

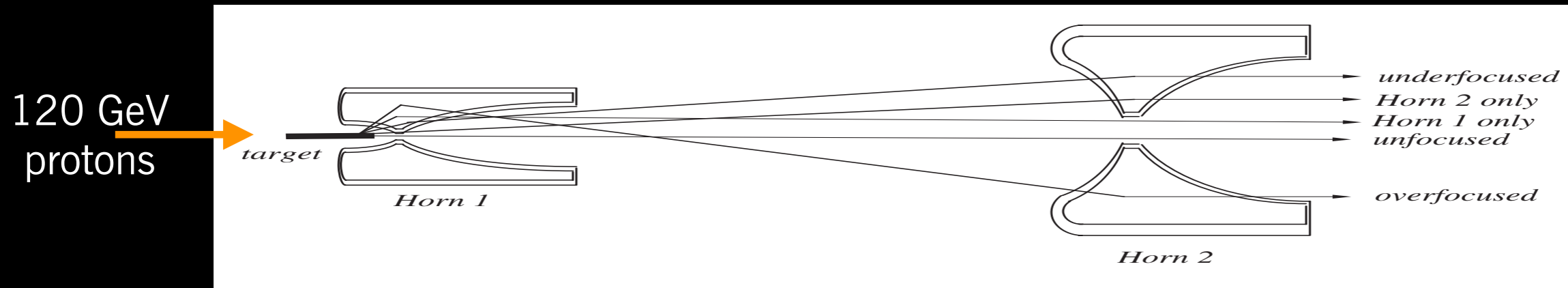
# NA61 FERMILAB TARGET RUN 2018



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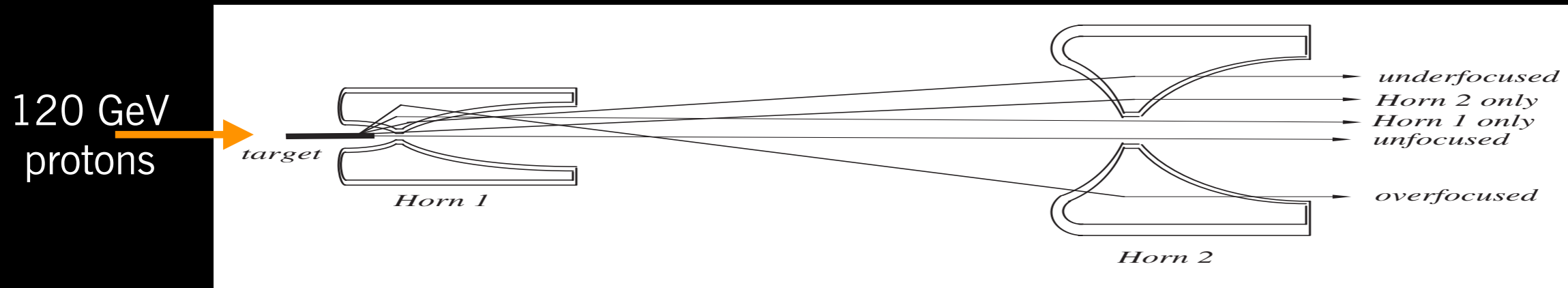
**SPS Users Meeting**  
**2 August 2018**

# Motivation in brief



- Fermilab's NuMI: a “conventional” horn-focused neutrino beam
- Interactions in the long carbon target produce pions, kaons
- These are focused with two “horns” into a roughly parallel beam
- Decays in flight in a 700m tunnel produce neutrinos

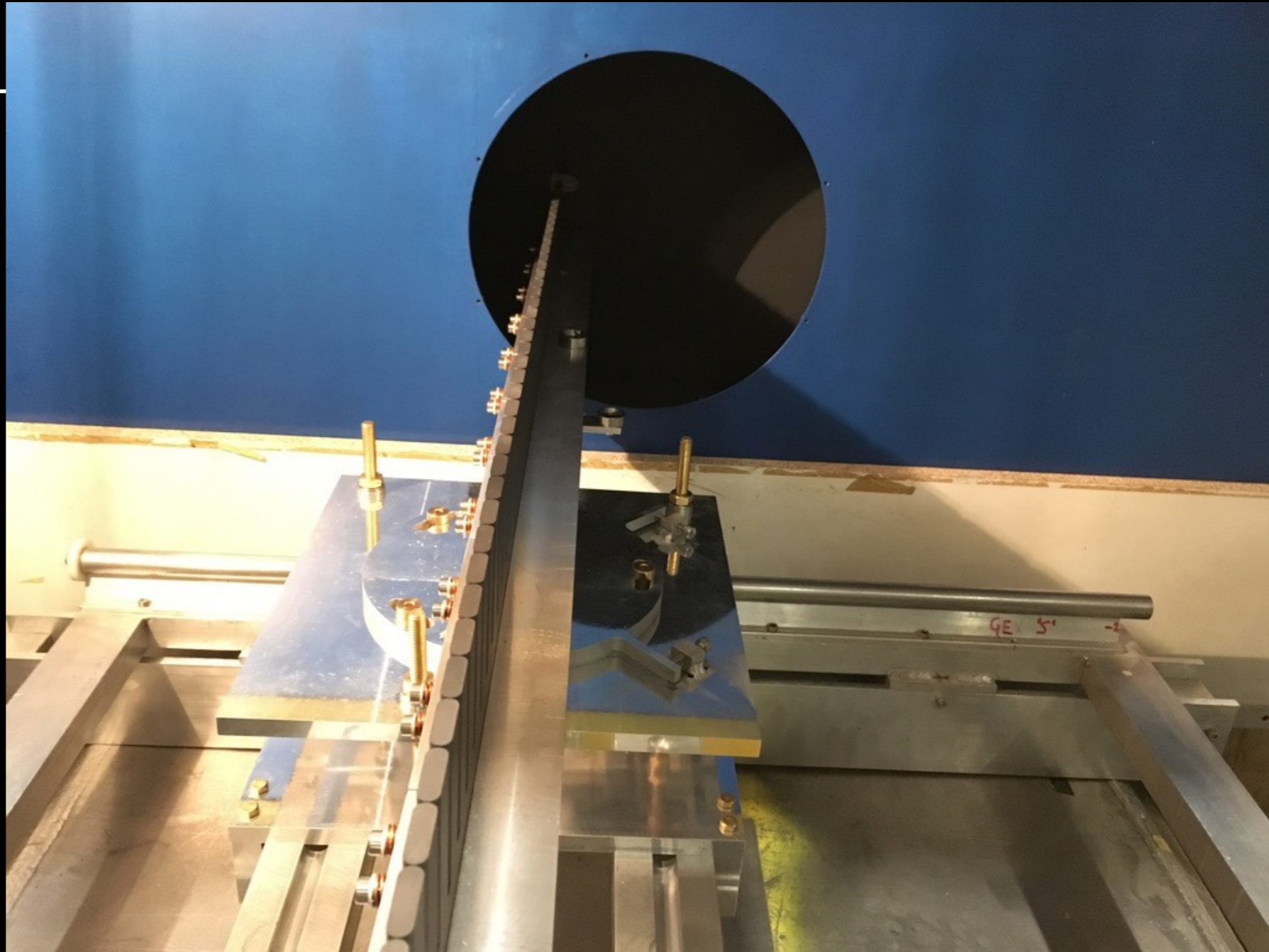
# Motivation in brief



- Production of pions and kaons in the target is not well understood: significant systematic error on neutrino flux predictions, especially for critical neutrino interaction cross-section measurements (MINERvA)
- NA61 can improve the situation in two ways:
  - Measurement of yields from specific particle interactions in target and horn material types: thin-target measurements of proton (last year) and pion (2016) interactions in thin C and Al targets
  - Measurement of yields from 120 GeV protons on a replica of the long target (this run)

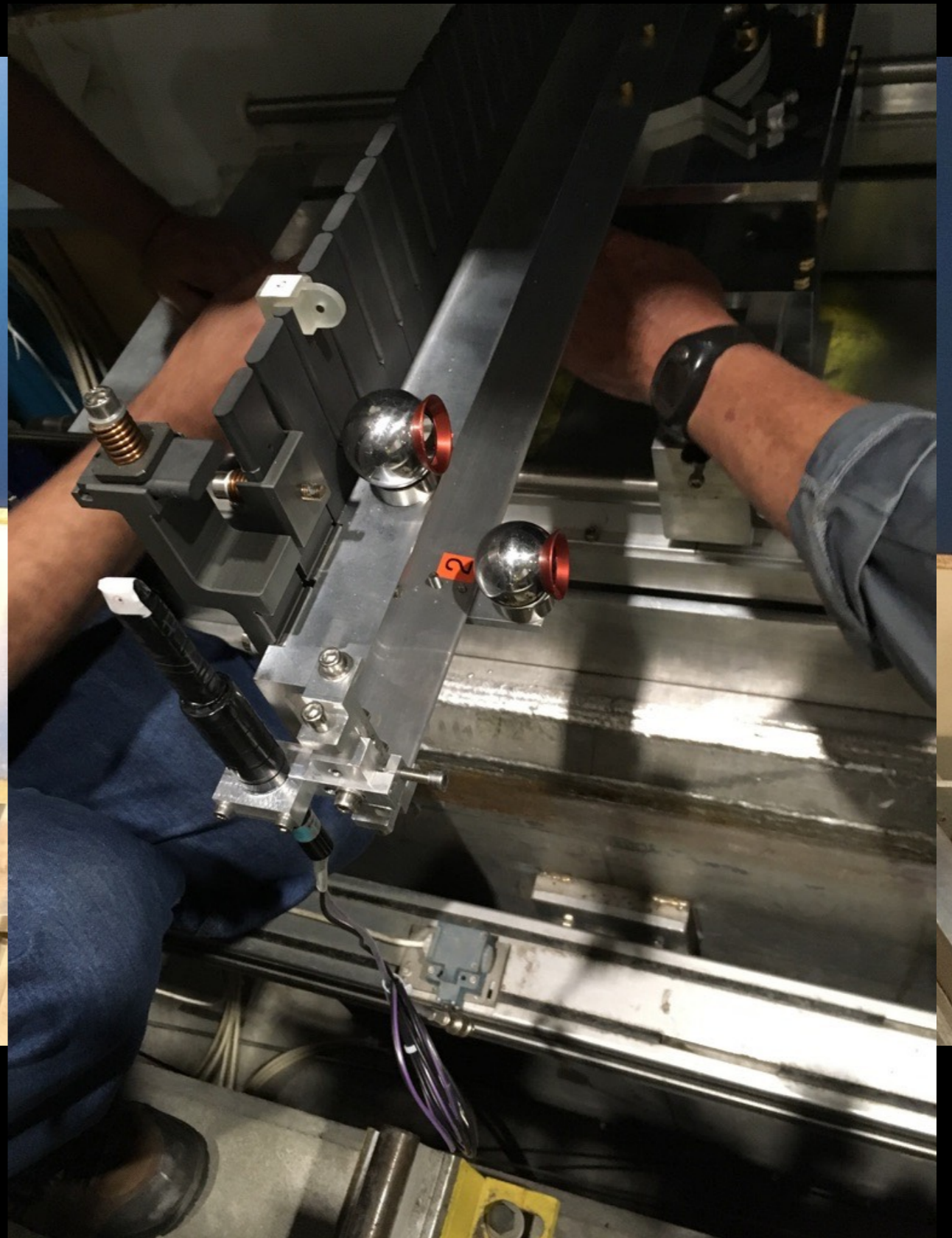
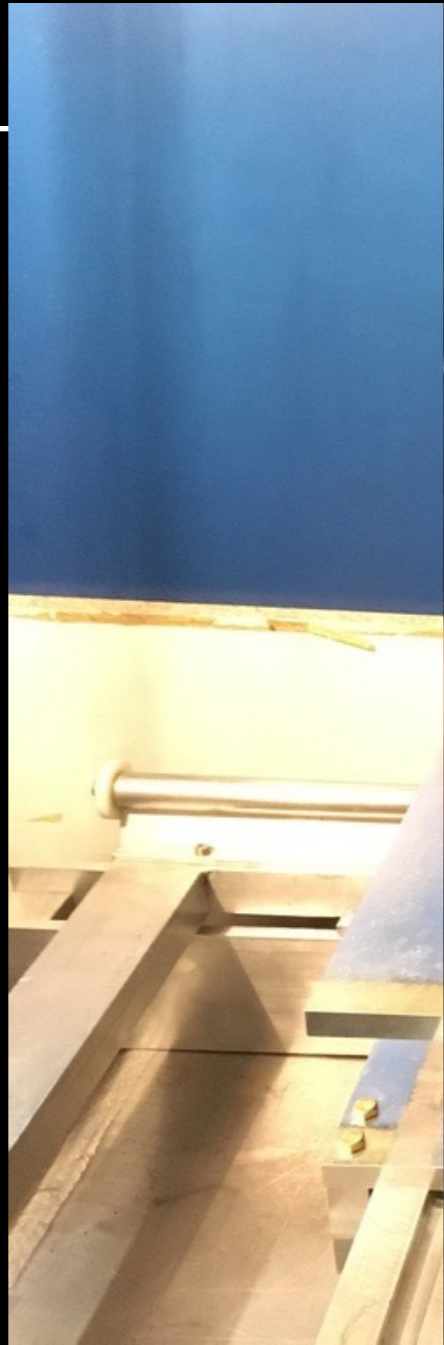
# NuMI replica target

- Target provided by Fermilab
- 1.25 meters long, graphite
- Complicated “fins” geometry due to cooling concerns in 750kW NuMI beam



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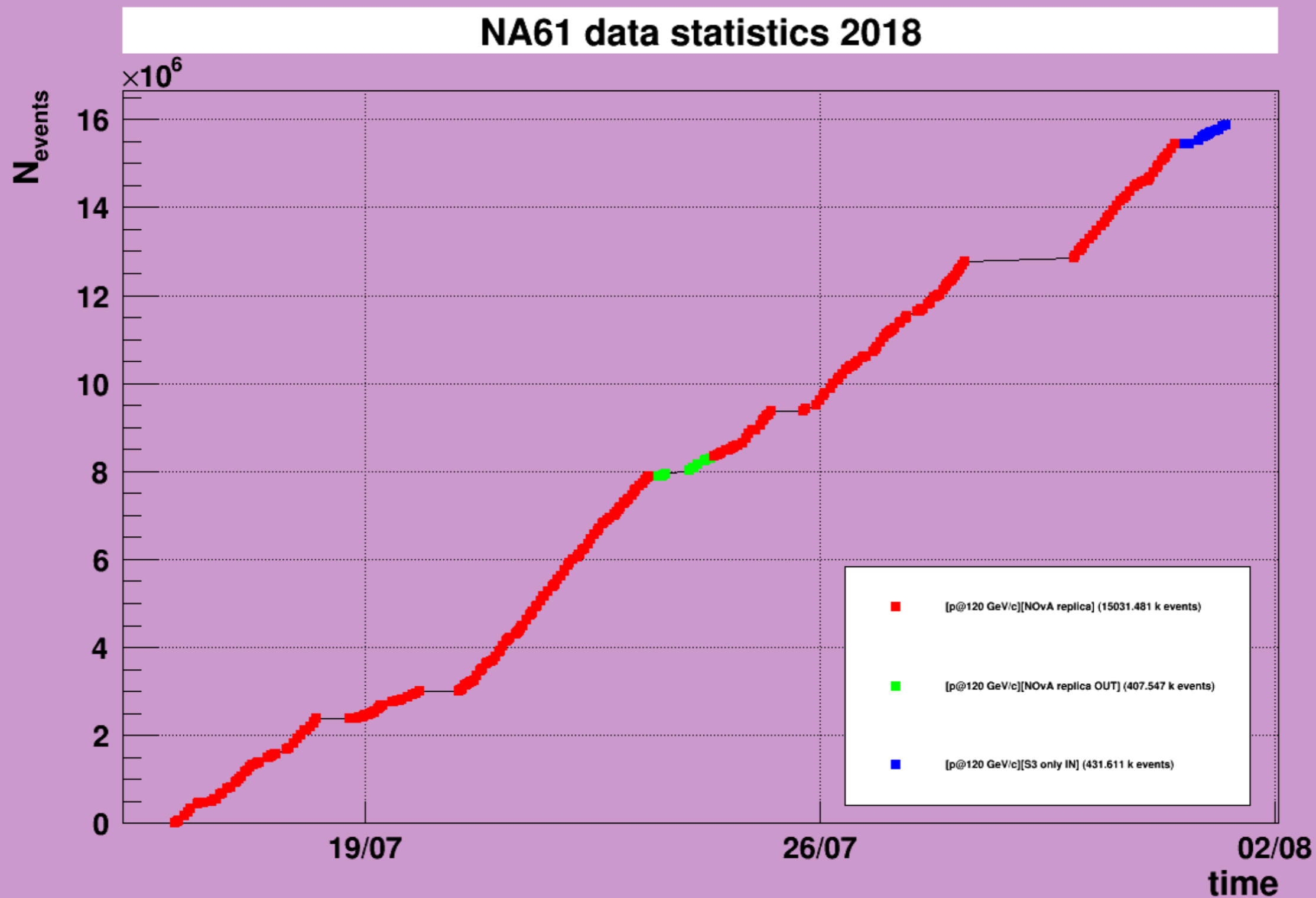


# 2018 run with replica target

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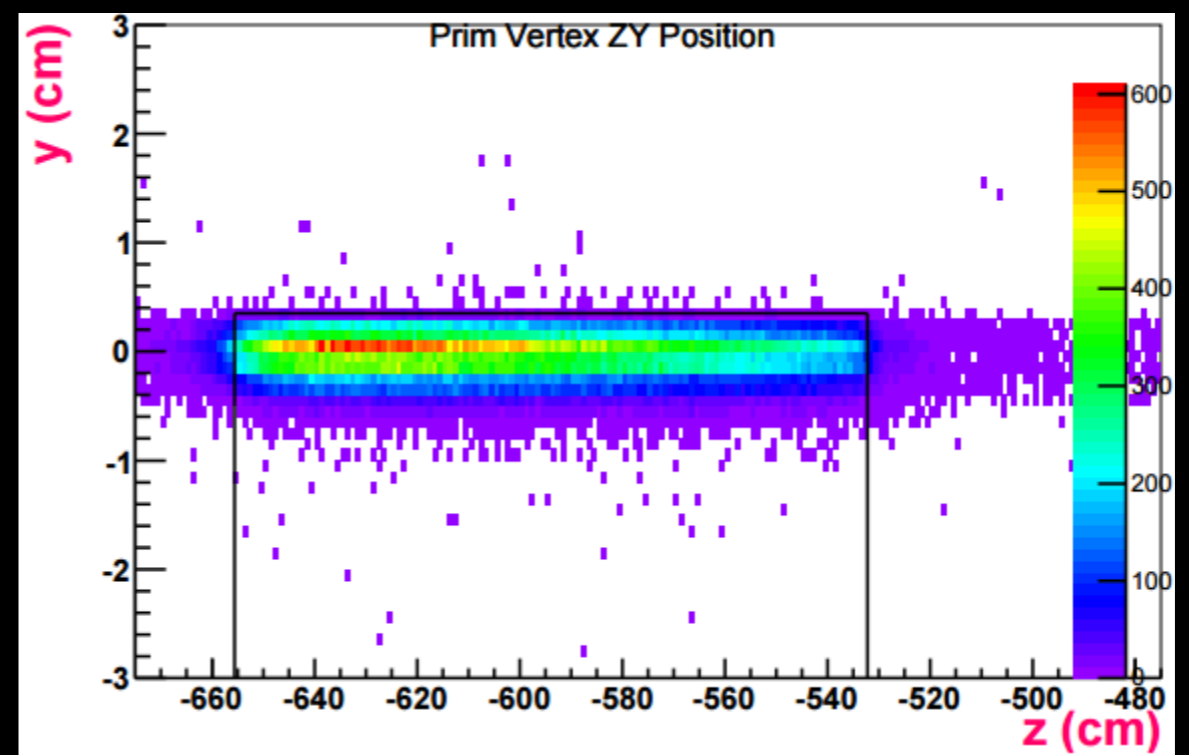
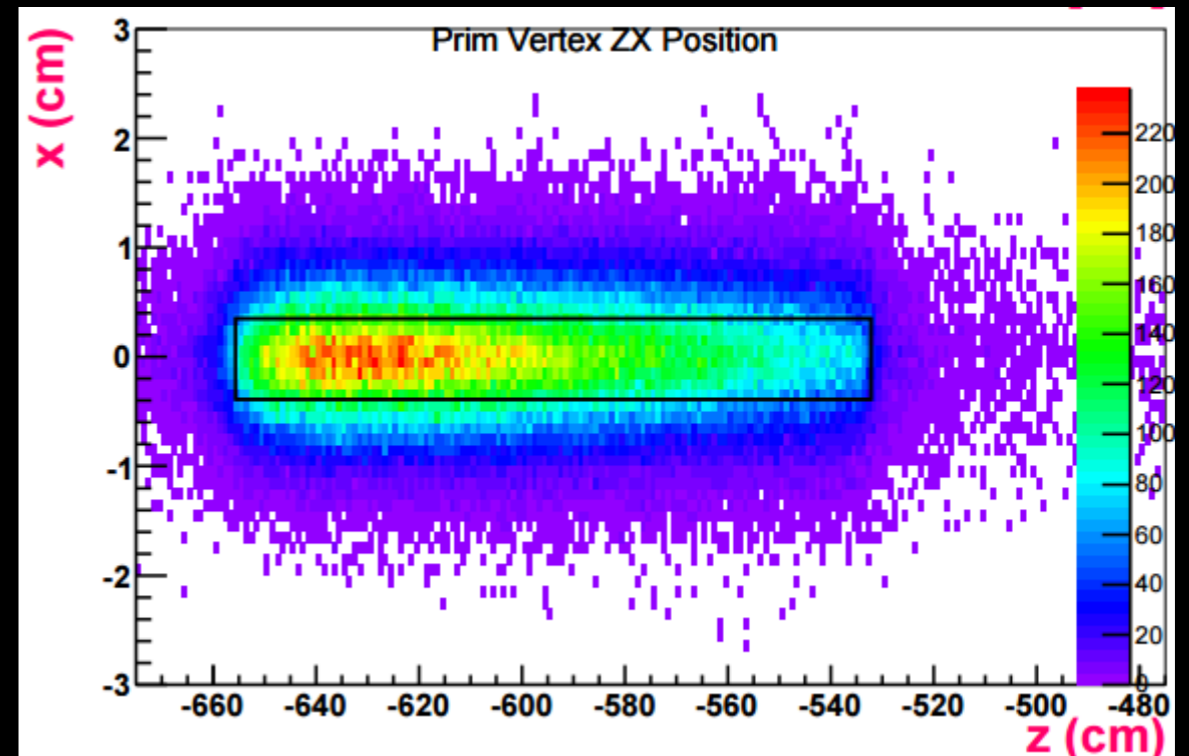
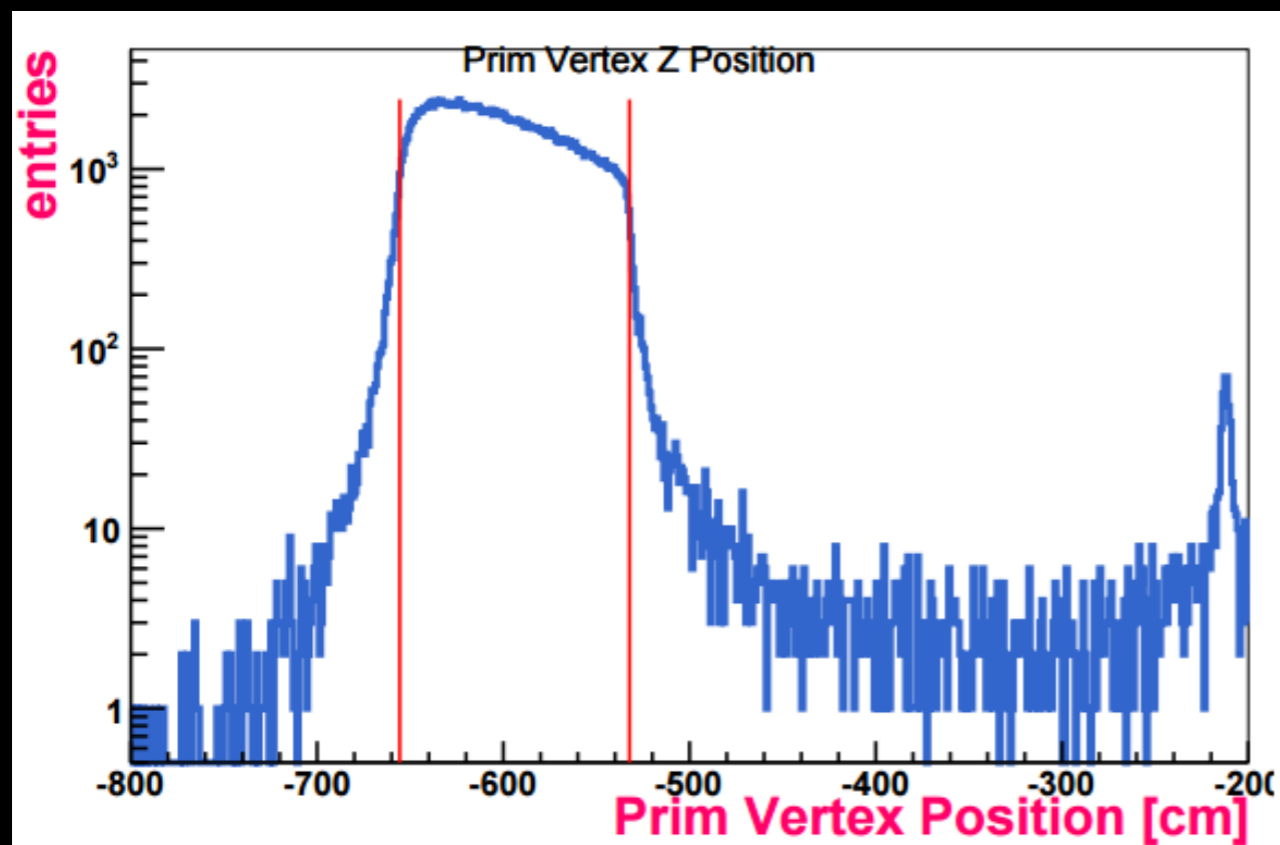
- Run was scheduled from 4 July to 1 August
- Goal was significantly larger data set than T2K 2010 run (10M events) because NuMI target has less symmetry and requires more complicated binning
- Problems with vertex magnets, new parts of DAQ delayed start of physics data for about 11 days
- Operation of beam with 120 GeV protons went well
- Final result: 15M events with target in

# Data collection progress

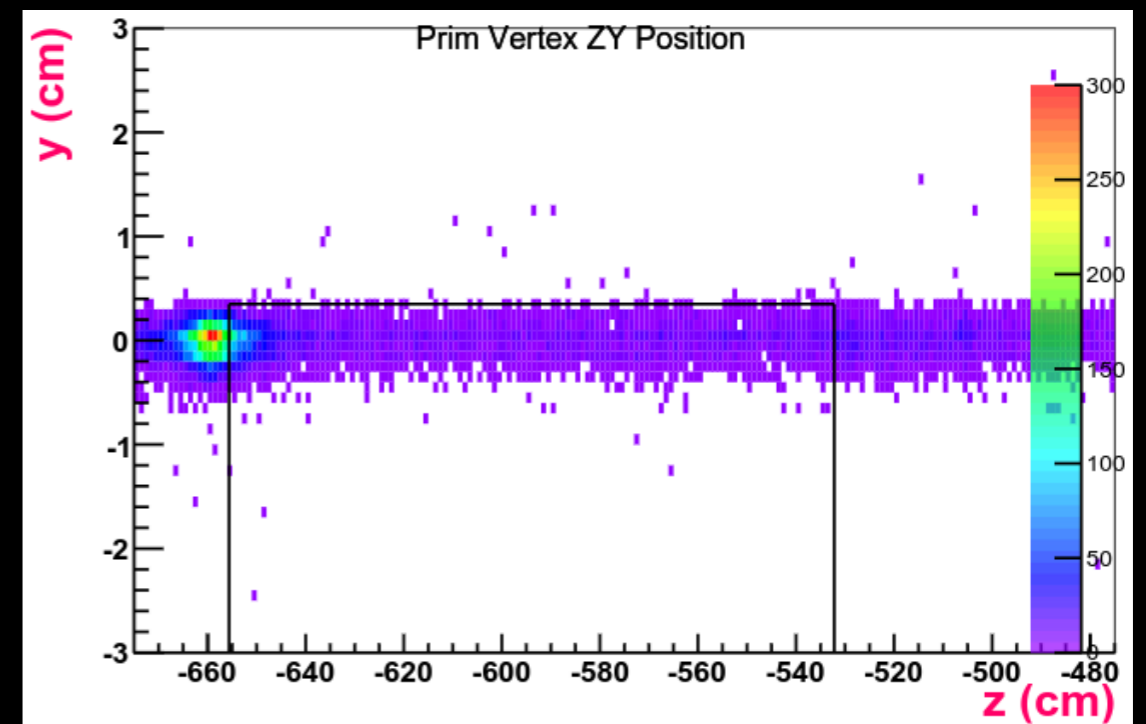
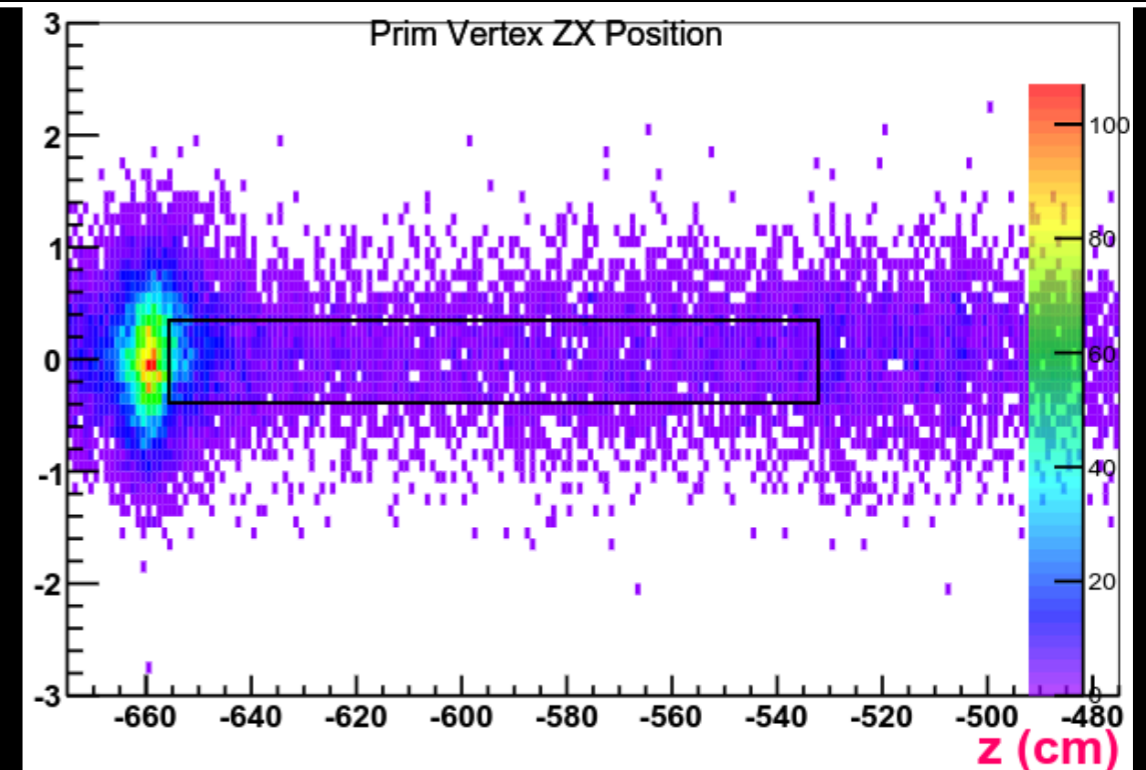
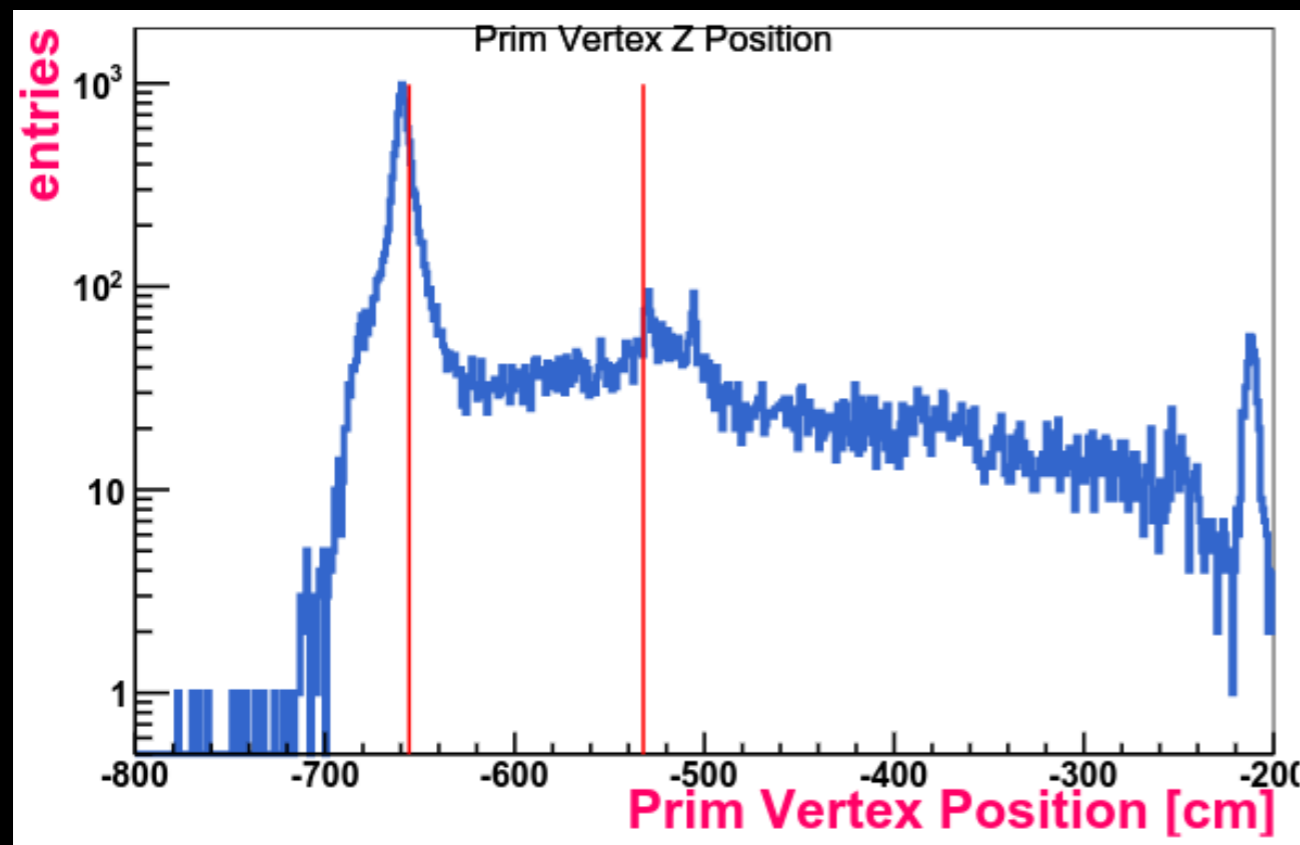


# Initial look at data: vertex position distributions

Bars/outlines represent edges of target

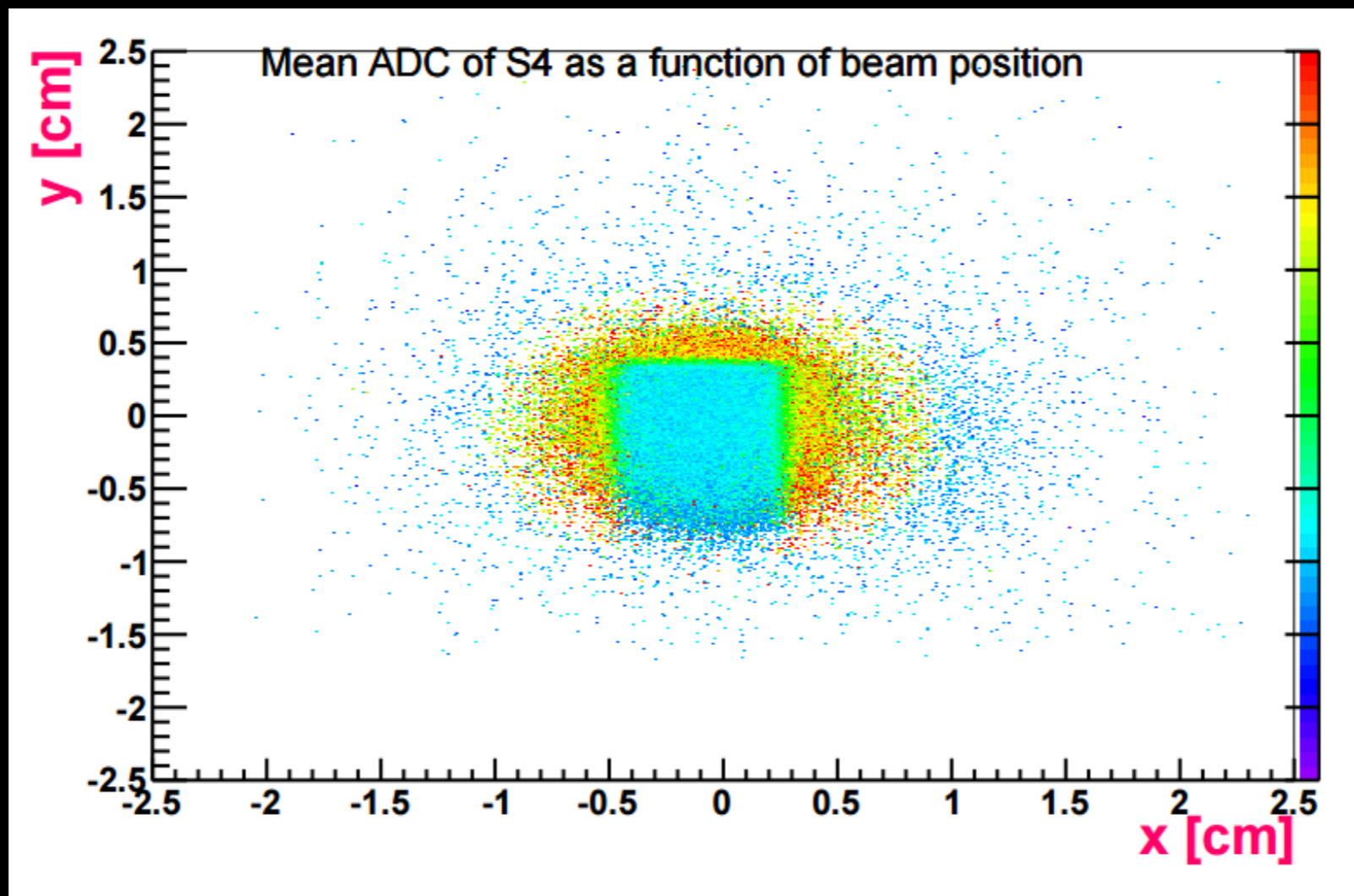


# Same vertex positions with target out



# Target “shadow”

- BPD projection for beam particles weighted by ADC value of trigger counter downstream of target
- Low values when the beam particle “disappears” (i.e. interacts in target)



# Conclusion from this run

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- High-quality data with very good beam!
- Statistics not quite what was hoped for — NA61 will discuss the possibility of returning to this target for fall run instead of K+C as on schedule
- Many thanks to the SPS group for the good beam and successful operation!