Geant4 FringeTracer

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Optics group meeting
September 22, 2016

Overview

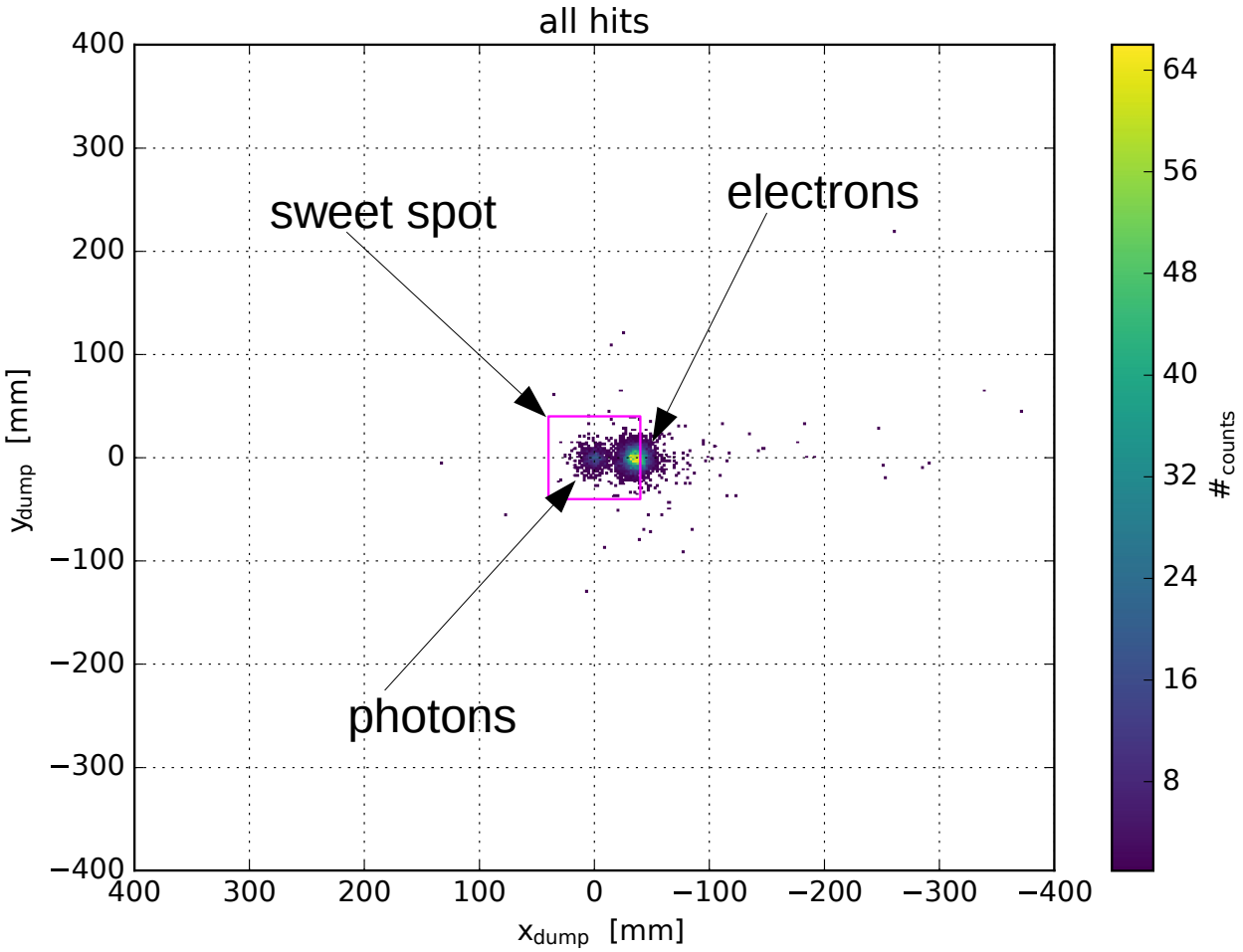
- simple, fast, customizable Geant4 simulation
- beam gun with a square, uniform raster
- 1.5% radiation length carbon target
- 3 sensitive detectors
  - big BPMs at 21.0 and 25.7 m
  - beam dump face at 51.8 m
- variable number of magnetic fields read from Tosca maps
- spectrometer angle can be changed between runs

- used to check the beam profile at the beam dump

- available on GitHub: JeffersonLab/HallC_FringeTracer

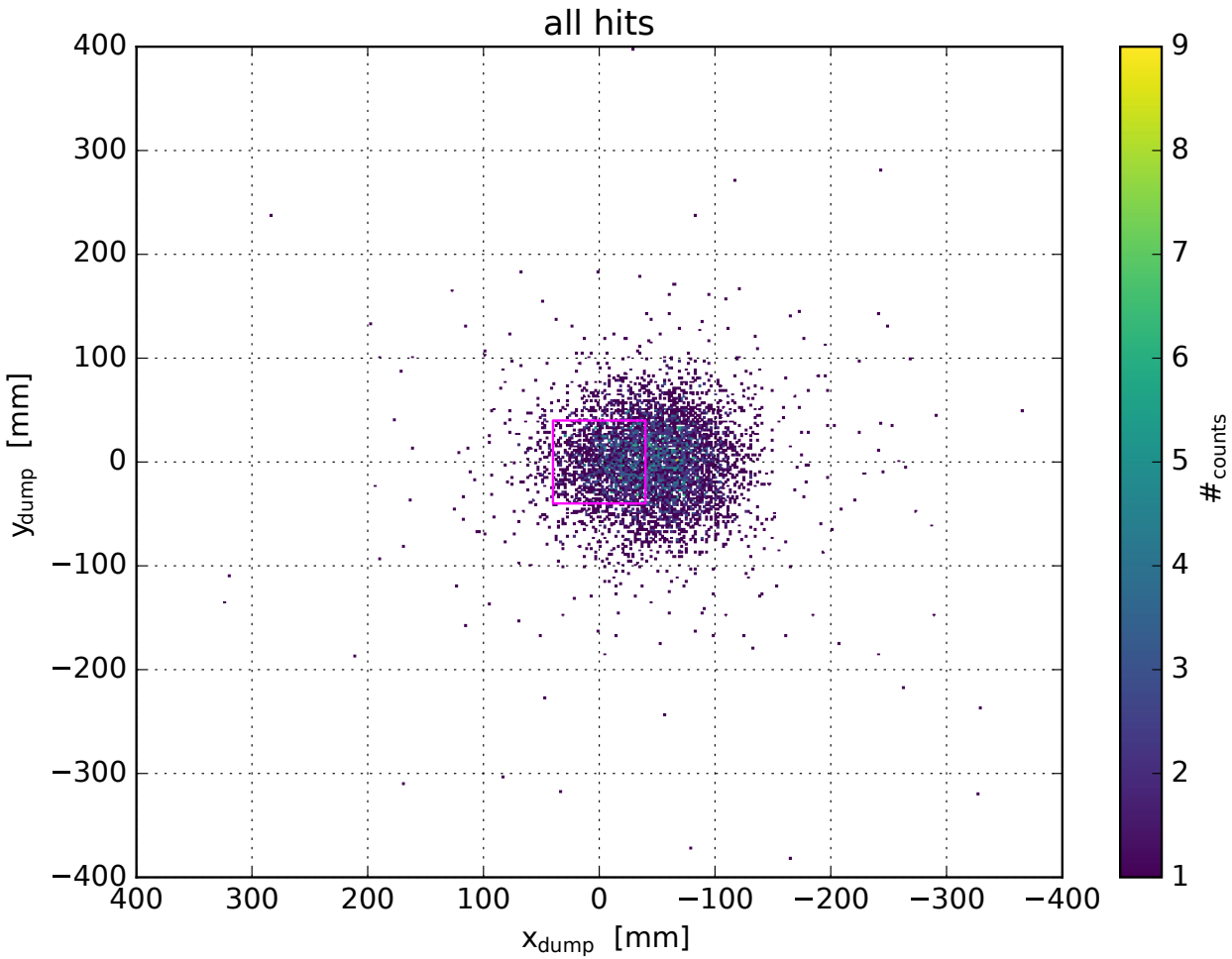
Sample beam profile - 1

- HB v9.3
- Q2 unshielded
- P = 7.5 GeV/c
- E = 11.0 GeV
- θ = 5.5°



Sample beam profile - 2

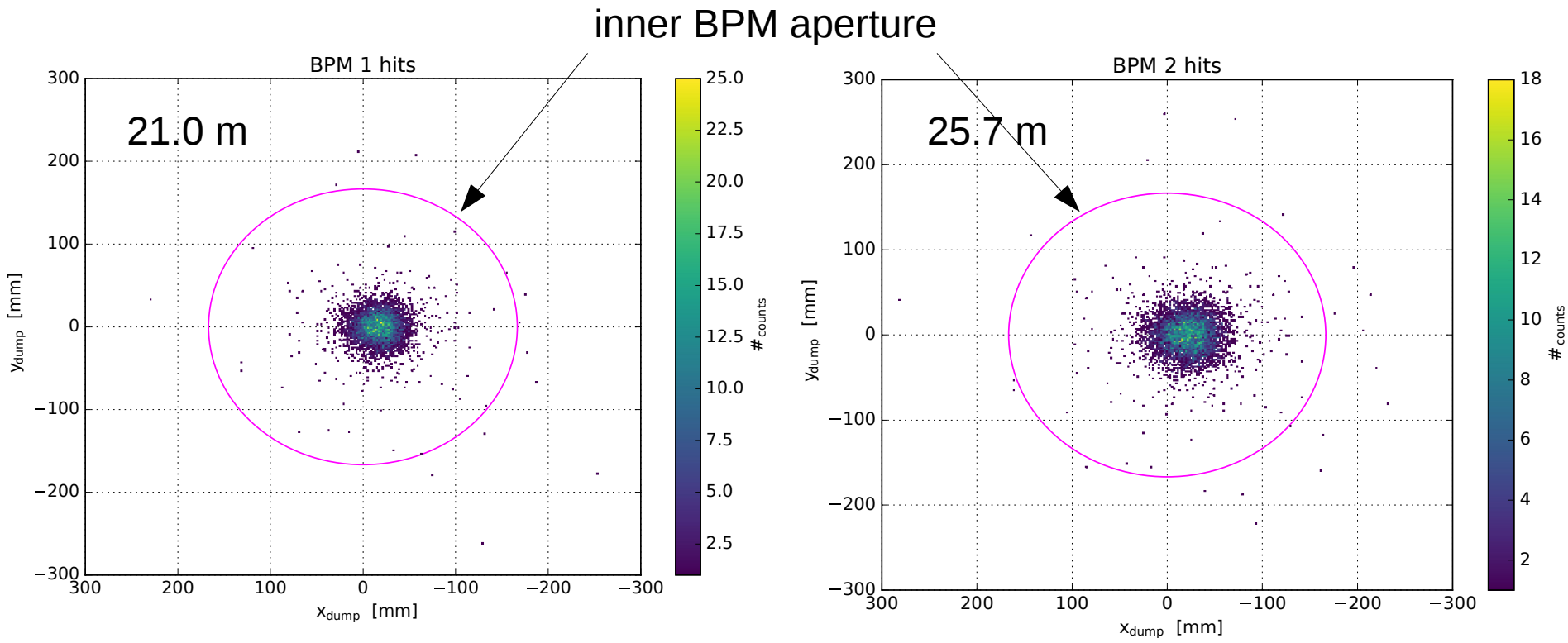
- HB v9.3
- Q2 unshielded
- P = 2.0 GeV/c
- E = 2.0 GeV
- θ = 5.5°



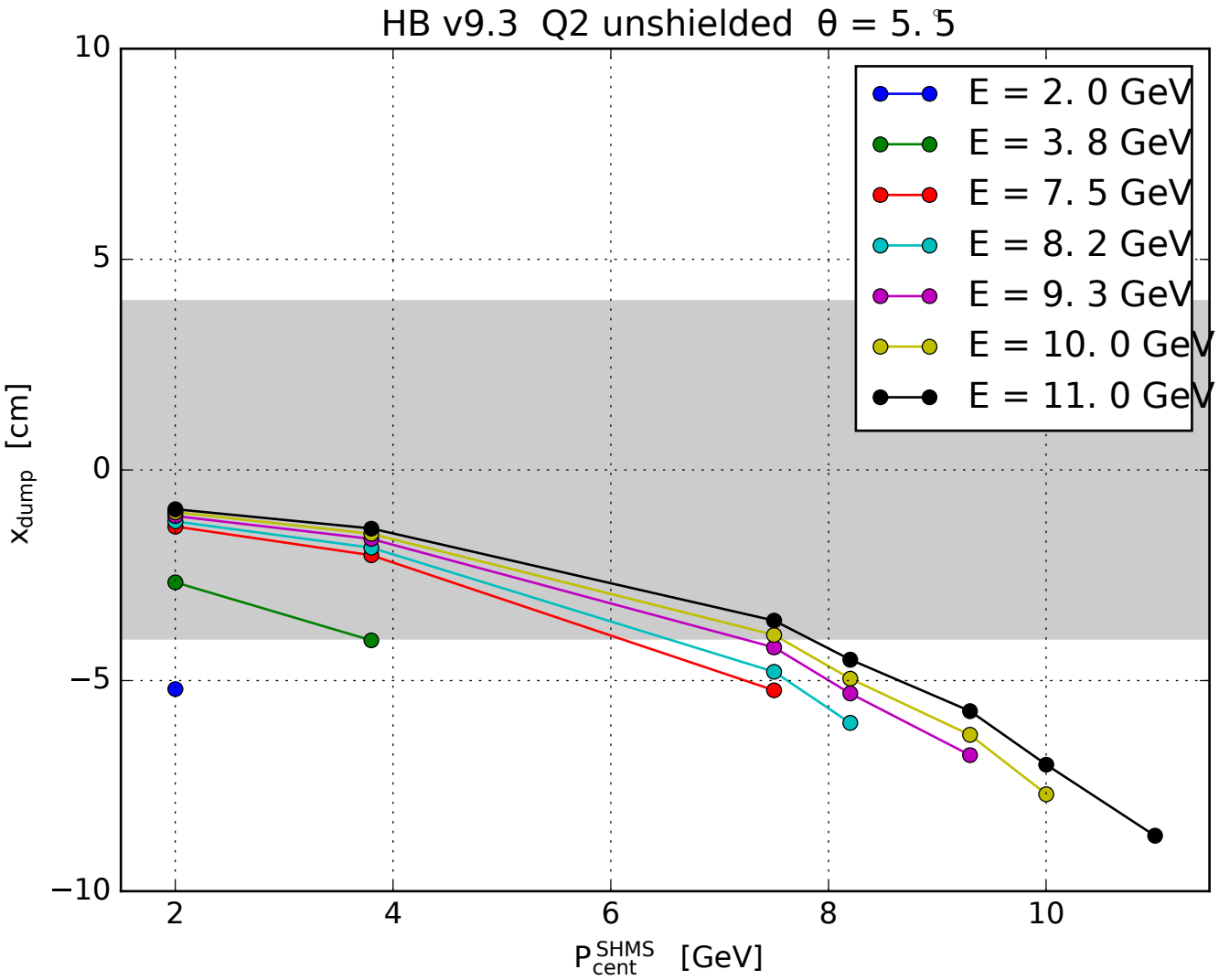
BPM beam profile

- HB v9.3
- Q2 unshielded

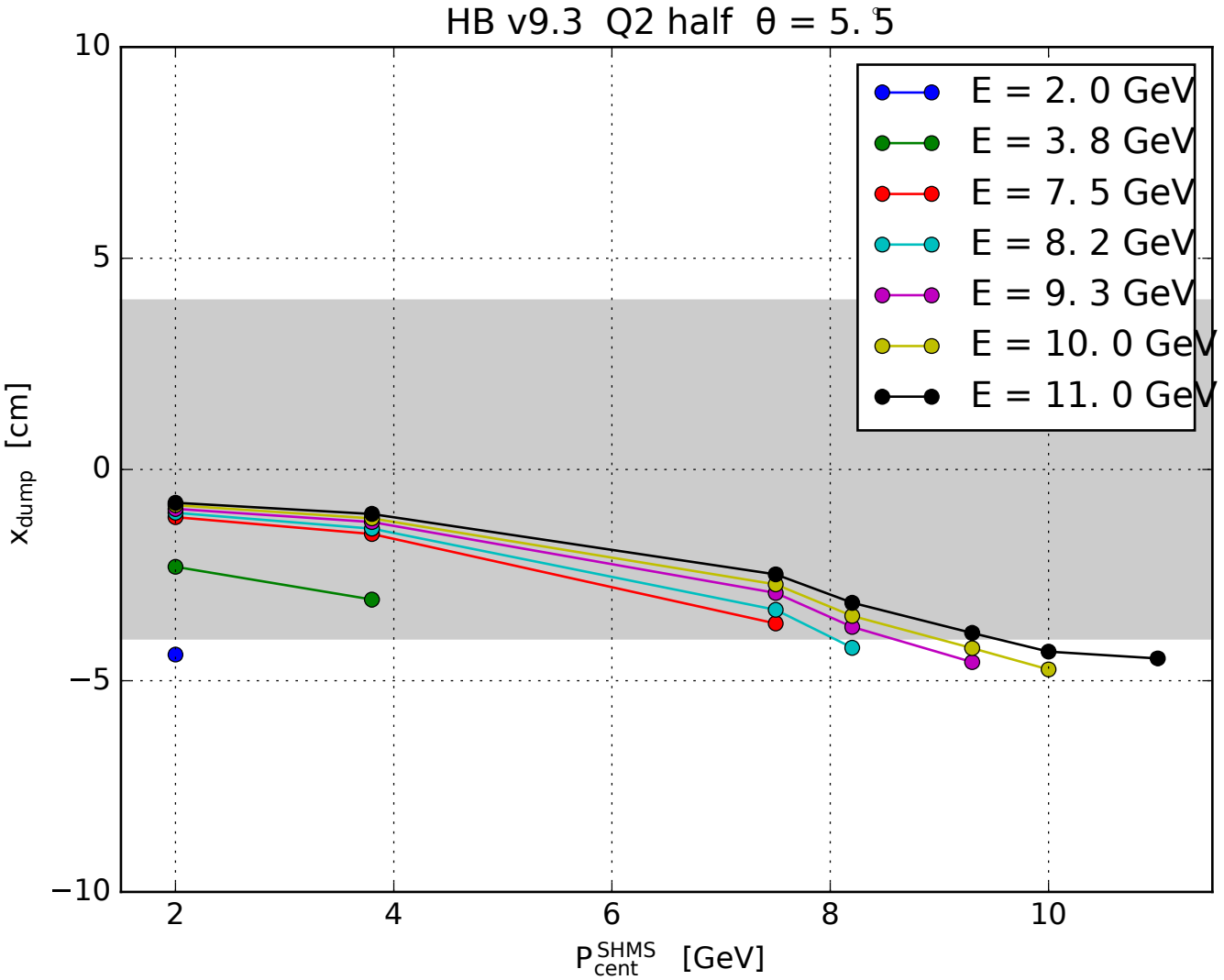
- P = 2.0 GeV/c
- E = 2.0 GeV
- θ = 5.5°



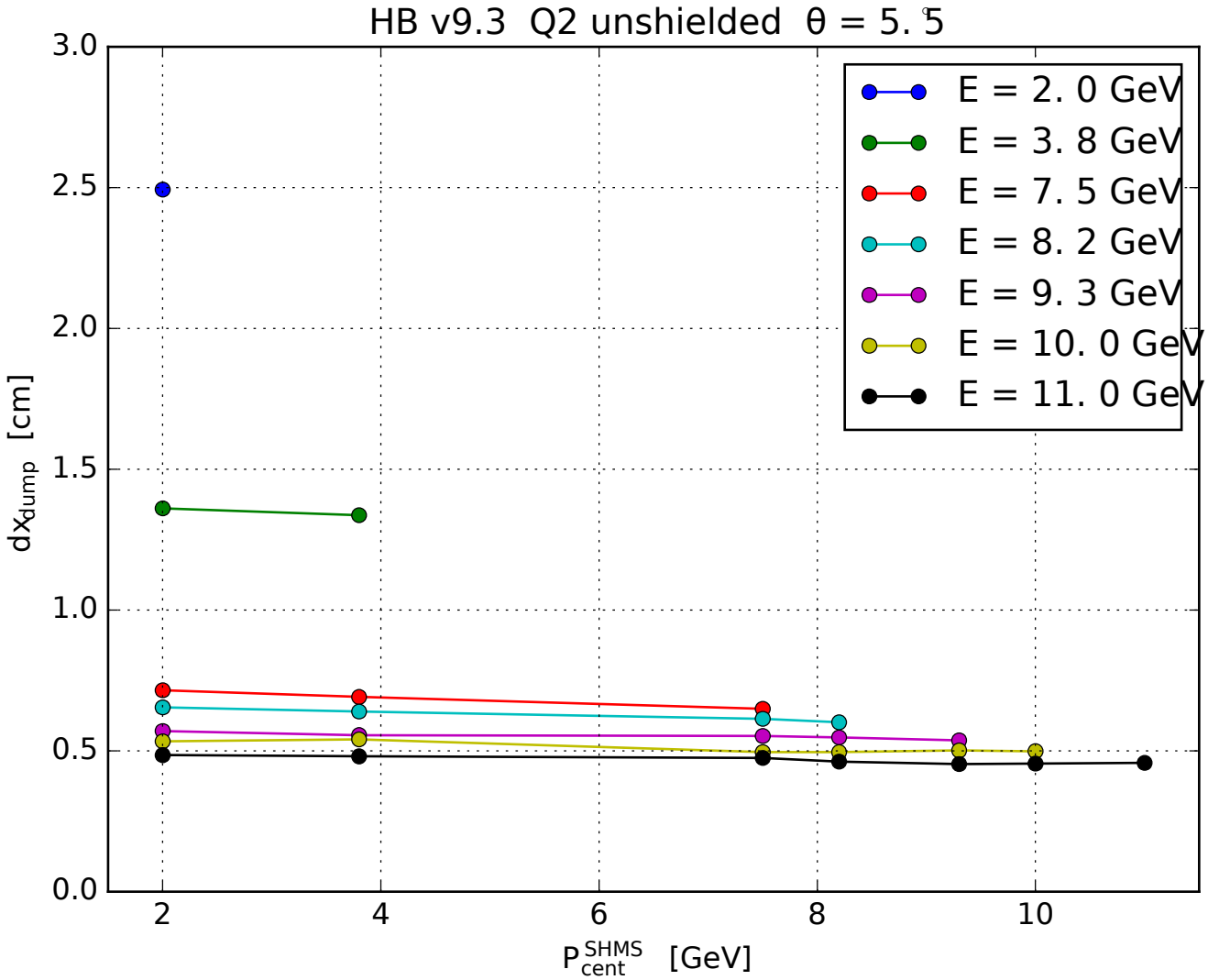
Beam displacement - 1



Beam displacement - 2



Beam width


HB v9.3 Q2 unshielded θ = 5.5°
E = 2.0 GeV
E = 3.8 GeV
E = 7.5 GeV
E = 8.2 GeV
E = 9.3 GeV
E = 10.0 GeV
E = 11.0 GeV
dx_dump [cm]
P^SHMS_cent [GeV]
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2
4
6
8
10

Conclusion

- Beam displacement similar as from Python raytracer
- Beam width depends mostly on beam energy
- Low energy tail more pronounced at larger momenta