Meson Production Comparison between HG and GA at 8 GeV (Update)

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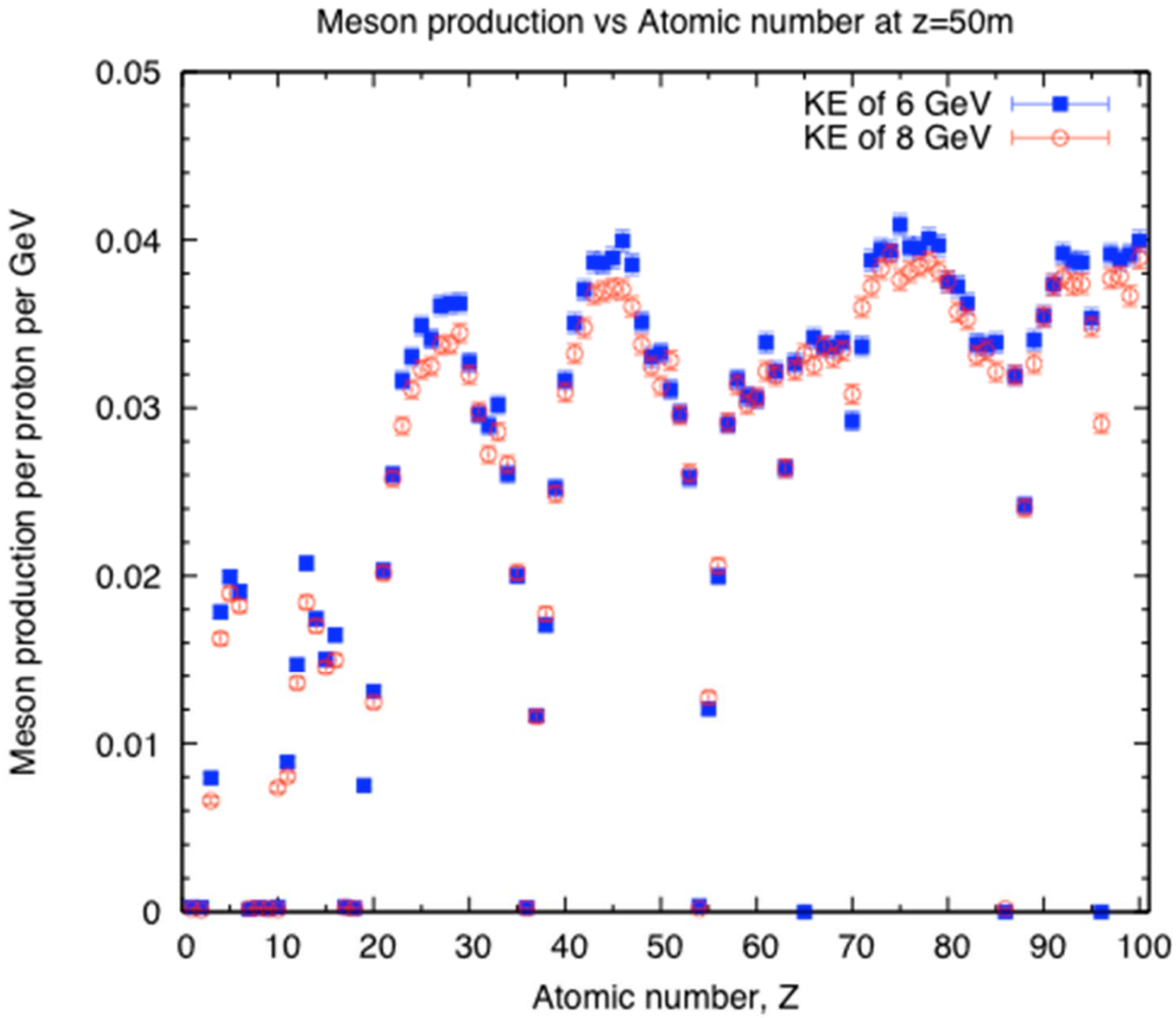
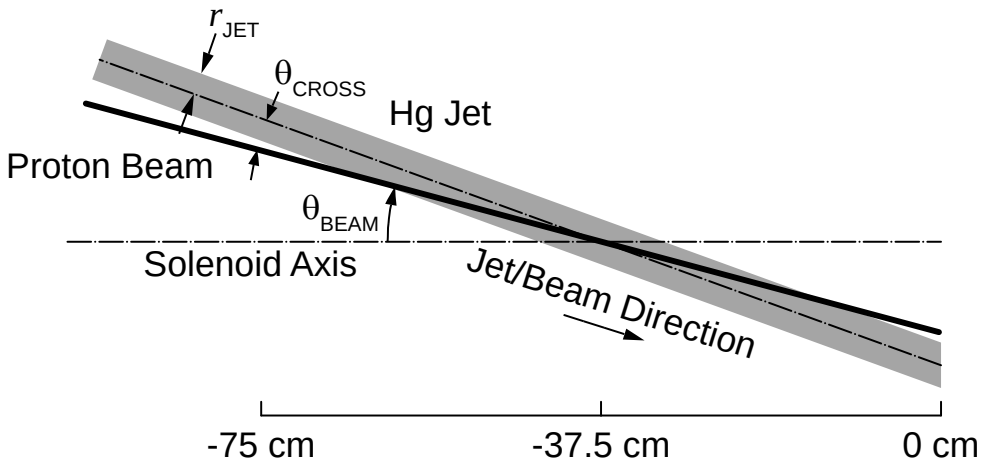
Meson Productions at 6 and 8 GeV

(All using the same geometry as Hg case)



Optimized Target Parameters at z=-37.5 cm



The mercury jet target geometry. The proton beam and mercury jet cross at z=-37.5 cm.

Study-2a Geometry and fieldmap, new optimization procedure (beam below the HG jet exactly at z=-37.5 cm)

Target material	HG (Mean Free Path 13.98 cm)	GA (Mean Free Path 22.12 cm)	GA (Radius scale from HG with 22.12/13.98)
Target radius (Rtg)	0.38 cm	0.42 cm	0.60 cm
Proton Beam Angle (θb)	99 mrad	77 mrad	87 mrad
Crossing Angle of Beam/Jet (θc)	19.14 mrad	9 mrad	16.6 mrad
Path length of proton beam inside the jet [2Rtg/sin(θc)]	39.7 cm	93.3 cm	72.3 cm

Meson Production Comparison at Z = 50 m (No. of events: 400000)

Target material	HG	GA	GA (Radius scale to be 0.6 cm)
Meson Production before optimization (0.5cm/67mrad/33 mrad)	57340 (Pos) 60791 (Neg) 118131 (Sum)	46414 (Pos) 48830 (Neg) 95244 (Sum)	
Meson Production after optimization	61255 (Pos) 66996 (Neg) 128351 (Sum) **(16.6% higher than GA case)**	54129 (Pos) 55958 (Neg) 110087 (Sum)	53253 (Pos) 54091 (Neg) 107343 (Sum)

Meson Production with Varied Roll Angles

Roll Angle	180 deg Beam below the HG Jet	270 deg Beam on the left of HG Jet	90 deg Beam on the right of HG Jet
Meson Production (HG Jet) (Diff)	127477.9 (0.0%)	130781.7 (+2.6%)	97815.5 (-2.3%)
Meson Production (GA Jet) (Diff)	109301 (0.0%)	114051.6 (+4.3%)	104005.6 (-4.8%)

BACKUP

MARS Results by J. Back

Useful pion/muon yields for different Z's and beam energies (J.Back)