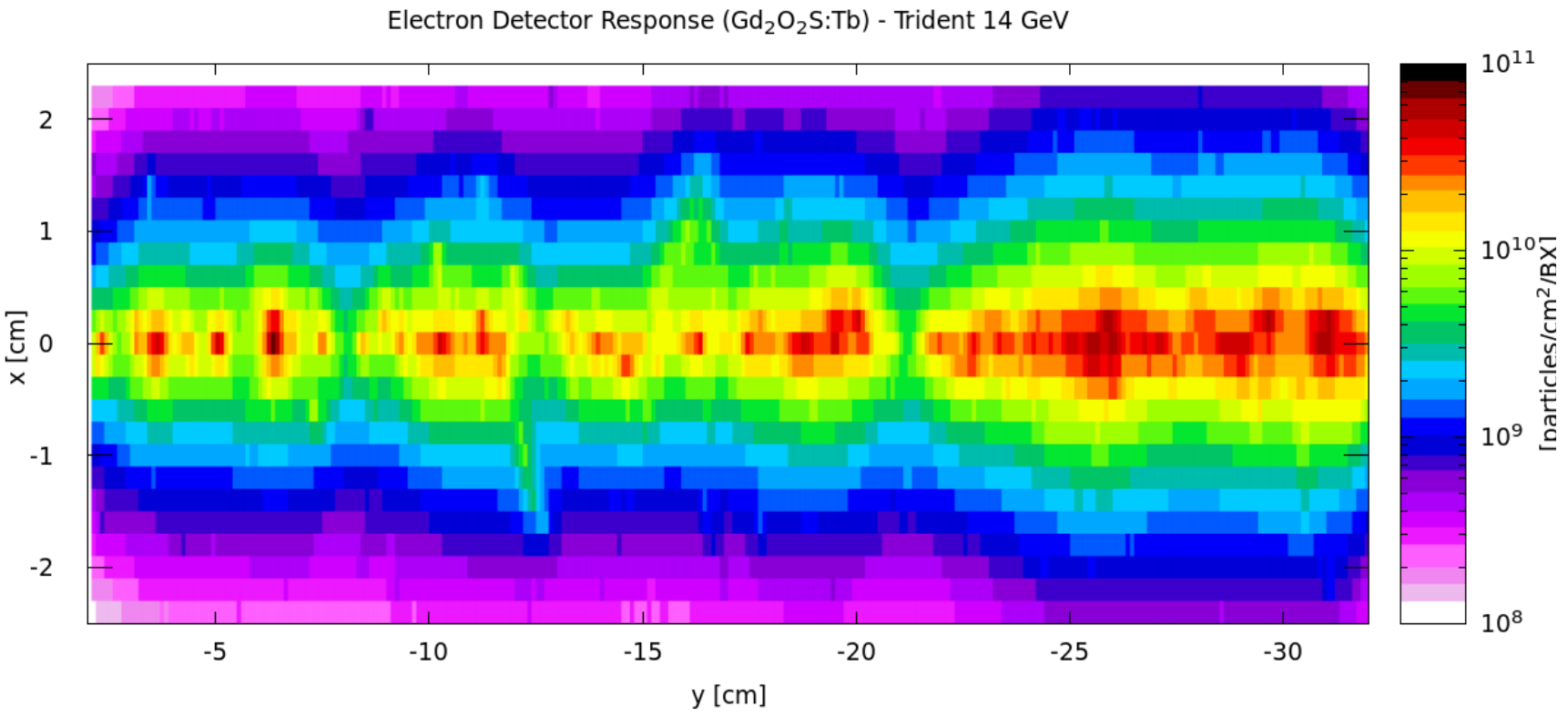

BPPP 17.5 GeV - Photon Map
x [cm]
y [cm]
250
200
150
100
50
0
-50
-100
-150
-200
-250
-2000
-1500
-1000
-500
0
500
1000
1500
10^{10}
10^{8}
10^{6}
10^{4}
10^{2}
10^{0}
[particles/cm^2/BX]


Electron Spectrum at Electron Detector (BPPP 17.5 GeV)
dN/dE [particles/GeV/BX]
10^8
10^7
10^6
0
2
4
6
8
10
12
14
Energy [GeV]

Additional – Reconstruction of Electron Response

- Use scintillator response map and knowledge of light yield and quantum efficiency of LANEX to estimate the electron signal
- Very preliminary at this stage – doesn't include attenuation effects etc
- Can be developed more if of interest

Scintillation Response



Spectrum Reconstruction