Comparison of Particle Production between MARS and FLUKA

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Target Studies
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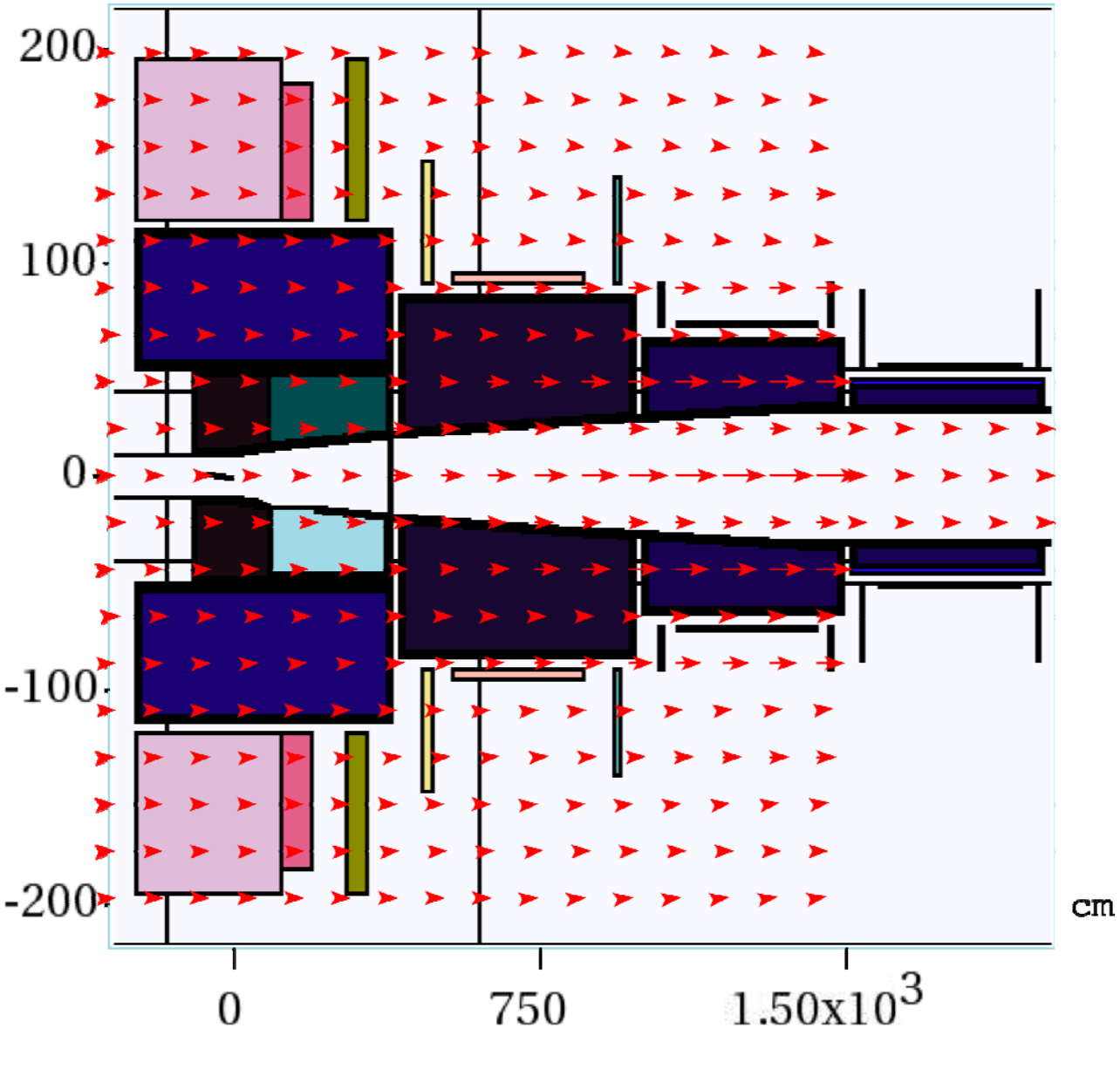
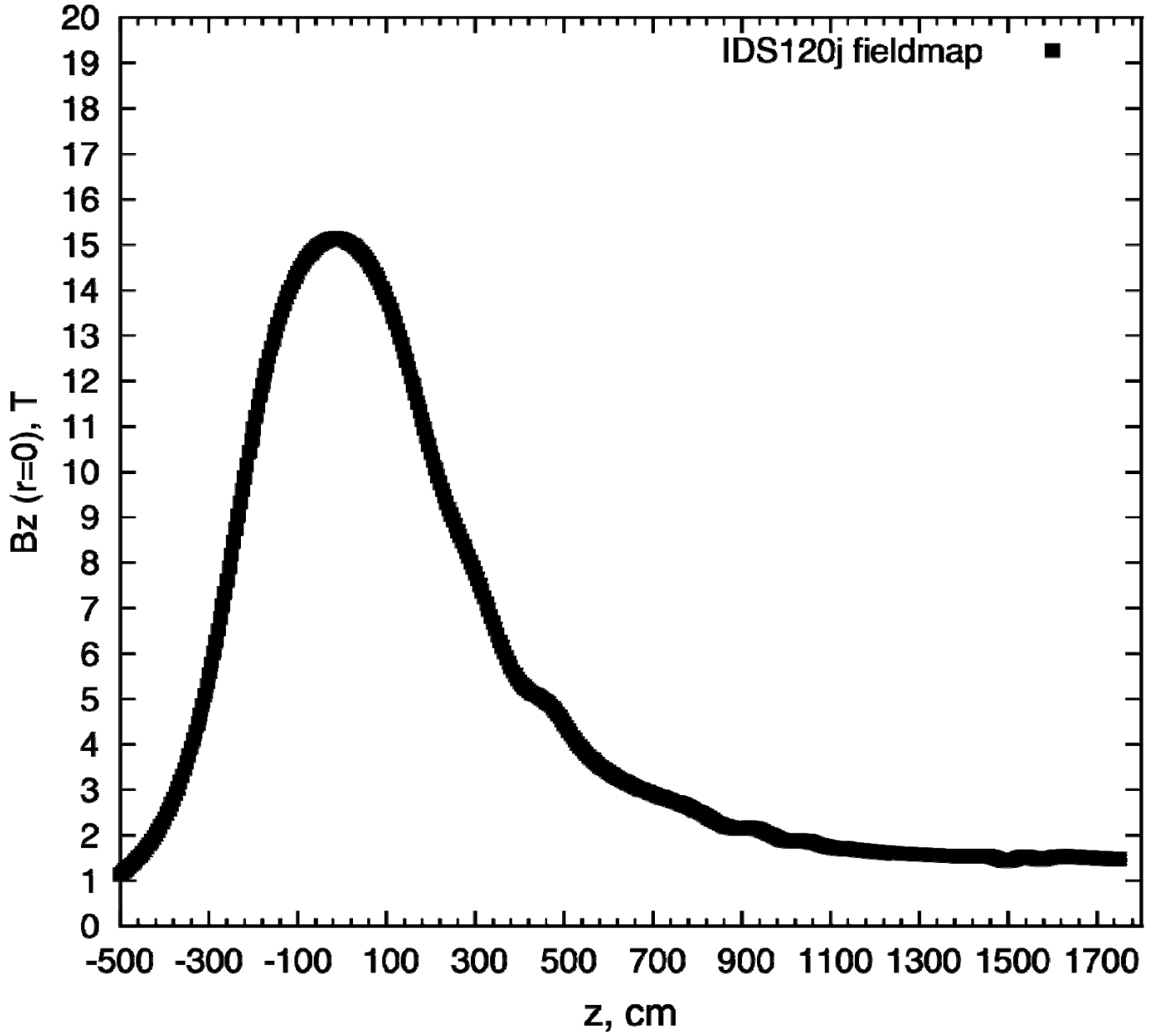
IDS120j Geometry



Fieldmap


IDS120j fieldmap
Bz (r=0), T
z, cm
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-500 -300 -100 100 300 500 700 900 1100 1300 1500 1700

Target Setting

- Original setting: MARS (Nicholas), FLUKA (John)
- Fieldmap: (IDS120j, 15 T $\rightarrow$ 1.5 T)
- Target parameters at 3 GeV:

  Carbon: target radius/0.346 cm, beam radius/0.0865 cm, beam angle/42 mrad, jet angle/42 mrad;

  launch at z = -100 cm

  Gallium: target radius/0.34 cm, beam radius/0.102 cm, beam angle/114 mrad, jet angle/125 mrad;
  launch at z = -75 cm

Target Setting (cont'd)

Mercury: target radius/0.23 cm, beam radius/0.069 cm, beam angle/137 mrad, jet angle/155 mrad; launch at z = -75 cm.

- Target parameters for Mercury at 8 GeV:

  Mercury: target radius/0.4 cm, beam radius/0.12 cm, beam angle/117 mrad, jet angle/137.6 mrad; launch at z = -75cm.

- Production Collection: (50 m downstream, 40 MeV < KE < 180 MeV).

Meson Production (IDS120j)

(Unit: Meson/proton/GeV)

		MARS	FLUKA
Carbon	3 GeV	0.02606	0.02969 (neg: 0.01173, pos: 0.01796)
Gallium	3 GeV	0.02361	0.025 (neg: 0.0113, pos: 0.0137)
Mercury	3 GeV	0.02059	0.0234 (neg: 0.01207, pos: 0.01133)
Mercury	8 GeV	0.04108	0.026 (neg: 0.01369, pos: 0.01231)
Gallium	8 GeV	0.03647	0.02656 (neg: 0.01302, pos: 0.01354)

Production of MARS vs. FLUKA

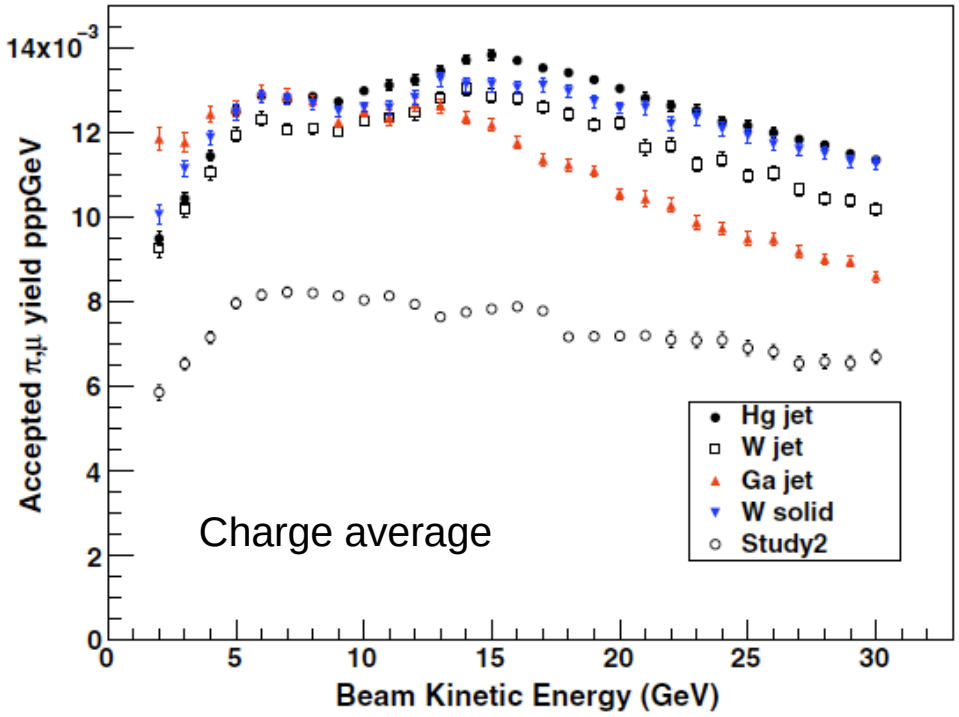
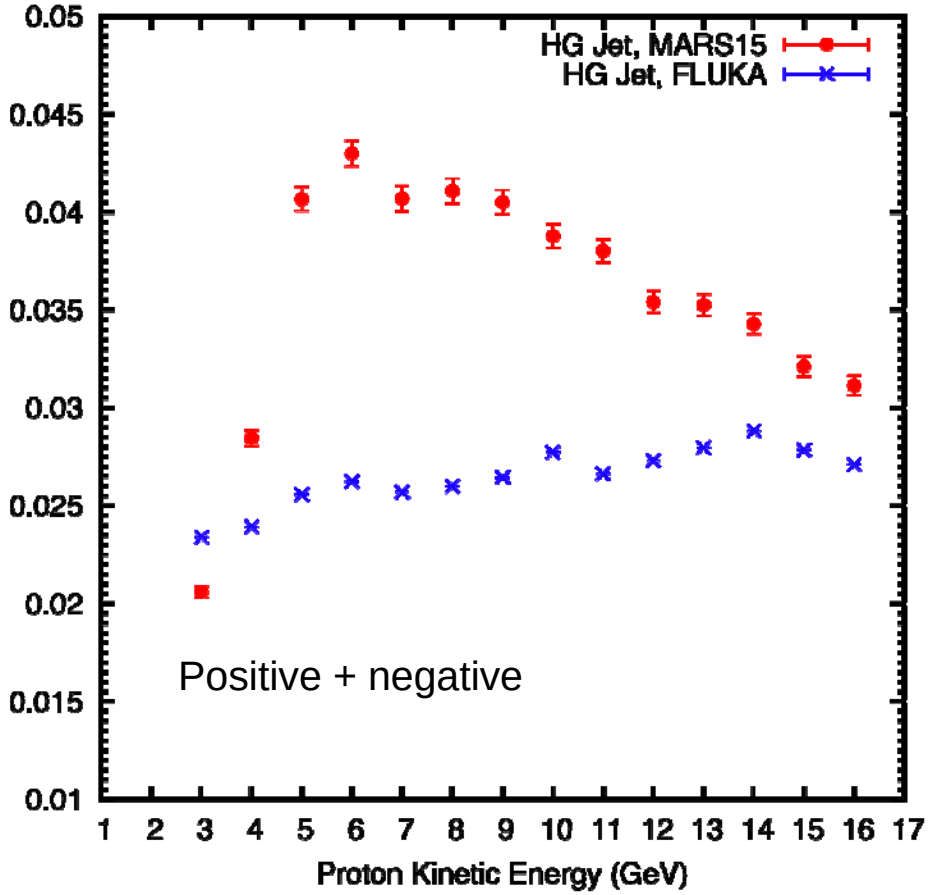


FIG. 6. The charged-averaged accepted pion and muon yield per proton per GeV for various targets in the new increased shielding geometry. Also shown are the equivalent yields for the mercury jet target in the Study 2 geometry.

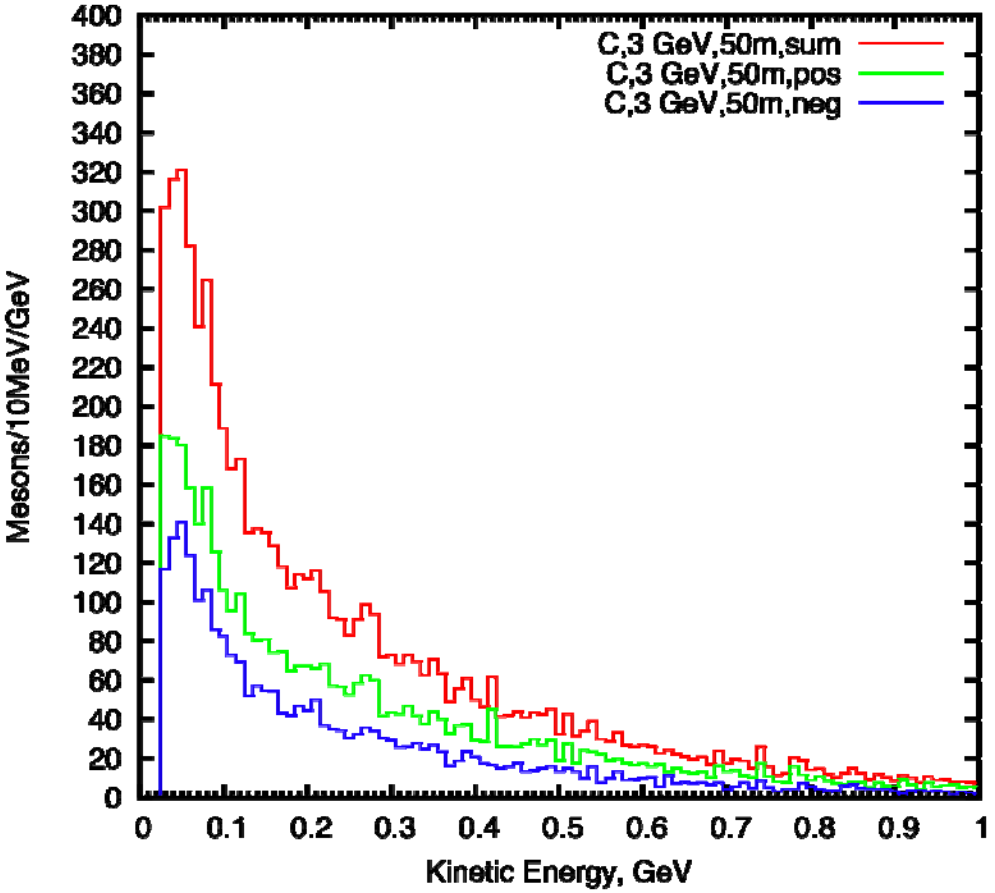
FLUKA (Average)

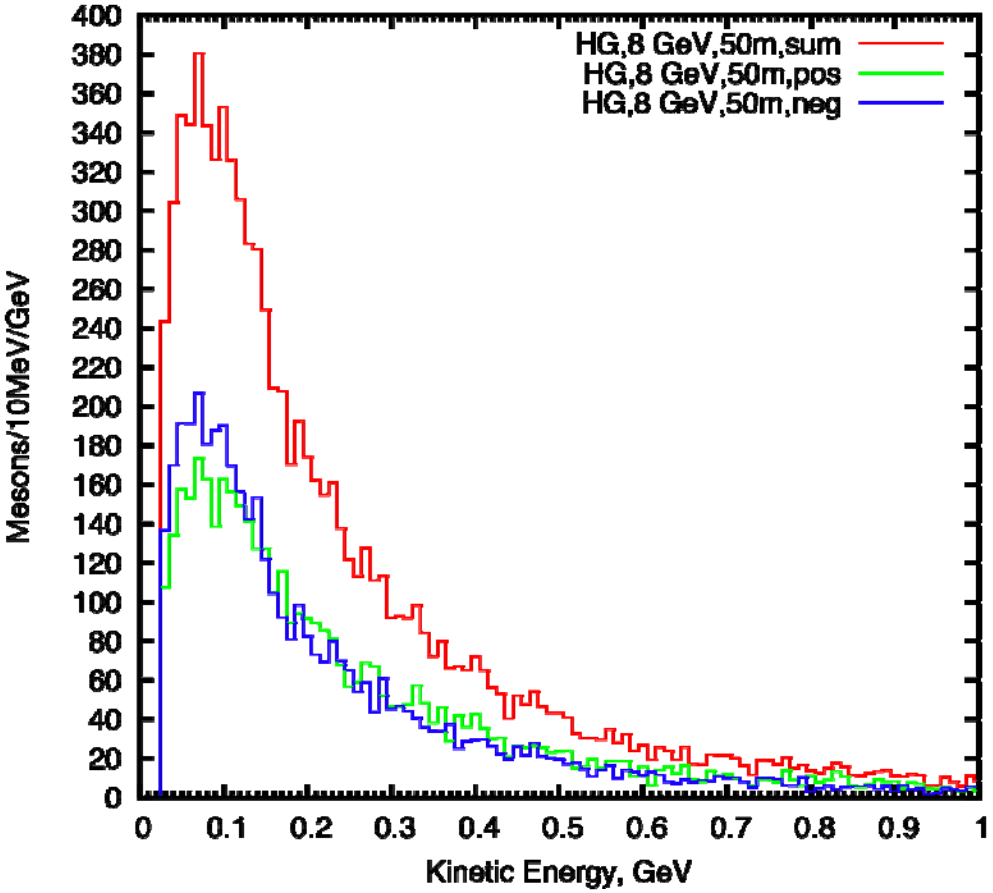


FLUKA(Sum), MARS(Sum)

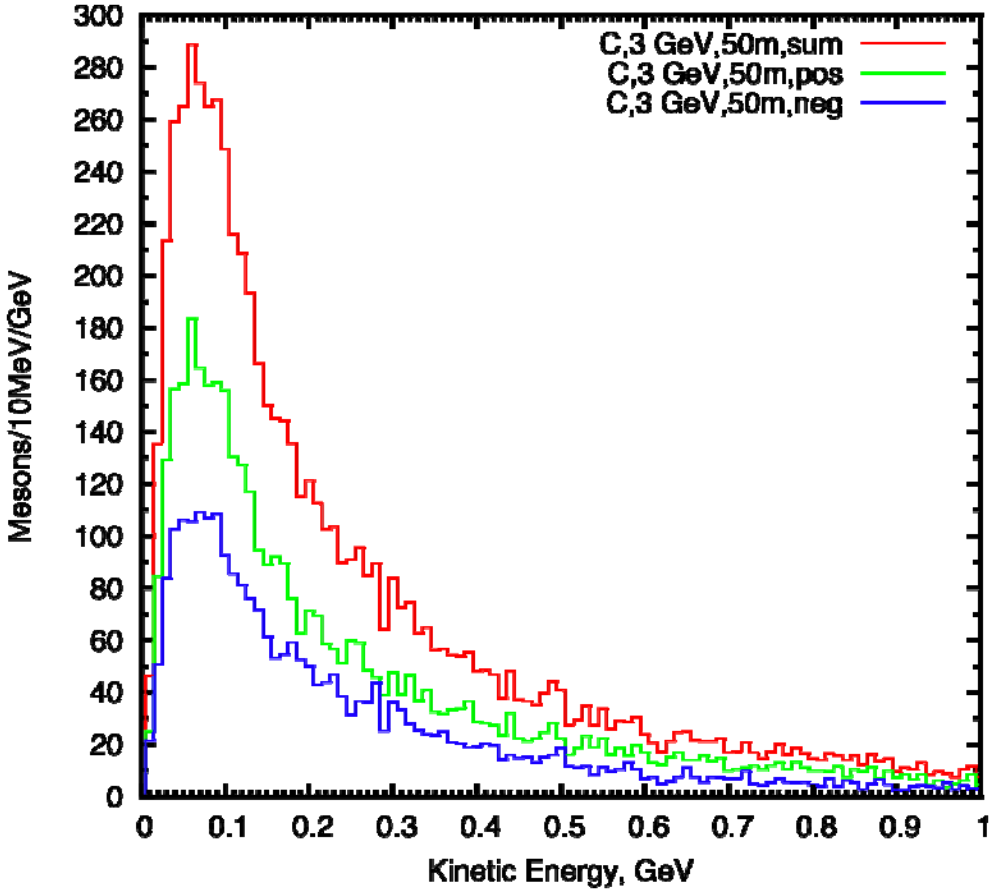
John et al., PRSTAB 16, 021001 (2013)

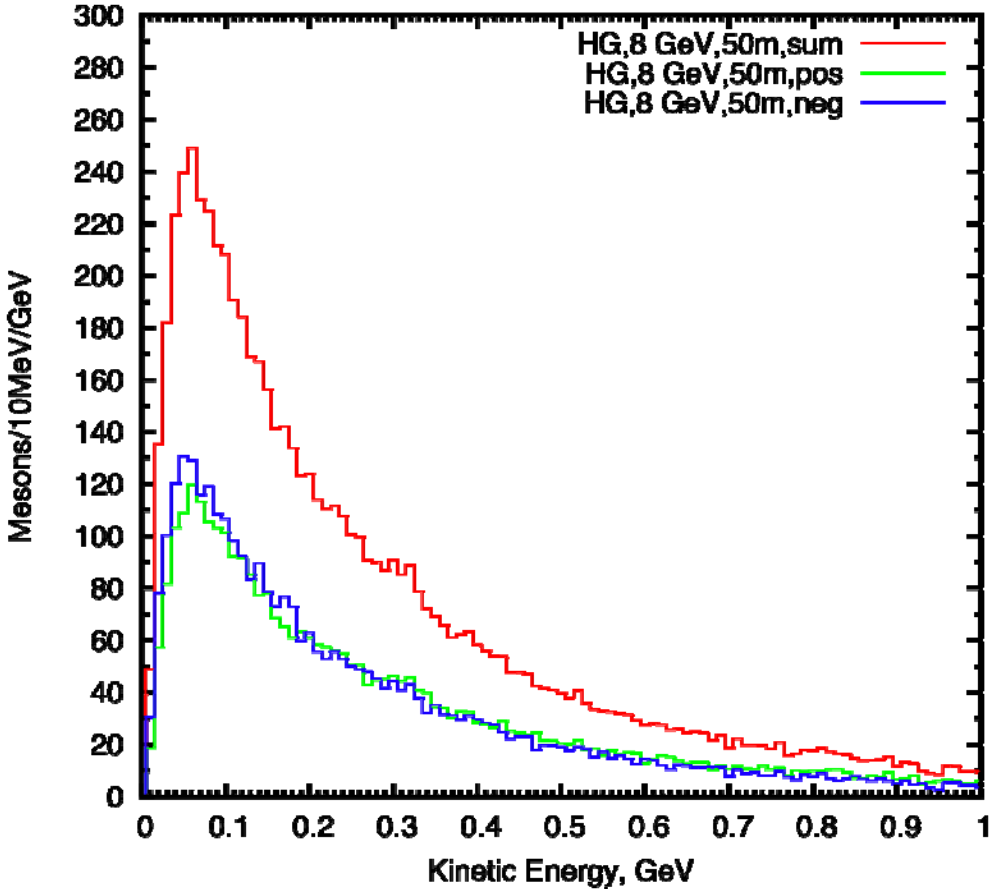
MARS (IDS120j)



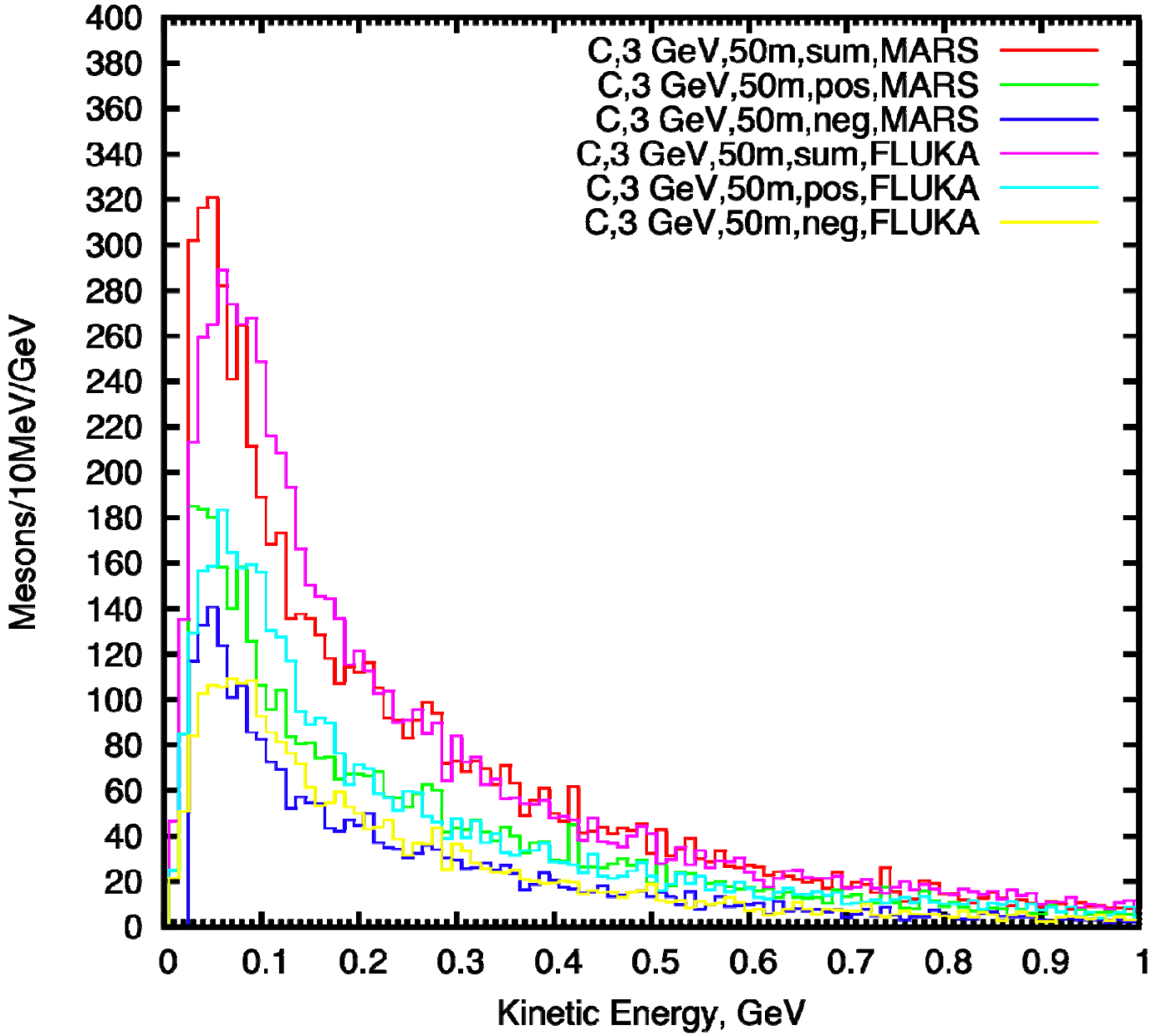


FLUKA (IDS120j)





MARS vs. FLUKA (C, 3 GeV)



MARS vs. FLUKA (Hg, 8 GeV)