0

OUTLINE

:

- *ver1 of 'charm meeting slides' (Page 1 to Page 15)*
- *List of things to be done*

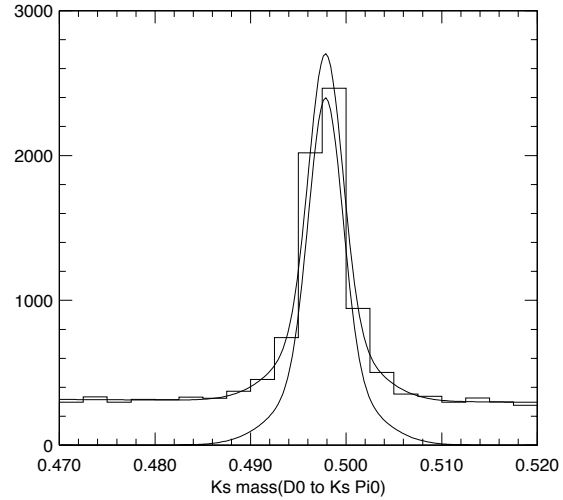
Reconstruction and Event selection

- **π^0 candidates**
  - mdstpi0
- **K_S candidates**
  - mdstvee2
  - $dr > 0.25, d\phi < 0.1, dz < 1$
  - $0.486 < M^{rec}_{K_S}(k0spi) < 0.510$
  - $0.491342 < M^{rec}_{K_S}(k0spipi) < 0.504038$

    plots

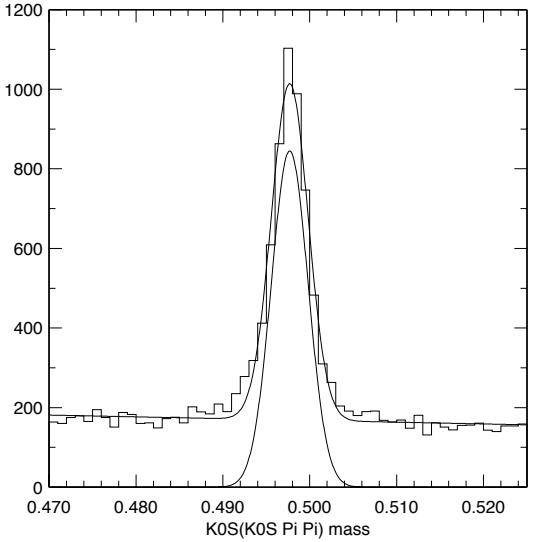
MINUIT χ^2 Fit to Plot 10&0
K0S mass
File: ver1.mn.hbk 19-OCT-2004 03:37
Plot Area Total/Fit 11594. / 11594. Fit Status 3
Func Area Total/Fit 11584. / 11584. E.D.M. 8.586E-06
χ^2= 10.7 for 20 - 8 d.o.f., C.L.= 55.2%

Errors		Parabolic		Minos	
Function 1: Polynomial of Order 1					
NORM	1.26382E+05	± 3539.	- 3505.	+ 3472.	
POLY01	-1.55912E+05	± 1.1382E+05	- 1.1483E+05	+ 1.1466E+05	
* OFFSET	0.47000	± 0.	- 0.	+ 0.	
Function 2: Two Gaussians (sigma)					
AREA	5459.5	± 119.3	- 114.8	+ 119.4	
MEAN	0.49786	± 4.8158E-05	- 5.3317E-05	+ 5.2635E-05	
SIGMA1	1.77091E-03	± 1.1440E-04	- 1.3214E-04	+ 1.0532E-04	
AR2/AREA	0.36787	± 6.8749E-02	- 6.2090E-02	+ 7.7514E-02	
DELM	-9.74686E-05	± 2.7010E-04	- 2.7985E-04	+ 2.5400E-04	
SIG2/SIG1	2.4859	± 0.2101	- 0.1813	+ 0.2339	



MINUIT χ^2 Fit to Plot 10&0
K0S mass
File: ver3.mn.hbk 21-SEP-2004 23:02
Plot Area Total/Fit 13896. / 13896. Fit Status 3
Func Area Total/Fit 13777. / 13777. E.D.M. 4.778E-08
χ^2= 119.2 for 55 - 5 d.o.f., C.L.=0.140E-04%

Errors		Parabolic		Minos	
Function 1: Polynomial of Order 1					
NORM	1.81232E+05	± 3692.	- 3666.	+ 3664.	
POLY01	-4.45171E+05	± 1.0854E+05	- 1.0867E+05	+ 1.0870E+05	
* OFFSET	0.47000	± 0.	- 0.	+ 0.	
Function 2: Gaussian (sigma)					
AREA	4482.4	± 84.72	- 84.72	+ 84.85	
MEAN	0.49769	± 4.2506E-05	- 4.2558E-05	+ 4.2442E-05	
SIGMA	2.11601E-03	± 4.7788E-05	- 4.5801E-05	+ 4.6742E-05	



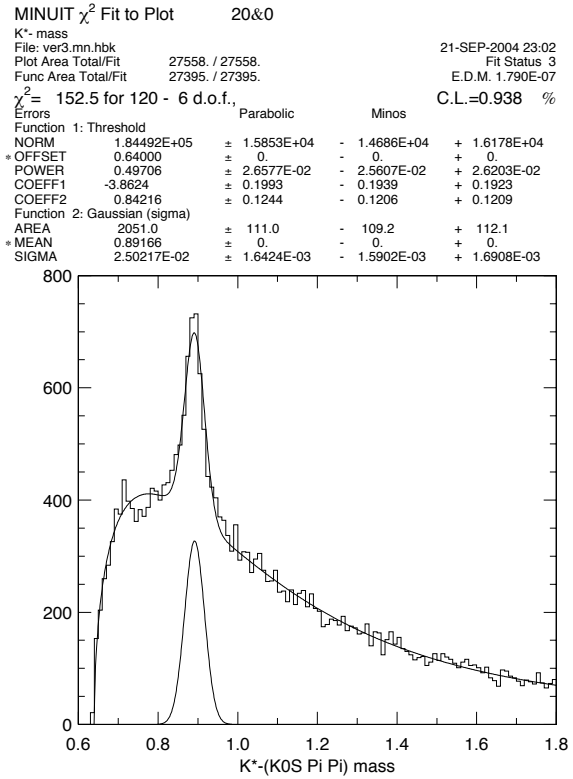
Reconstruction and Event selection conti....

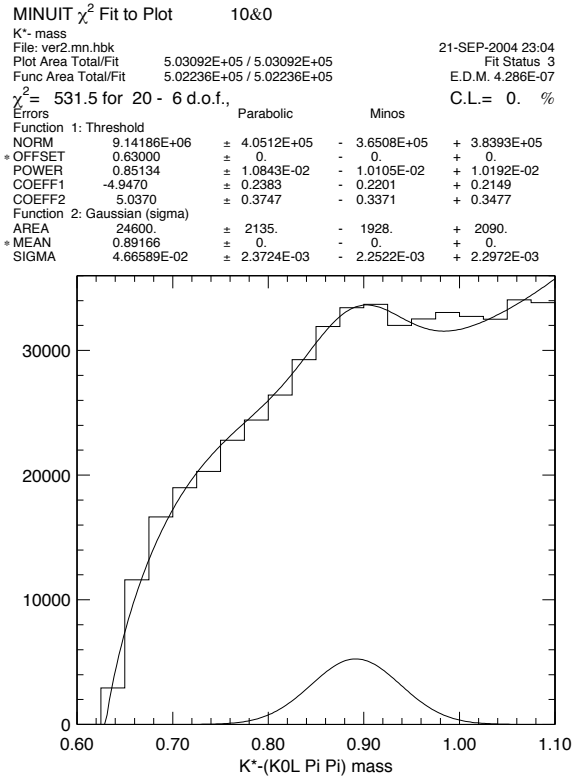
- **K_L candidates**
  - K_L reconstruction technique
    take K_L direction (mdstk0l), reconstructed π^0 (π^+ and π^- in case of $D^0 \to K_L\pi\pi$)
    fix K_L and D^0 mass to PDG value
    quadratic equation(2 solutions) for p_{K_L}
  - which solution to be taken?
    I do a fom study in MC (and data+MC) for both solutions
    conclusion: increased yield with better fom if both solutions taken together
    results shown in detail in later slides

Reconstruction and Event selection conti....

- K^{*-} **candidates**

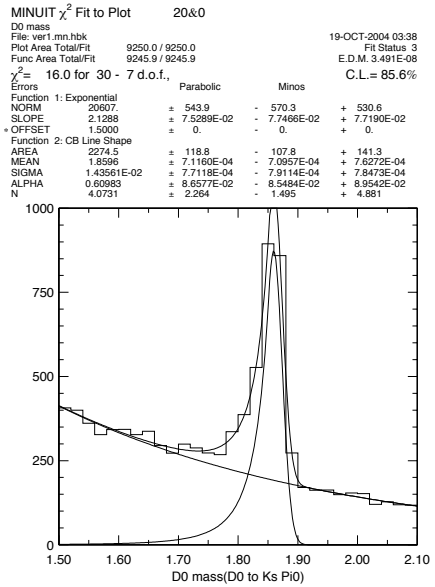
$$-\ 0.89166GeV - 3\sigma < M^{rec}_{K^{*-}} < 0.89166GeV + 3\sigma$$

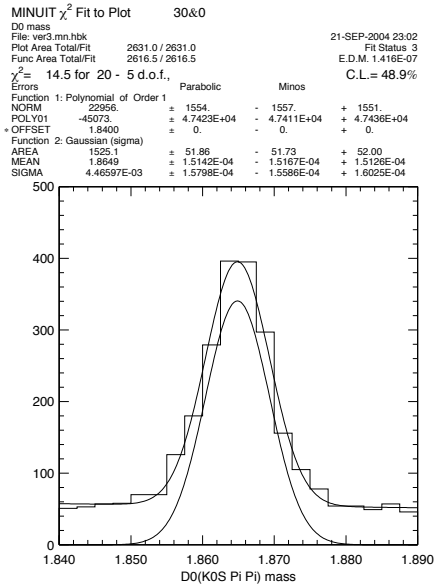




Reconstruction and Event selection conti....

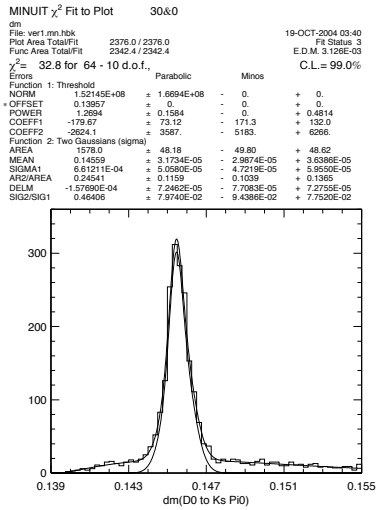
- D^0 **candidates**
  - $1.75GeV < M^{rec}_{D^0}(k0spi) < 1.9GeV$
  - $1.8649GeV - 3\sigma < M^{rec}_{D^0}(k0spipi) < 1.8649GeV + 3\sigma$
  - M_{D^0} is fixed to PDG value for K_L modes

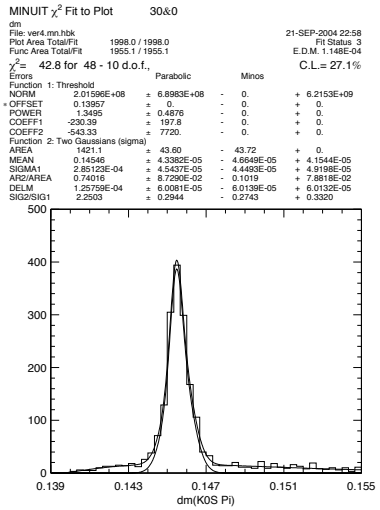


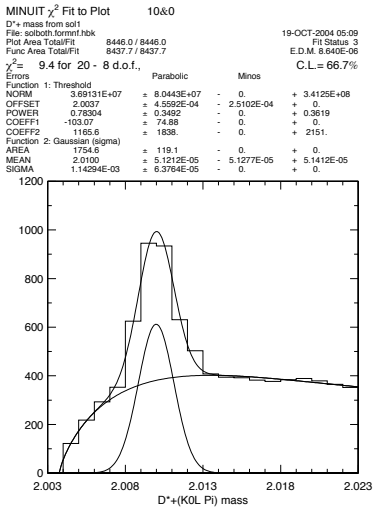


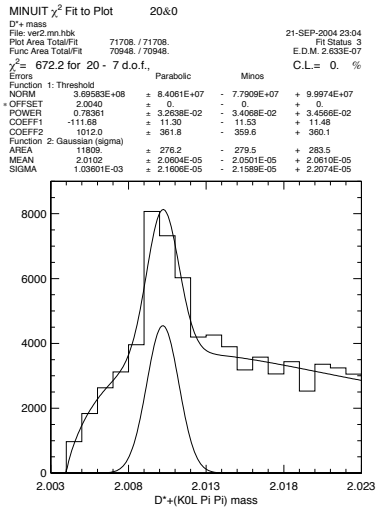
Reconstruction and Event selection conti....

- **tagging the signal**
  - $0.144 < \Delta M(k0spi0) < 0.147, 0.143 < \Delta M(k0spipi) < 0.148$
  - $M^{rec}_{D^{*+}}$ within $\pm 3\sigma$ of mean for K_L modes









Useful studies in signal MC

- **study1: fom study for choosing between 2 solutions for p_{K_L}**
- **study2: efficiency study in bins of momentum**

study1: fom statistics for the solutions

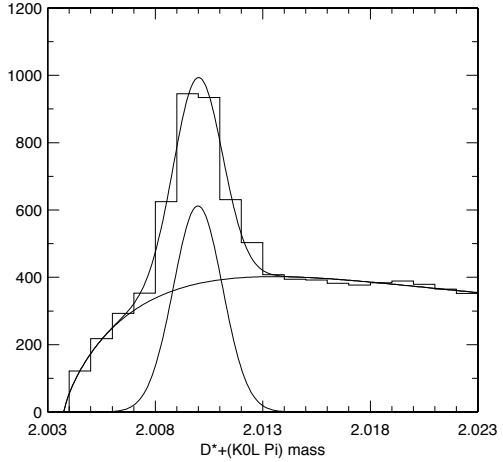
Solutions	Signal	Background	fom
1	1750.8	2555.4	26.6802
2	620.21	1602.1	13.1564
Both	2402.8	4123.2	29.7436

MINUIT χ^2 Fit to Plot 10&0

D*+ mass from sol1
File: solboth.formnf.hbk 19-OCT-2004 05:09
Plot Area Total/Fit 8446.0 / 8446.0 Fit Status 3
Func Area Total/Fit 8437.7 / 8437.7 E.D.M. 8.640E-06

χ^2= 9.4 for 20 - 8 d.o.f., C.L.= 66.7%

Errors		Parabolic	Minos	
Function 1: Threshold				
NORM	3.69131E+07	± 8.0443E+07	- 0.	+ 3.4125E+08
OFFSET	2.0037	± 4.5592E-04	- 2.5102E-04	+ 0.
POWER	0.78304	± 0.3492	- 0.	+ 0.3619
COEFF1	-103.07	± 74.88	- 0.	+ 0.
COEFF2	1165.6	± 1838.	- 0.	+ 2151.
Function 2: Gaussian (sigma)				
AREA	1754.6	± 119.1	- 0.	+ 0.
MEAN	2.0100	± 5.1212E-05	- 5.1277E-05	+ 5.1412E-05
SIGMA	1.14294E-03	± 6.3764E-05	- 0.	+ 0.

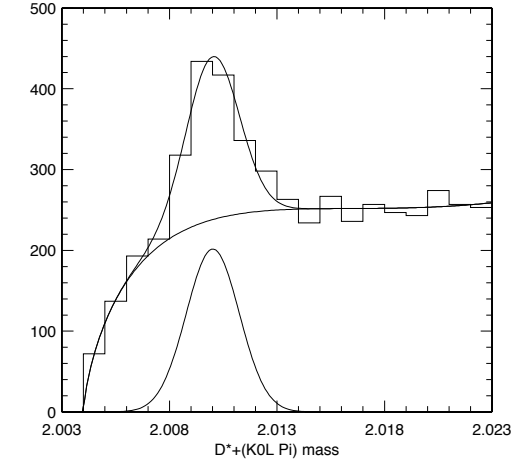


MINUIT χ^2 Fit to Plot 20&0

D*+ mass from sol2
File: solboth.formnf.hbk 19-OCT-2004 05:09
Plot Area Total/Fit 4950.0 / 4950.0 Fit Status 3
Func Area Total/Fit 4933.1 / 4933.1 E.D.M. 6.850E-06

χ^2= 10.3 for 20 - 7 d.o.f., C.L.= 67.0%

Errors		Parabolic	Minos	
Function 1: Threshold				
NORM	1.54136E+07	± 1.4427E+07	- 0.	+ 2.5297E+07
* OFFSET	2.0040	± 0.	- 0.	+ 0.
POWER	0.69935	± 0.1315	- 0.1383	+ 0.1380
COEFF1	-112.43	± 46.15	- 46.72	+ 48.73
COEFF2	2275.9	± 1394.	- 1442.	+ 1395.
Function 2: Gaussian (sigma)				
AREA	623.09	± 93.38	- 89.17	+ 103.6
MEAN	2.0100	± 1.1766E-04	- 1.1584E-04	+ 1.1966E-04
SIGMA	1.23268E-03	± 1.5611E-04	- 1.4872E-04	+ 1.6950E-04

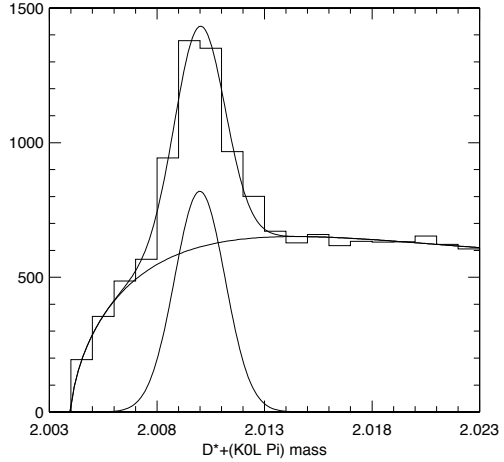


MINUIT χ^2 Fit to Plot 30&0

D*+ mass from both sol
File: solboth.formnf.hbk 19-OCT-2004 05:10
Plot Area Total/Fit 13396. / 13396. Fit Status 3
Func Area Total/Fit 13362. / 13362. E.D.M. 1.647E-06

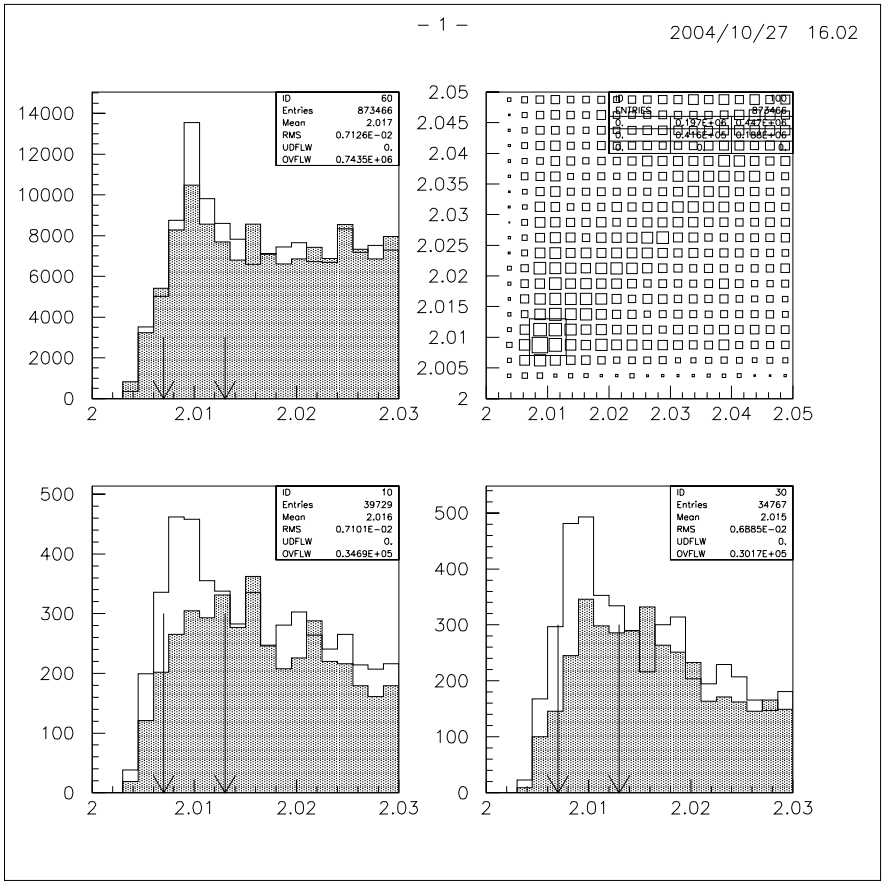
χ^2= 16.1 for 20 - 7 d.o.f., C.L.= 24.3%

Errors		Parabolic	Minos	
Function 1: Threshold				
NORM	2.43678E+07	± 1.4920E+07	- 1.0826E+07	+ 1.9537E+07
* OFFSET	2.0040	± 0.	- 0.	+ 0.
POWER	0.63113	± 8.6089E-02	- 8.2369E-02	+ 8.3340E-02
COEFF1	-81.795	± 30.30	- 28.76	+ 29.09
COEFF2	1019.5	± 914.9	- 878.2	+ 868.0
Function 2: Gaussian (sigma)				
AREA	2409.6	± 145.4	- 140.2	+ 146.9
MEAN	2.0100	± 4.7759E-05	- 4.7417E-05	+ 4.7861E-05
SIGMA	1.17290E-03	± 6.0333E-05	- 5.8311E-05	+ 6.1464E-05



Useful studies in signal MC continues.....

study1: We saw taking both solutions more profitable, better yield better fom. Now are there 2 competing solutions in 1 event?



Useful studies in signal MC continues....

study2: efficiency in bins of momentum

we have to verify the following assumptions

$\epsilon_{D\to K\pi}(p_K, p_\pi, p_{\pi_s}) = \epsilon_K(p_K) \times \epsilon_\pi(p_\pi) \times \epsilon_{\pi_s}(p_{\pi_s})$

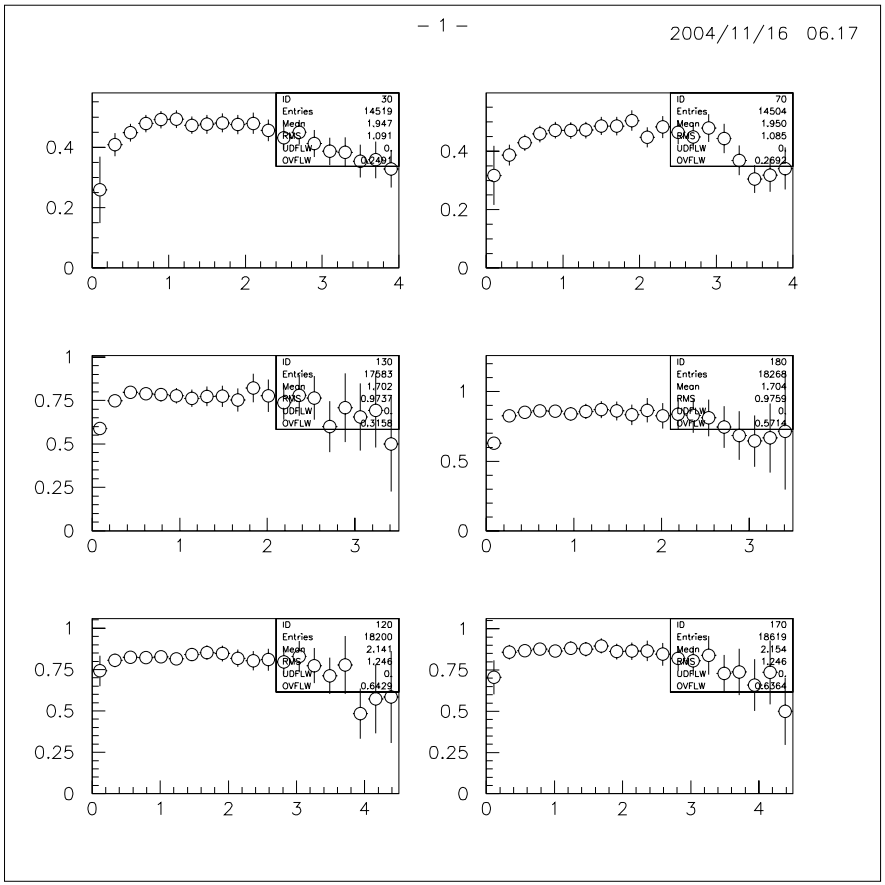
$\epsilon_{D\to K\pi^-\pi^+}(p_K, p_{\pi^+}, p_{\pi^-}, p_{\pi_s}) =$

$\epsilon_K(p_K) \times \epsilon_{\pi^+}(p_{\pi^+}) \times \epsilon_{\pi^-}(p_{\pi^-}) \times \epsilon_{\pi_s}(p_{\pi_s})$

Our strategy is to show that there is no correlation in the 3D efficiency functions on the LHS of the factorisation equation by looking at the efficiency functions of the arguments in a pair wise fashion

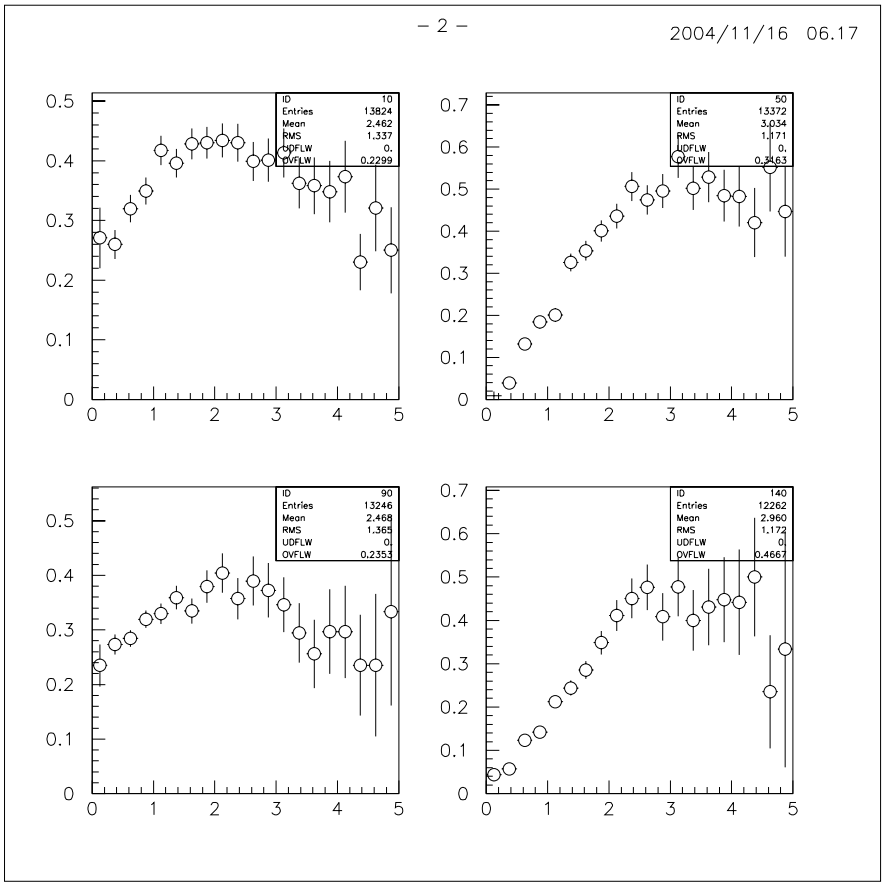
Useful studies in signal MC continues....

study2: 1D efficiency functions of π^0s and $\pi^{\pm}$s



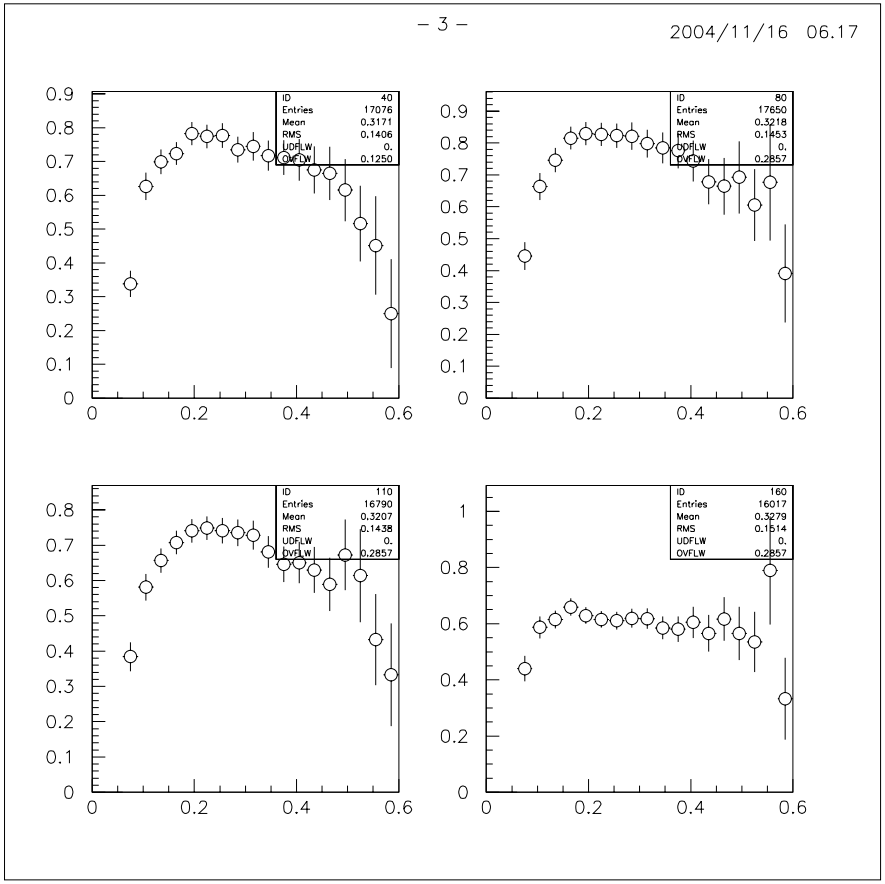
Useful studies in signal MC continues....

study2: 1D efficiency functions K^0s



Useful studies in signal MC continues....

study2: 1D efficiency functions π_ss



Useful studies in signal MC continues....

study2: 2D efficiency functions

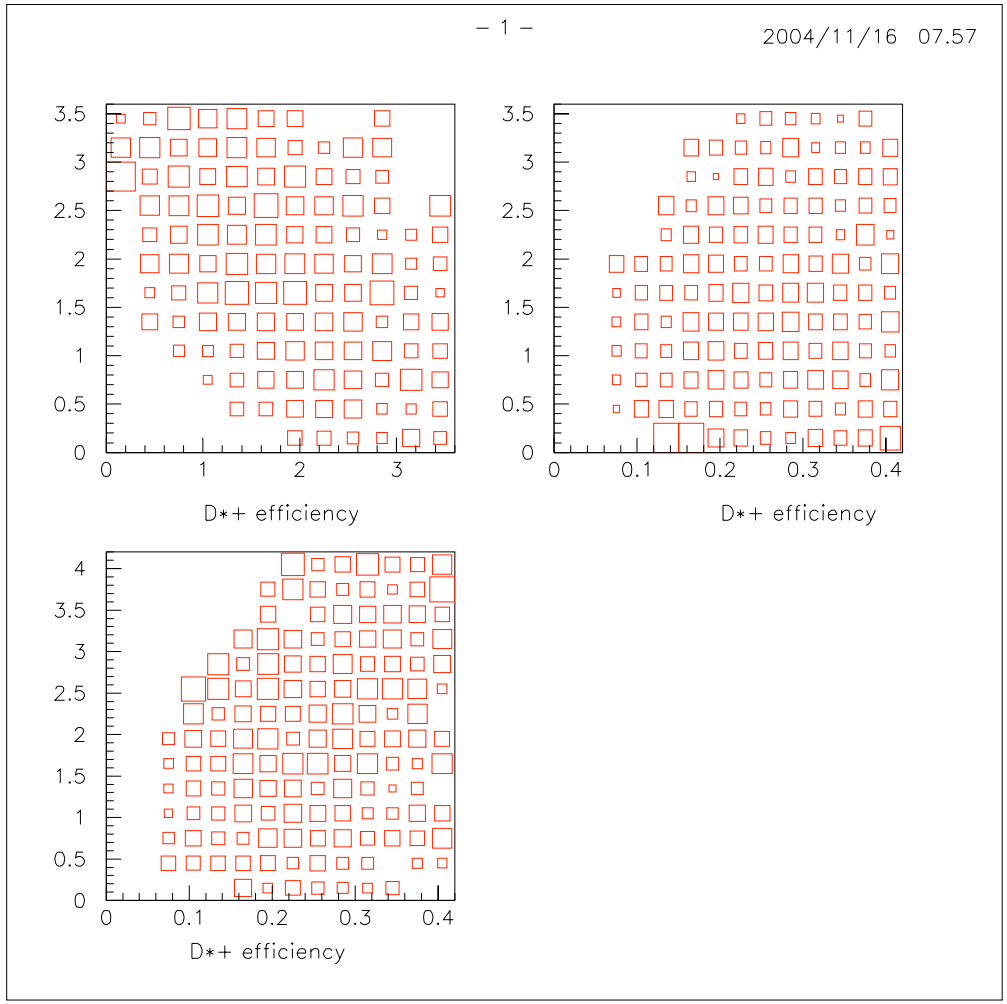
$\epsilon_{D\to K_S\pi}(p_K, p_\pi)$

$\epsilon_{D\to K_S\pi}(p_\pi, p_{\pi_s})$

$\epsilon_{D\to K_S\pi}(p_K, p_{\pi_s})$

There are 15 more such 2D functions in all 4 modes

besides the $K_S\pi$ modes shown here


– 1 –
2004/11/16 07.57
D*+ efficiency
D*+ efficiency
D*+ efficiency

list of things to do (and done)

More sig MC is being produced

Now is the time for:

remove double counting from K_L modes

fix event by event comparison of the 2 solutions

Fix other coding issues(if any) and copy for 'cc' modes