Particle flux simulations

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Fermilab
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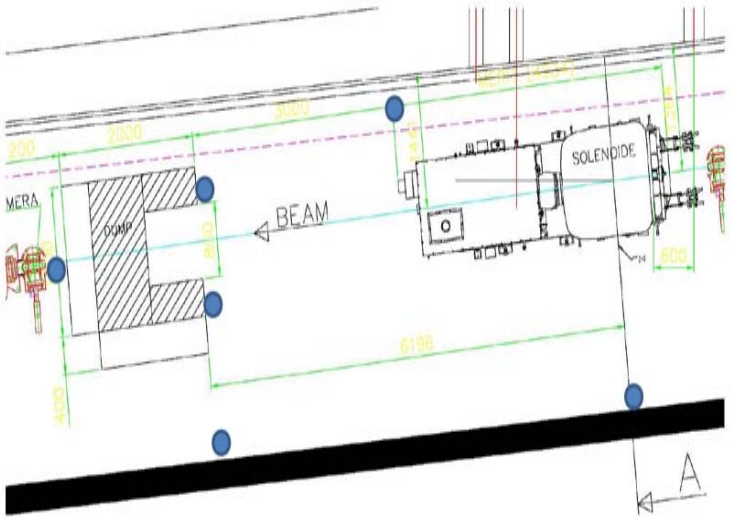
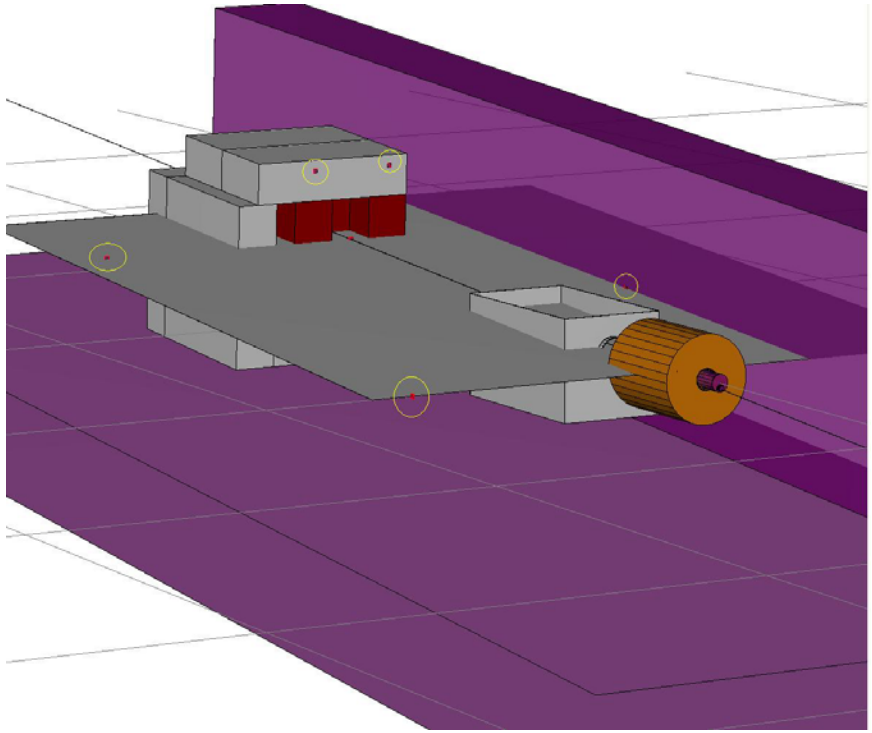
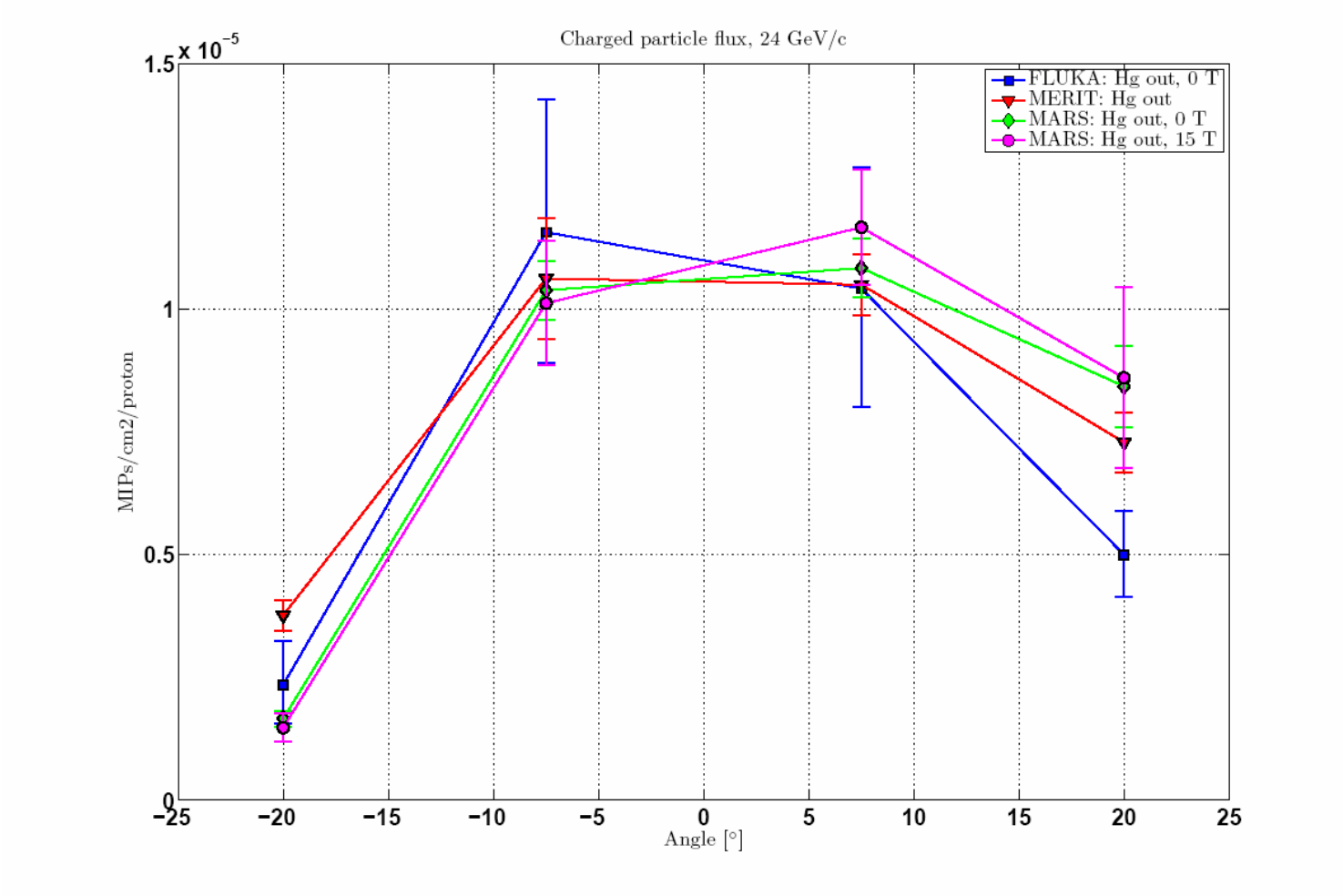
Detector positions in experiment

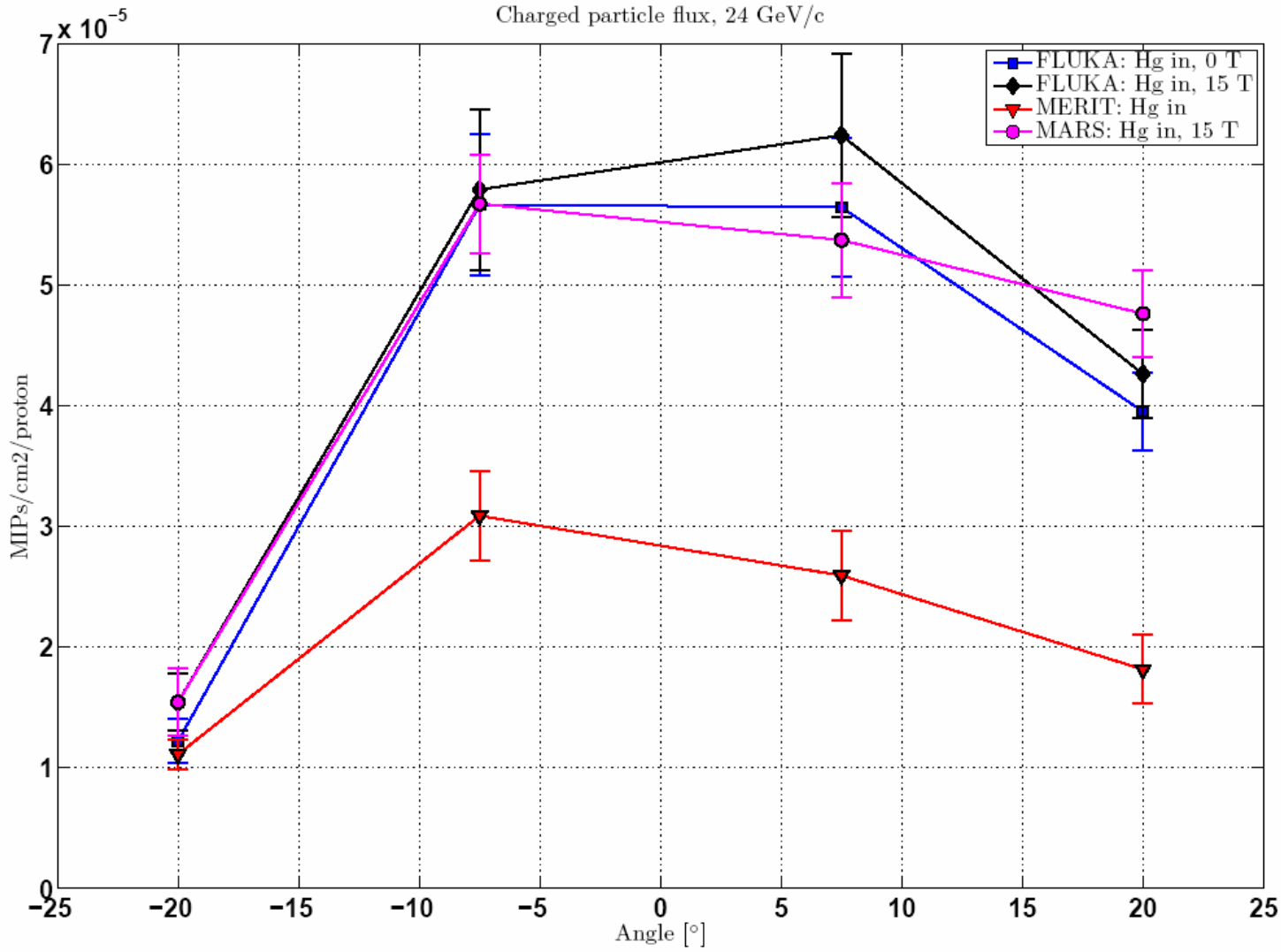




Charged particle flux [cm^{-2}] – Hg out (last year results)



Charged particle flux [cm^{-2}] – Hg in (last year results)



Beam description

- Courant-Snyder parameters – vertical direction:
- α_v = 0.26
- β_v = 279 cm
- σ_v = 0.117 cm (???? = 0.15 cm)
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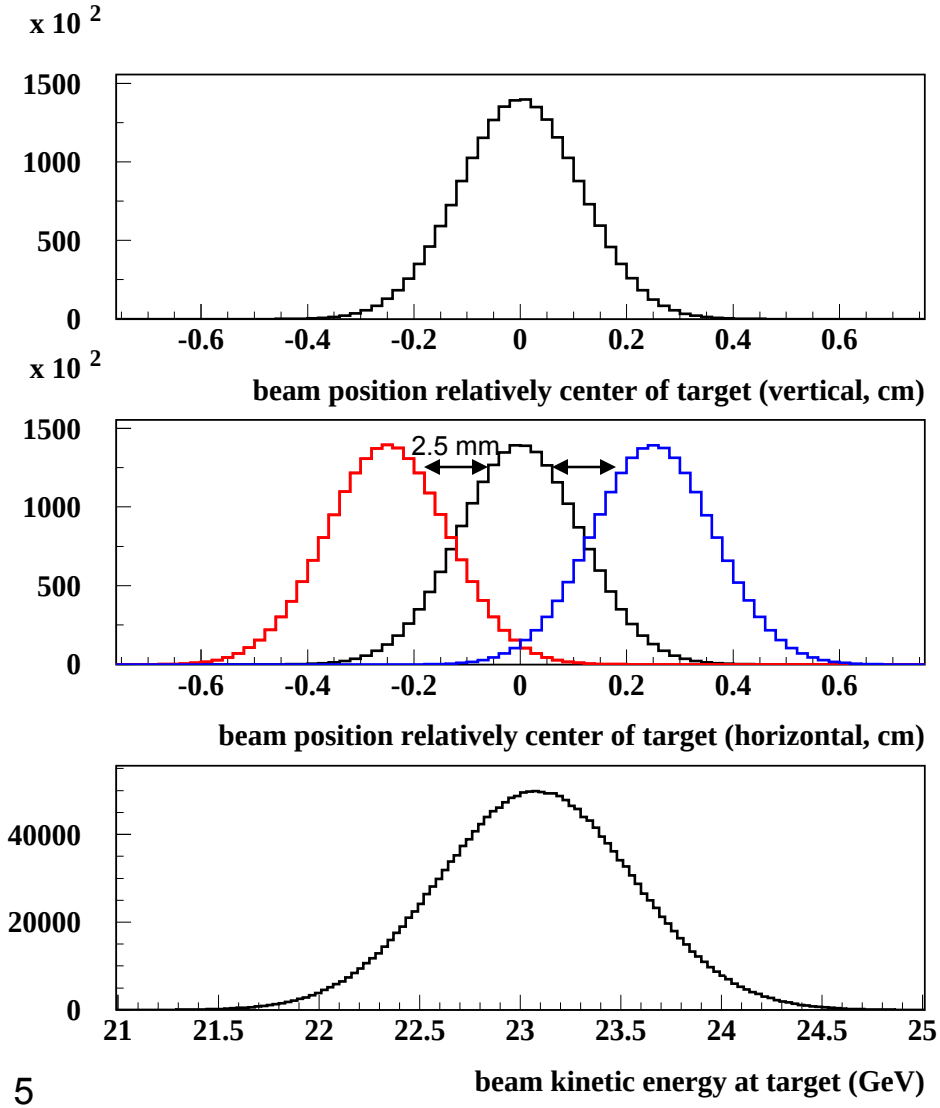
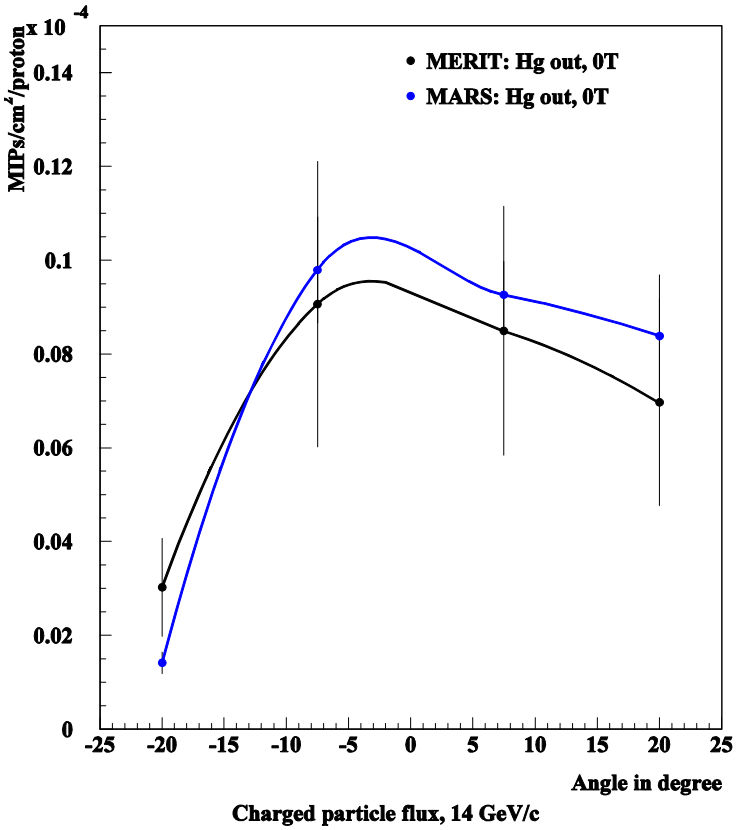
- Courant –Snyder parameter - horizontal direction:
- α_h = 0.53
- β_h = 279 cm
- σ_h = 0.129 cm (???? = 0.15 cm)

- Momentum distribution:
- σ_p= 480 MeV/c



14 GeV/c – Hg out

- MERIT data has been obtained from table provided by Harold
- Flux values and errors depends on “scan valley” definition
- It could be useful to fix “scan valley” definition and create tables with “official data”
- Large disagreement between simulations and data at -21 degree (similar to 24 GeV/c)



14 GeV/c – Hg in

- Jet shapes:

  circular (r = 5 mm)

  elliptical (r_v = 12 mm r_h = 2.1 mm)

- Gravity adjusted Hg trajectory:

  $y-y_0=0.032(z-z_0)-0.0218\ (z-z_0)^2$

  y_0=-0.147 m, z_0=-0.46 m

- "Optical length":

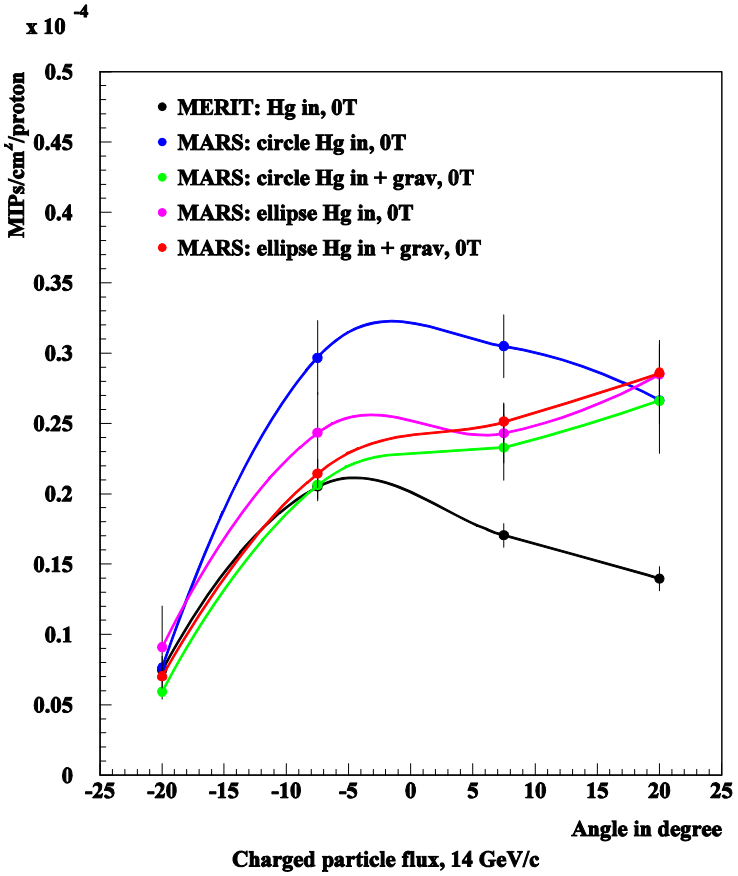
circular straight – 30 cm

circular + gravity – 20 cm

elliptical straight – 73 cm

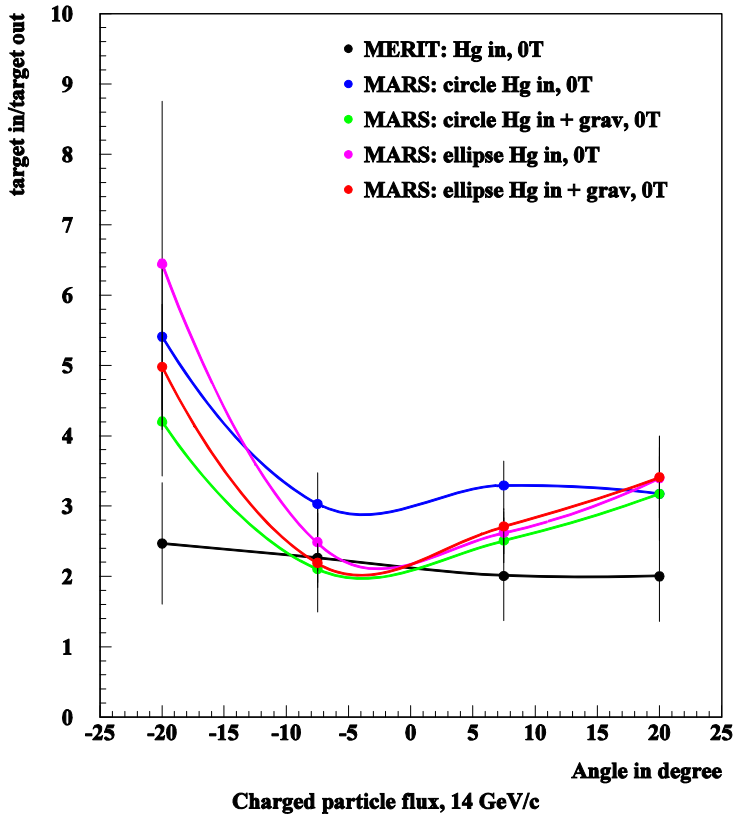
circular + gravity – 48 cm

interaction length – 14 cm



14 GeV/c – ratio Hg in/ Hg out

- Simulations with gravity adjusted jets are close to measurements for central detectors
- Simulation underestimates data at large angle and large distance from beam (no target)
- Simulation overestimates data at large angle and smallest distance from center of the jet



To do list

- Check dependence on beam spot size
- Check large angle detector positions, orientations, environment
- Consider jet shape changing with distance to nozzle (constant and non-constant density)
- Run 24 GeV/c simulation with gravity adjusted jet