Pion Production with MARS14

Neutrino Factory Muon Collider

Collaboration Meeting

Illinois Institute of Technology

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BROOKHAVEN NATIONAL LABORATORY

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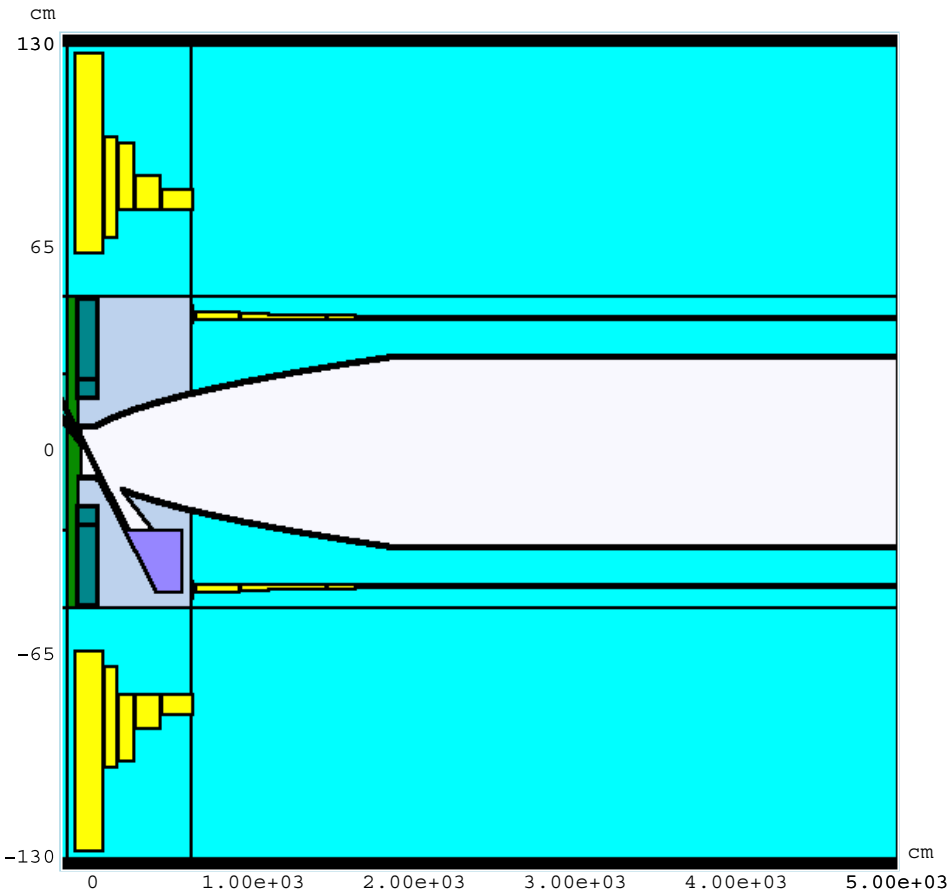
The Study2 Target System

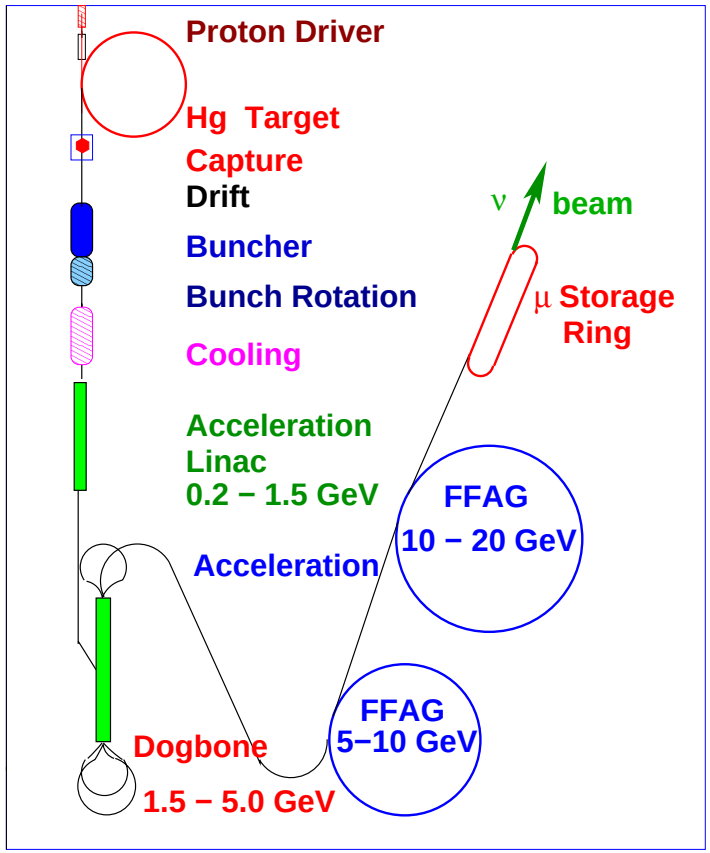


Count all the pions and muons that cross the transverse plane at z=50m.

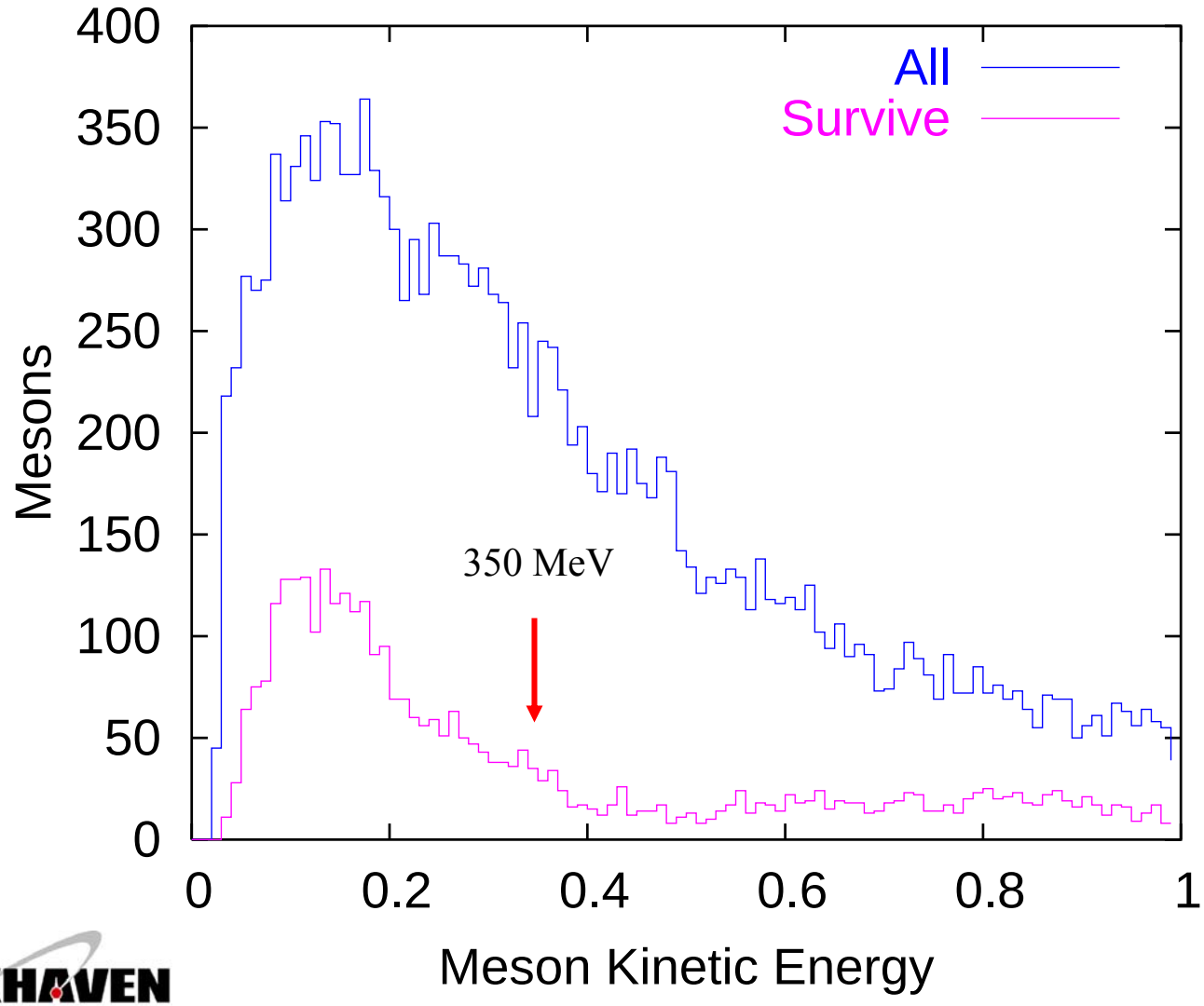
For this analysis we select all pions and muons with KE< 0.35 GeV.

Process mesons through Cooling

Consider mesons within acceptance of
$\varepsilon_\perp = 30\pi$ mm and
$\varepsilon_L = 150\pi$ mm
after cooling



Meson Post-cooling Survival



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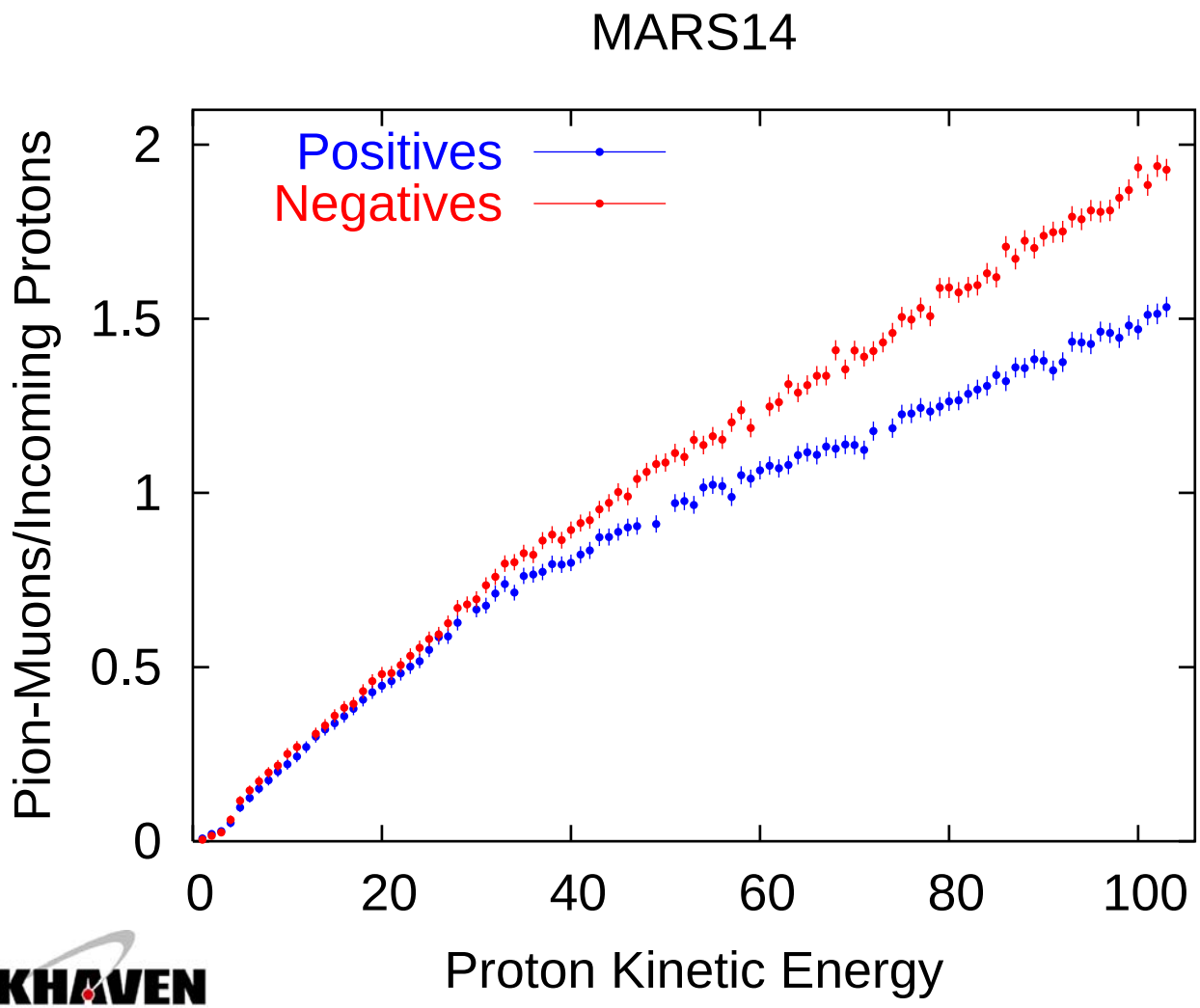
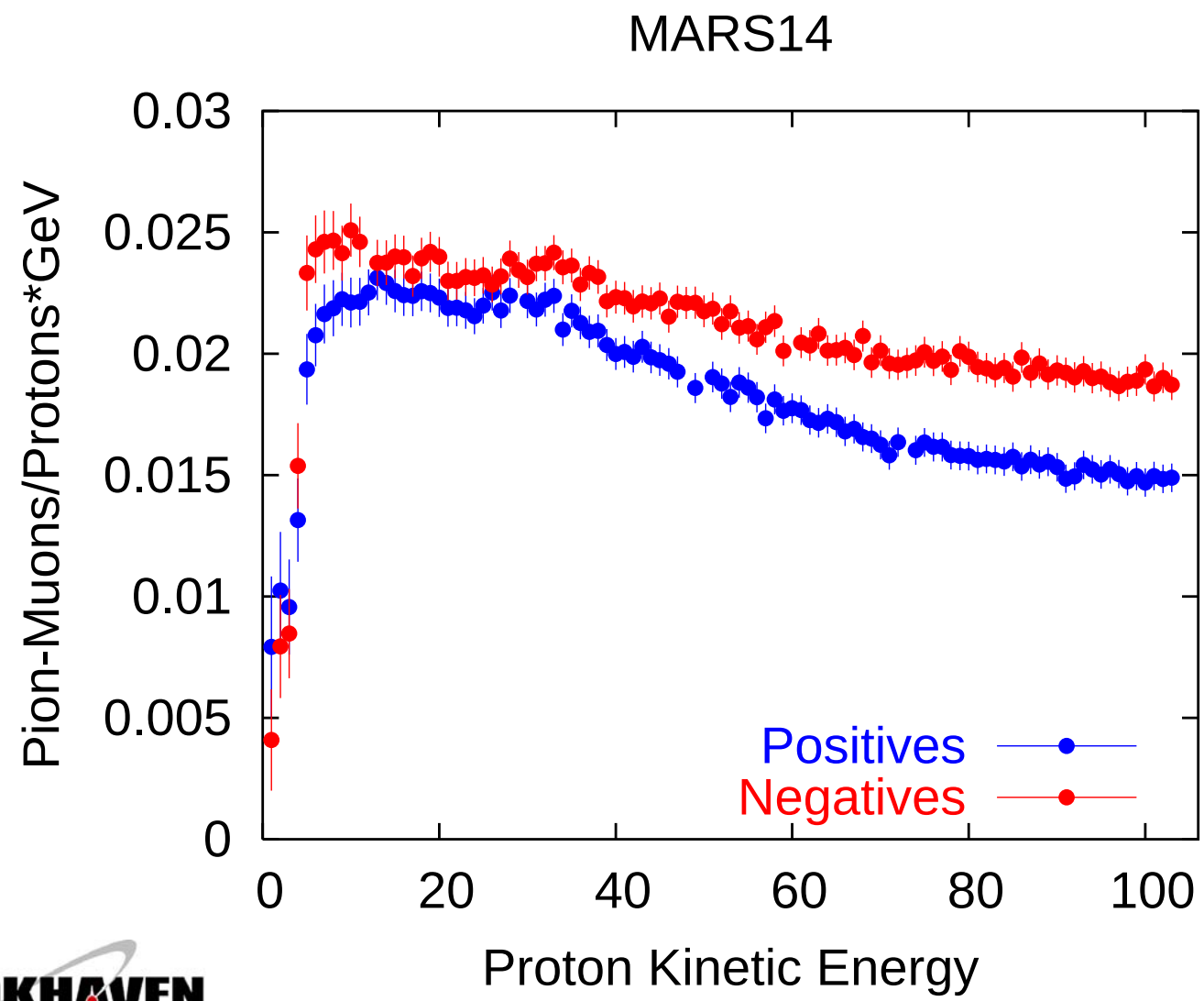
Meson KE < 350 MeV at 50m

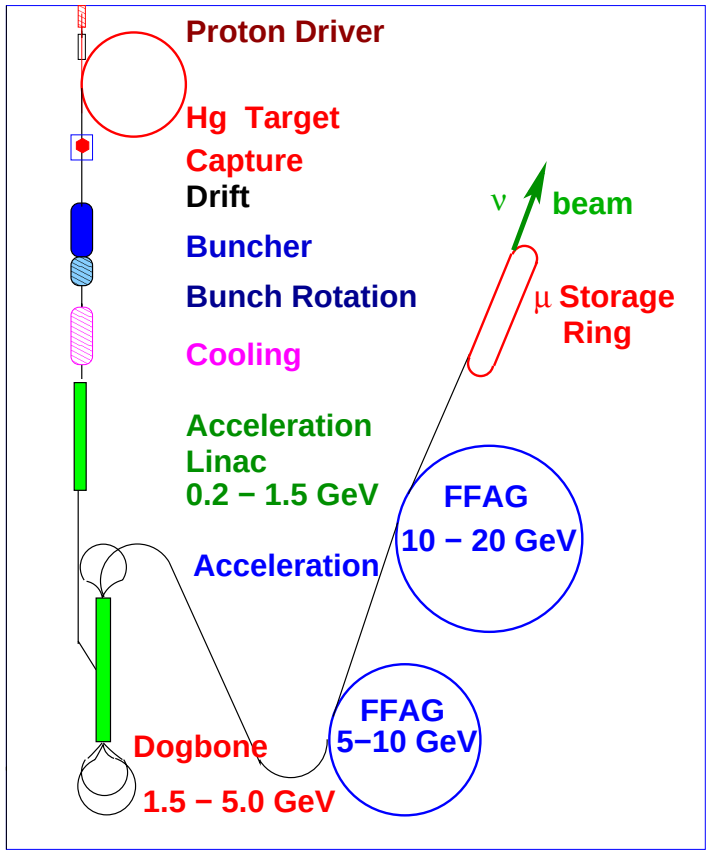


Normalized Meson count at 50m

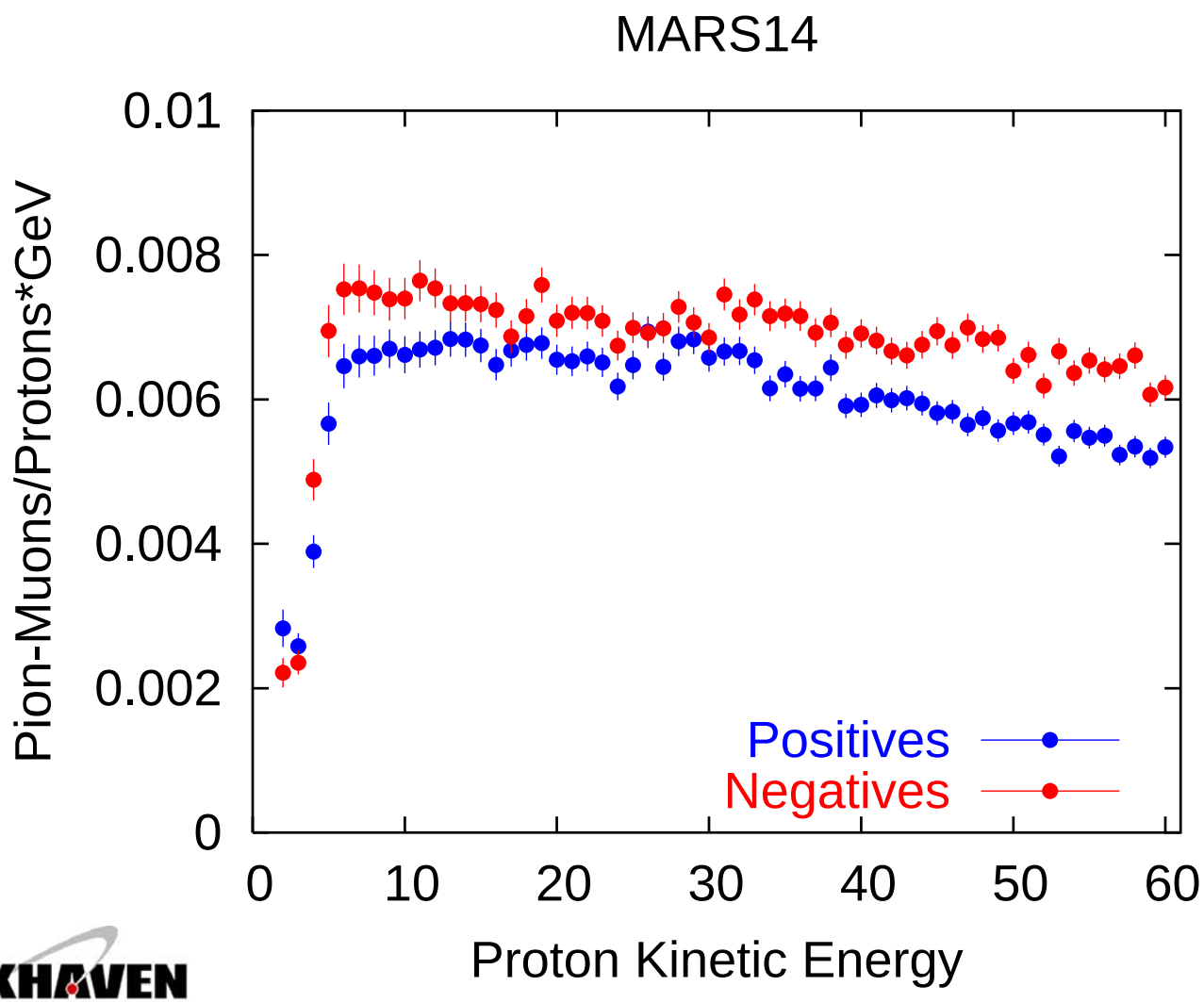


Process mesons through Cooling

Count mesons within acceptance of 30π mm



Post-cooling 30π Acceptance



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Summary for Hg

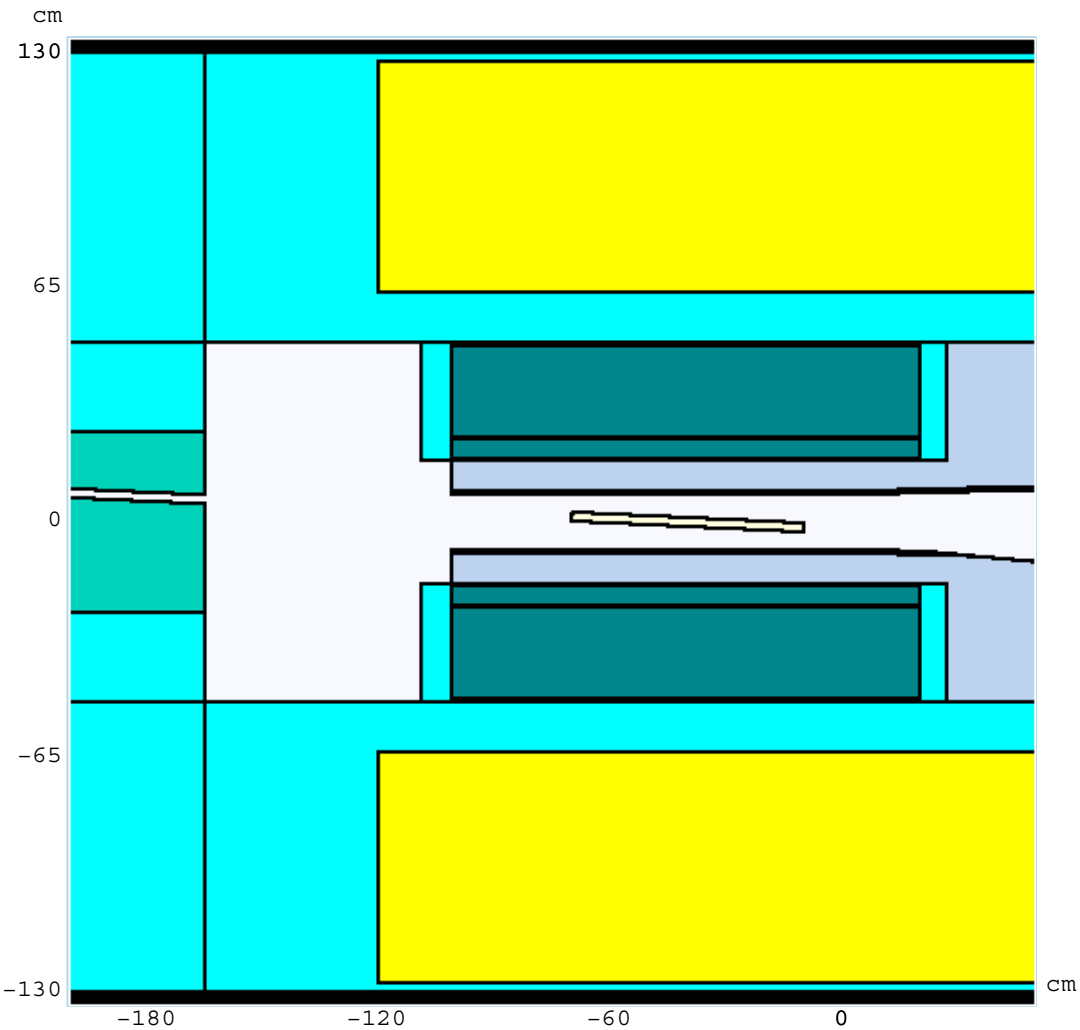
For Negatives the peak occurs for

6 Gev < Proton KE < 11 GeV

For Positives the peak occurs for

9 Gev < Proton KE < 19 GeV

Carbon Target Parameters Search



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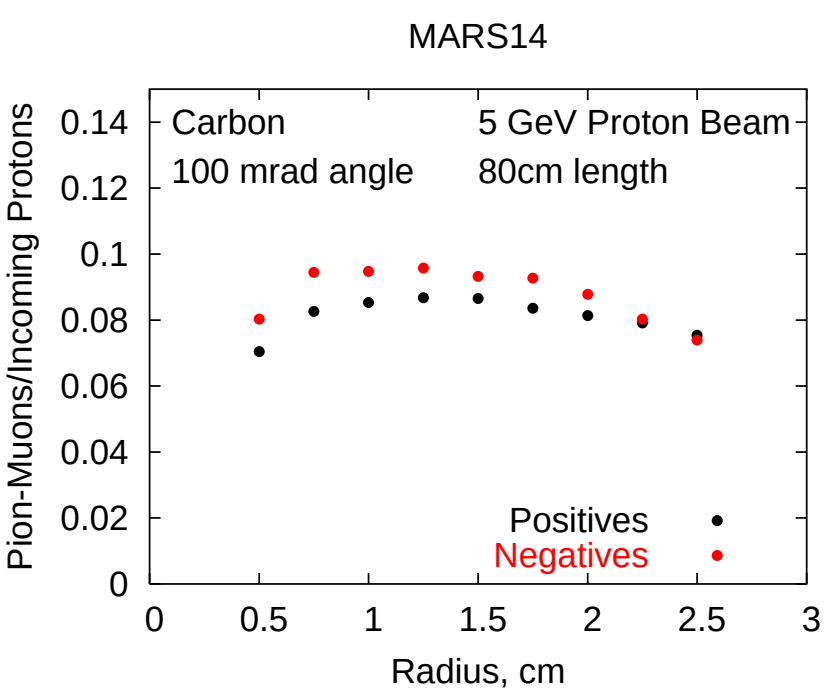
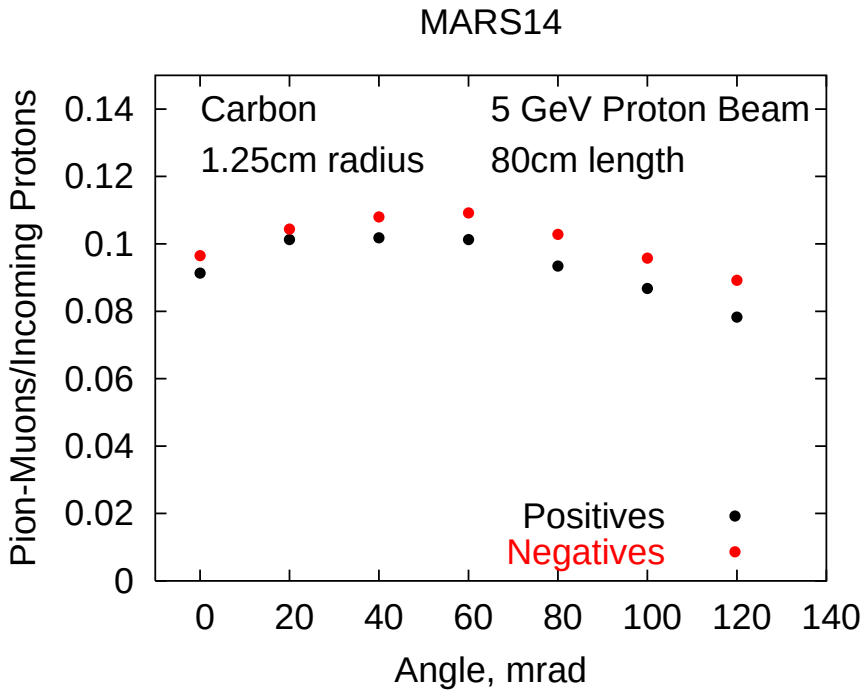
Carbon Target Optimization





Set R at 1.25cm

Set tilt angle at 50 mrad

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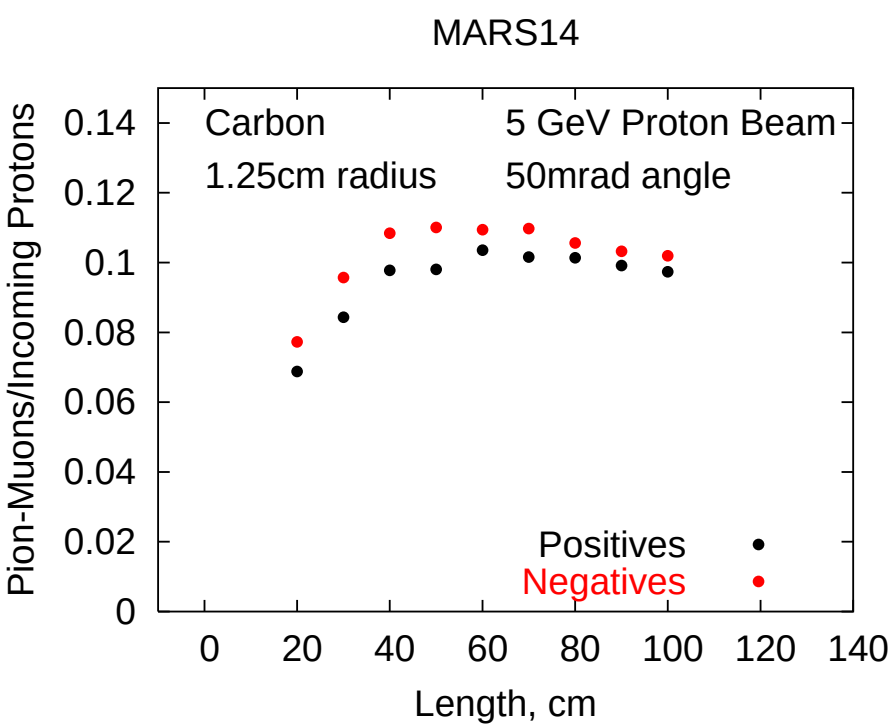
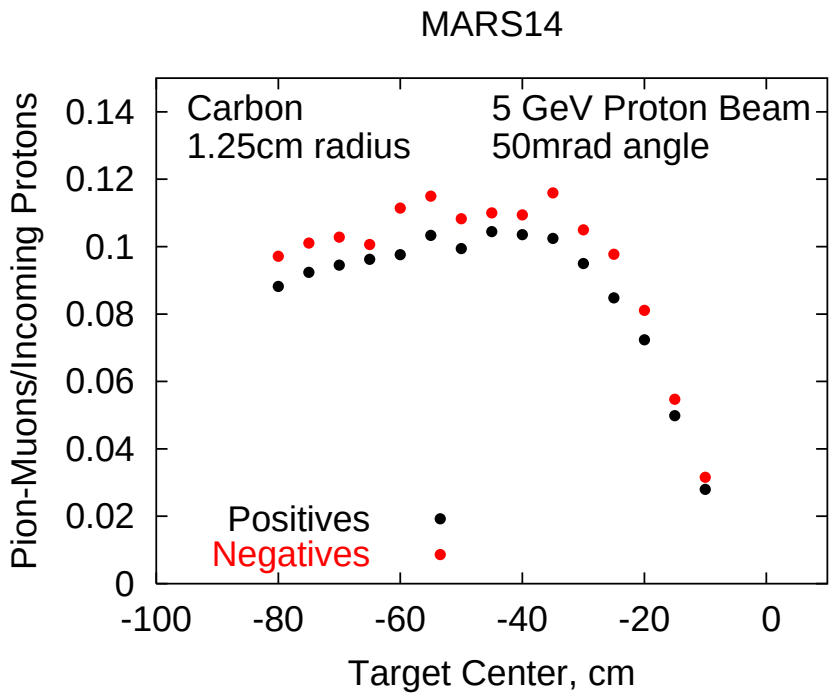
Carbon Target Optimization (cont)



Set Length at 60cm



Set Zcent at -40 cm

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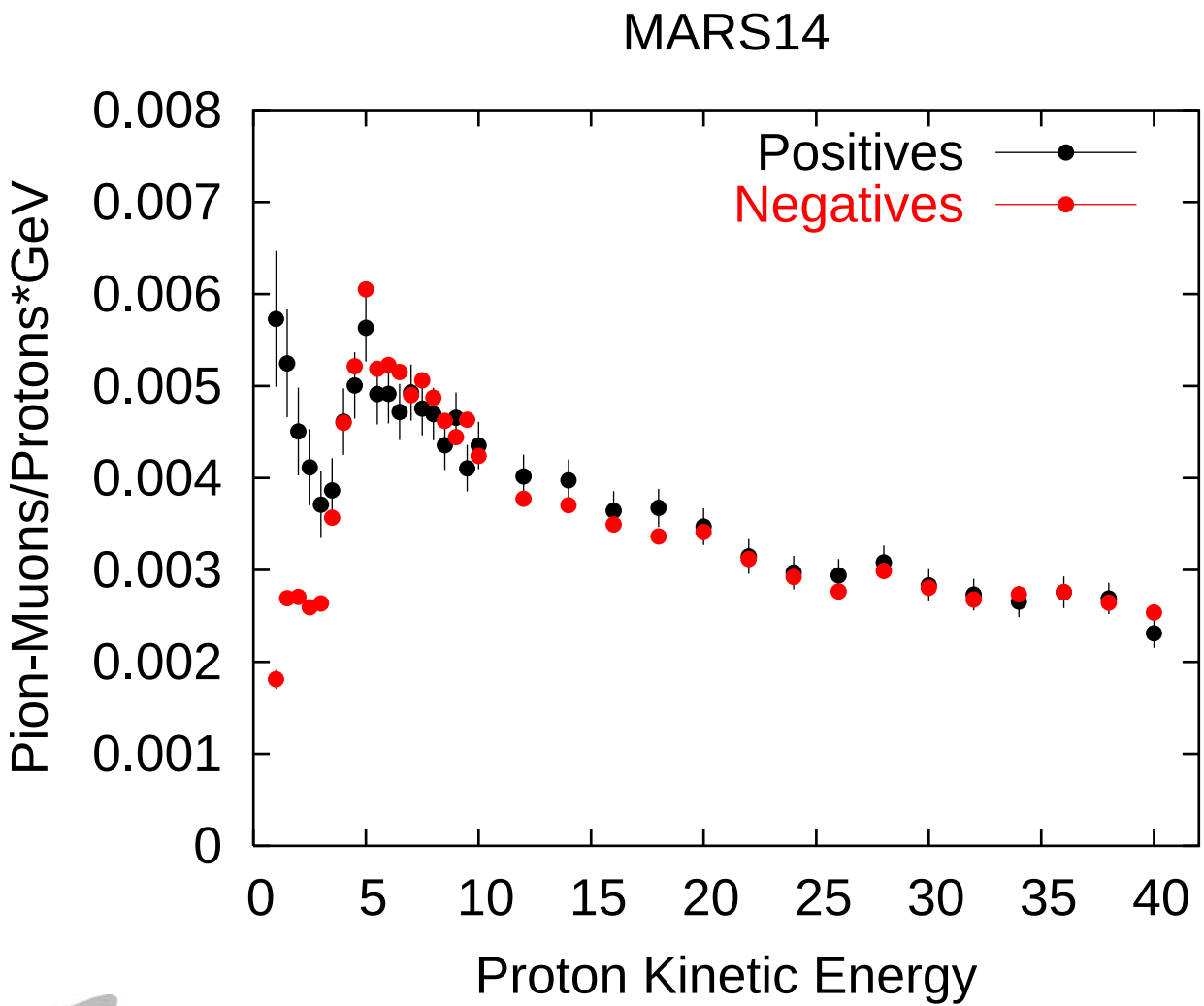
Proton KE Scan with Carbon



Summary of Results

Compare Meson production for Hg at 24 GeV and 10 GeV

$$\frac{N^{+}_{10GeV}}{N^{+}_{24GeV}} = 1.07 \qquad \frac{N^{-}_{10GeV}}{N^{-}_{24GeV}} = 1.10$$

Compare Meson production for C at 24 GeV and 5 GeV

$$\frac{N^{+}_{5GeV}}{N^{+}_{24GeV}} = 1.90 \qquad \frac{N^{-}_{5GeV}}{N^{-}_{24GeV}} = 1.77$$

Compare Meson production for Hg at 10 GeV and C at 5 GeV

$$\frac{N^{+}_{Hg-10GeV}}{N^{+}_{C-5GeV}} = 1.18 \qquad \frac{N^{-}_{Hg-10GeV}}{N^{-}_{C-5GeV}} = 1.22$$