Towards an Inelastic Cross Section Measurement of 6 GeV Kaons on Argon at ProtoDUNE Single-Phase
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1. ProtoDUNE Single-Phase (ProtoDUNE-SP)
   - Detector is a 700-ton liquid argon time-projection-chamber with two drift volumes.
   - Prototypes DUNE Far Detector and evaluates hadron passage in argon.
   - Uses the CERN Super Proton Synchotron 0.3-7 GeV/c test beam.
   - Kaons are final-state particle in neutrino interactions and predicted in proton decay.
     - Use kaons at high momentum to understand passage in argon.
   - Beamline monitor uses Cherenkov detectors to select candidate kaons.
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2. Selection of Candidate Inelastic Scatters
   - Candidate kaons are selected if a beamline particle:
     - Passes a quality check using the beamline monitor data.
     - Contains reconstructed track calorimetry information.
     - Ends in the first APA to prevent broken tracks being mis-identified.

3. Fit of Kaon Inelastic Interaction Points using Monte Carlo as Fake Data
   - An interaction point is an inelastic scatter candidate found through the track endpoint.
   - An incident point is a slice of the track where no interaction candidate occurred.
   - Uses a template fit of interacting kinetic energy bins with multinomial statistics [2].

4. Extraction of Cross Section using Monte Carlo-to-Monte Carlo Fit
   - Cross section calculated using post fit incident and interacting histograms.
   - The uncertainties extracted from correlated throws from covariance matrix.

References