Particle Production of Hg and Ga Target at 15to2T5m (compared with C target at 20to2T5m) at 6.75 GeV

X. Ding, UCLA

Target Studies
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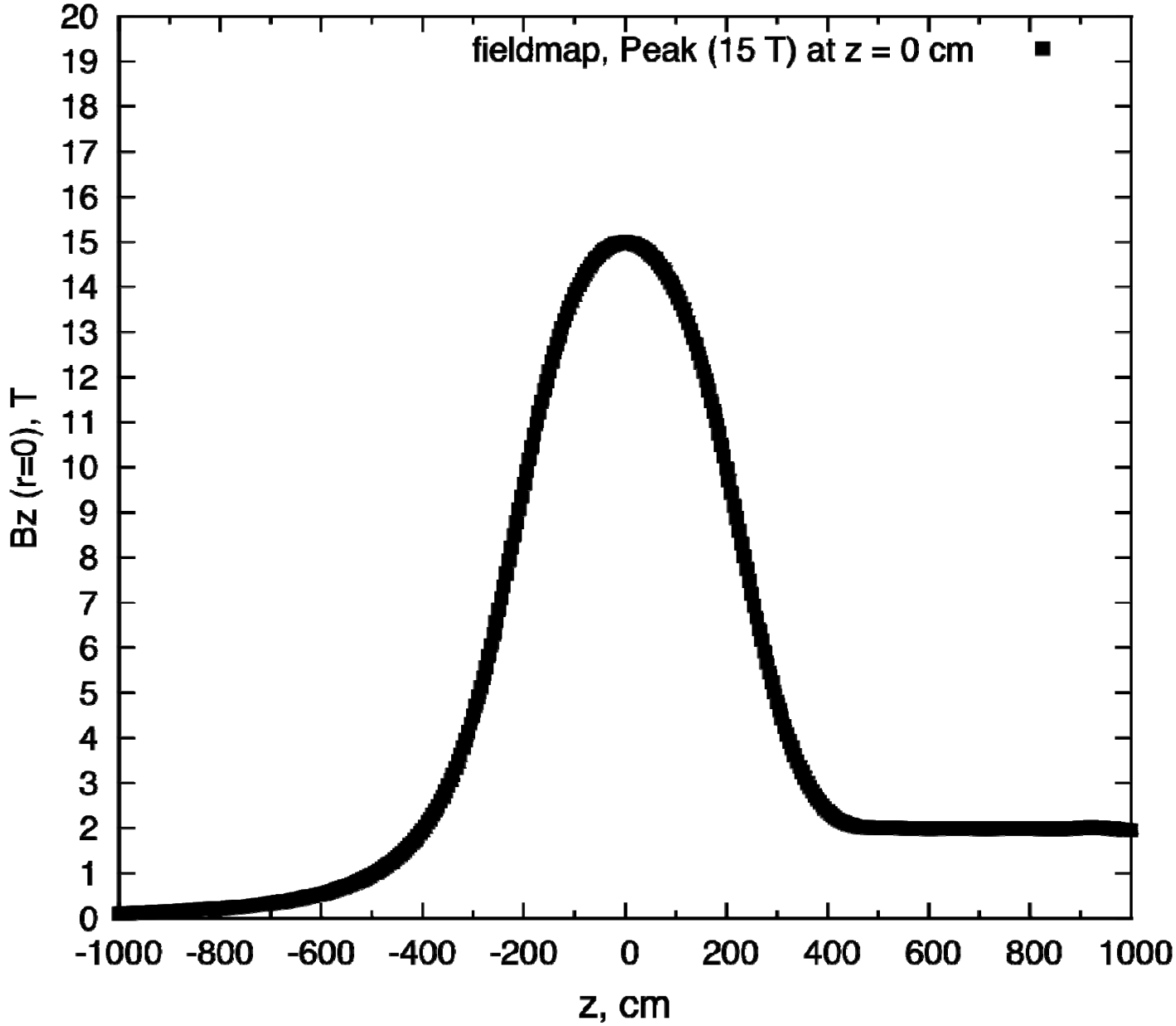
Target Setting

- Hg and Ga target with 15to2T5m Configuration (no resistive copper) and Fieldmap (15T➔2T);
- Carbon target with 20to2T5m Configuration (with resistive copper) and Fieldmap (20T➔2T);
- Code: MARS15(2014) with ICEM 4 = 1;
- Proton beam: 6.75 GeV (KE) and launched at z = -100 cm,

  Focal beam with waist at z= 0 m and emittance of 5 μm;
- Production Collection: (50 m downstream, 40 MeV < KE < 180 MeV).
- BR/TR=0.3 for Hg and Ga; BR/TR=0.25 for Carbon;
- ENRG 1 = 6.75, 2 = 0.02, 3 = 0.3, 4 = 0.01, 5 = 0.05, 6 = 0.01, 7 = 0.01 (Energy card setting)

15to2T5m Fieldmap

(along SC axis)



Optimized Target Parameters And Yield Comparison (1000,000 events)

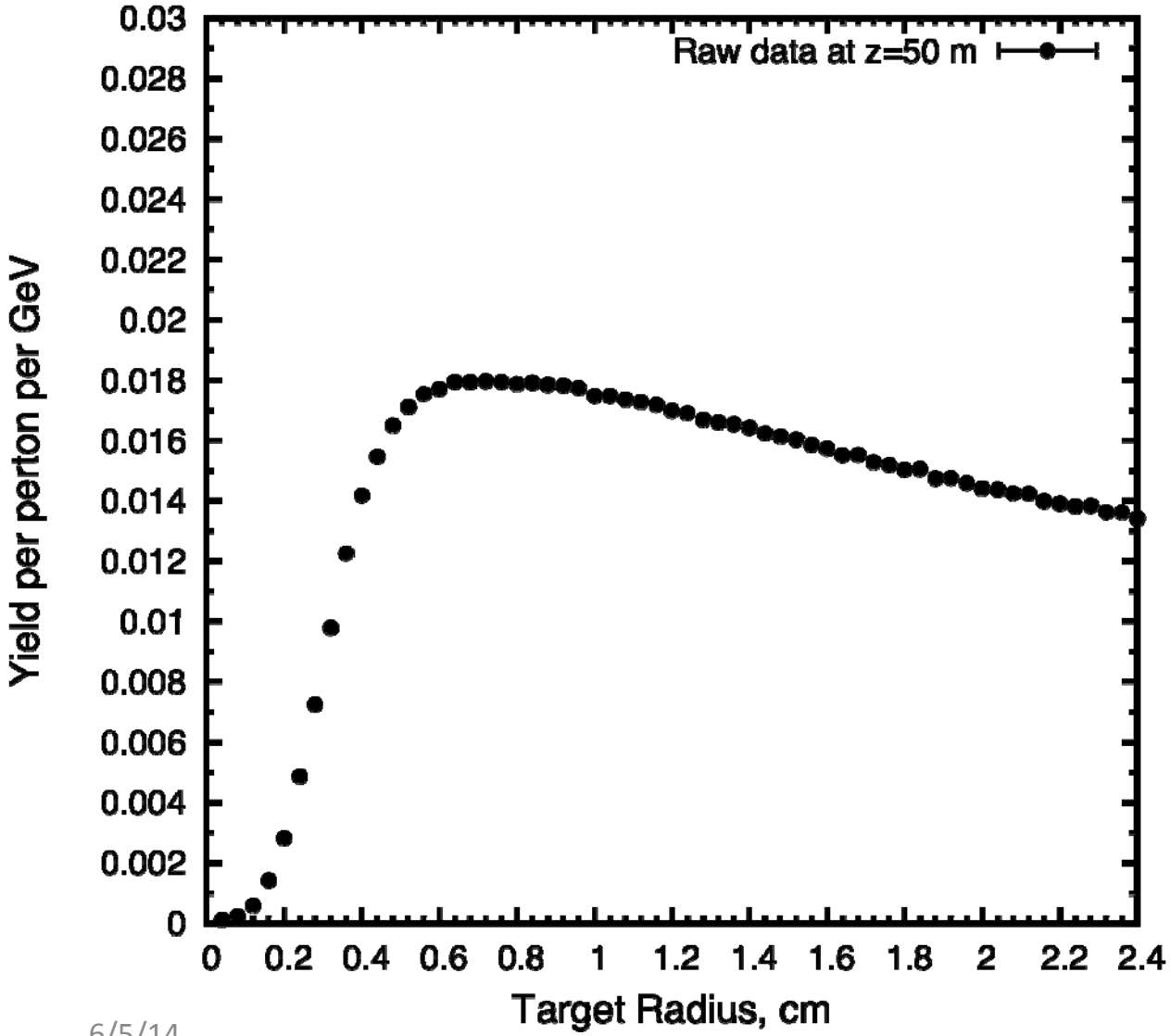
- Carbon (length: 80 cm, target radius: 0.8 cm, beam radius: 0.2 cm, beam angle: 65 mrad, crossing angle: 0 mrad) at 20to2T5m; Production: 120842
- Hg (target radius: 0.54 cm, beam radius: 0.162 cm, beam angle: 95 mrad, crossing angle: 26 mrad) at 15to2T5m;

  Production: 140856 (+16.6% higher than C)
- Ga (target radius: 0.60 cm, beam radius: 0.18 cm, beam angle: 70 mrad; crossing angle: 16 mrad) at 15to2T5m;

  Production: 135470 (+12.1% higher than C)

Carbon target, 20to2T5m

(Extension of maximum target radius from 1.6 cm to 2.4 cm)



20to2T5m Configuration;
Target length: 80 cm;
Beam angle: 65 mrad;
Beam/Target crossing angle: 0 mrad;
TR/BR=4;

Carbon target, 20to2T5m (Cont'd)

Target radius, cm	Yield per proton per GeV	Difference
0.8	**0.0178778**	**0%**
1.0	0.0174818	-2.2%
1.2	0.0169881	-5%
1.4	0.0164227	-8.1%
1.6	**0.0157262**	**-12%**
1.8	0.0150353	-15.9%
2.0	0.0144062	-19.4%
2.2	0.0139147	-22.2%
2.4	**0.0134181**	**-24.9%**