

0

**OUTLINE**

Analysis done with 10,000 signal M.C. events produced by evtgen

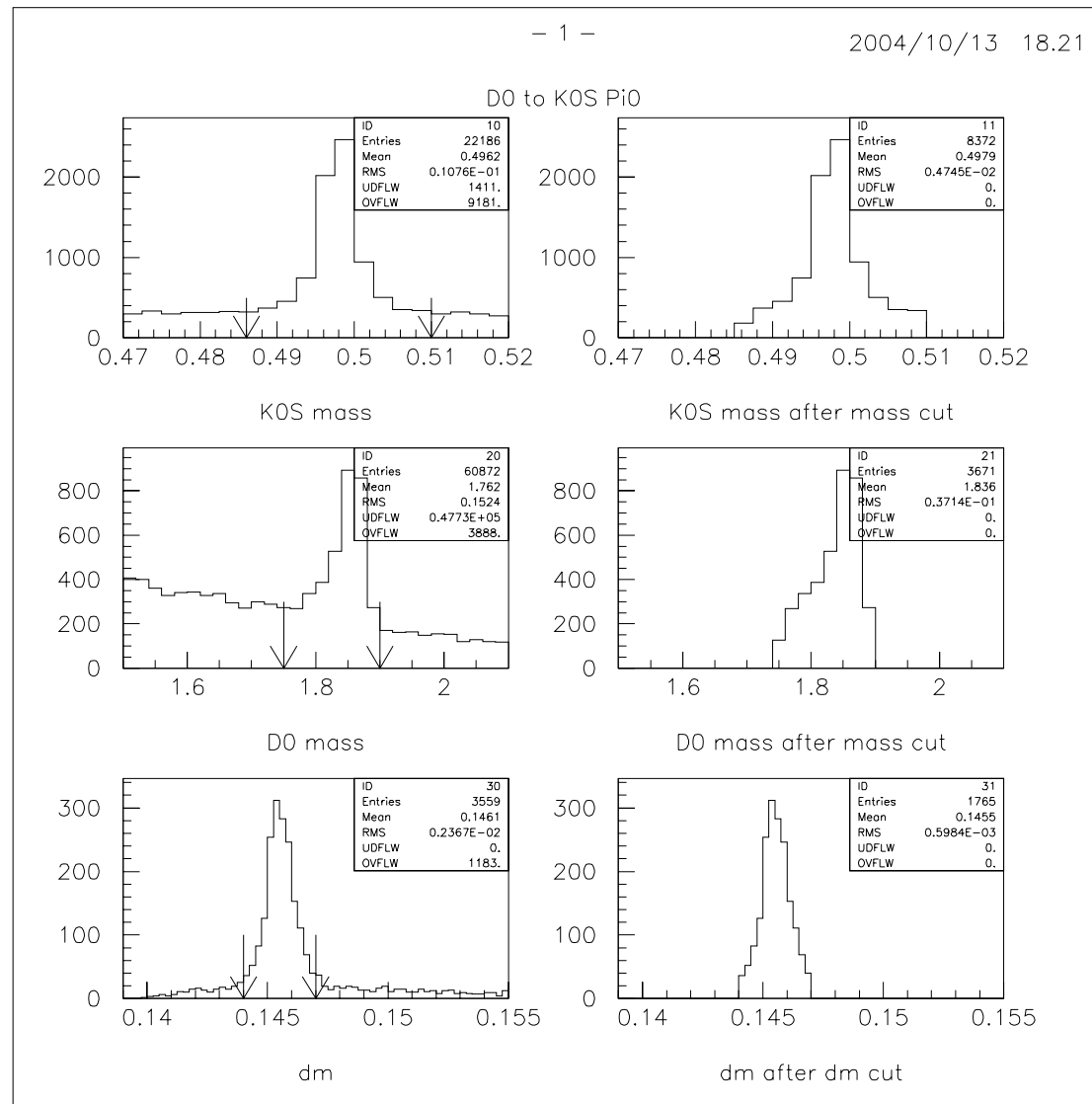
**Improvements in fitting:**

- $D^0 \rightarrow K_S \pi^0$

$$D^0 \rightarrow K_S \pi^0$$

### Reconstruction Procedure:

- $\pi^0$  made from mdstpi0
- $\pi^+$  made from mdstcharged
- $K_S$  made from mdstvee2
  - track, kind and mass cut ( $0.486\text{GeV} < M_{K_S} < 0.510\text{GeV}$ )
- $D^0$  made from  $K_S$  and  $\pi^0$ 
  - mass cut ( $1.75\text{GeV} < M_{D^0} < 1.90\text{GeV}$ )
- $D^{*+}$  made from  $D^0$  and  $\pi_s^+$ 
  - signal region is defined by  
( $0.144 < dm = M_{D^{*+}} - M_{D^0} < 0.147$ )

Reconstructing  $D^0 \rightarrow K_S \pi^0$ 

$D^0 \rightarrow K_S \pi^0$  continues...

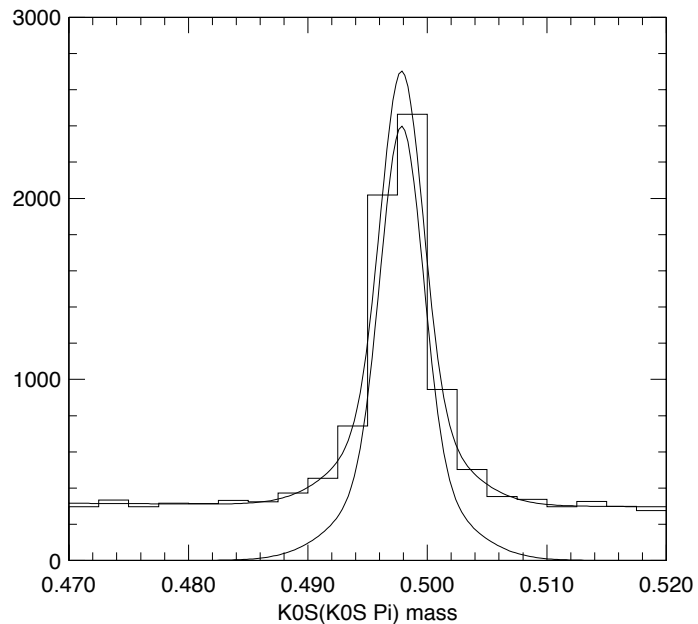
### Fitting Procedure:

- $M_{K_S}$  distribution before mass cut fitted as follows
  - background fitted to 1st order polynomial  
offset fixed at 0.4700
  - signal fitted to 'Double Gaussian'
- $M_{D^0}$  distribution before mass cut fitted as follows
  - background fitted to falling exponential  
offset fixed at 1.5
  - signal fitted to 'Crystal Ball' function
- 'dm' distribution before cut fitted as follows

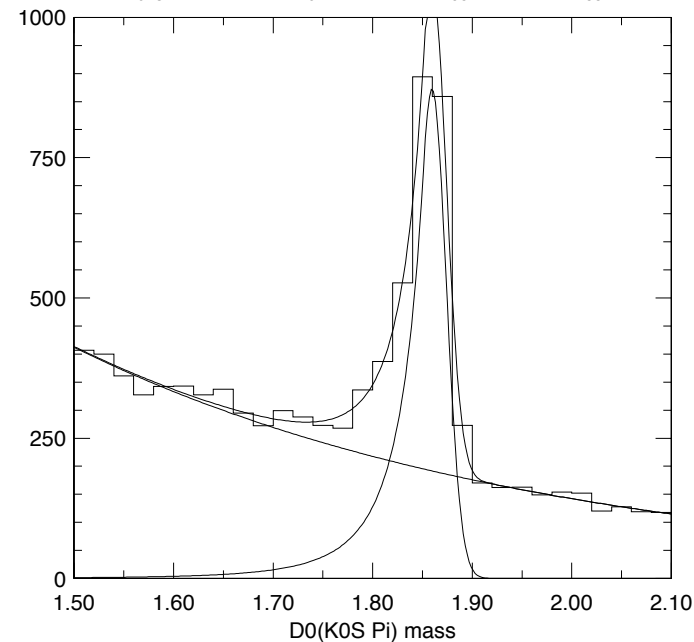
- background fitted to threshold function  
offset fixed at  $M_{\pi^+} = 0.13957 GeV$
- signal fitted to 'Double Gaussian'

# Fitting $M_{K_S}$ and $M_{D^0}$ in $D^0 \rightarrow K_S \pi^0$

MINUIT  $\chi^2$  Fit to Plot 10&0  
 K0S mass  
 File: ver1.mn.hbk 13-OCT-2004 18:22  
 Plot Area Total/Fit 11594. / 11594. Fit Status 3  
 Func Area Total/Fit 11584. / 11584. E.D.M. 8.586E-06  
 $\chi^2 = 10.7$  for 20 - 8 d.o.f., C.L.= 55.2%  
 Errors Parabolic Minos  
 Function 1: Polynomial of Order 1  
 NORM 1.26382E+05  $\pm$  3539. - 3505. + 3472.  
 POLY01 -1.55912E+05  $\pm$  1.1382E+05 - 1.1483E+05 + 1.1466E+05  
 \* OFFSET 0.47000  $\pm$  0. - 0. + 0.  
 Function 2: Two Gaussians (sigma)  
 AREA 5459.5  $\pm$  119.3 - 114.8 + 119.4  
 MEAN 0.49786  $\pm$  4.8158E-05 - 5.3317E-05 + 5.2635E-05  
 SIGMA1 1.77091E-03  $\pm$  1.1440E-04 - 1.3214E-04 + 1.0532E-04  
 AR2/AREA 0.36787  $\pm$  6.8749E-02 - 6.2090E-02 + 7.7514E-02  
 DELM -9.74686E-05  $\pm$  2.7010E-04 - 2.7985E-04 + 2.5400E-04  
 SIG2/SIG1 2.4859  $\pm$  0.2101 - 0.1813 + 0.2339



MINUIT  $\chi^2$  Fit to Plot 20&0  
 D0 mass  
 File: ver1.mn.hbk 13-OCT-2004 18:22  
 Plot Area Total/Fit 9250.0 / 9250.0 Fit Status 3  
 Func Area Total/Fit 9245.9 / 9245.9 E.D.M. 3.491E-08  
 $\chi^2 = 16.0$  for 30 - 7 d.o.f., C.L.= 85.6%  
 Errors Parabolic Minos  
 Function 1: Exponential  
 NORM 20607.  $\pm$  543.9 - 570.3 + 530.6  
 SLOPE 2.1288  $\pm$  7.5289E-02 - 7.7466E-02 + 7.7190E-02  
 \* OFFSET 1.5000  $\pm$  0. - 0. + 0.  
 Function 2: CB Line Shape  
 AREA 2274.5  $\pm$  118.8 - 107.8 + 141.3  
 MEAN 1.8596  $\pm$  7.1160E-04 - 7.0957E-04 + 7.6272E-04  
 SIGMA 1.43561E-02  $\pm$  7.7118E-04 - 7.9114E-04 + 7.8473E-04  
 ALPHA 0.60983  $\pm$  8.6577E-02 - 8.5484E-02 + 8.9542E-02  
 N 4.0731  $\pm$  2.264 - 1.495 + 4.881



Fitting 'dm' and  $M_{D^{*+}}$  in  $D^0 \rightarrow K_S \pi^0$ 

MINUIT  $\chi^2$  Fit to Plot 30&0  
 dm  
 File: ver1.mn.hbk 13-OCT-2004 18:22  
 Plot Area Total/Fit 2376.0 / 2376.0 Fit Status 3  
 Func Area Total/Fit 2342.4 / 2342.4 E.D.M. 3.126E-03  
 $\chi^2 = 32.8$  for 64 - 10 d.o.f., C.L.= 99.0%  
 Errors Parabolic Minos  
 Function 1: Threshold  
 NORM 1.52145E+08  $\pm$  1.6694E+08 - 0. + 0.  
 \* OFFSET 0.13957  $\pm$  0. - 0. + 0.  
 POWER 1.2694  $\pm$  0.1584 - 0. + 0.4814  
 COEFF1 -179.67  $\pm$  73.12 - 171.3 + 132.0  
 COEFF2 -2624.1  $\pm$  3587. - 5183. + 6266.  
 Function 2: Two Gaussians (sigma)  
 AREA 1578.0  $\pm$  48.18 - 49.80 + 48.62  
 MEAN 0.14559  $\pm$  3.1734E-05 - 2.9874E-05 + 3.6386E-05  
 SIGMA1 6.61211E-04  $\pm$  5.0580E-05 - 4.7219E-05 + 5.9550E-05  
 AR2/AREA 0.24541  $\pm$  0.1159 - 0.1039 + 0.1365  
 DELM -1.57690E-04  $\pm$  7.2462E-05 - 7.7083E-05 + 7.2755E-05  
 SIG2/SIG1 0.46406  $\pm$  7.9740E-02 - 9.4386E-02 + 7.7520E-02

