$\pi, \mu$ Yields for Hybrid Study2 Geometry

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Introduction

- Simulations of $\pi$, $\mu$ accepted yields for W target cylindrical rods for a hybrid geometry, 10 GeV parabolic proton beam:
  - Study 2 geometry, target rod placed just behind main Cu-SC magnets
  - Extra Cu coils placed upstream before target rod

- Vary the maximum radial extent of the upstream Cu coils ($r_{\text{magnet}}$);
  Keep shielding the same; Gap between Cu coils always 30 cm

- As before, radius of beam = radius of rod, tilt of beam = tilt of rod
  Try out different lengths of the target rods: 15 – 30 cm

- Yields are charge-averaged number of accepted $\pi$ and $\mu$ per proton per GeV
Vary maximum radial extent of the leftmost Cu solenoid (magenta), before target rod (black). Other sections: shielding (brown), SC coils (yellow)
Study 2 Geometry
Hybrid Geometry
Dotted lines: rod z position range

$r_{\text{magnet}} = 49 \text{ cm}$

Study 2 Geometry
Hybrid Geometry
Dotted lines: rod z position range

$r_{\text{magnet}} = 100 \text{ cm}$
\( r_{\text{rod}} = r_{\text{beam}} = 0.25 \text{ cm} \)

Top Left: \( r_{\text{magnet}} = 49 \text{ cm} \)

Bottom Left: \( r_{\text{magnet}} = 60 \text{ cm} \)

Bottom Right: \( r_{\text{magnet}} = 100 \text{ cm} \)

Dotted line: Hg yield for optimal tilt at same energy as solid target
$r_{\text{rod}} = r_{\text{beam}} = 0.50 \text{ cm}$

Top Left: $r_{\text{magnet}} = 49 \text{ cm}$

Bottom Left: $r_{\text{magnet}} = 60 \text{ cm}$

Bottom Right: $r_{\text{magnet}} = 100 \text{ cm}$

Dotted line: Hg yield for optimal tilt at same energy as solid target
$r_{\text{rod}} = r_{\text{beam}} = 0.75 \text{ cm}$

Top Left: $r_{\text{magnet}} = 49 \text{ cm}$

Bottom Left: $r_{\text{magnet}} = 60 \text{ cm}$

Bottom Right: $r_{\text{magnet}} = 100 \text{ cm}$

Dotted line: Hg yield for optimal tilt at same energy as solid target
\( r_{\text{rod}} = r_{\text{beam}} = 1 \text{ cm} \)

Top Left: \( r_{\text{magnet}} = 49 \text{ cm} \)

Bottom Left: \( r_{\text{magnet}} = 60 \text{ cm} \)

Bottom Right: \( r_{\text{magnet}} = 100 \text{ cm} \)

Dotted line: Hg yield for optimal tilt at same energy as solid target
$r_{\text{rod}} = r_{\text{beam}} = 1.5 \text{ cm}$

Top Left: $r_{\text{magnet}} = 49 \text{ cm}$

Bottom Left: $r_{\text{magnet}} = 60 \text{ cm}$

Bottom Right: $r_{\text{magnet}} = 100 \text{ cm}$

Dotted line: Hg yield for optimal
tilt at same energy as solid target