Carbon: Pion-proton events (2.1 MLN events analysed)

Quasi-elastic scattering on bound proton (Elastic scattering ideally should have Total CMS energy of 1498 MeV and missing mass zero)

Particle identification on mass spectrum
Carbon: $\pi^+ \pi^-$ events (2.1 MLN events analysed)

di-pion events from Carbon target (no clear peak at missing neutron mass visible- expected for pion-proton reaction)
PolyEthylene: Pion-proton events (also ~2.1 MLN events)

- very clear signal from proton-pion elastic scattering
- ~40% more (total) yield as compared to carbon target
- Background can be almost completely isolated by cuts on inv. Mass & missing. Mass (see corresponding plots on slide 1)
PolyEthylene: \( \pi^+ \pi^- \) events (also \( \sim 2.1 \) MLN events)

- very clear signal from \( \pi^- p \rightarrow \pi^- \pi^+ n \) reaction (missing of neutron)
- \( \sim 100\% \) more (total) yield as compared to carbon target
- Background can be reduced by cut on missing mass (dashed histograms shows resp.missing mass from carbon run (slide2) normalized to the number of collected events \( \sim 35\% \) in window around missing neutron mass)
- resolution can be improved by pion momentum reconstruction, detector calibration(?)