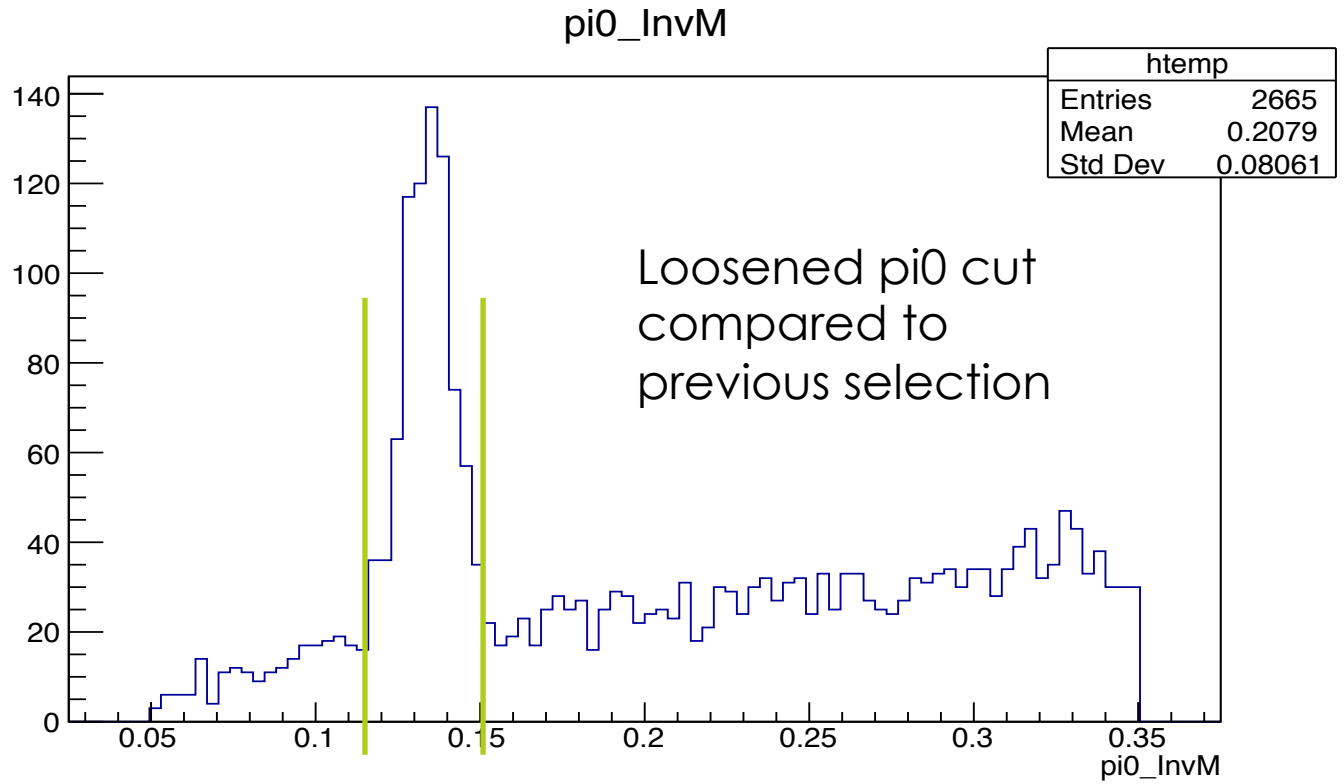
Semi-tauonic Report: On the D and D* reconstruction

Racha Cheaib

University of Mississippi

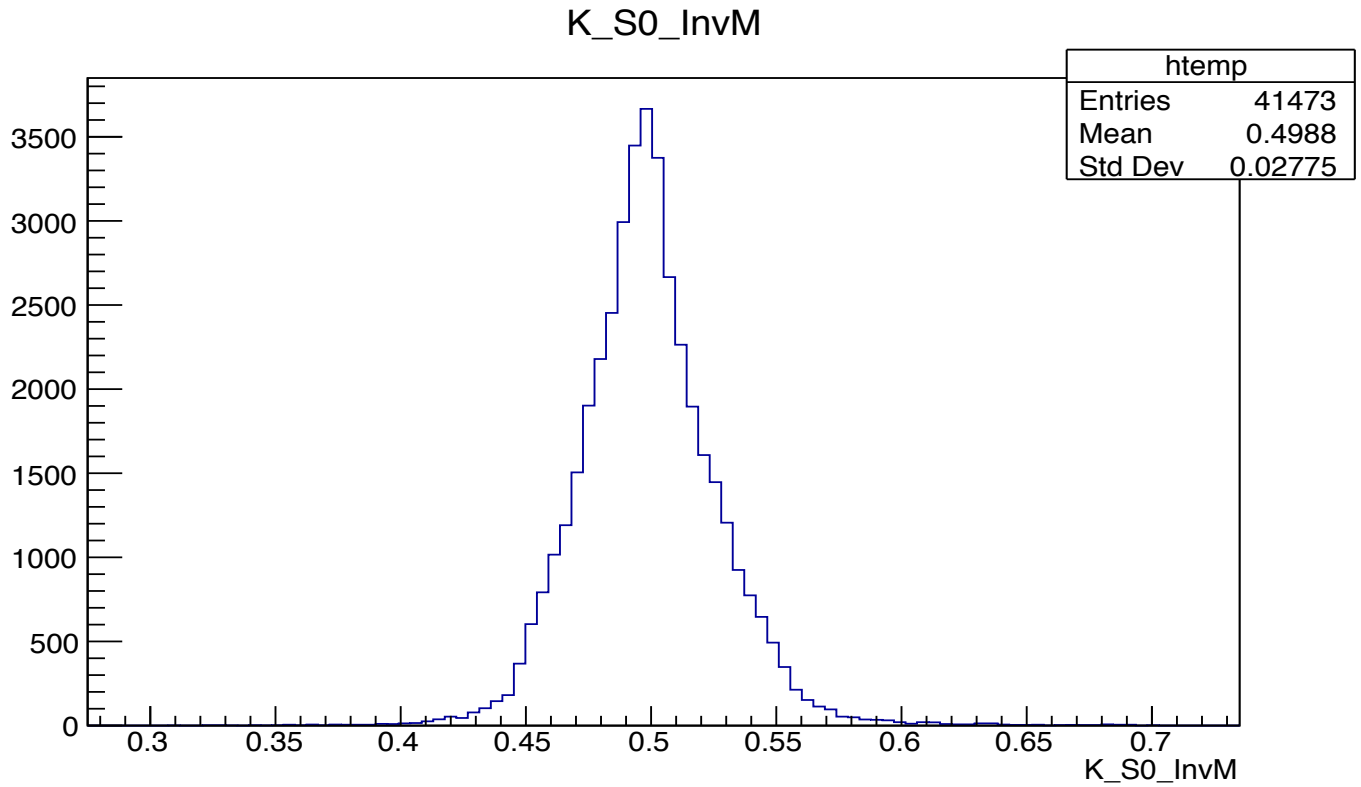
π^0 reconstrcution

- stdPhotons('pi0highE')
- applyCuts('gamma:pi0highE','E>0.150 and clusterE9E25>0.8 and abs(clusterTiming)<clusterErrorTiming')



K_s^0 reconstruction:

- vertexKFit('K_S0:all',0.001)
- cutAndCopyList('K_S0:sig','K_S0:all', 'distance>0.5 and significanceOfDistance>2')

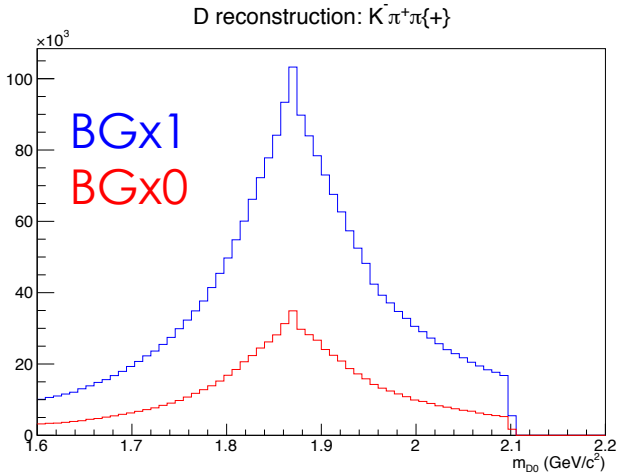


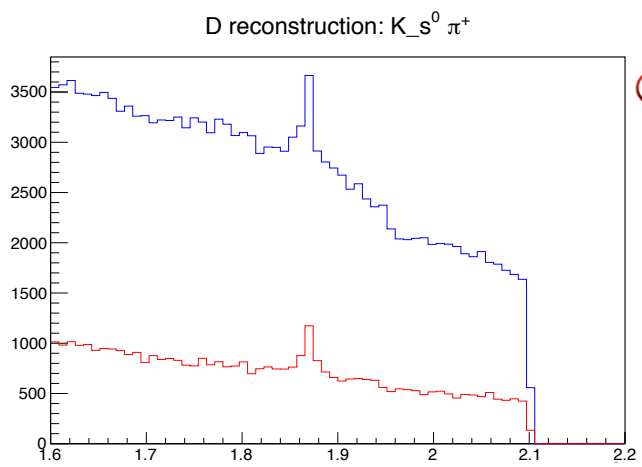
D+ modes: Cocktail sample D pi

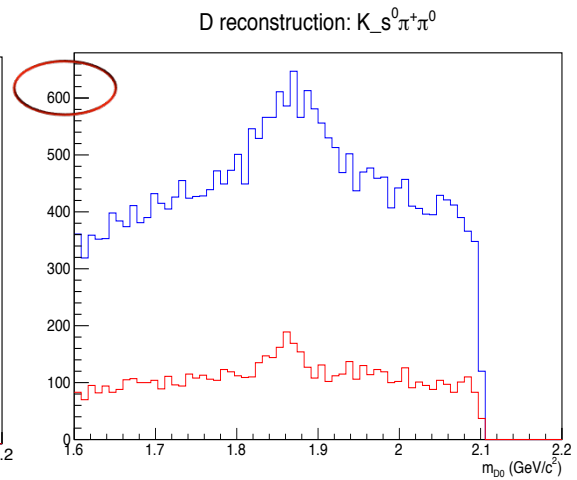
$D_+ \rightarrow K^-\pi^+\pi^+$ (1), $K^-\pi^+\pi^+\pi^0$ (2), $K_s^0\pi^+$ (3), $K_s^0\pi^+\pi^-\pi^+$ (4), $K_s^0\pi^+\pi^0$ + (5), $K_s^0K^+$(6)

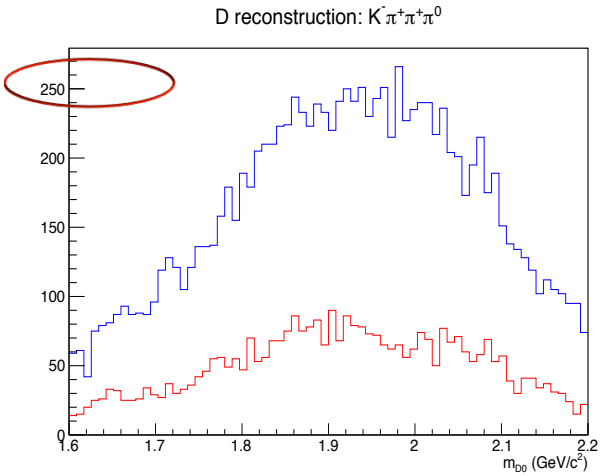
pi+: 85eff : pt>0.05,

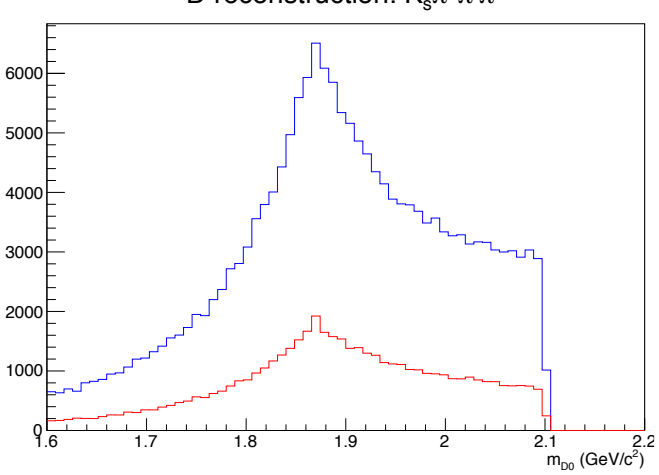
K+: 85eff : dr < 0.5 and −2 < dz < 2 and pt > 0.1 and 0.3<useCMSFrame(p)<2.8,

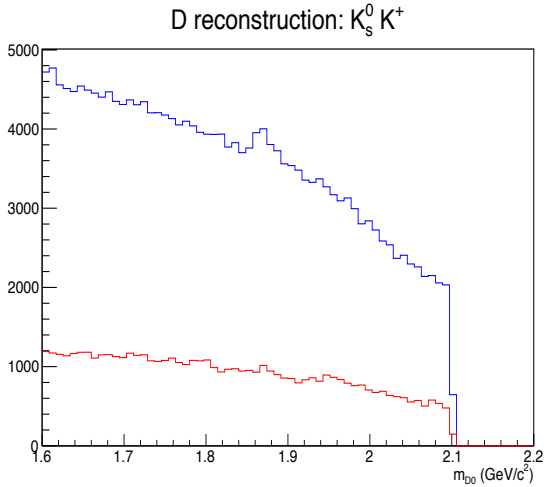








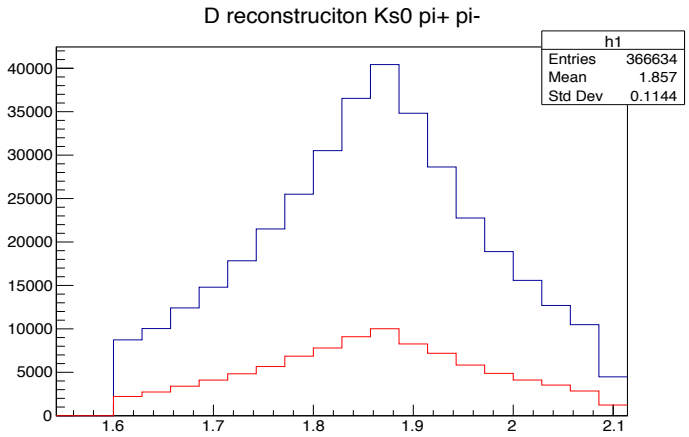


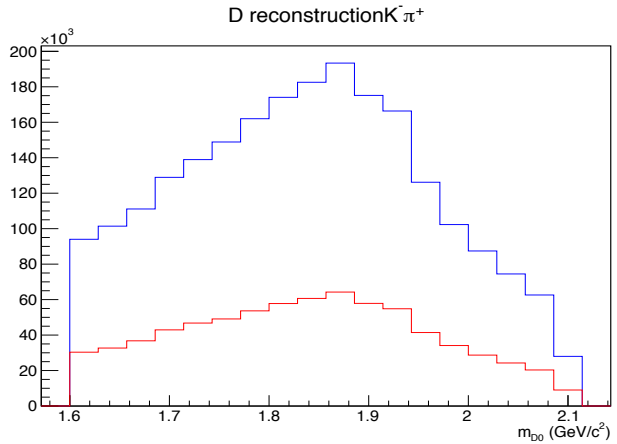


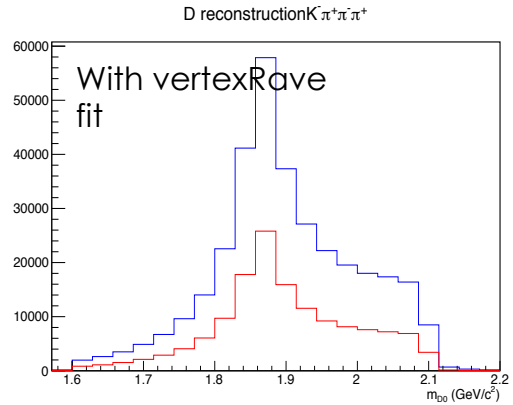
D0 modes: Cocktail sample D pi

pi+:85eff:pt>0.05,
K+:85eff:dr<0.5 and -2<dz<2 and pt>0.1 and 0.3<useCMSFrame(p)<2.8,

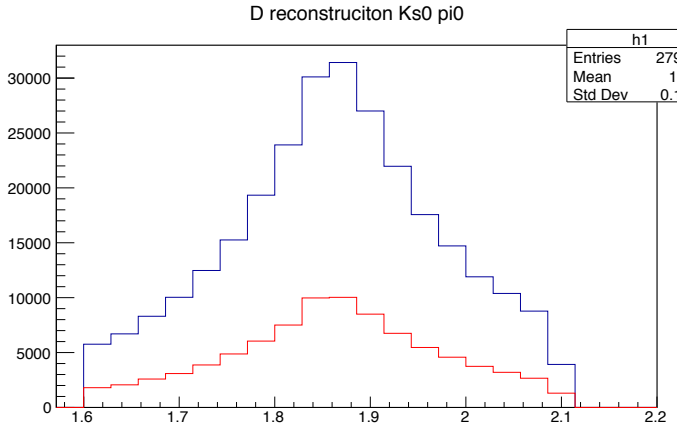
$D^0 \rightarrow K^-\pi^+$ (7) , $K^-\pi^+\pi^0$ (8) , $K_s^0\pi^0$ (9), $K^-\pi^+\pi^-\pi^+$ (10) , $K_s^0\pi^+\pi^-$ (11)

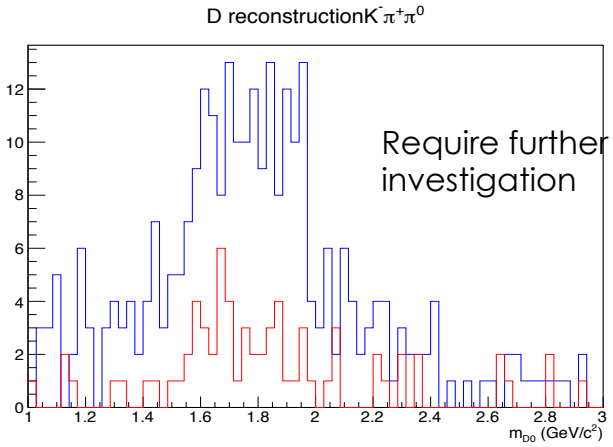






BGx1
BGx0

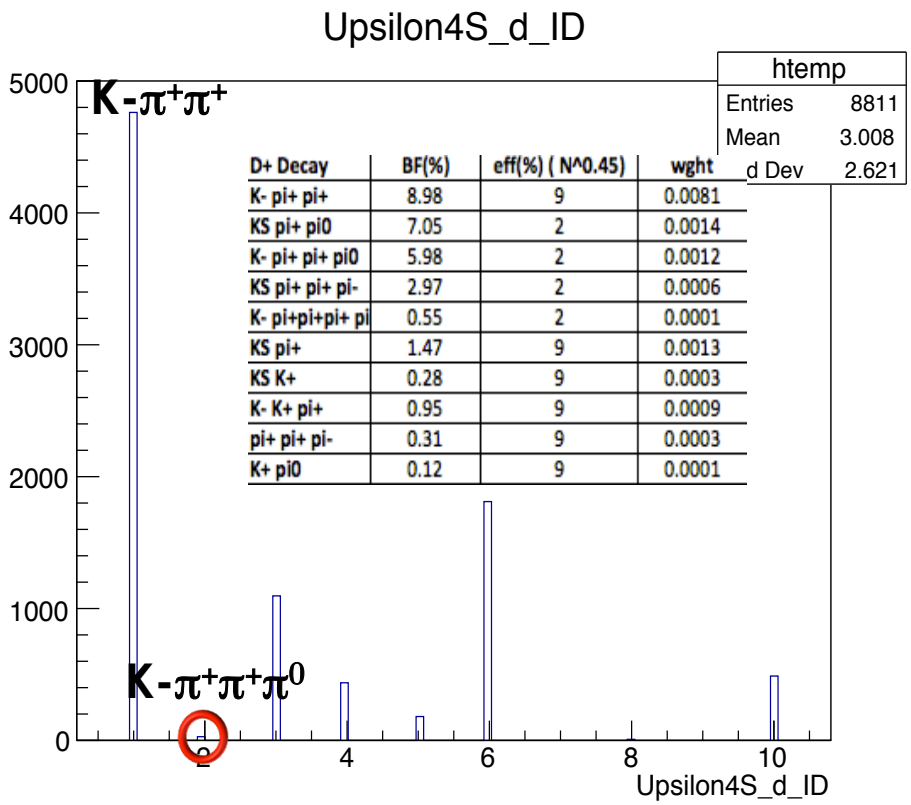




D Modes after Y(4S) reconstruction:

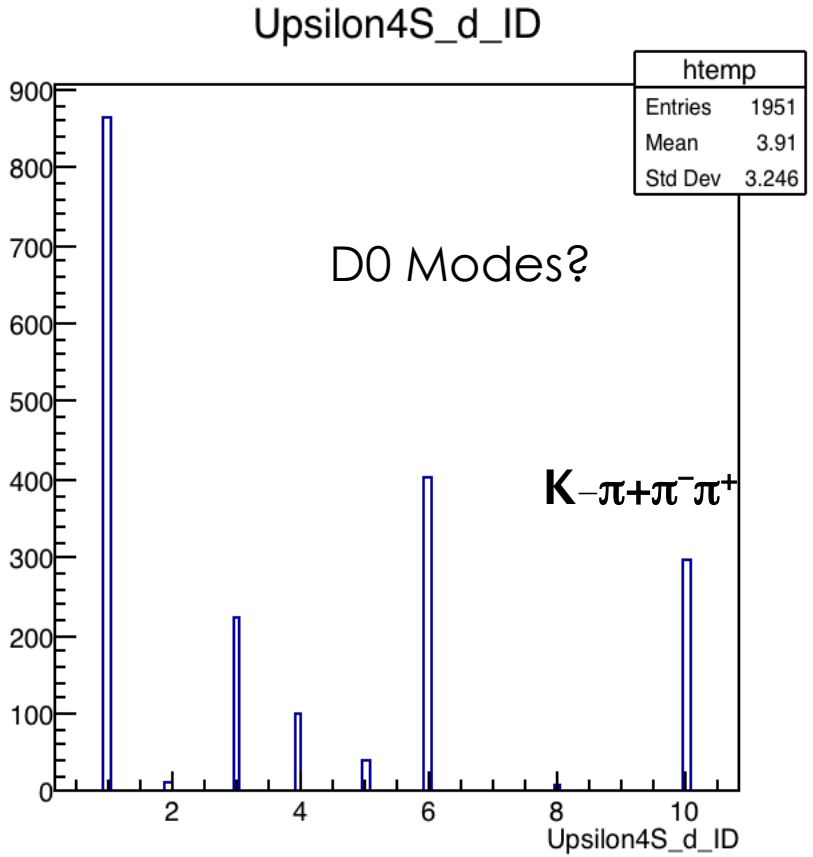
$D^+ \rightarrow K^-\pi^+\pi^+$ (1), $K^-\pi^+\pi^+\pi^0$ (2), $K_s^0\pi^+$ (3), $K_s^0\pi^+\pi^-\pi^+$ (4), $K_s^0\pi^+\pi^0$ + (5), $K_s^0K^+$(6)

Cocktail sample:

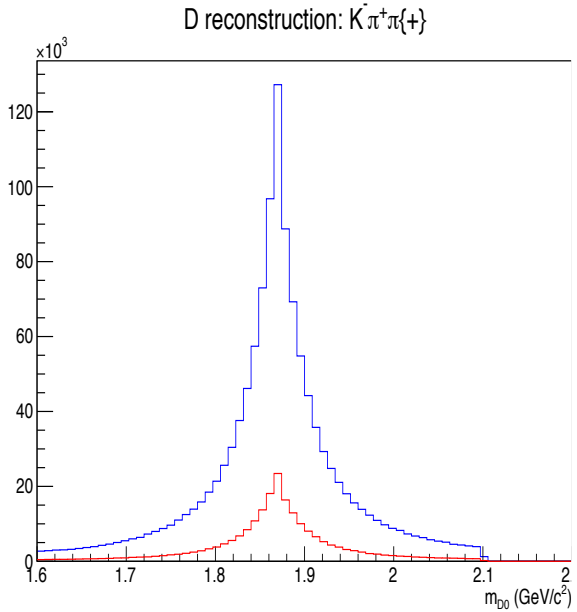


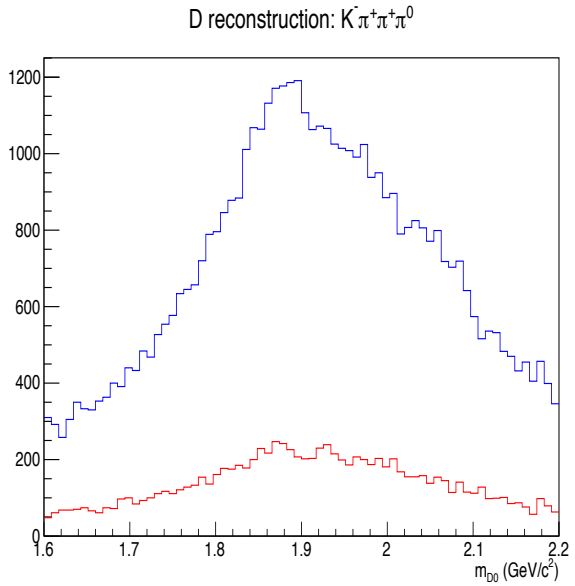
D+ Decay	BF(%)	eff(%) (N^0.45)	wght
K- pi+ pi+	8.98	9	0.0081
KS pi+ pi0	7.05	2	0.0014
K- pi+ pi+ pi0	5.98	2	0.0012
KS pi+ pi+ pi-	2.97	2	0.0006
K- pi+pi+pi+ pi	0.55	2	0.0001
KS pi+	1.47	9	0.0013
KS K+	0.28	9	0.0003
K- K+ pi+	0.95	9	0.0009
pi+ pi+ pi-	0.31	9	0.0003
K+ pi0	0.12	9	0.0001

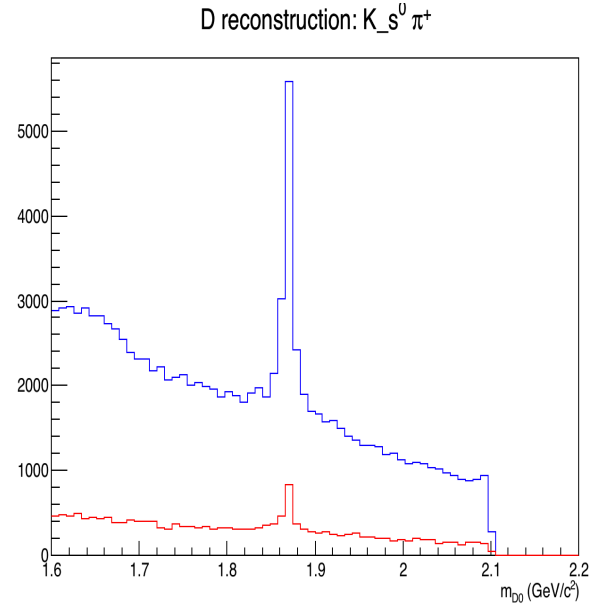
Non-cocktail sample:

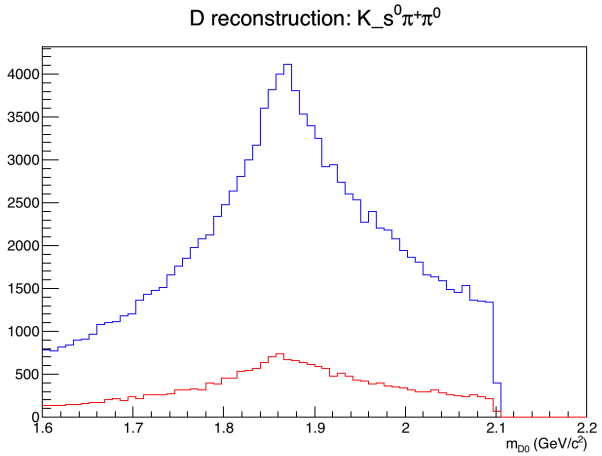


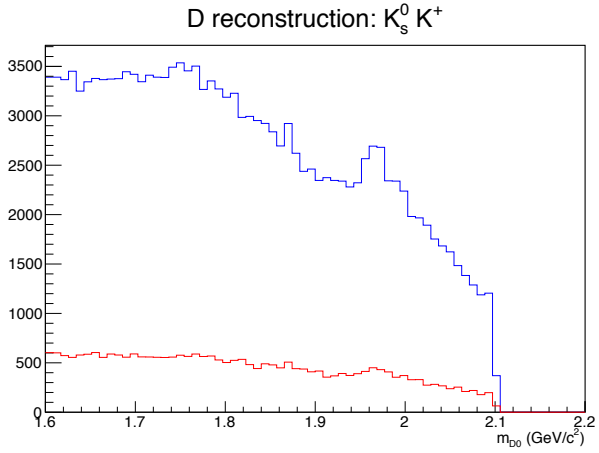
MC8 vs. MC9:


D reconstruction: K⁻π⁺π{+}
×10³
120
100
80
60
40
20
0
1.6
1.7
1.8
1.9
2
2.1
2
m_D0 (GeV/c²)

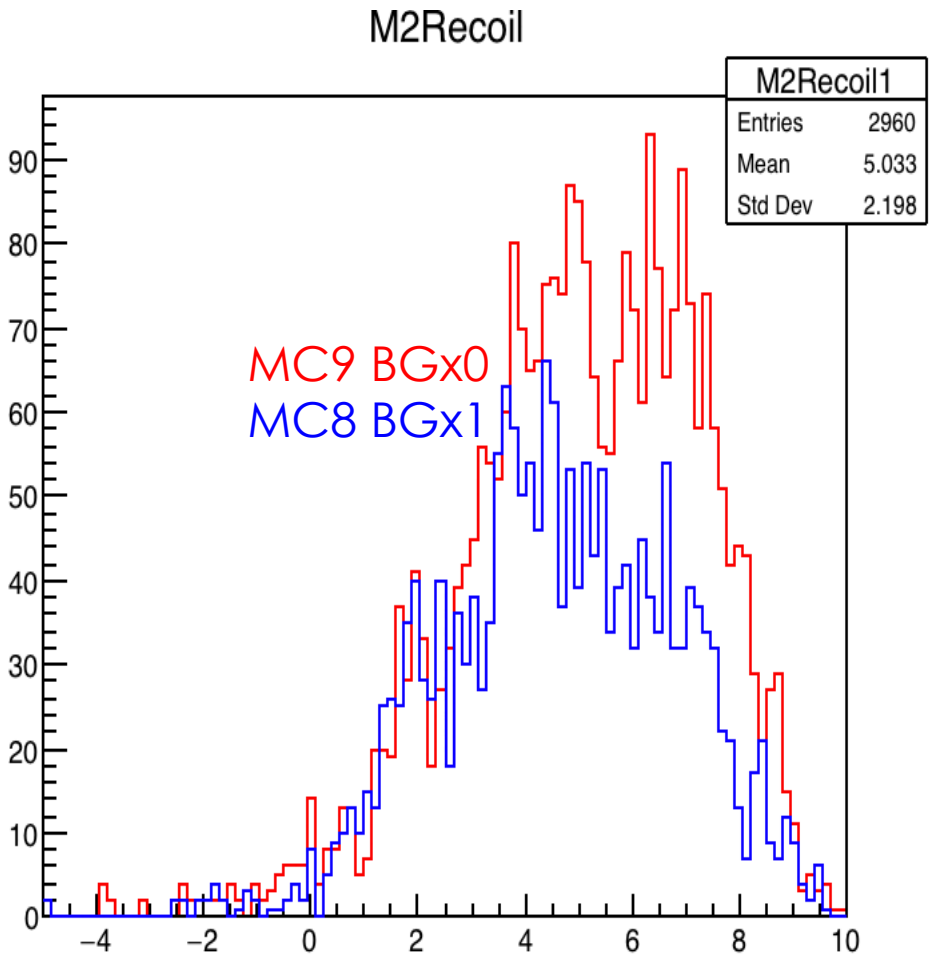

D reconstruction: K⁻π⁺π⁺π⁰
1200
1000
800
600
400
200
0
1.6
1.7
1.8
1.9
2
2.1
2.2
m_D0 (GeV/c²)

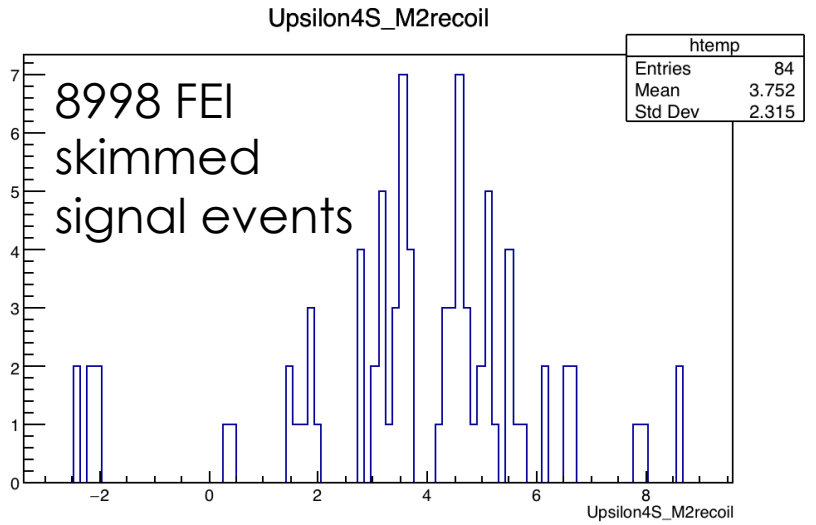

D reconstruction: K_s⁰ π⁺
5000
4000
3000
2000
1000
0
1.6
1.7
1.8
1.9
2
2.1
2.2
m_D0 (GeV/c²)

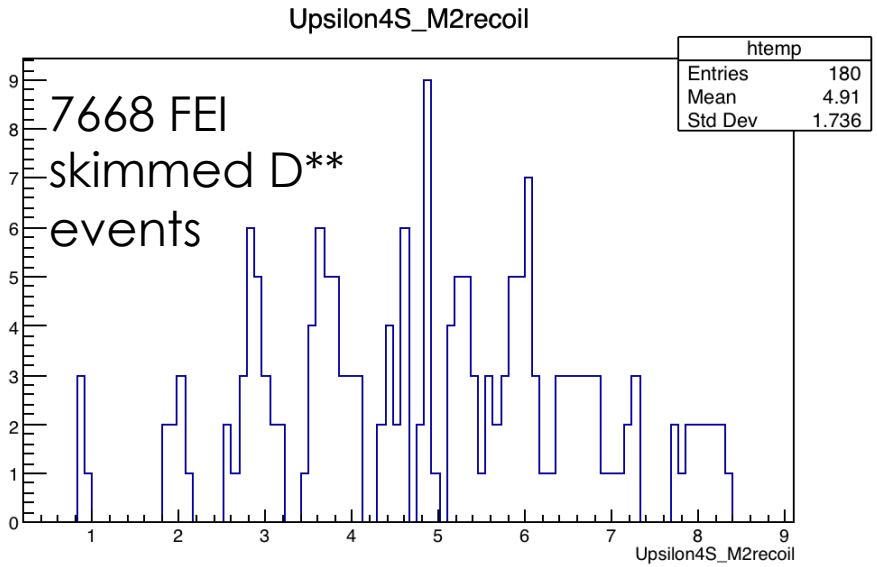

D reconstruction: K_s⁰π⁺π⁰
4000
3500
3000
2500
2000
1500
1000
500
0
1.6
1.7
1.8
1.9
2
2.1
2.2
m_D0 (GeV/c²)


D reconstruction: K⁰s K⁺
3500
3000
2500
2000
1500
1000
500
0
1.6
1.7
1.8
1.9
2
2.1
2.2
m_D0 (GeV/c²)

M2Recoil Distributions







To do

- Figure out why running over full signal sample is crashing.
- Determine whether corrections to the pi0 reconstruction can improve the D modes with pi0 in the final state.
- Determine where the D0 modes disappeared.
- Run over full background samples.
- Add continuum suppression.
- Investigate PID and angular distributions.
- .. Much more.