# ProtoDUNE data for the MasterClass (Update)

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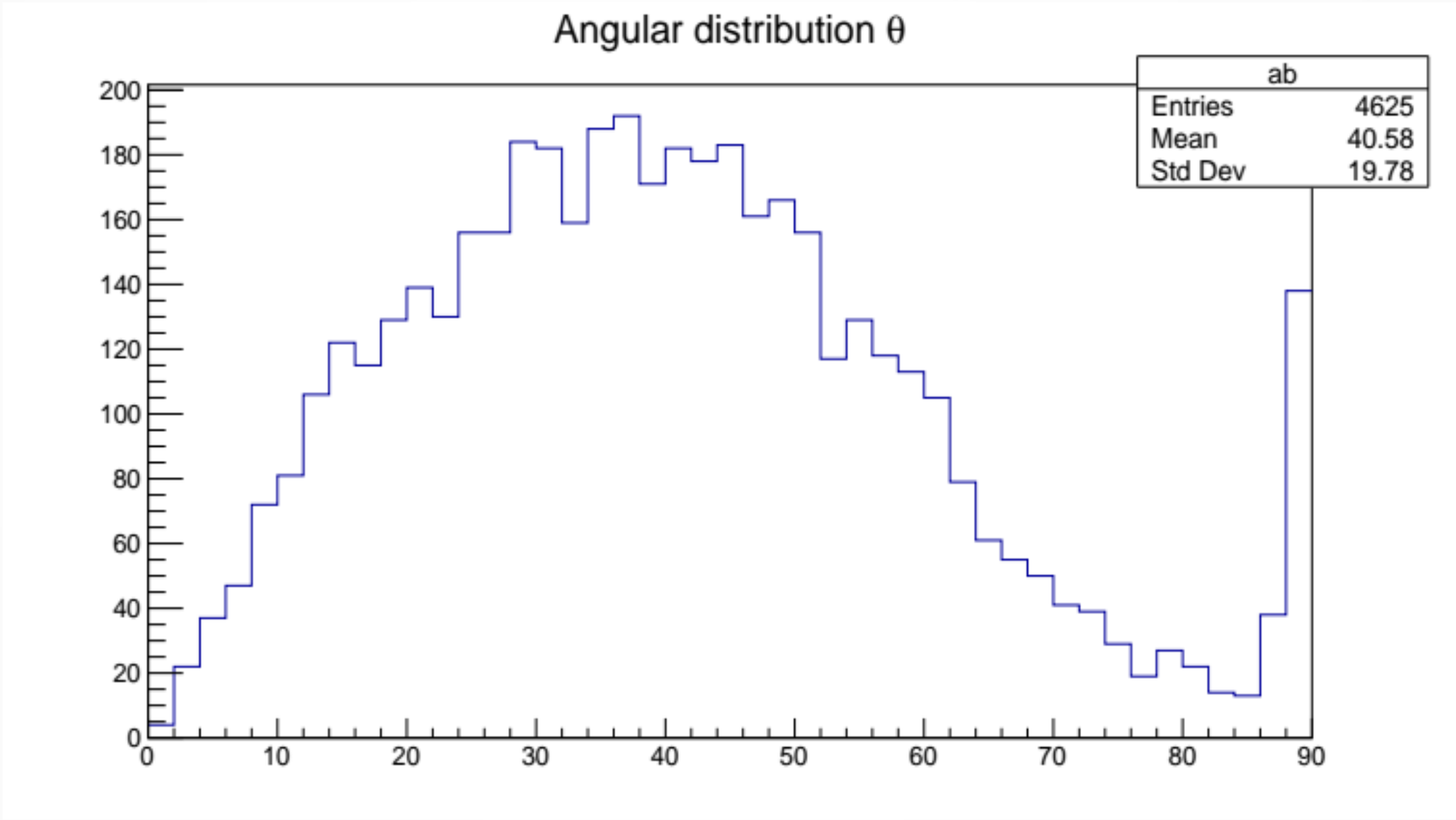
# Goal

- Getting some display sample of cosmic run from ProtoDUNE data
- We expect to plot some cosmic tracks that the students will be able to see on the website

# Status during the last meeting

- During the last meeting we found a problem with the track angle distribution



# Why we had that shape

- Because of the blindness of detector at certain region
- The reconstruction is limited

**Charge Calibration track selection:** We use energetic through-going cosmic ray muons,

- **Fiducial volume requirements:** FV1 = a rectangular prism with boundaries from anodes is 10cm, boundaries from top and bottom is 40cm and boundaries from upstream and downstream is 40cm. We require both track ends to be outside FV1.

- **Angular requirements:** The reconstruction capability of LArTPCs is limited for tracks that are parallel to the wire plane or contained in a plane containing a wire and the electric field direction. We remove tracks with
  65 deg < |θxz | < 115 deg and 70 deg < |θyz | < 110 deg .

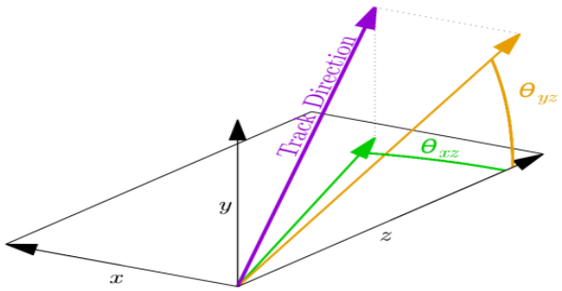
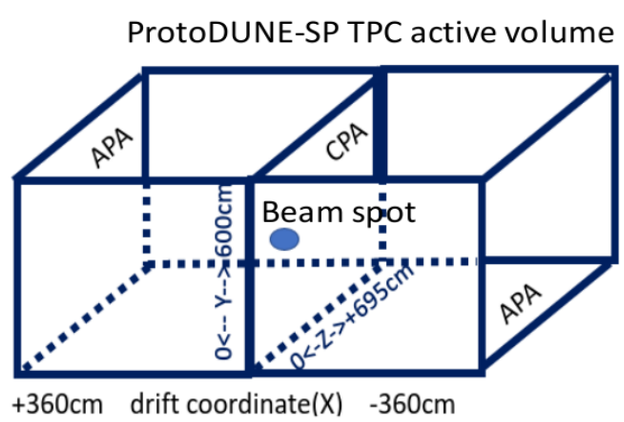



Fig: Definition of θxz and θyxz



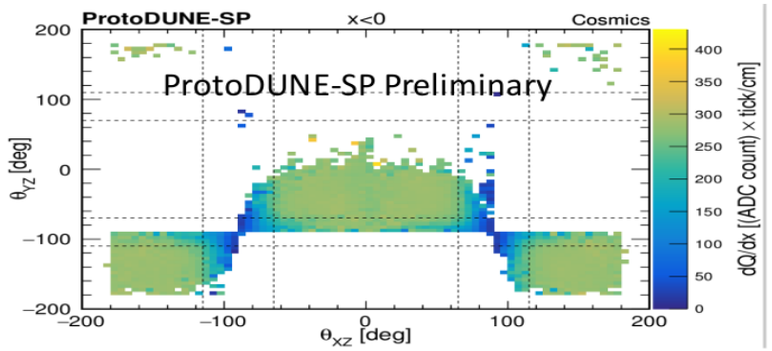




Fig: Mean dQ/dx distribution as a function of track angles θxz and θyz .Tracks within the dotted region are removed.

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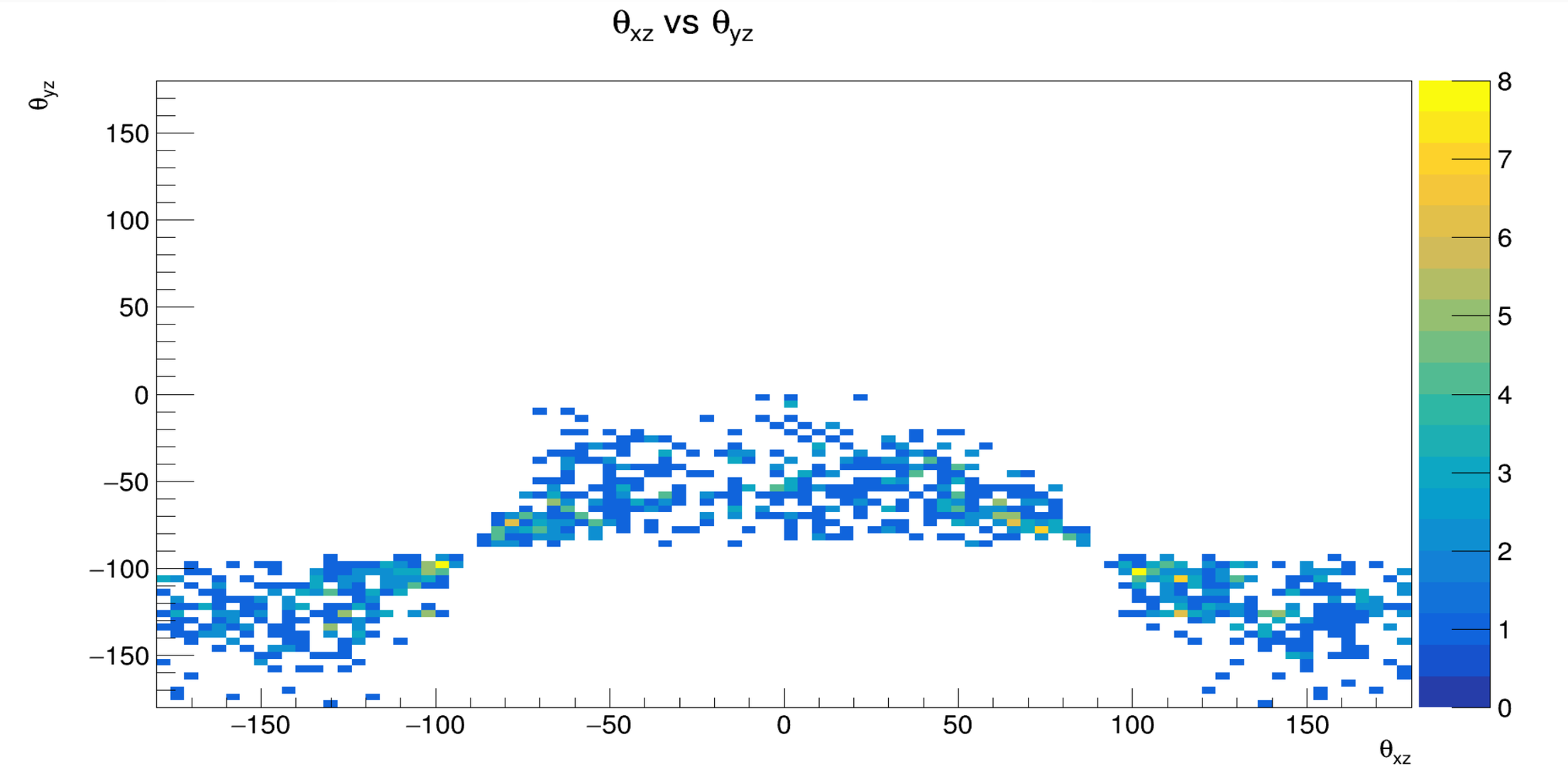
https://indico.fnal.gov/event/23989/contributions/74784/attachments/46641/56015/APS_April_meeting_2020.pdf

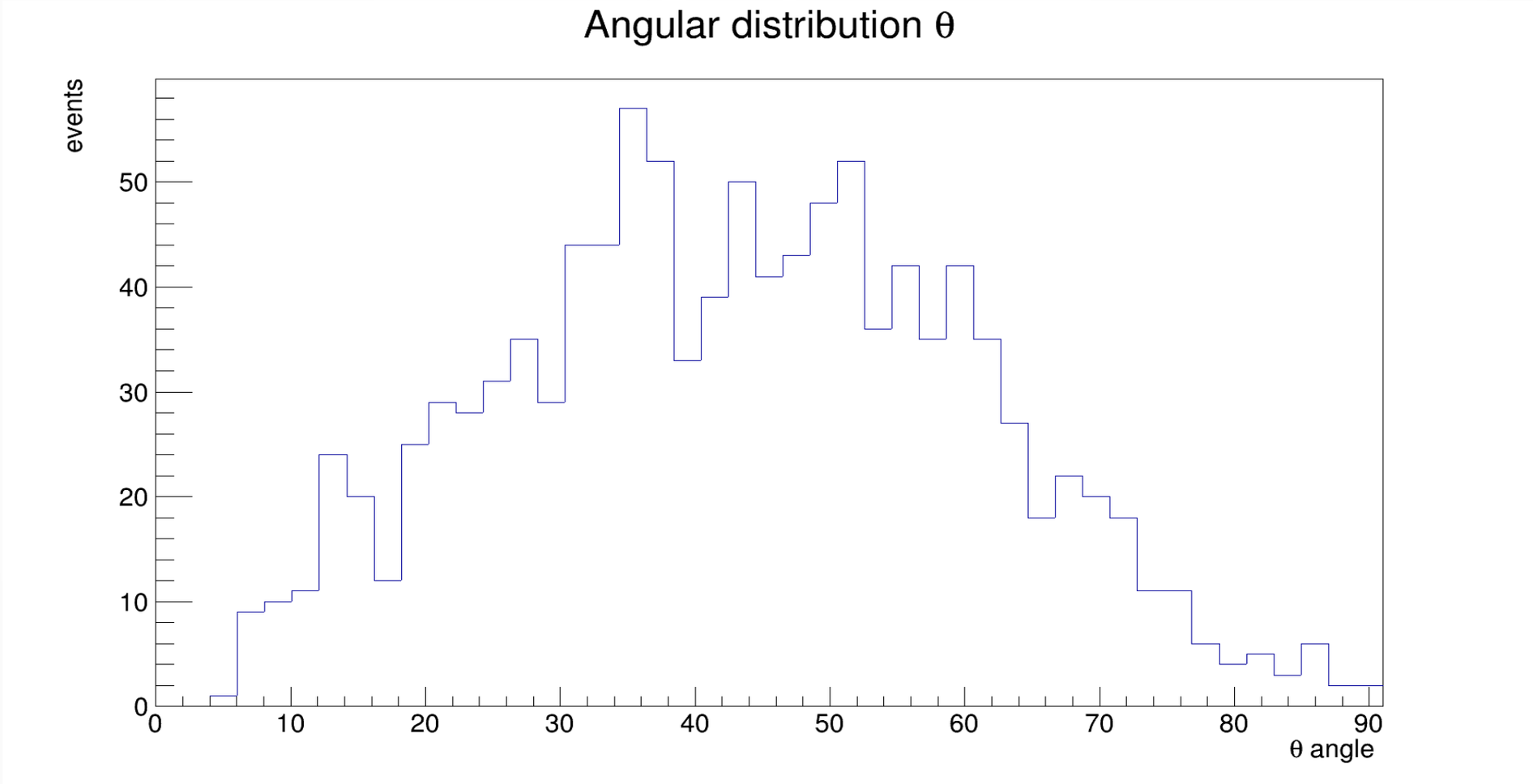
# Why we had that shape

- We got the following for θxz Vs θyz



# Current status

- We used the following cuts : track length >30, track within 20 cm of the TPC and removing 85deg<|θxz|<95deg and 85deg<|θyz|<95 deg



# Next steps

- Beginning to think about some activities
- We do have enough data already