

# Update on $\gamma p \rightarrow \pi^+ \pi^- \pi^+ n$

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Physics Working Group Meeting

February 28, 2011

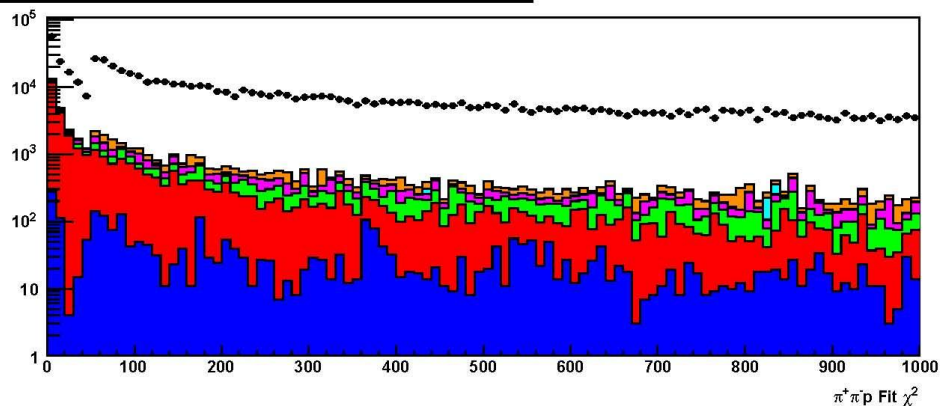
# Simulations on the grid

- Simulation seems to work fine, reconstruction has some issues to be worked out
  - Can run through bggen, hdgeant, mcsmear
  - Crashes on analysis?
  - Getting close!
- Added wiki page under offline software
  - Brief introduction to what is being done and our goals, issues, etc.

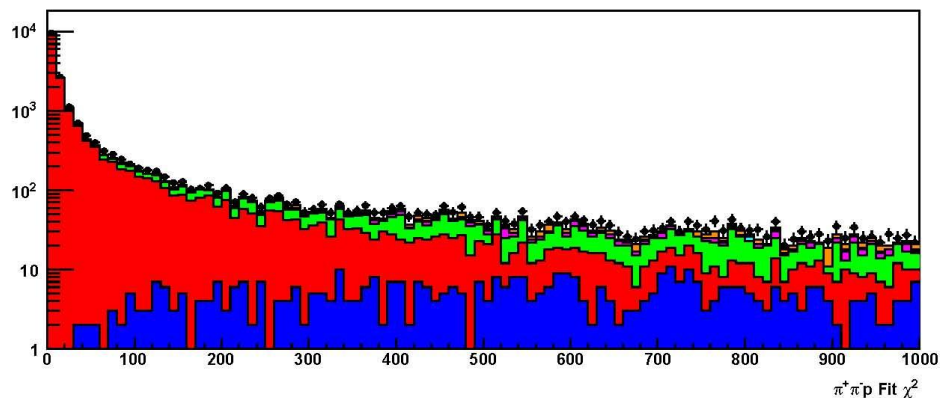
# $\gamma p \rightarrow \pi^+ \pi^- \pi^+ n$ Reconstruction

- Looking at kinematic fitting
  - What is the shape of the signal efficiency?
  - Can it be used for signal isolation?

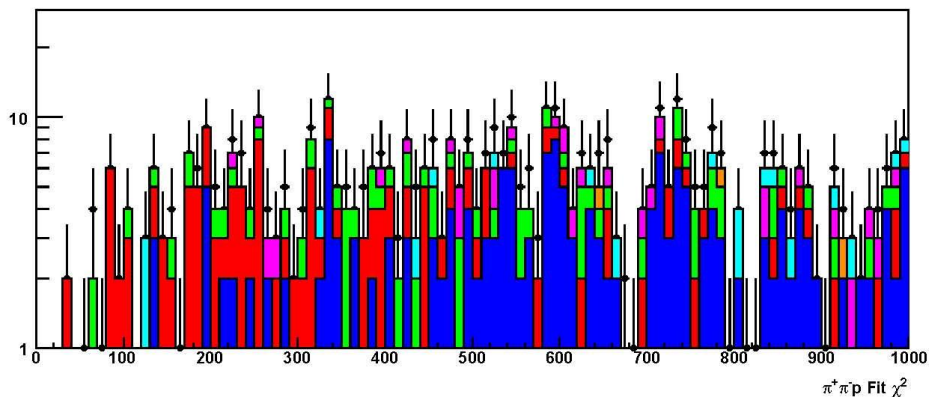
At least 2 positive and 1 negative tracks



Base cuts



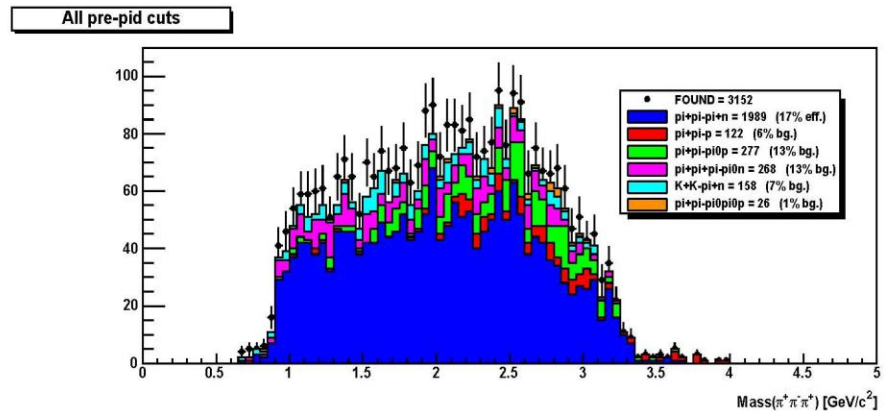
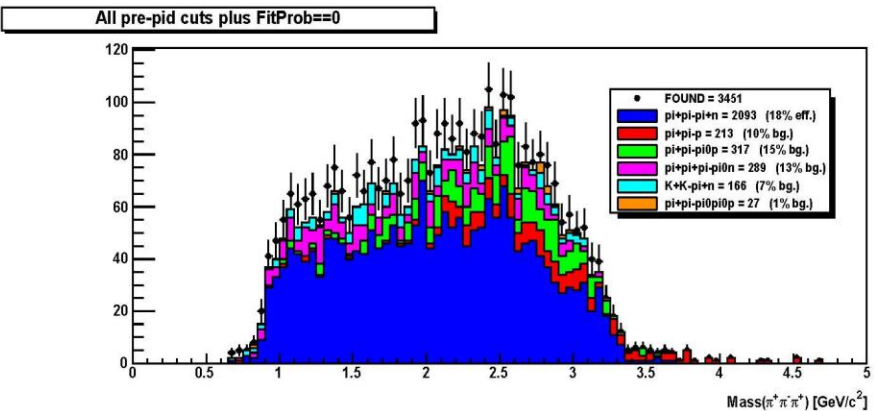
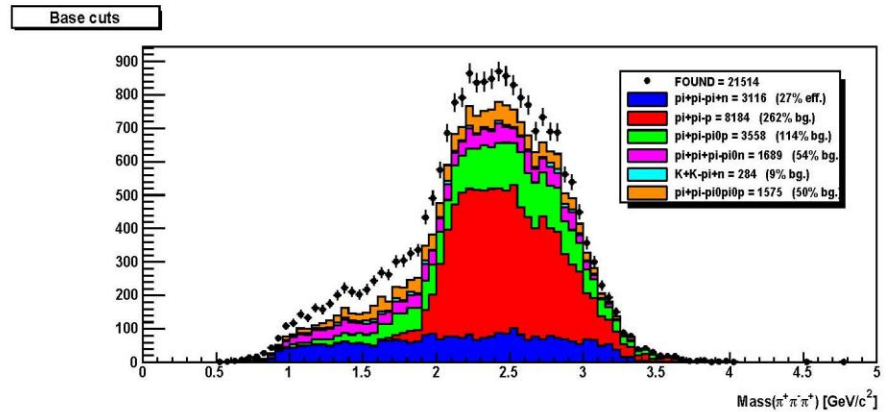
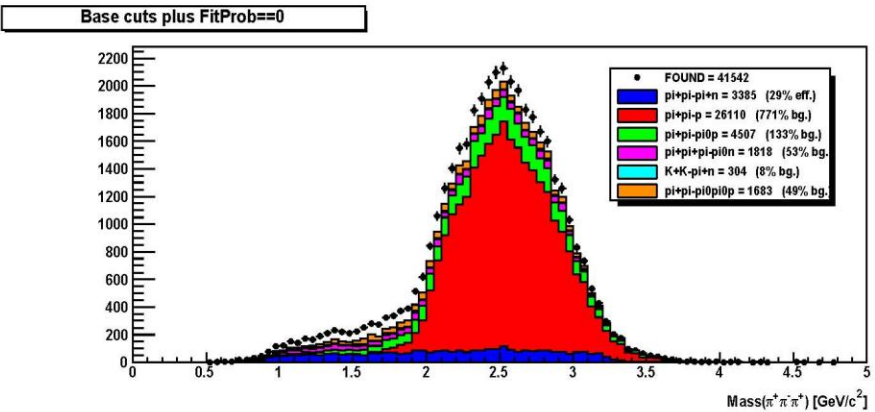
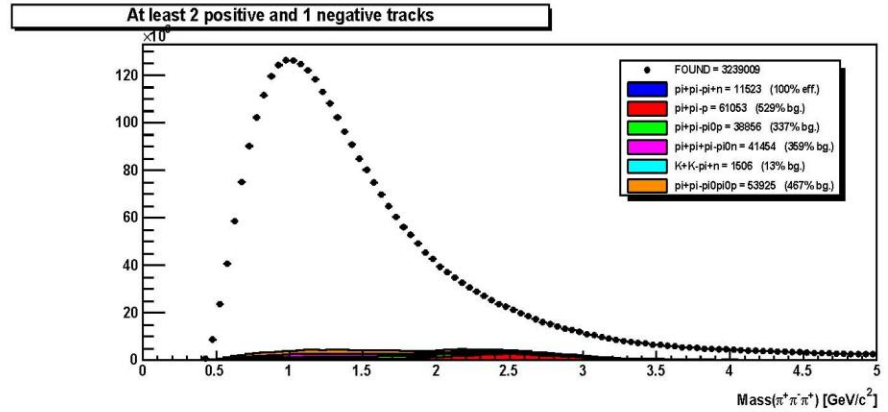
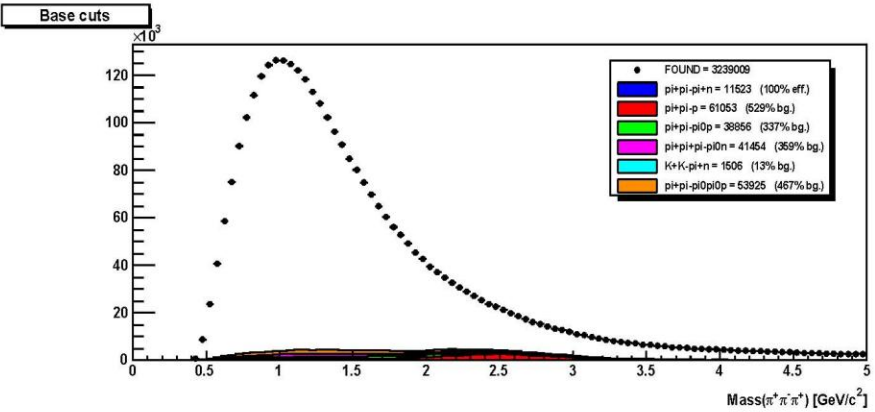
All pre-pid cuts



- Fit to background and veto on good fits
  - $\pi^+ \pi p$  shown on right
- Can also fit to signal and veto on poor fits
- Not great for signal isolation alone, but possibly useful

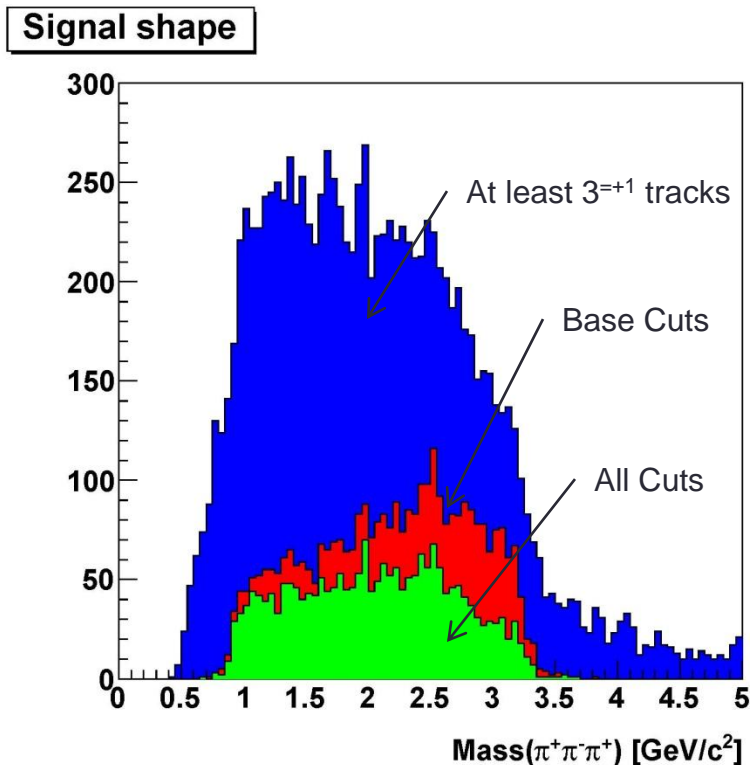
# No Kinematic Fitting

# With Kinematic Fitting

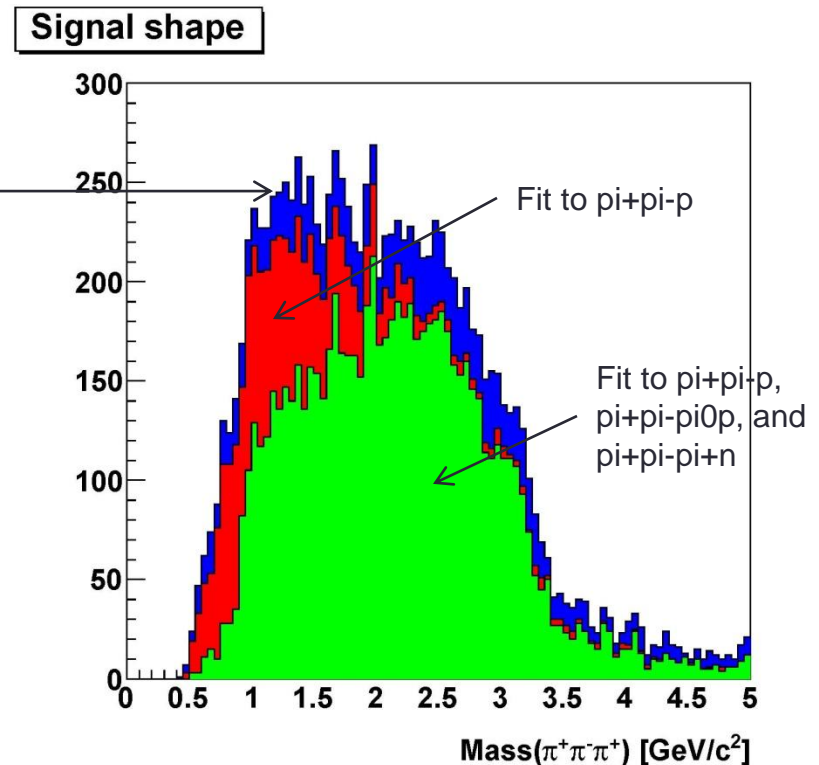


# $\gamma p \rightarrow \pi^+ \pi^- \pi^+ n$ Reconstruction

Pre-PID cuts



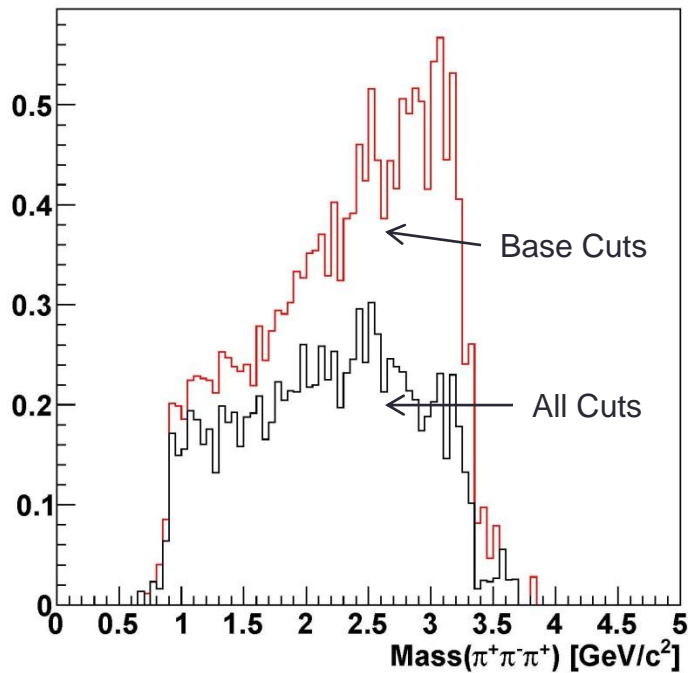
Kinematic Fitting cuts



# $\gamma p \rightarrow \pi^+ \pi^- \pi^+ n$ Reconstruction

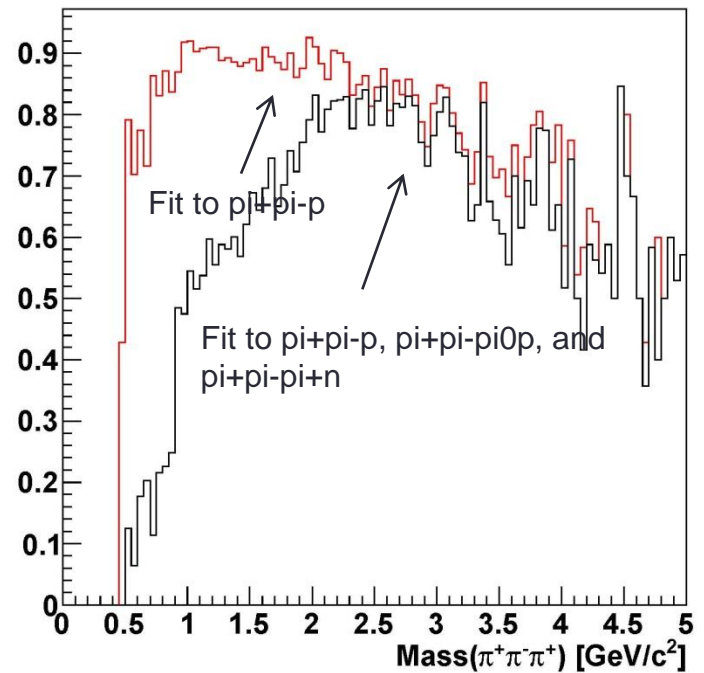
Pre-PID cuts

Signal efficiency



Kinematic Fitting cuts

Signal efficiency

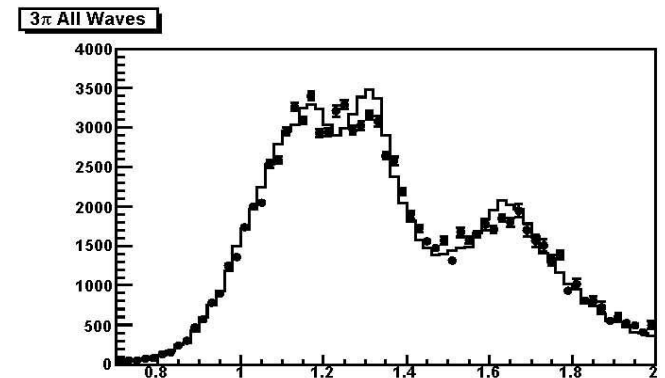
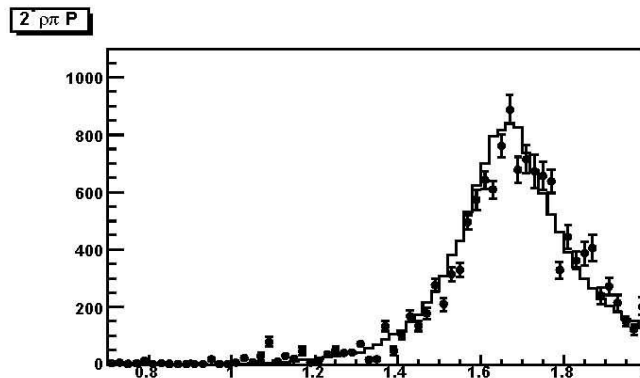
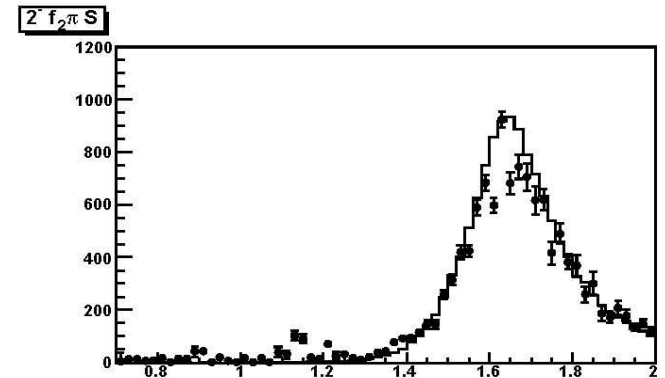
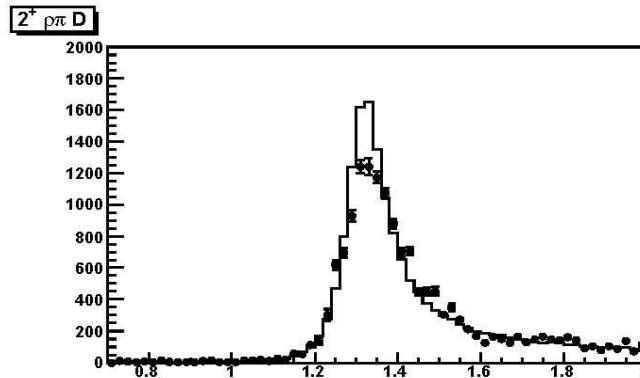
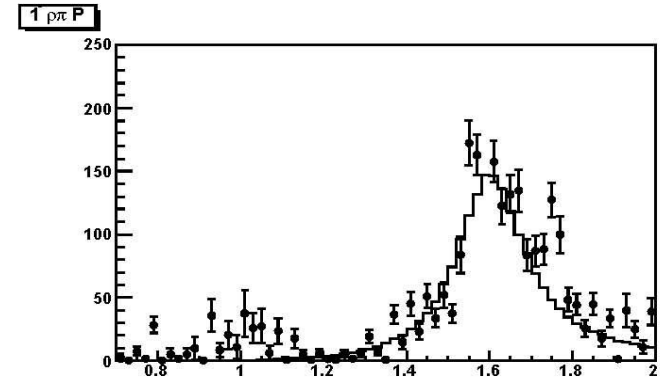
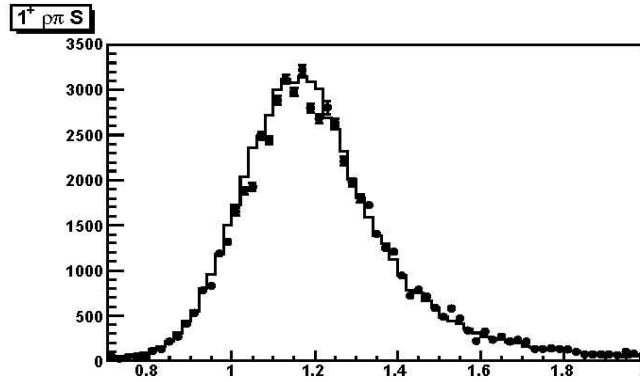


# Amplitude Analysis

- Goals:
  - Generate sample similar to CLAS results
    - Add exotic wave
  - Use bggen MC background to attempt “realistic” amplitude analysis
    - Running on the grid would be nice

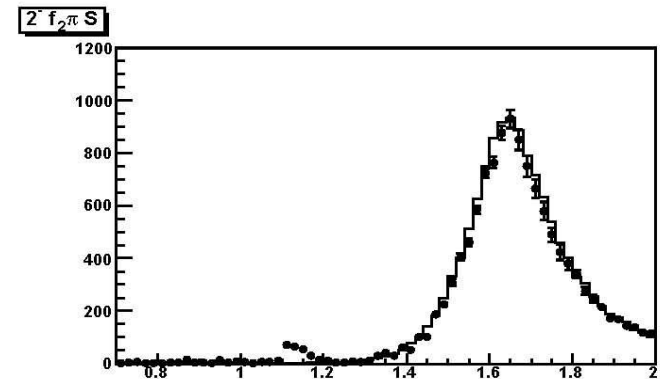
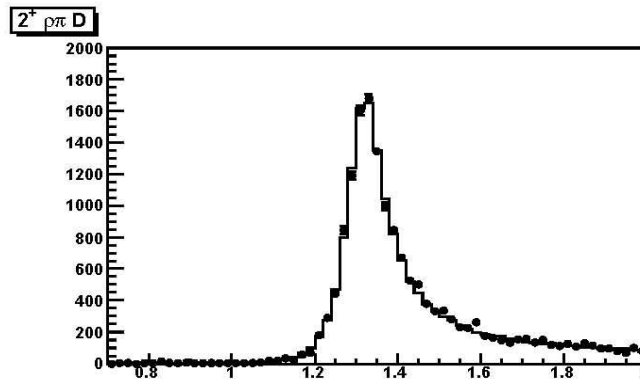
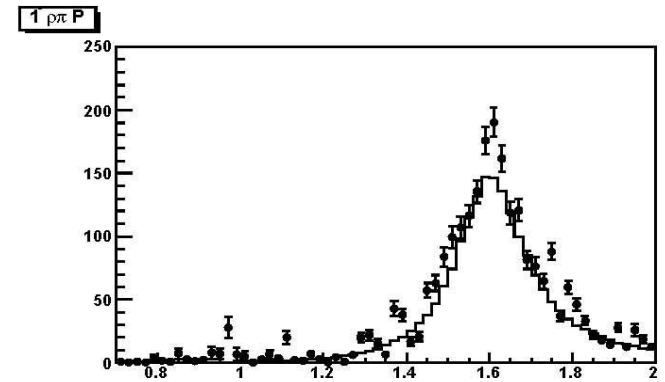
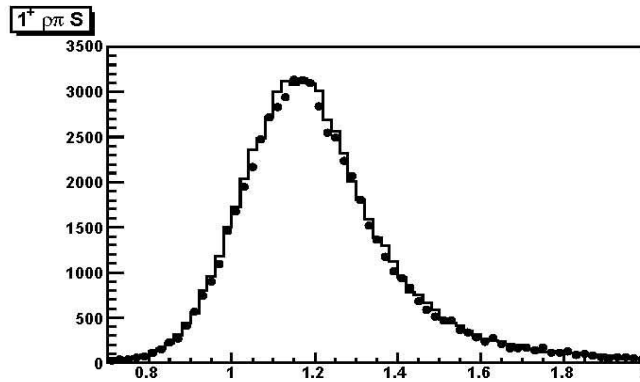


Fit with actual  
detector  
reconstruction



- $a_1 \rightarrow \rho\pi$  S-wave
- $a_2 \rightarrow \rho\pi$  D-wave
- $\pi_1 \rightarrow \rho\pi$  P-wave
- $\pi_2 \rightarrow f_2\pi$  S-wave
- $\pi_2 \rightarrow \rho\pi$  P-wave

Fit with perfect acceptance



- $a_1 \rightarrow \rho\pi$  S-wave
- $a_2 \rightarrow \rho\pi$  D-wave
- $\pi_1 \rightarrow \rho\pi$  P-wave
- $\pi_2 \rightarrow f_2\pi$  S-wave
- $\pi_2 \rightarrow \rho\pi$  P-wave

