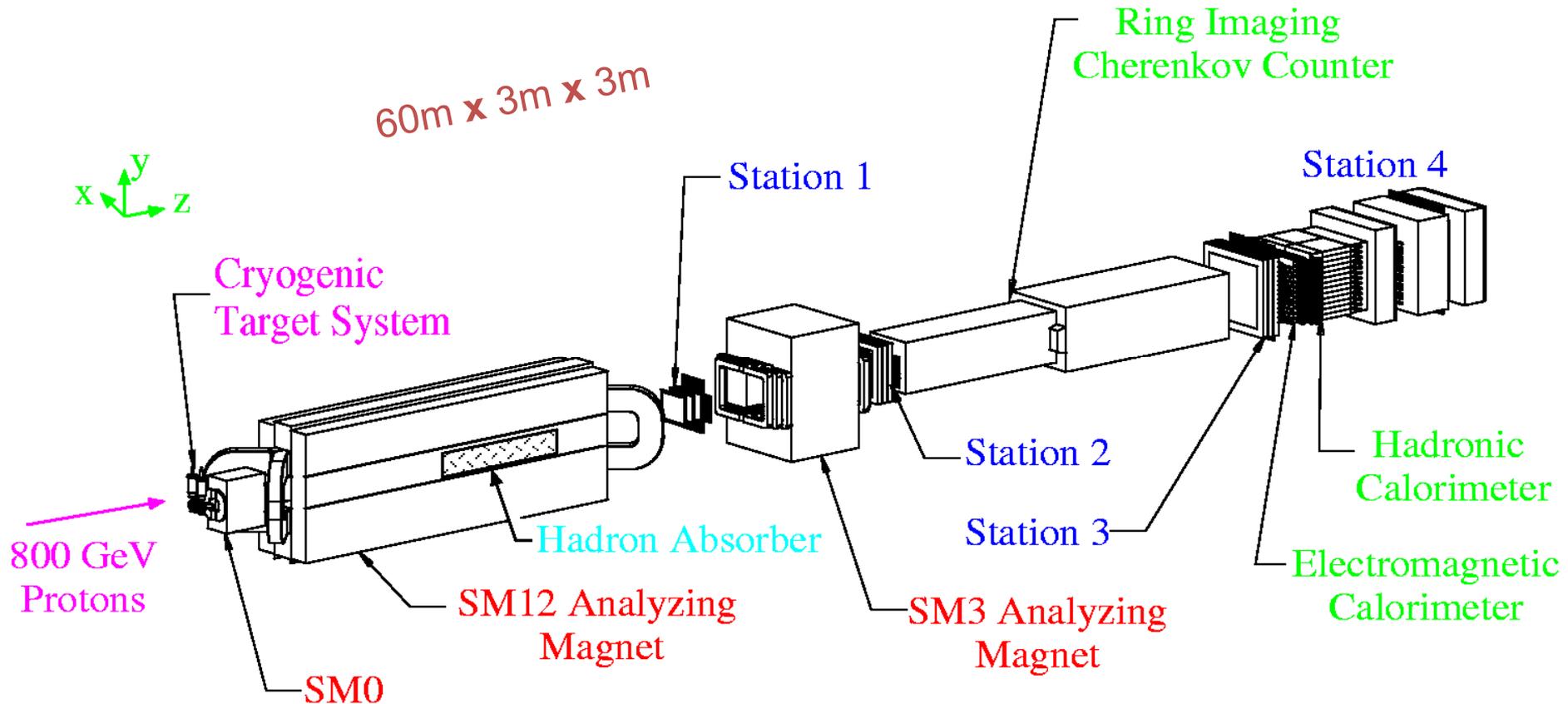


Fermilab E866/NuSea Detector

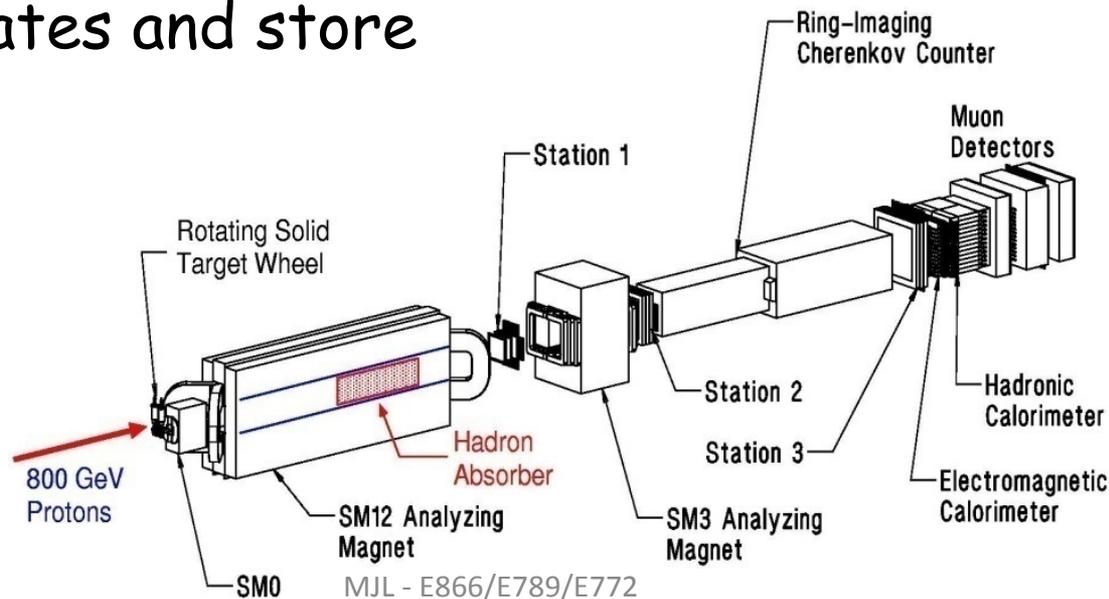


- Forward x_F , high mass μ -pair spectrometer
- Liquid hydrogen and deuterium targets
- Two acceptance defining magnets (SM0, SM12)

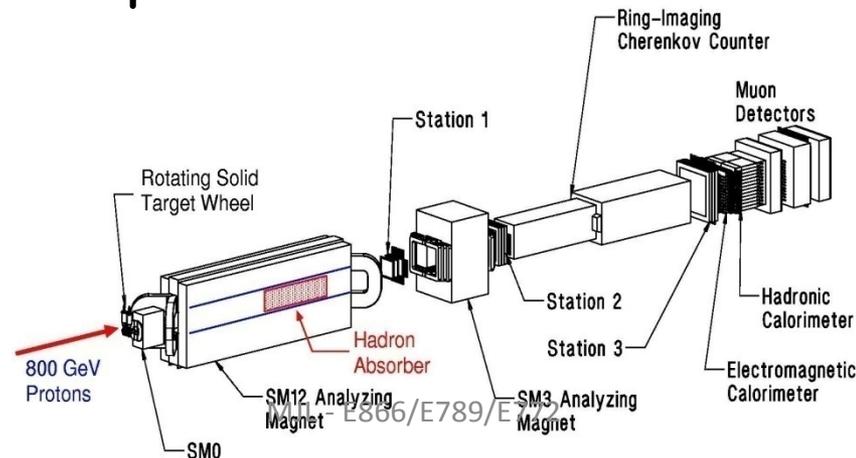
- Beam dump (4.3m Cu)
- Hadronic absorber (13.4 I_0 -Cu, C, CH₂)
- Momentum analyzing magnet (SM3)
- Three tracking stations
- Muon identifier wall & 4th tracking

E866 Tracker

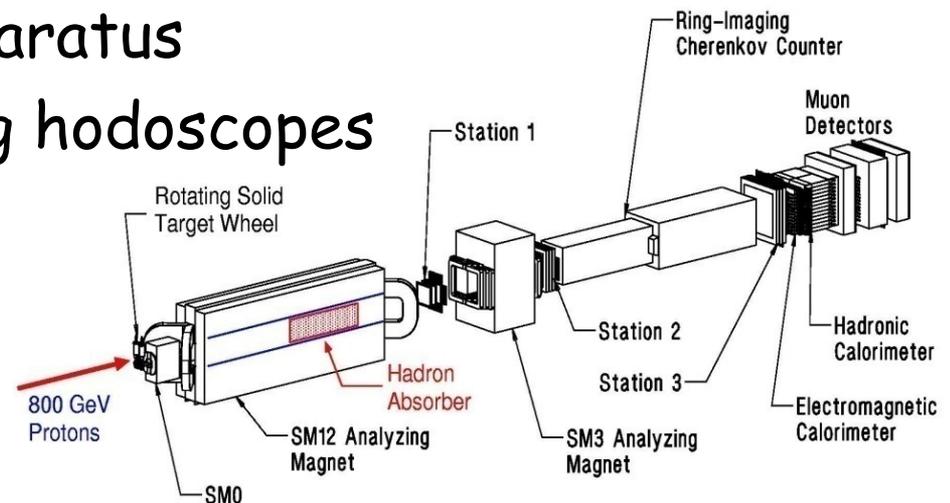
- Start at rear and work forward to take advantage of lower occupancies at rear
- Optional mask of drift-chamber (DC) hits by hodoscope (matrix) roads and by DAQ processor tracks
- For each view (e.g. yy') associate hits & resolve L-R if possible. Convert hits to inches in local chamber coordinates and store



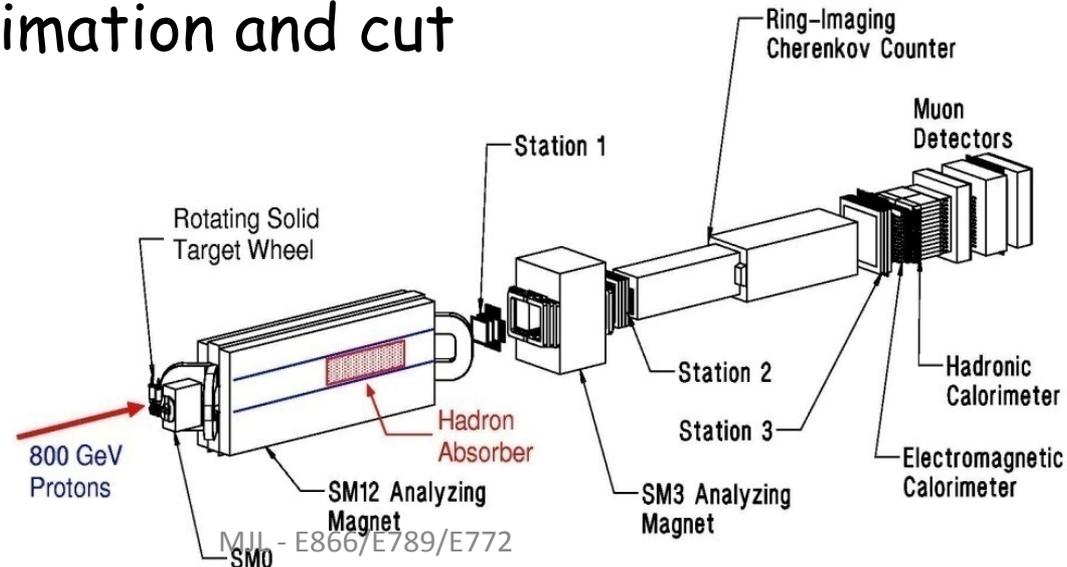
- For each station (yy'uu'vv') find triplets and doublets
 - require each view (yuv) to have at least one hit
 - form all combinations of yuv consistent with maximum track angle, plane separation, and resolution
 - require at least one associated (e.g. yy') hit.
 - then find doublets (e.g. yu only) using only associated hits
- Find tracks in station-2 & 3
 - look at all triplet/doublet combinations



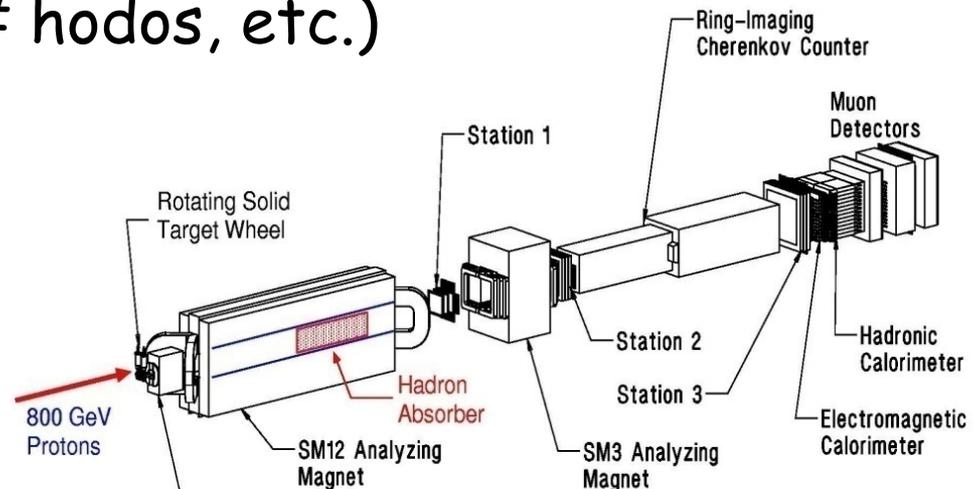
- optional cut in $y_2^*y_3$ space based on Monte Carlo of target events
- x-target and y-dump cuts
- require 3/5 station-4 (muon) hits on track
- refined check-sum cut using angle of track
- require at least one associated hit in each station or, for doublets, all associated hits in their station
- fit hits and cut on χ^2/DF
- cut on apertures of apparatus
- optional cut on matching hodoscopes



- Eliminate ghost tracks
 - e.g. tracks which lie near each other and share two or more hits in each station
- For each station-2/3 track project to station-1 and look for hits in window
 - window based upon minimum momentum, SM3 kick, and resolution
- Cut on x-target projection (no bending in x)
- Project to y-dump and y-target using single-bend plane approximation and cut



- Fit station-1/2/3 track
 - using individual hits and matrix inversion
 - cut on χ^2/DF and store track
- Weed out hits that don't belong to track
 - $> 4\sigma$ residual hits which improve χ^2 probability significantly
- Reject identical tracks
- Make additional quality cuts on tracks
- Save various associated information with track in it's track bank (e.g. # hodos, etc.)



- “Swim” each track back through SM12 field.
 - 2” steps in magnet field (or fast 18” steps)
 - energy-loss corrections
 - detector aperture cuts
- Cut on x & y at the target
- Bend tracks at the absorber-dump multiple-scattering plane & re-swim until track passes exactly through center of the target
- Cut on “un-iterated” vertex at target
- Put all pairs in ntuple

