Measurement of $D^0 \to K^+\pi^-$

- Proceed either through $D^0\,\overline{D}^0$ mixing or through $D^0 \to K^+\pi^-$
  - Highly suppressed in Standard. Model
  - Look for new physics
- Measure the Ratio

$$R = \frac{\Gamma(D^0 \to K^+\pi^-)}{\Gamma(D^0 \to K^-\pi^+)}$$

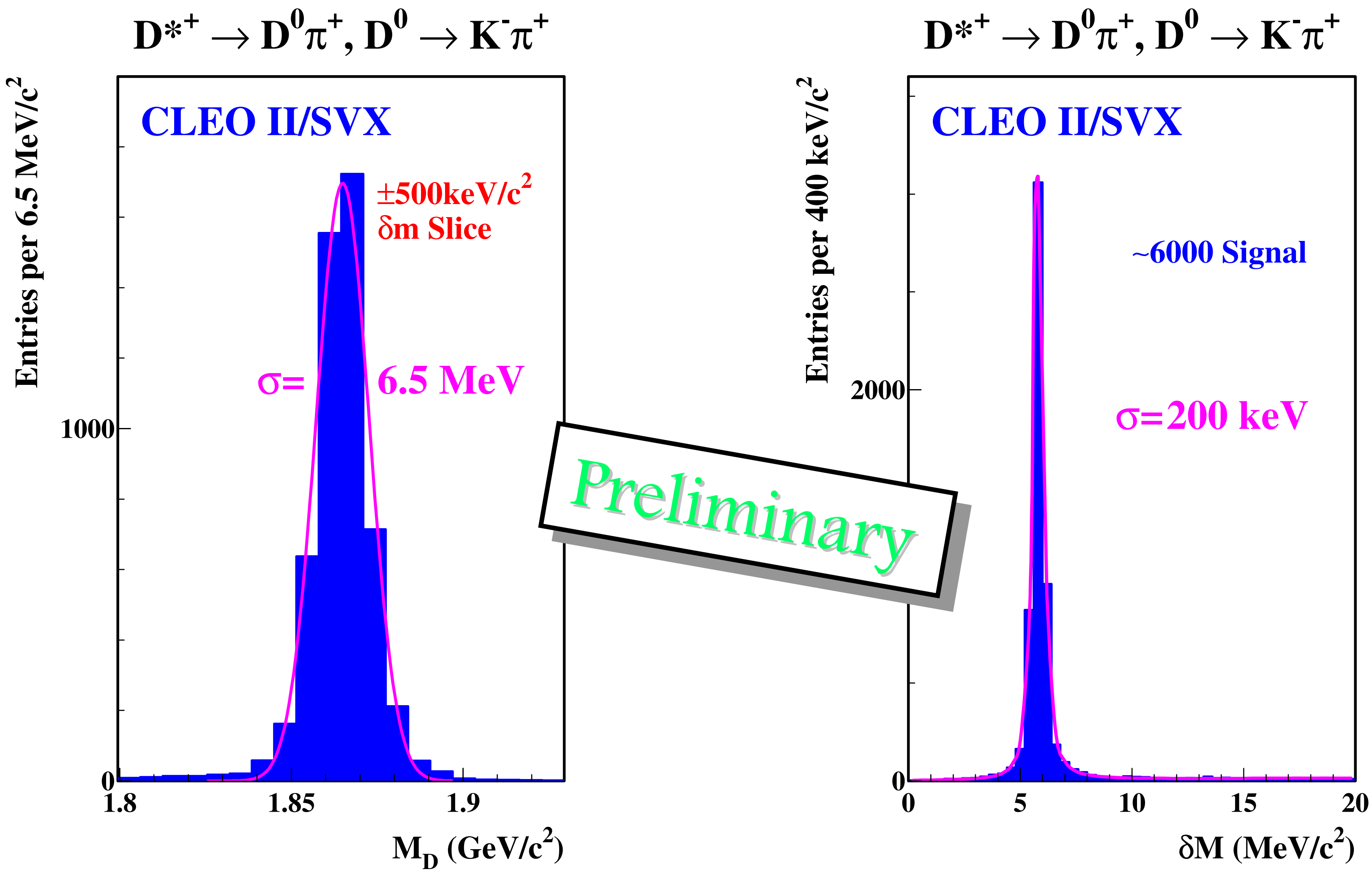
- In Standard Model contributions to R
  - Mixing 10^{-3} to 10^{-10}
  - DCSD is of order $\tan^4\theta_C \sim 3\times10^{-3}$
- CLEO can now do a time dependent measurement
  - $N_{DCSD} \propto e^{-\Gamma t}$
  - $N_{Mixing} \propto t^2 e^{-\Gamma t}$

Analysis Procedure

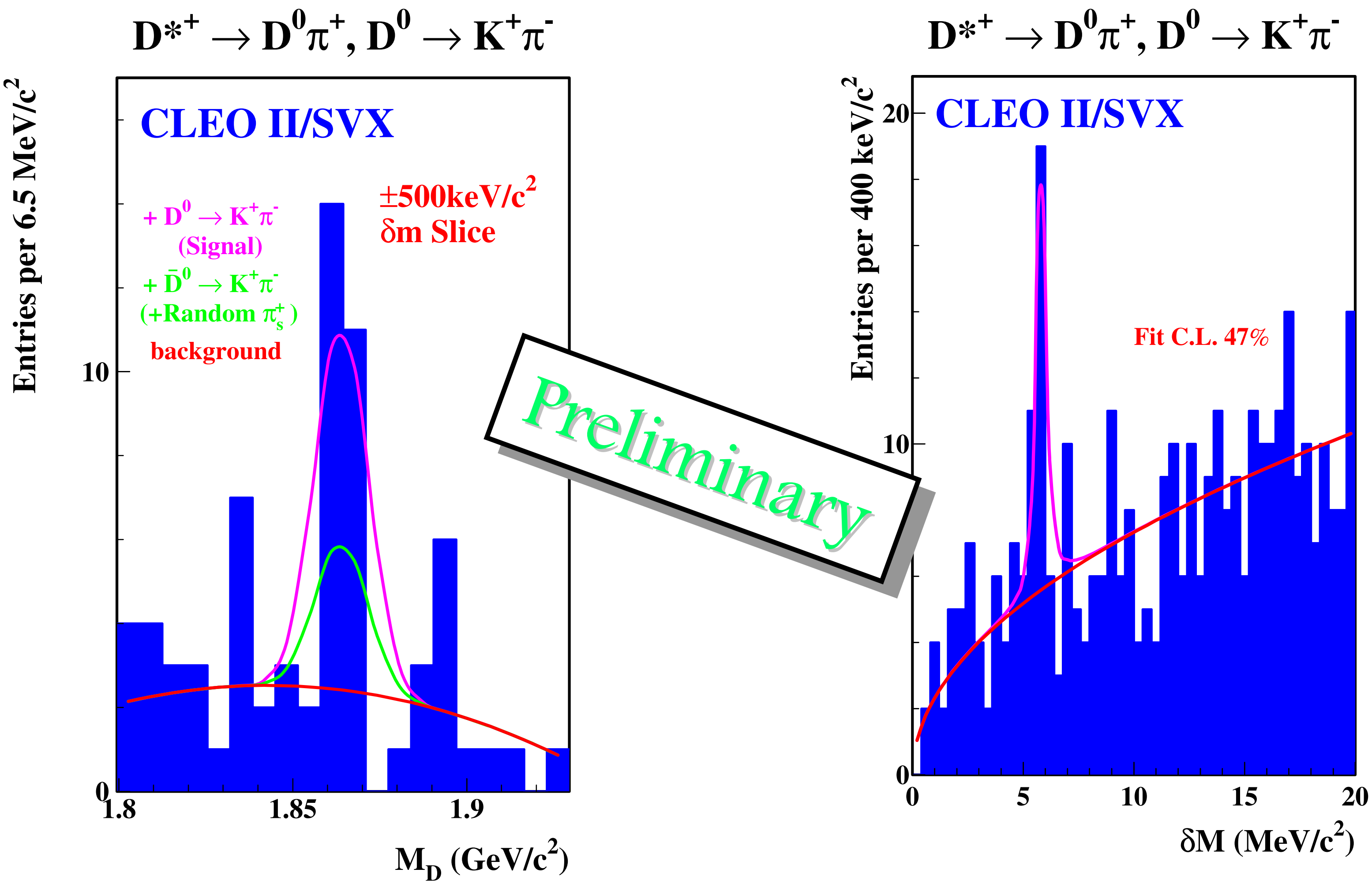
sign of π_s tags the flavor of the D^0

- Begin with $D^{*+} \to D^0 \pi_s^+$, $D^0 \to K^+ \pi^-$ (W.S.)
  - Selecting high momentum D^{*+} (x_p cut)
  - Particle ID from dE/dx
  - Signal extracted from
    - Invariant mass of D^0
    - D^{*+}, D^0 mass difference (δm)
- Background considerations for W.S.
  - Real $\overline{D}^0 \to K^+ \pi^-$ with random π_s^+
    - Peaks in the D^0 mass but not in δm
  - Mis–identification of K/π
    - Broad peak in δm but not in D^0 mass
    - Most serious is double misID (form M_{flip} and veto if w/in 4σ)
  - Use Monte Carlo to model the backgrounds in the fit

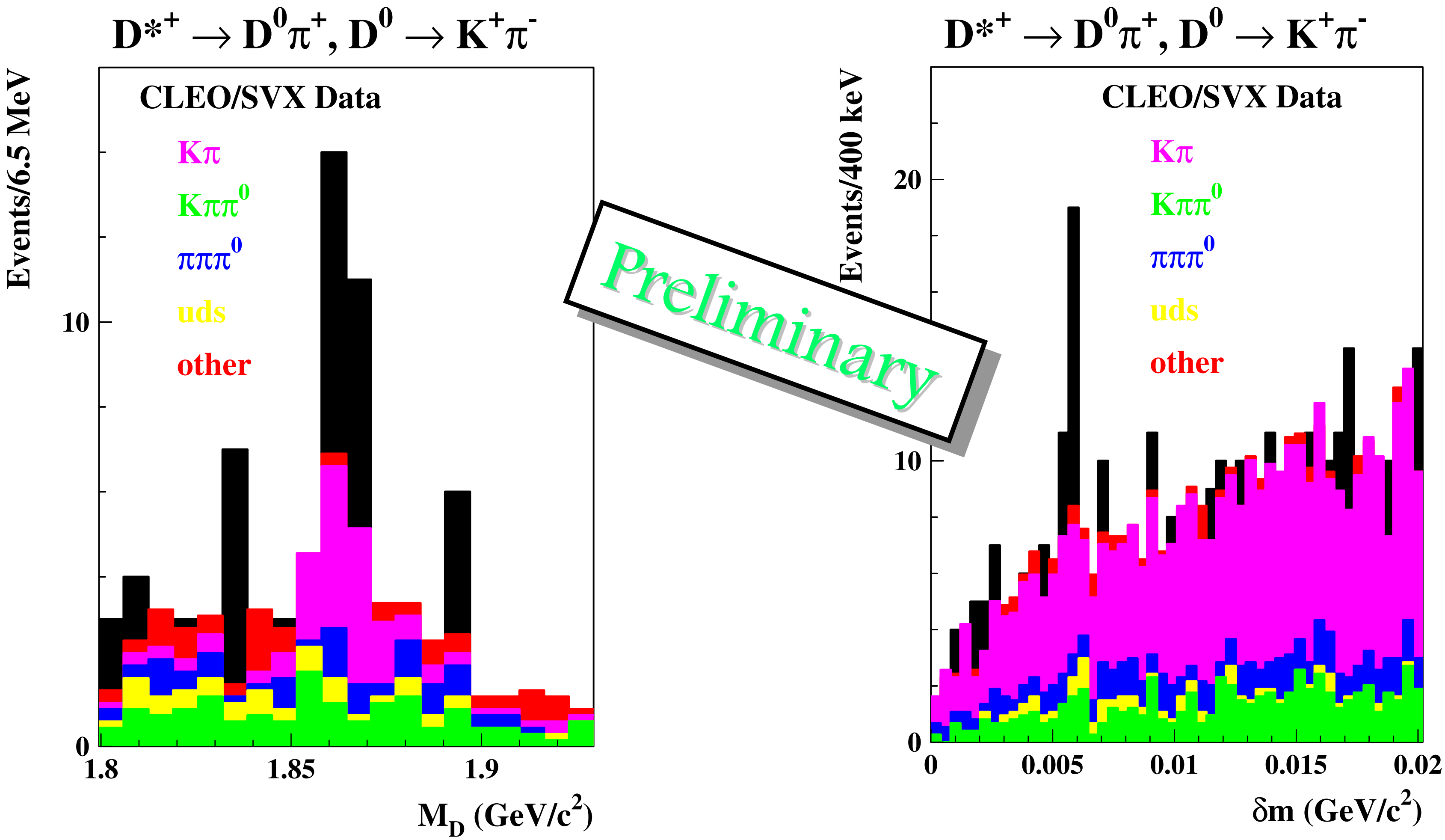
Right Sign Distributions



Wrong Sign Distributions



Backgrounds in Wrong Sign



Results for the $D^0 \rightarrow K^+\pi^-$

Based on CLEOII/SVX ($3.8\ fb^{-1}$)

Preliminary

Experiment	$\dfrac{\Gamma(D^0 \rightarrow K^+\pi^-)}{\Gamma(D^0 \rightarrow K^-\pi^+)}$
CLEOII/SVX	$0.0032 \pm 0.0012 \pm 0.0015$
CLEOII	$0.0077 \pm 0.0025 \pm 0.0025$
E791	$0.0068 \pm 0.0034 \pm 0.0007$
ALEPH	$0.0177 \pm 0.0058 \pm 0.0031$
PDG	0.0072 ± 0.0025

- Significant reduction in statistical error over previous measurements
  - This measurement with CLEOII/SVX only $\sim 2 \times$ more statistics
  - Plan to add the rest of the CLEOII data as well $\sim 5 \times$ more statistics
- Time dependent R analysis planned with CLEO/SVX data