

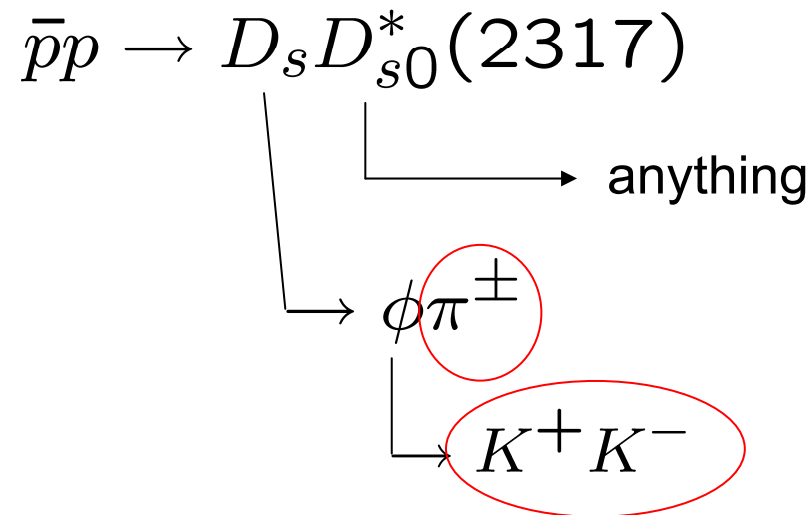
# Disc DIRC Studies

## $\bar{p}p \rightarrow D_s D_{s0}^*(2317)$

**Klaus Götzen**  
GSI Darmstadt

**Update to EVO Meeting**  
**04/07/2008**

- Decay Tree



- Inclusive Selection

- Loose pion PID, various kaon PID
- vertex fit of the  $\phi$  ( $P > 0.001$ )
- vertex fit of the  $D_s$  ( $P > 0.001$ )
- $|m(\phi) - 1019.5| < 20$  [MeV/c<sup>2</sup>]
- $|m(\phi\pi) - 1968.5| < 30$  [MeV/c<sup>2</sup>]
- Choose best candidate/event

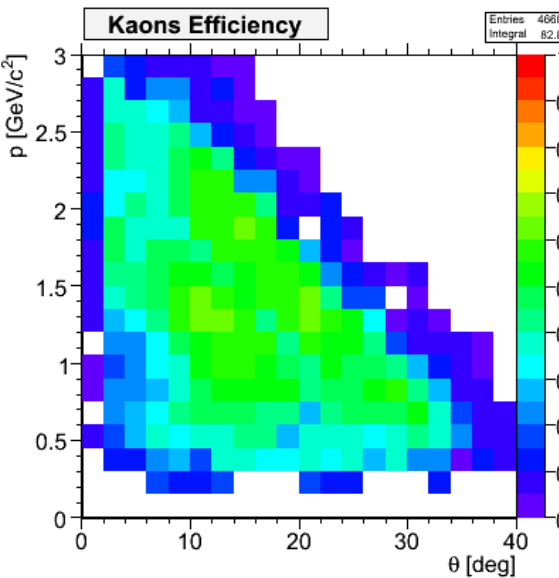
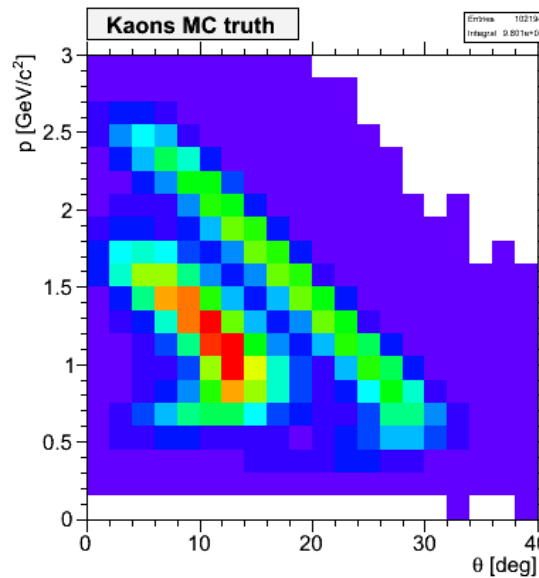
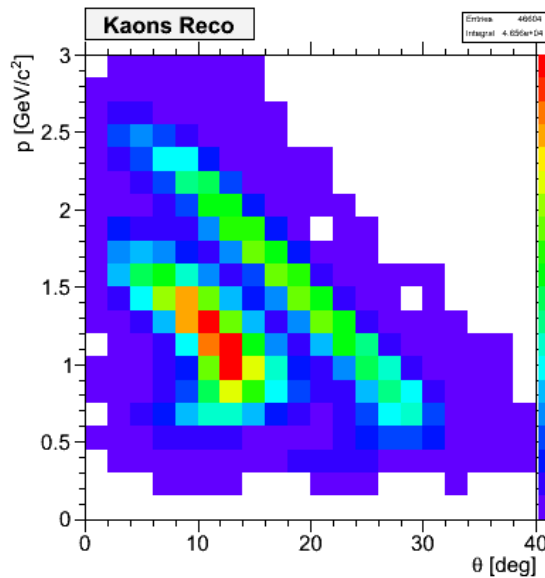
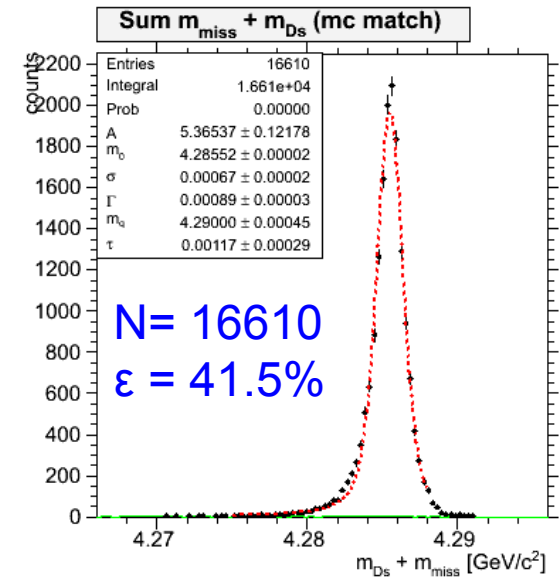
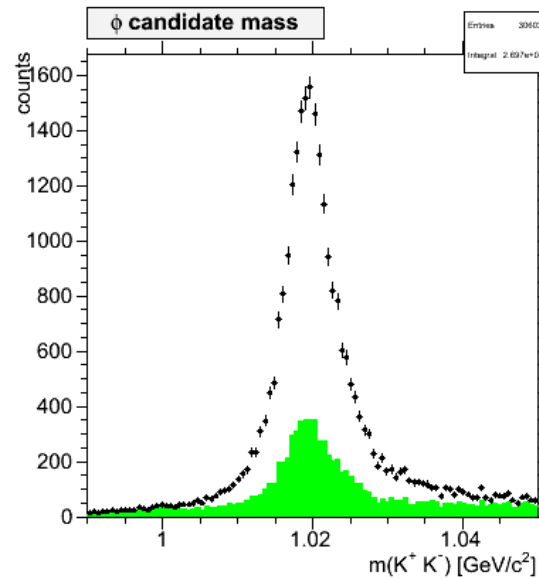
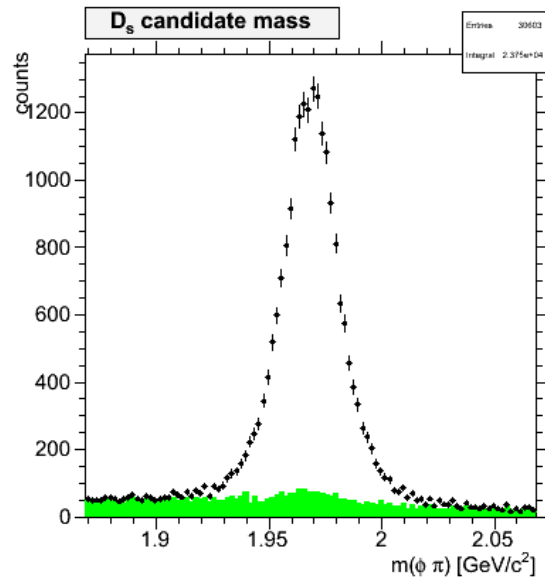
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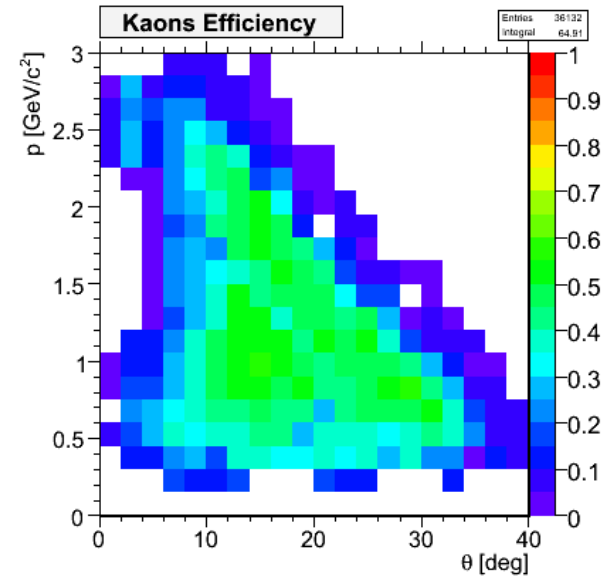
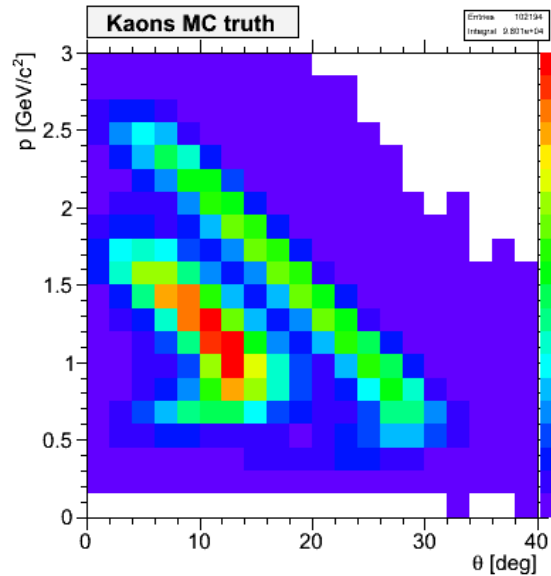
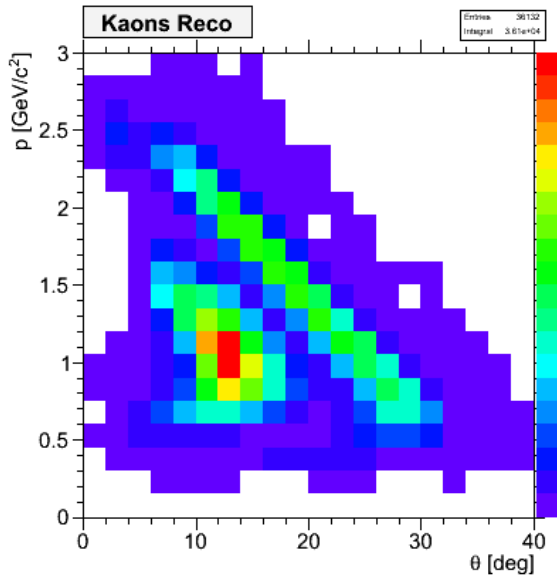
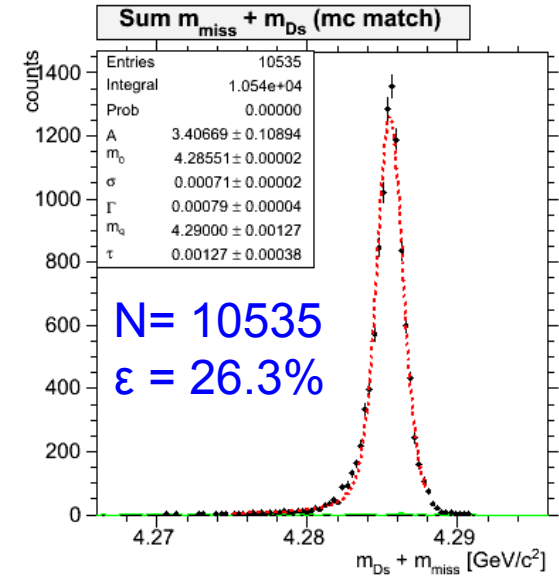
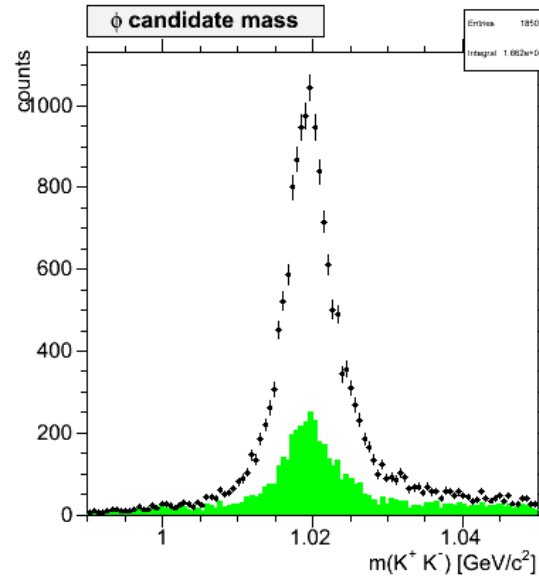
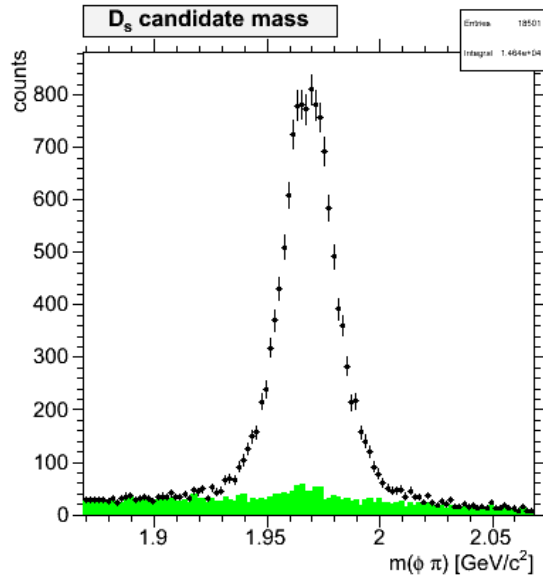
- signal with DISC (40k)
- signal worse DISC (40k)
- signal w/o DISC (40k)
- DPM with DISC (5.84M)
- DPM worse DISC (5.43M)
- DPM w/o DISC (5.94M)

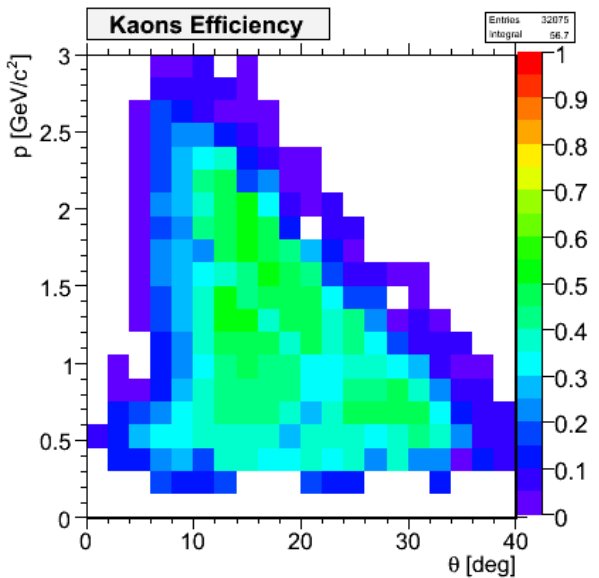
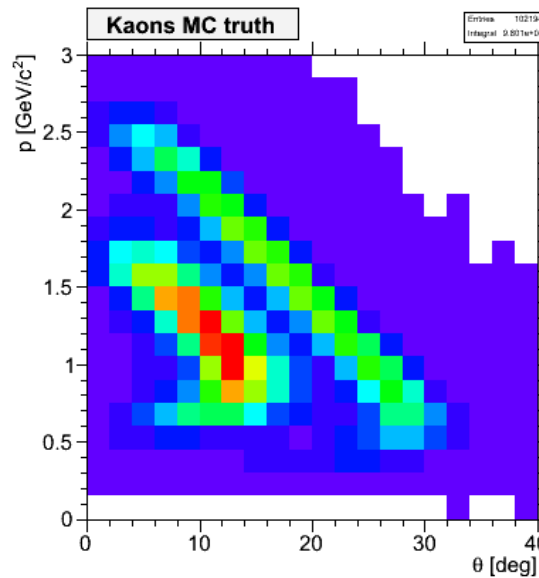
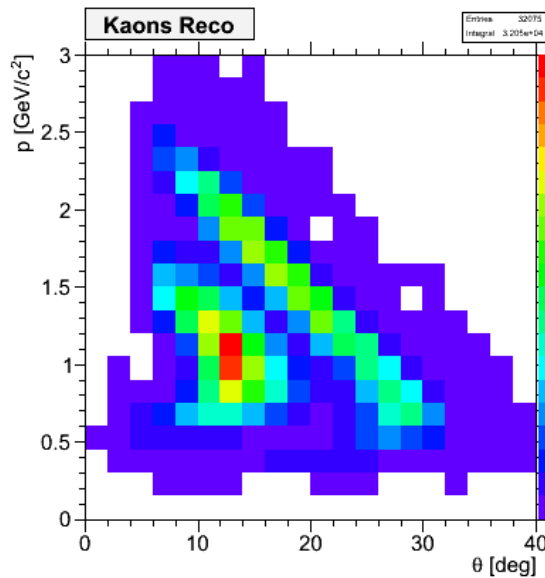
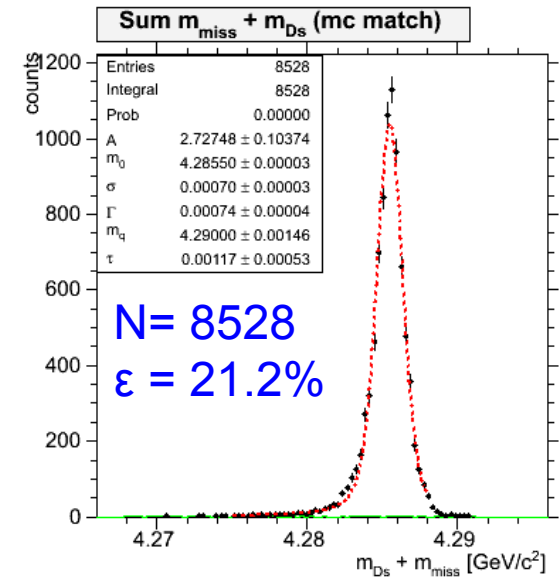
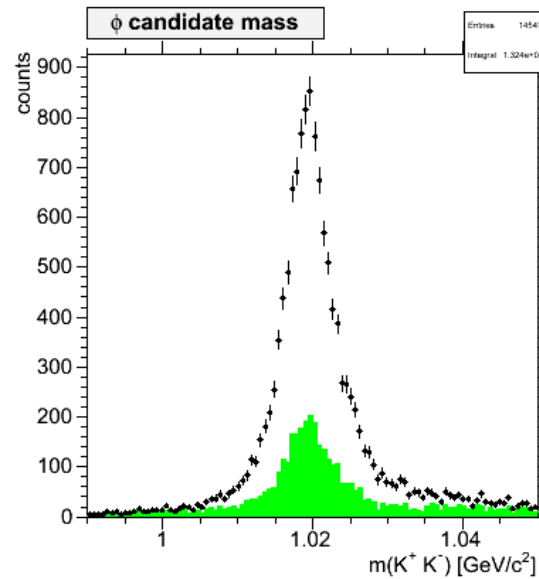
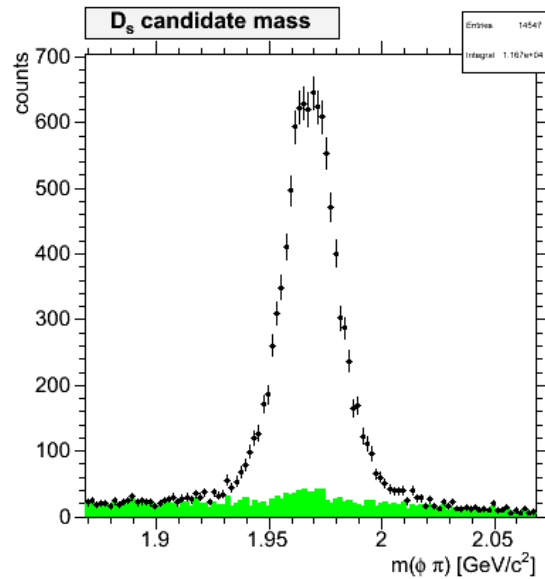
- **Signal events: 40k**
- **Background DPM**
  - with DISC: 5.84 M
  - worse DISC: 5.43 M
  - w/o DISC: 5.94 M
- Every combination of:
- **PID Selection**
  - veryLoose, loose, tight, veryTight
- **Detector option**
  - with DISC, w/o DISC, worse DISC (factor 2)

# Signal events

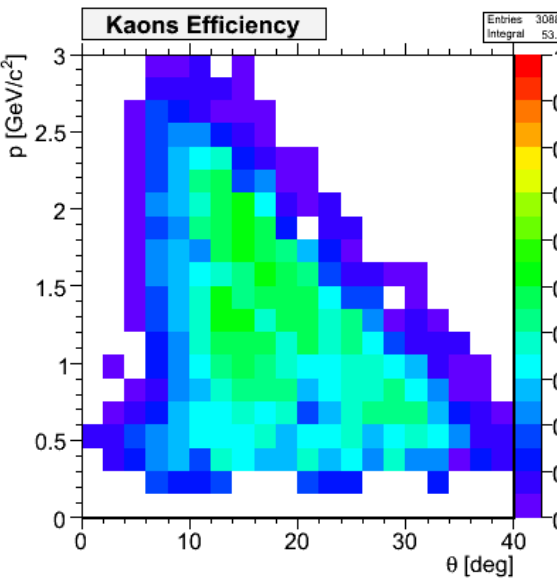
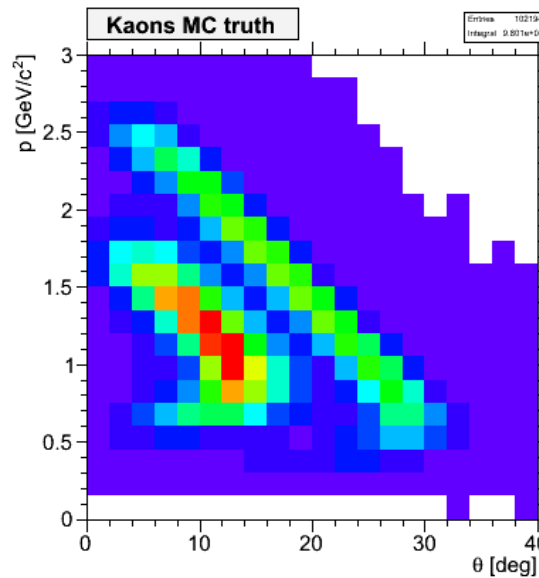
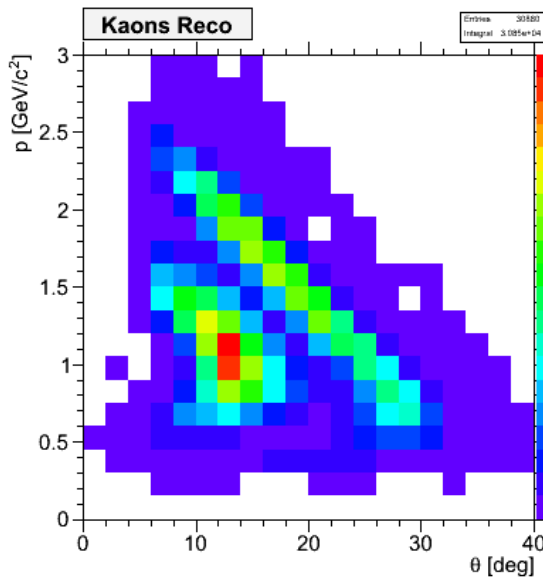
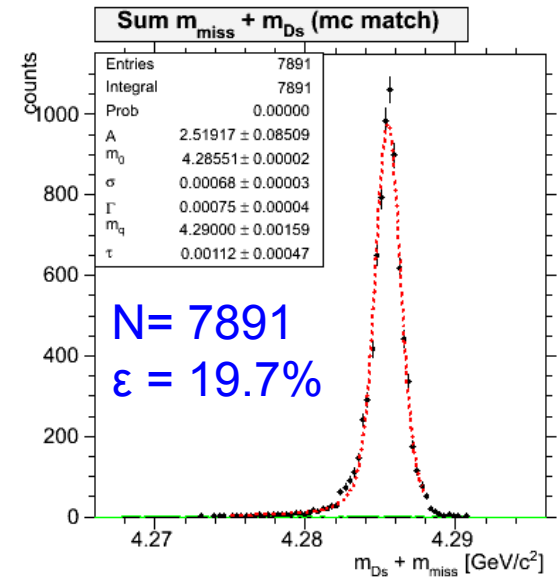
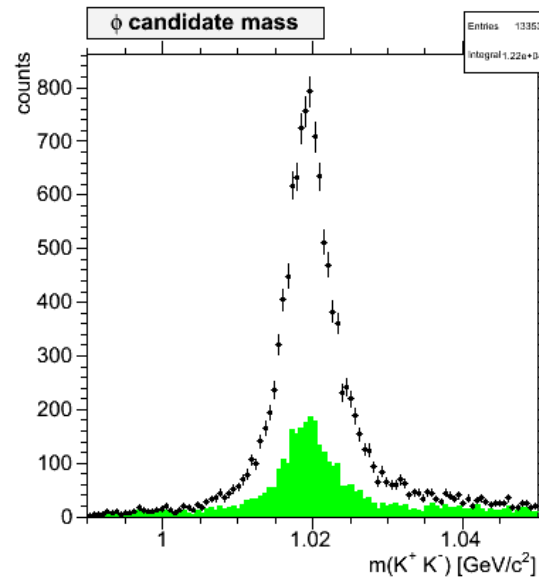
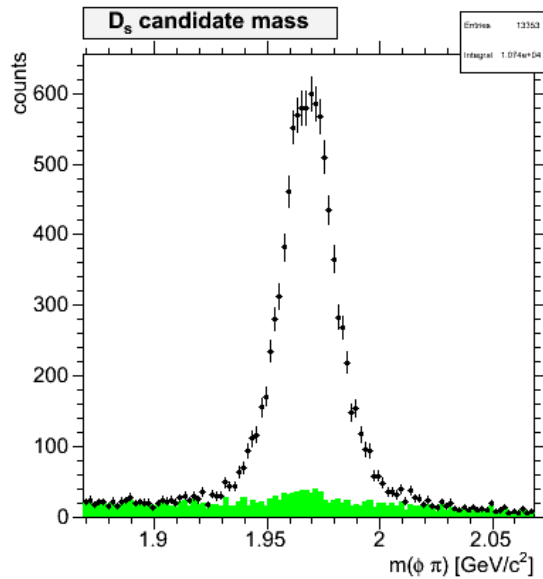
# Signal with DISC / K veryLoose





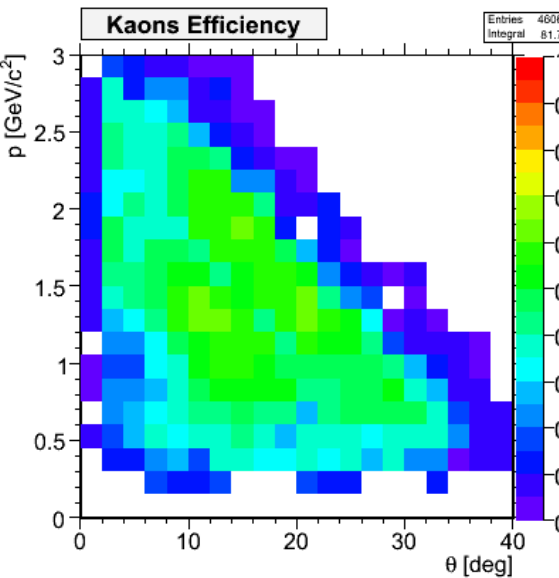
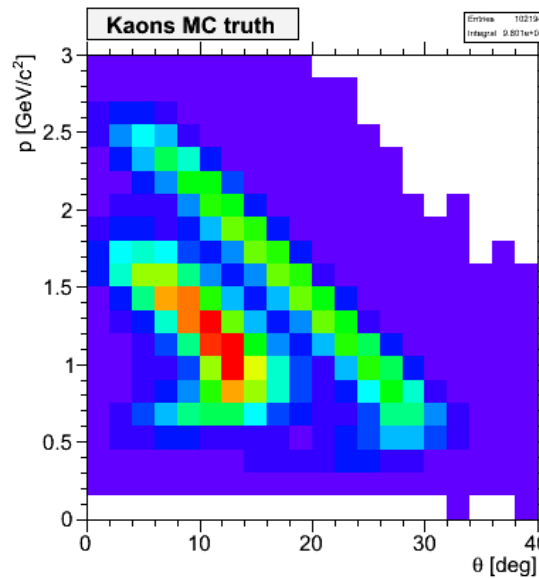
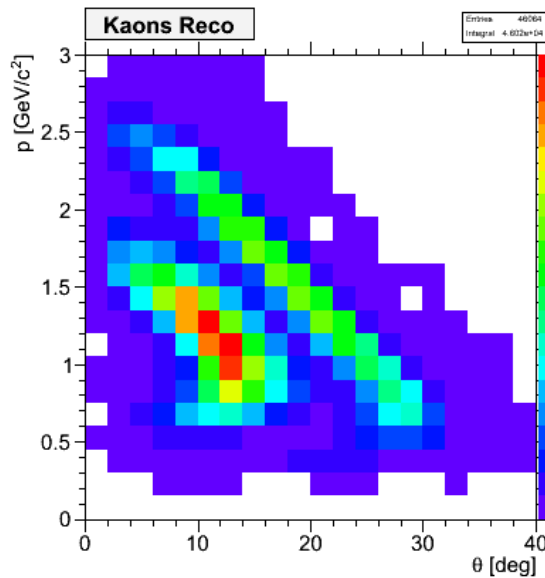
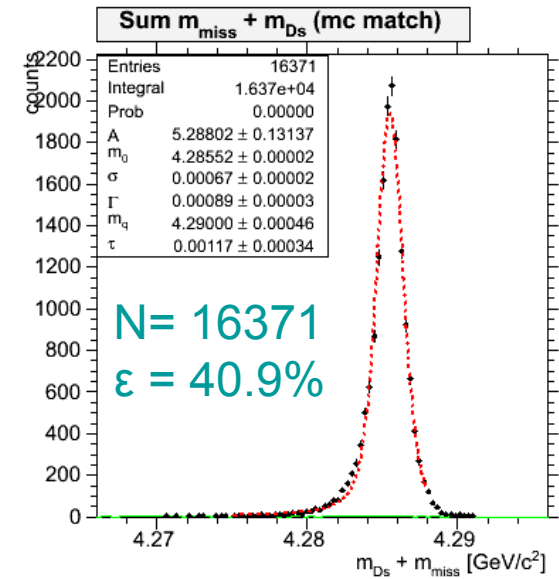
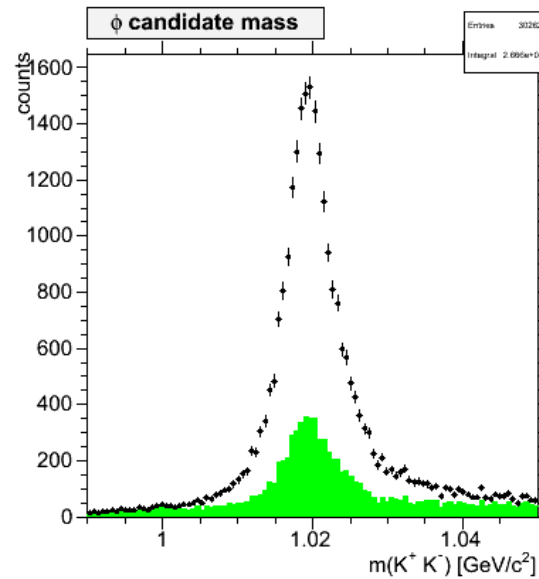
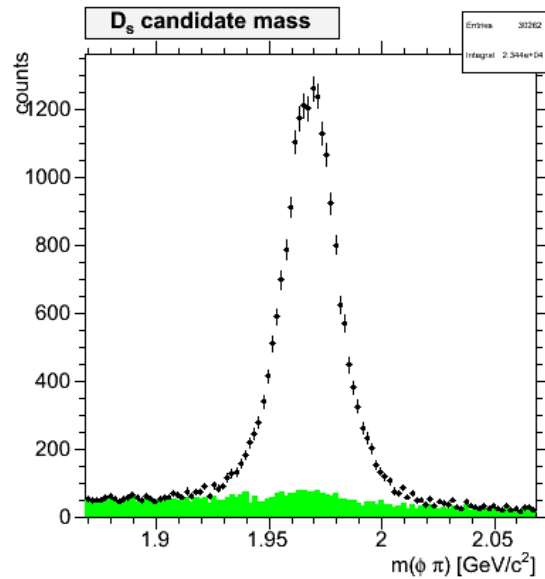


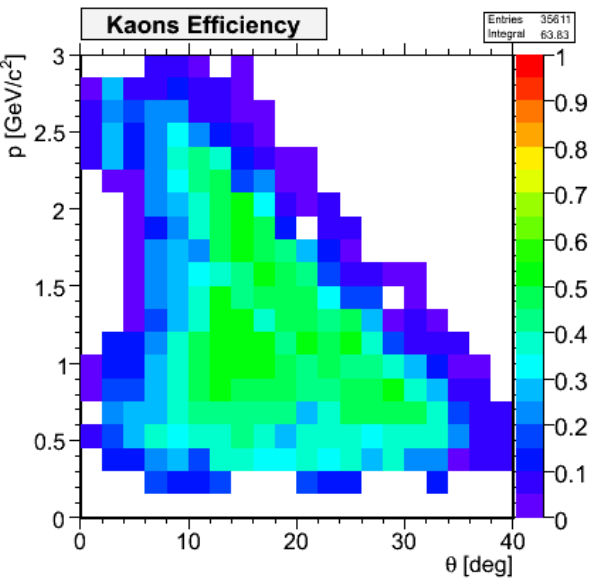
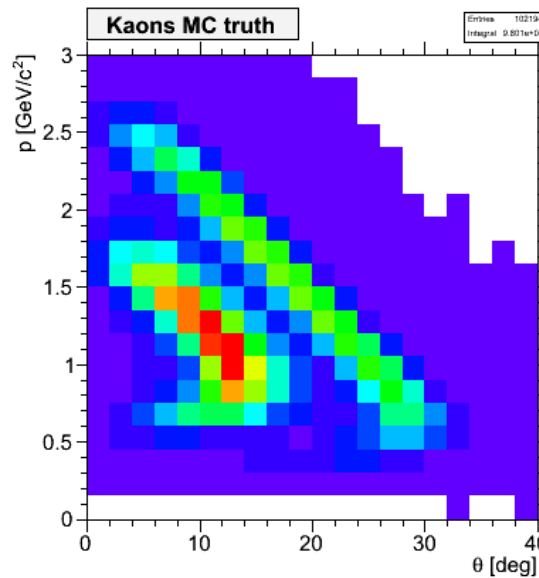
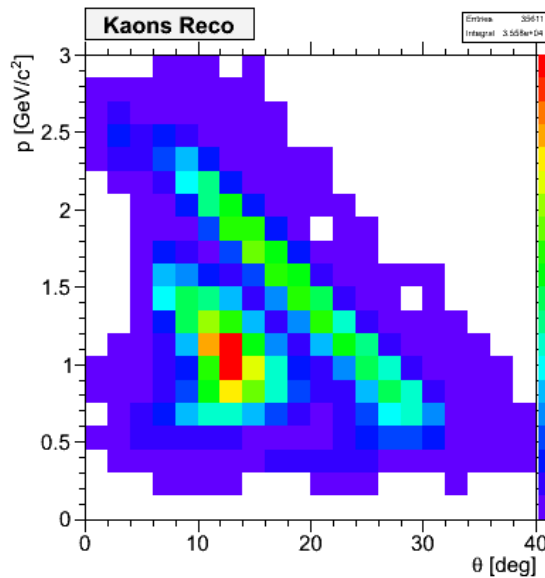
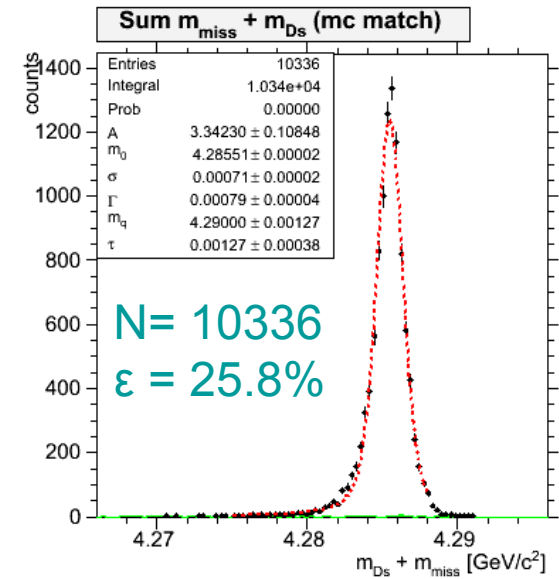
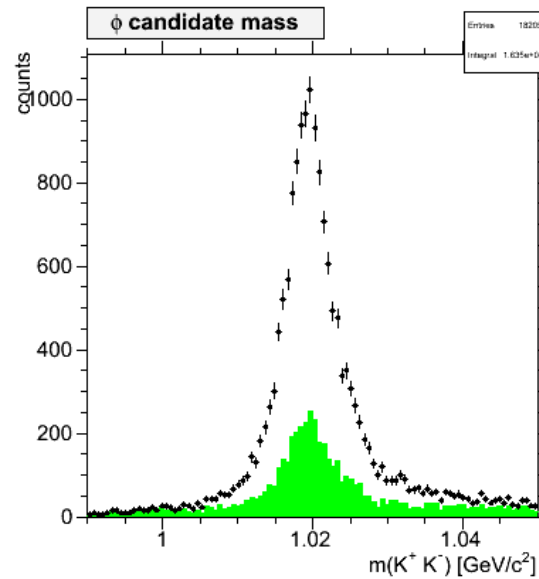
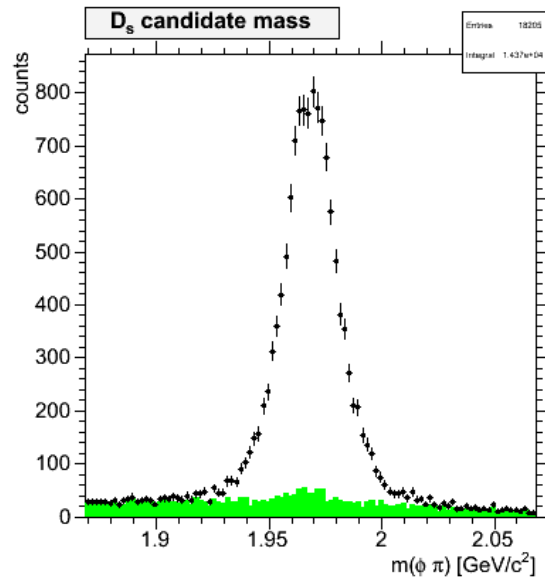
# Signal with DISC / K veryTight



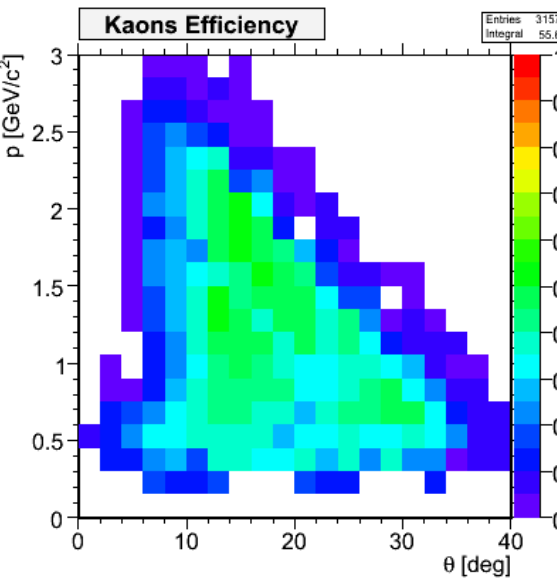
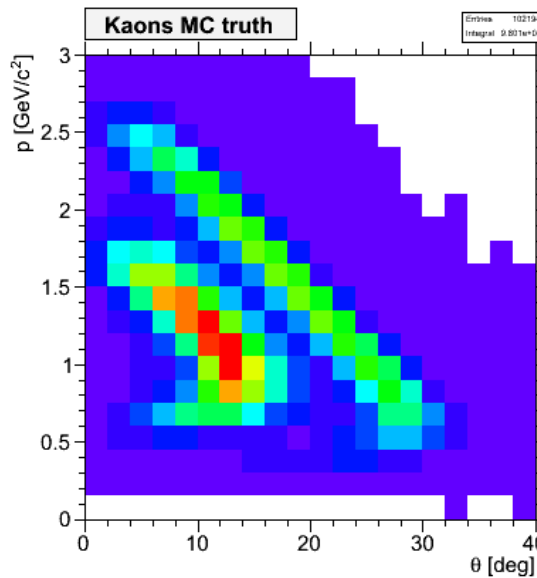
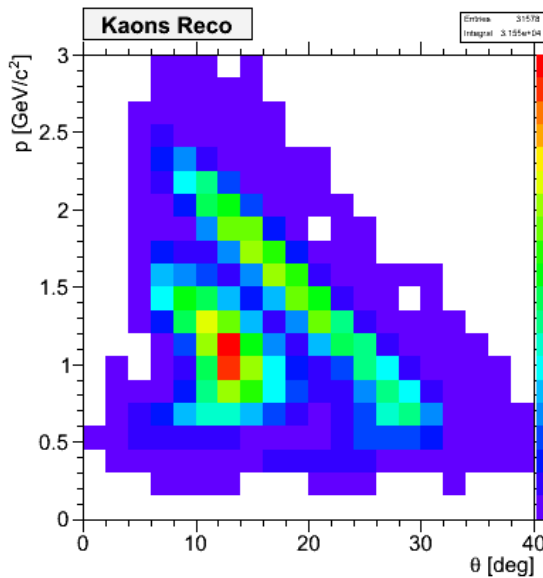
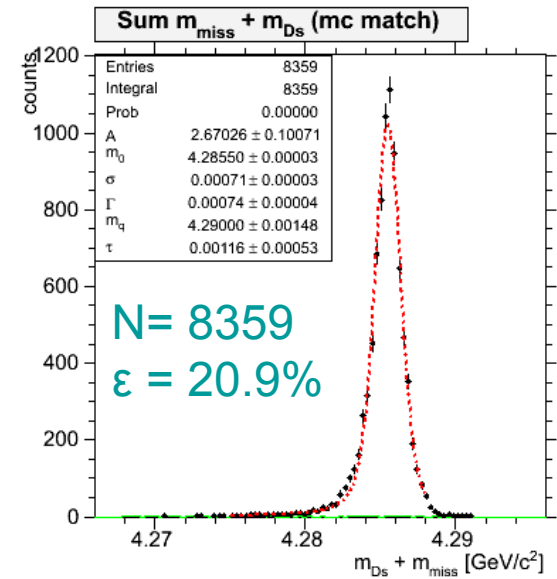
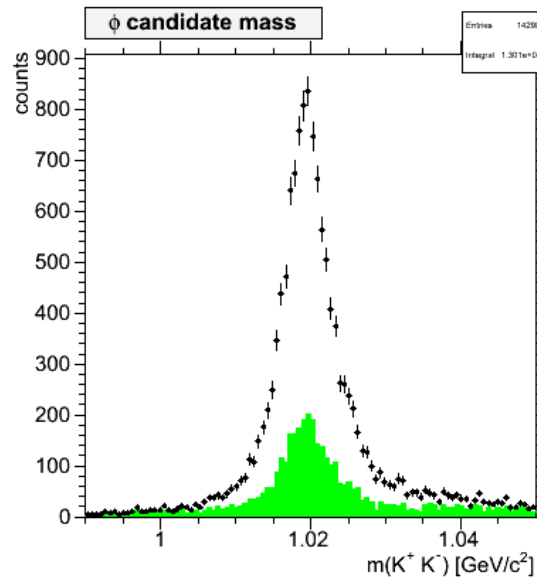
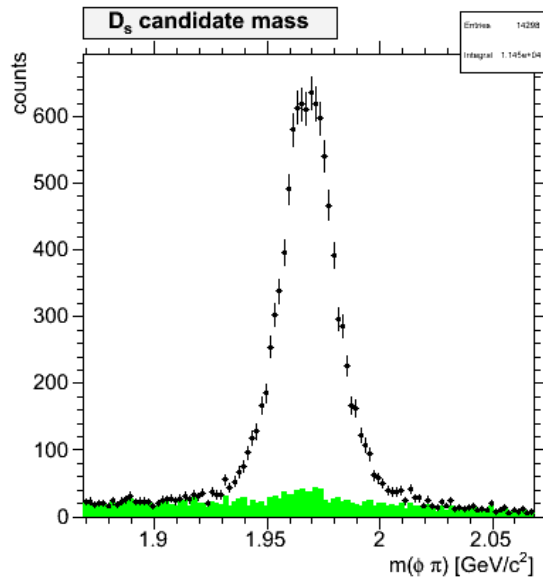


# Signal with worse DISC / K veryLoose

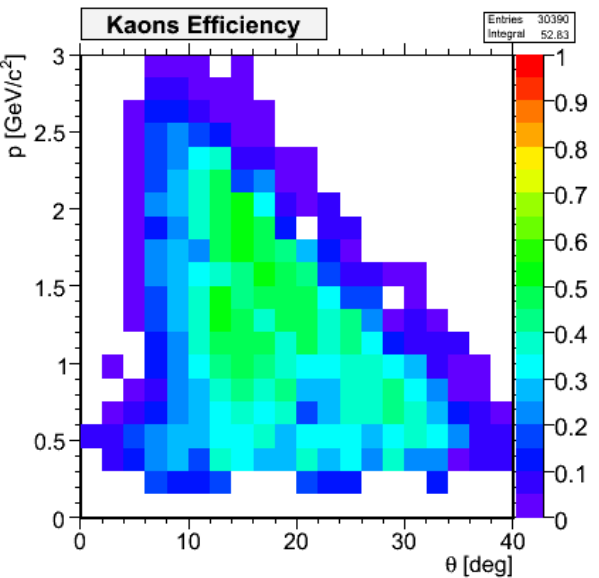
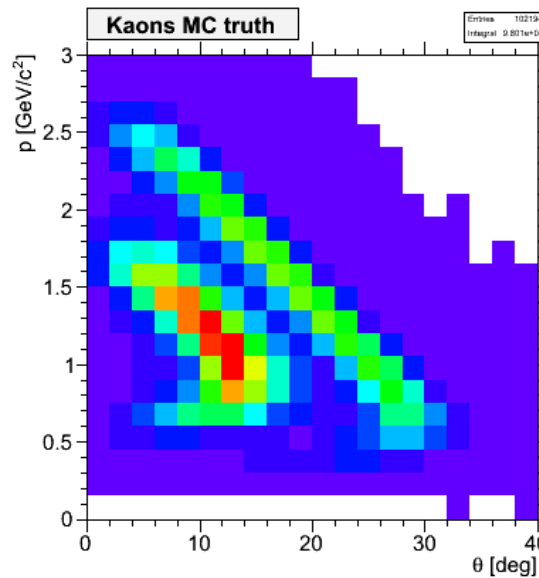
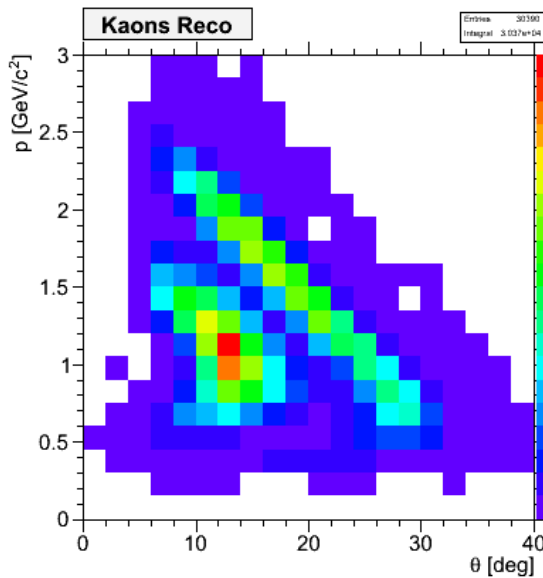
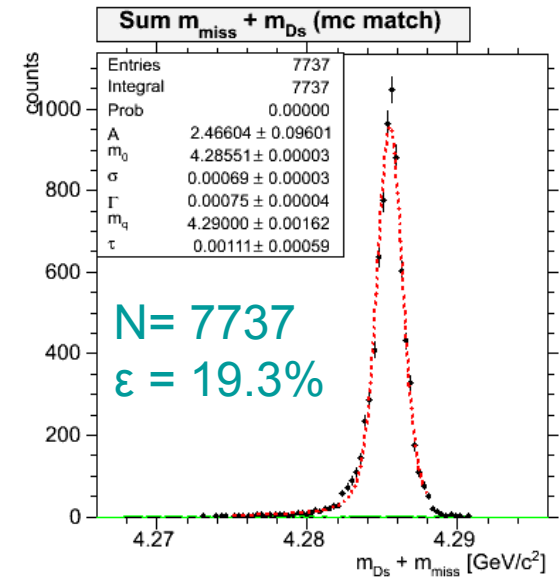
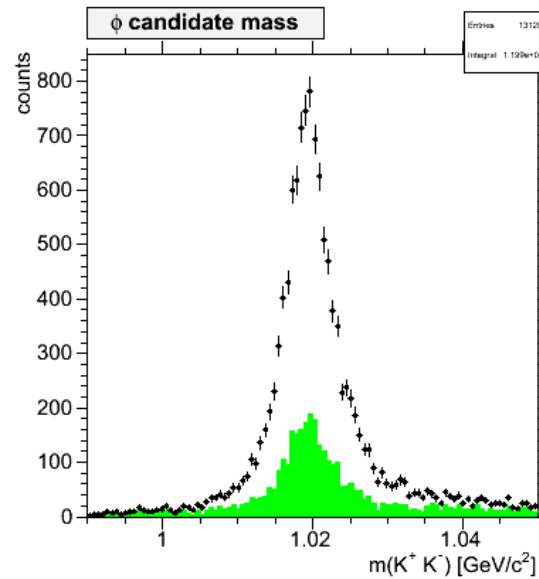
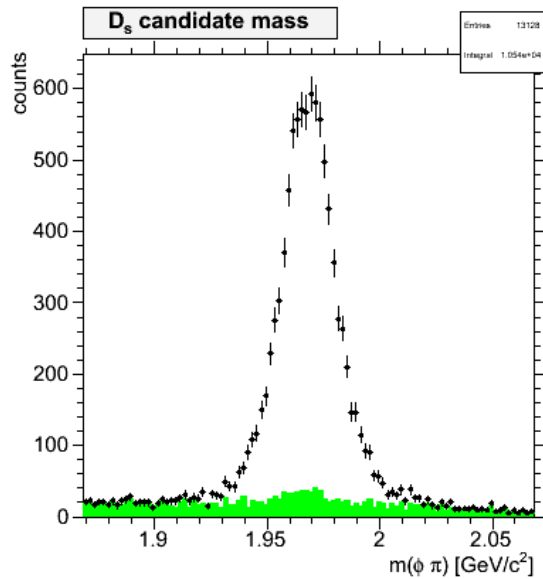


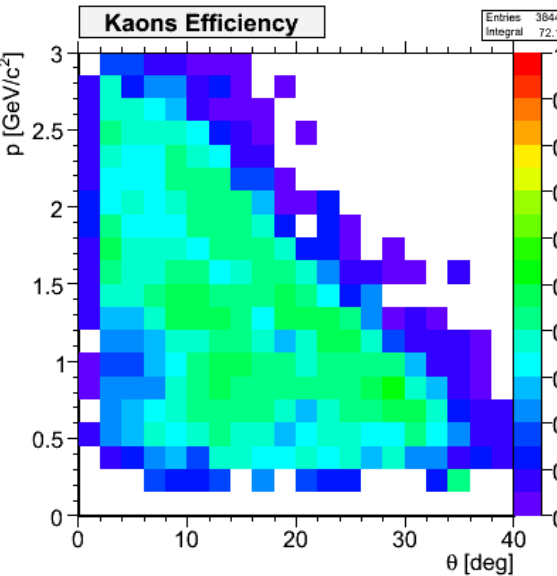
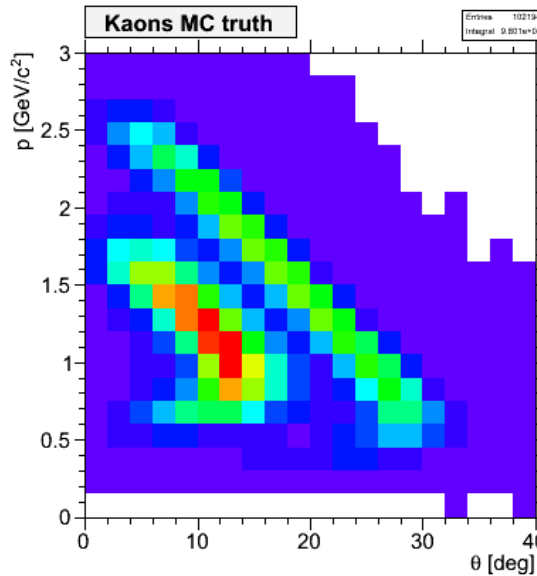
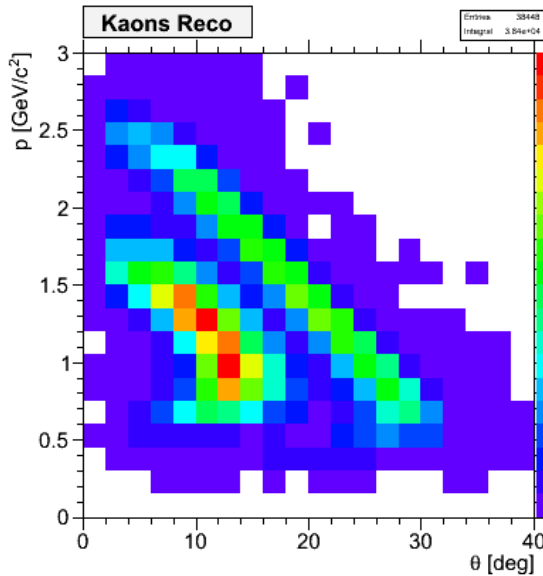
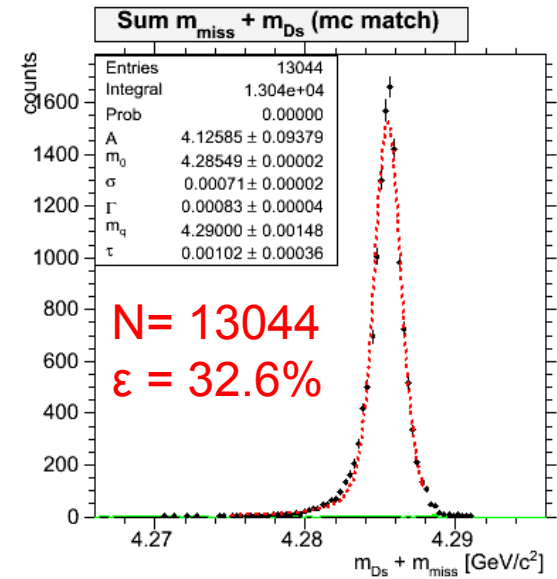
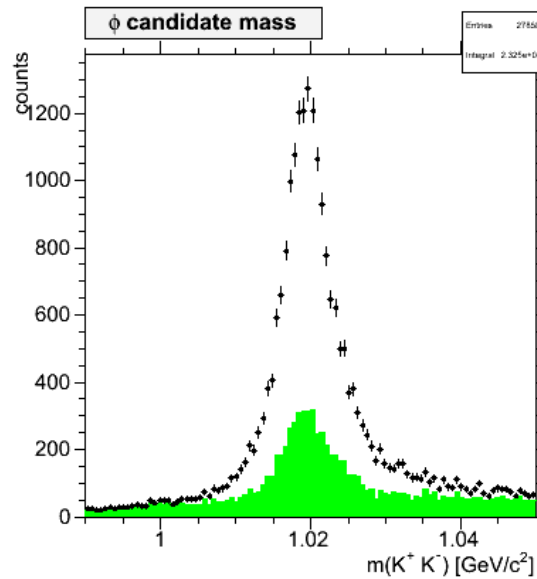
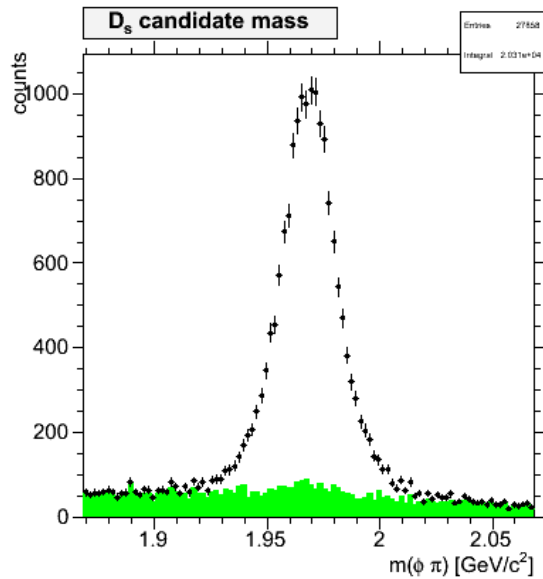


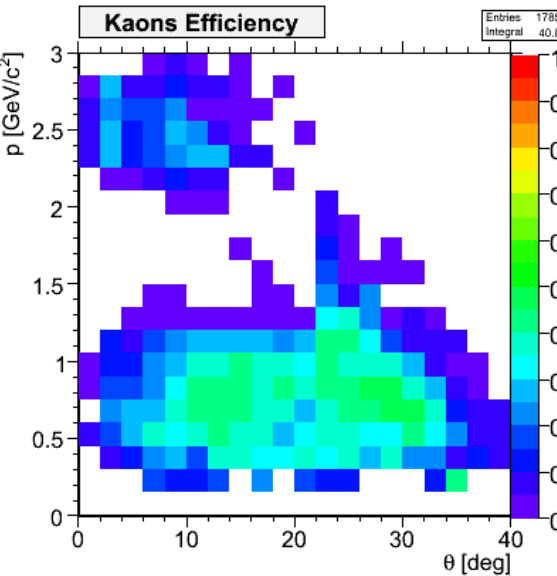
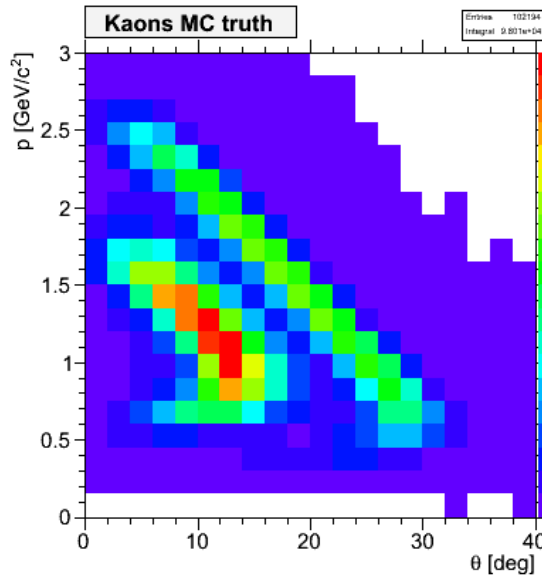
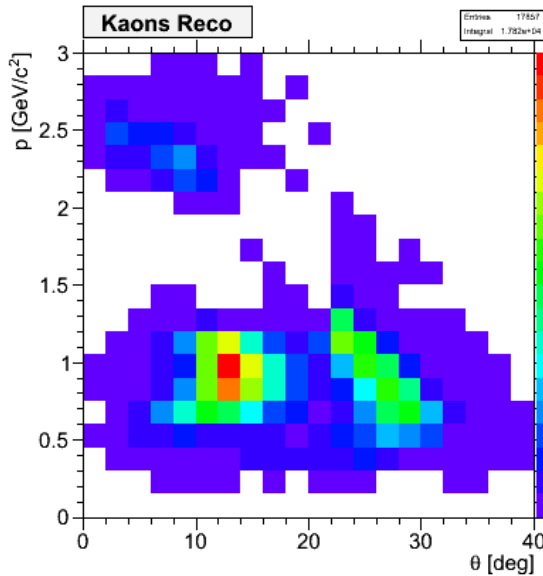
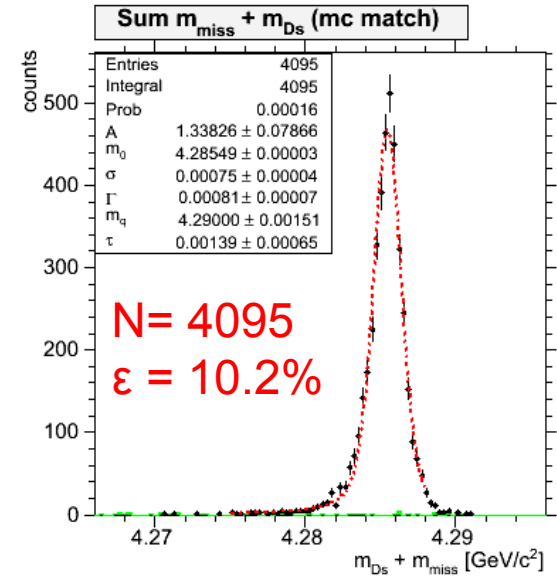
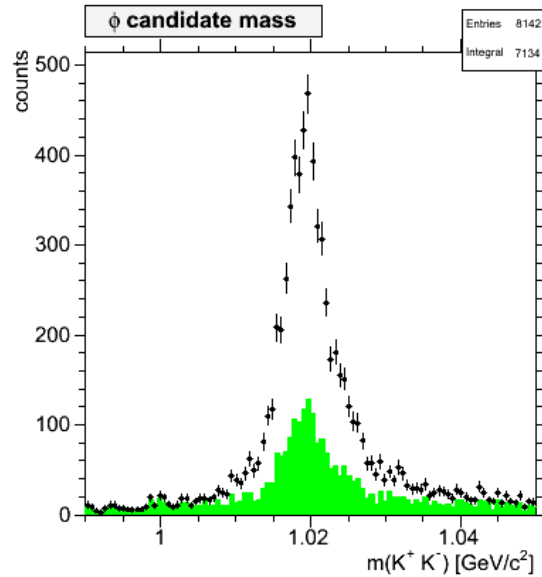
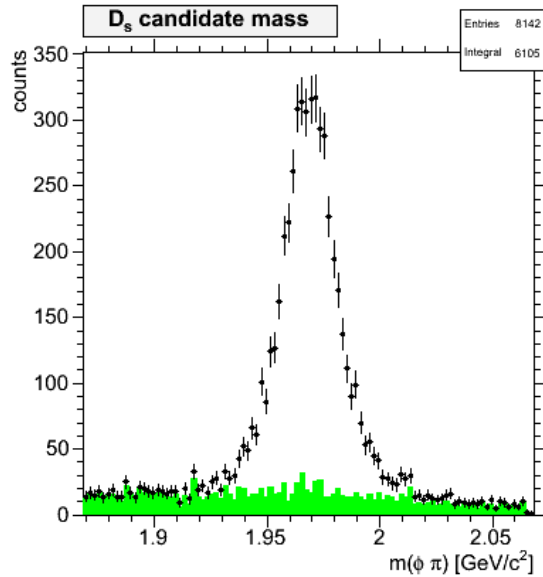
# Signal with worse DISC / K Tight

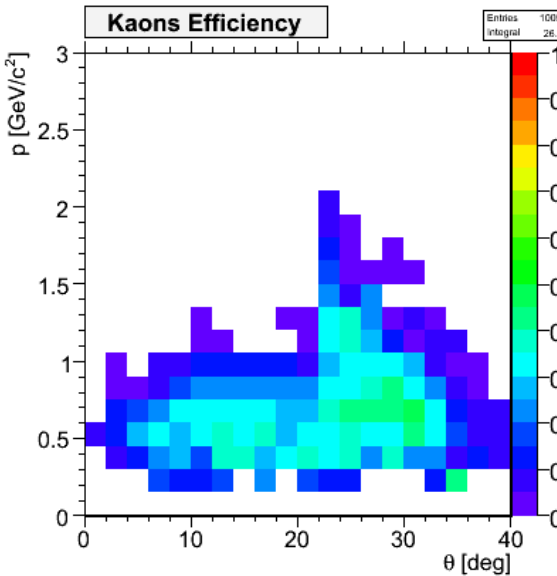
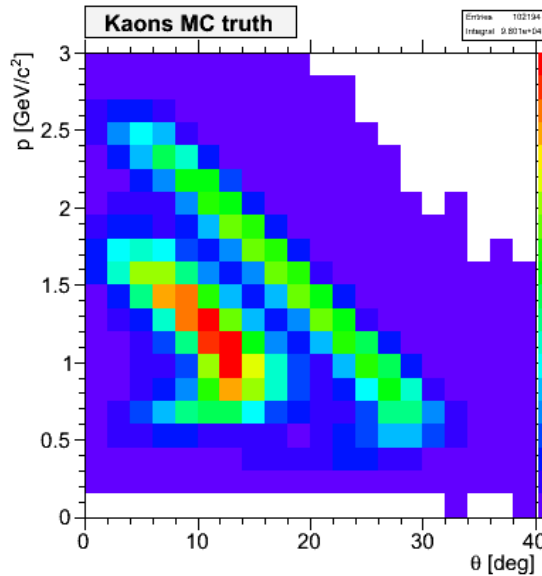
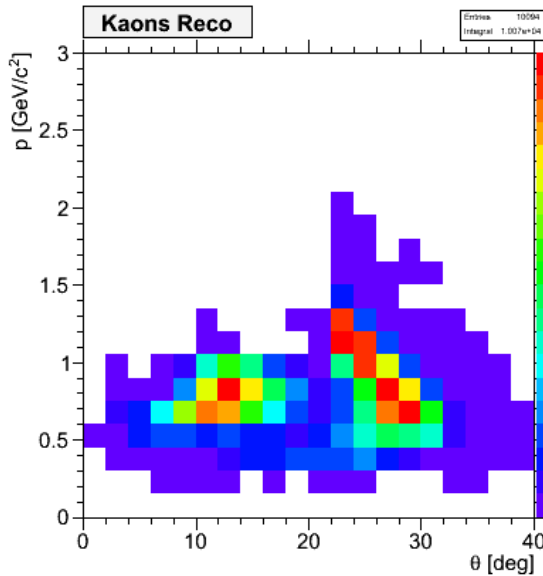
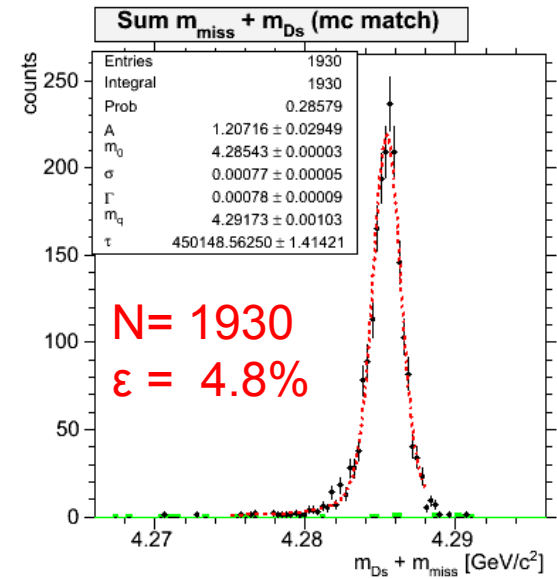
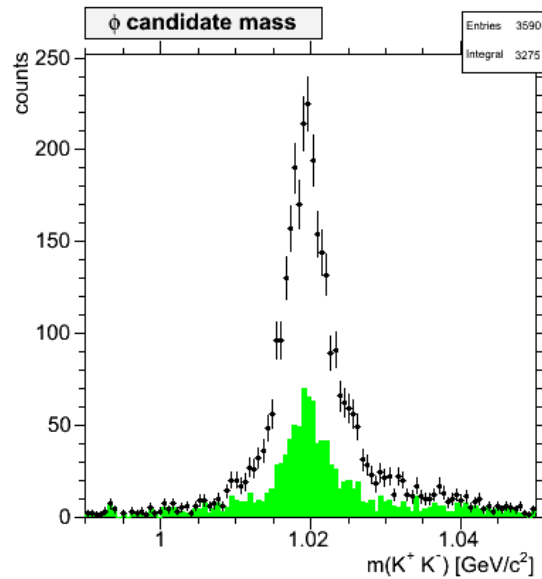
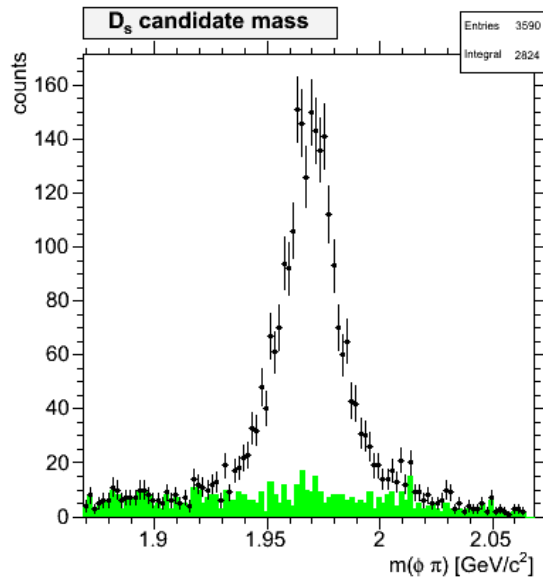


# Signal with worse DISC / K veryTight

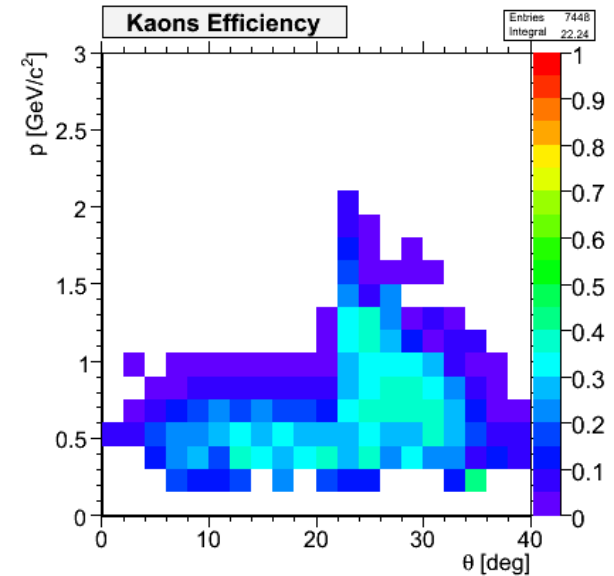
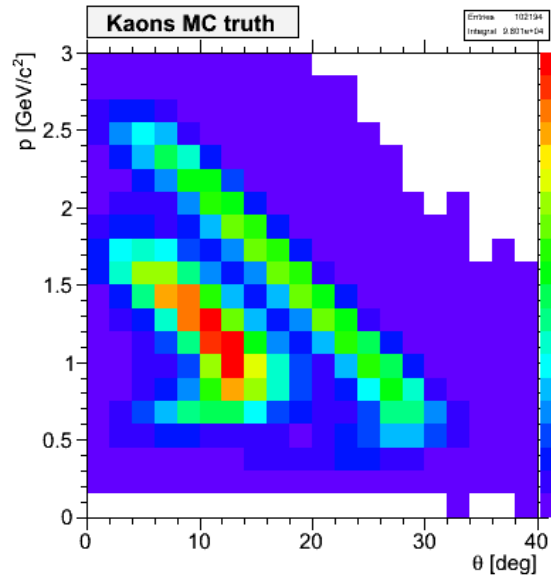
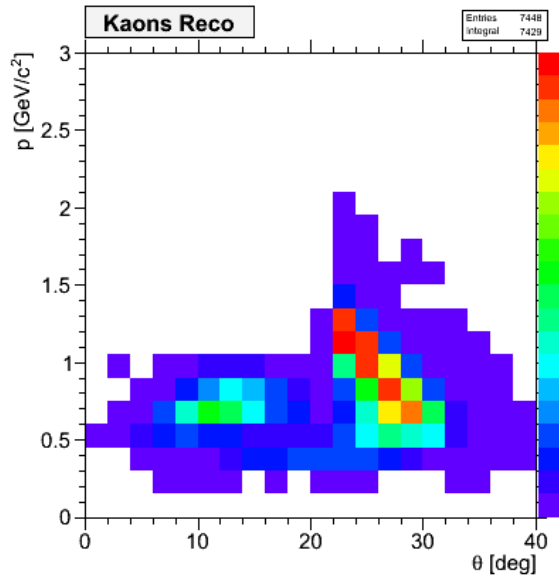
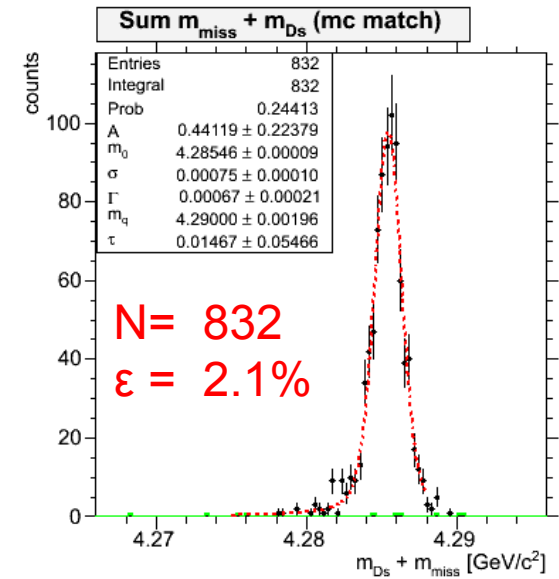
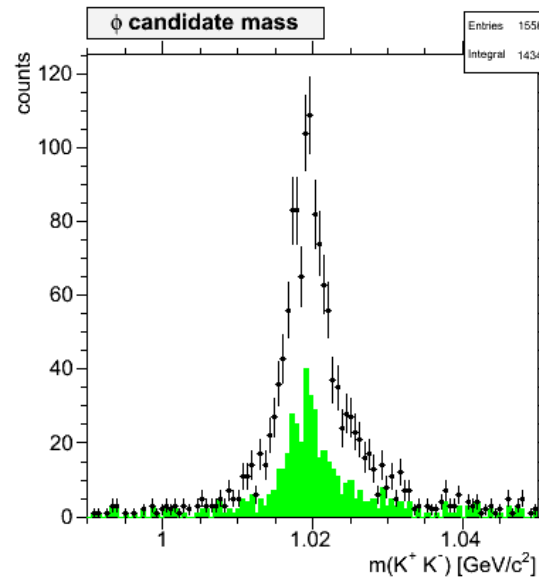
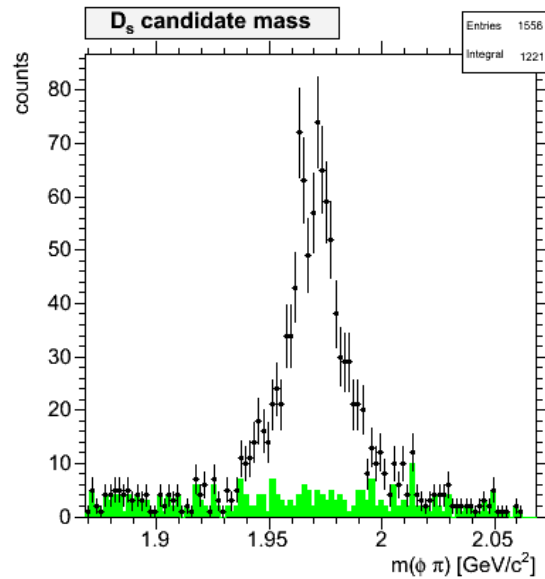






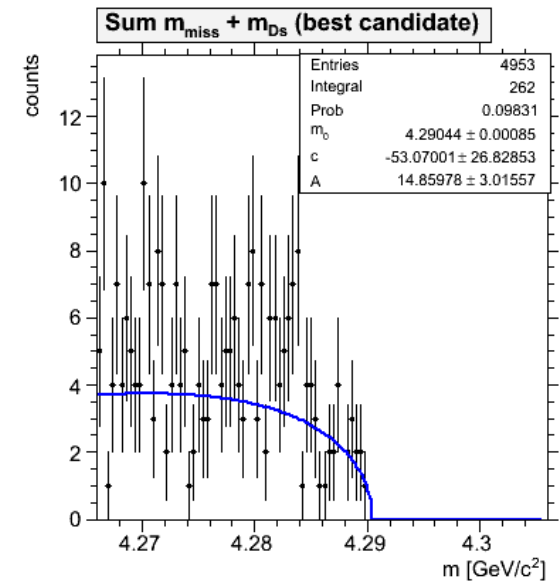
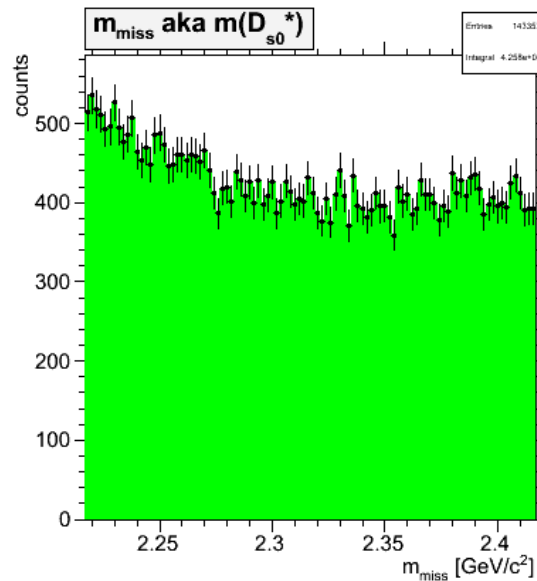
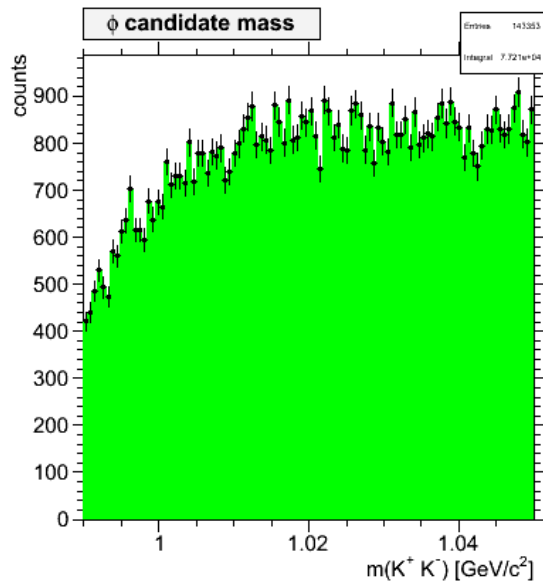
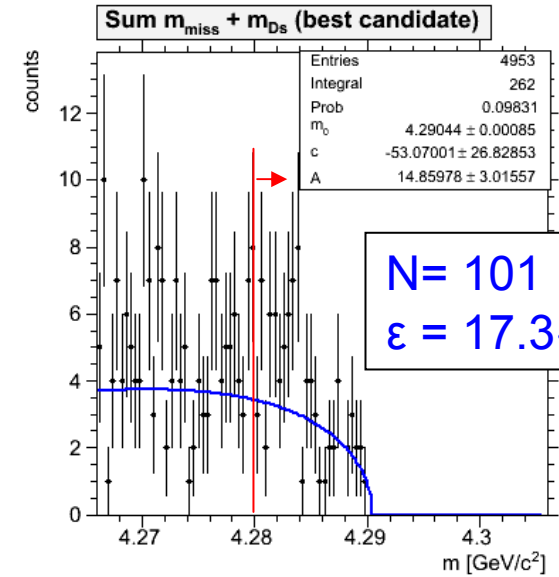
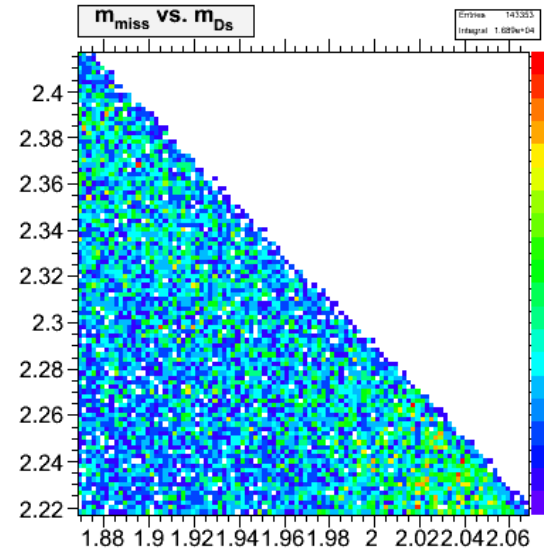
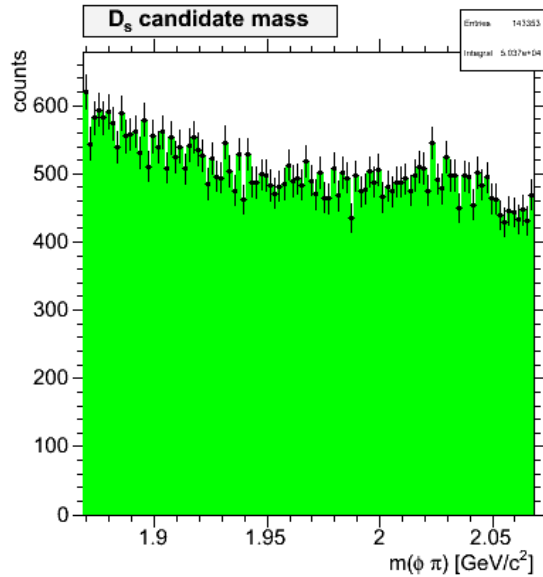


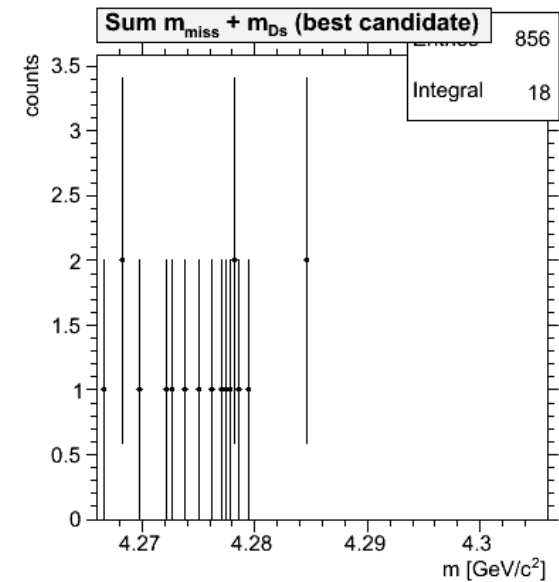
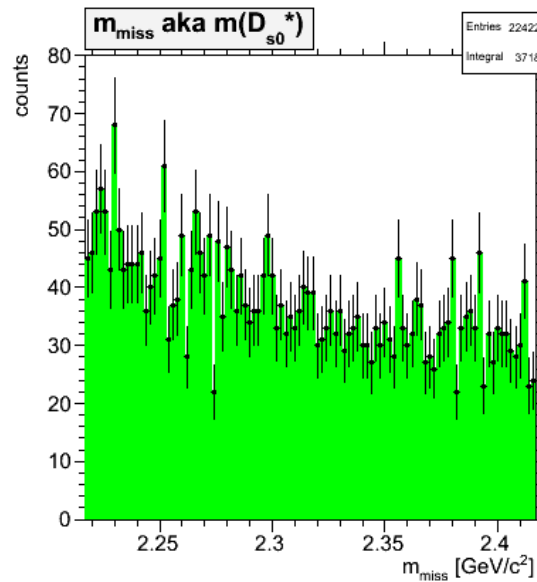
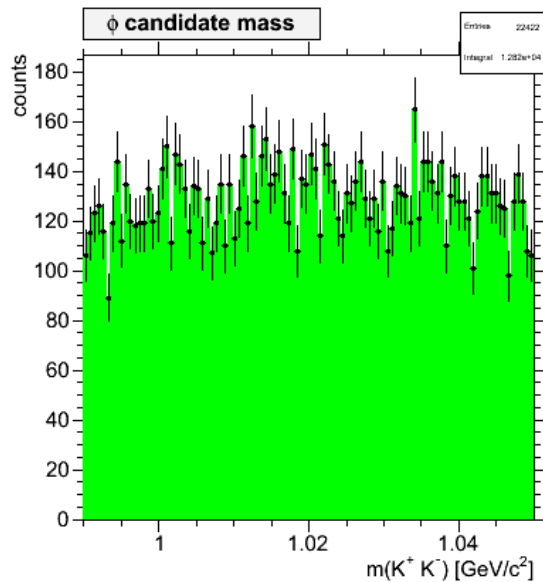
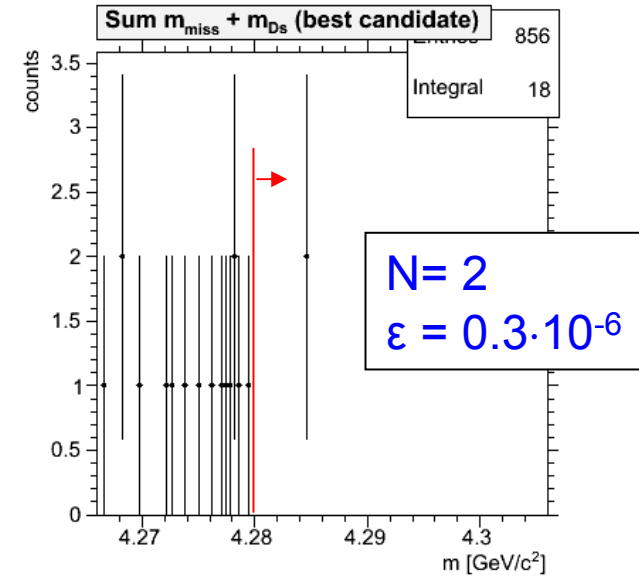
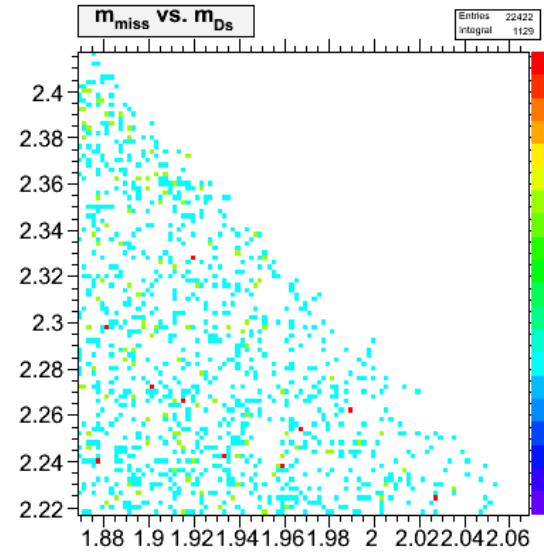
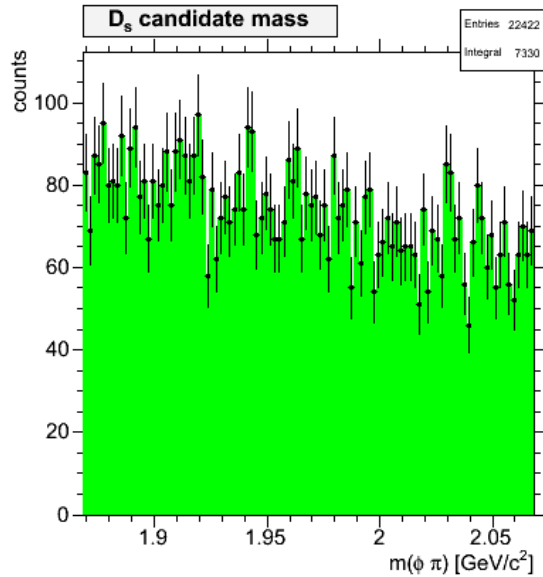
# Signal w/o DISC / K veryTight

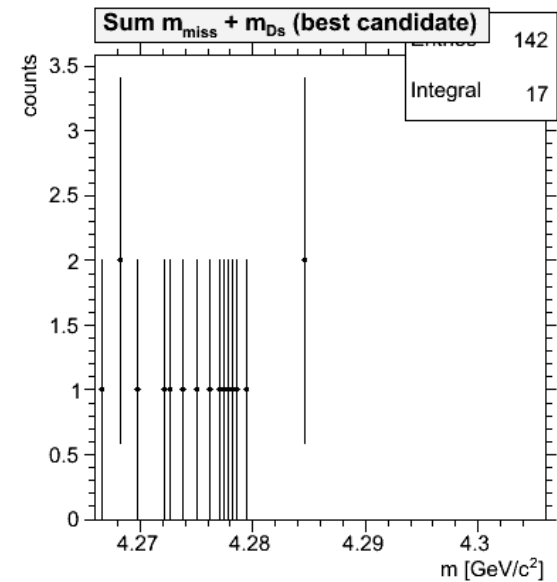
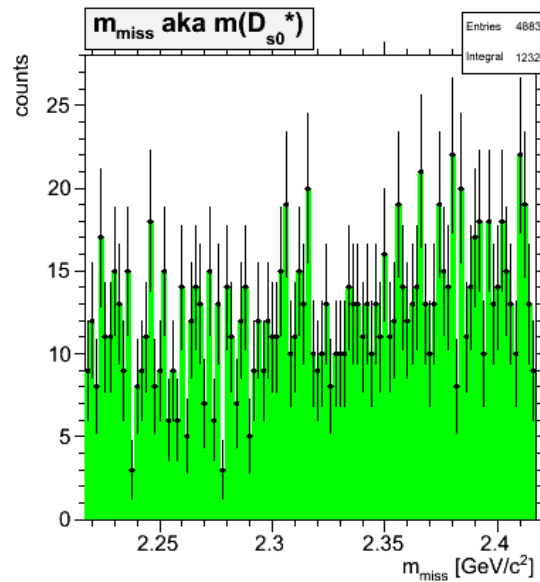
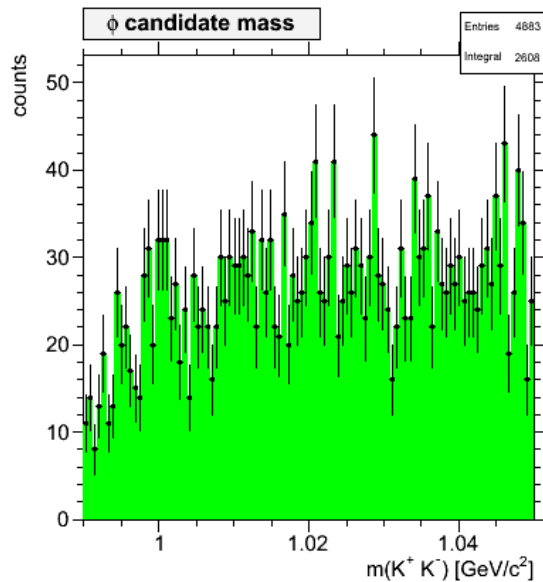
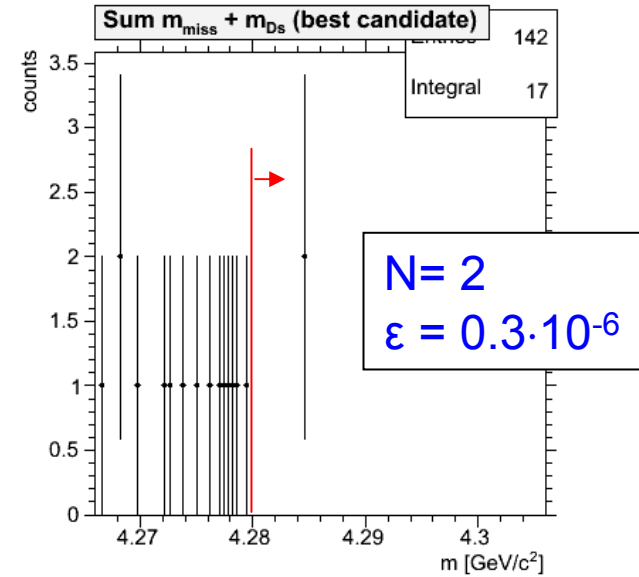
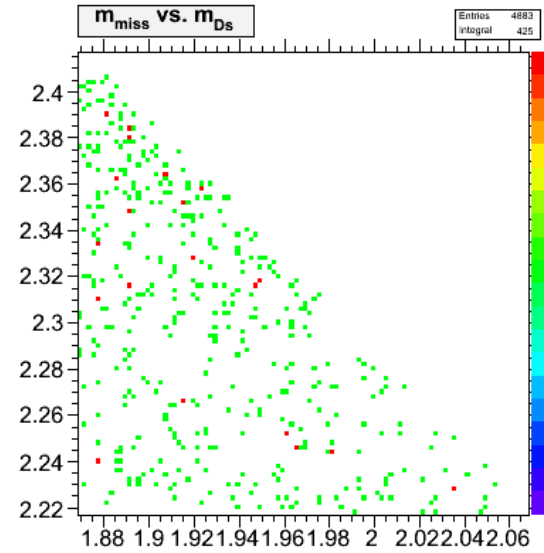
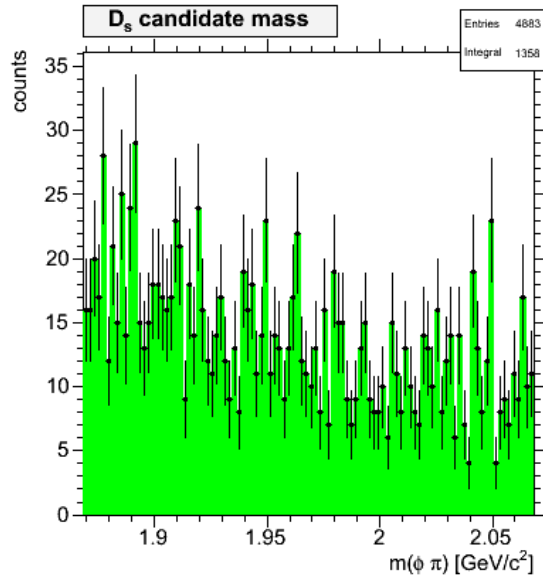




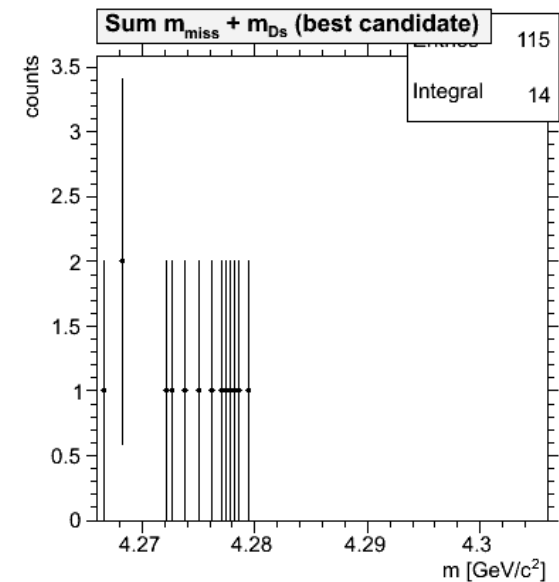
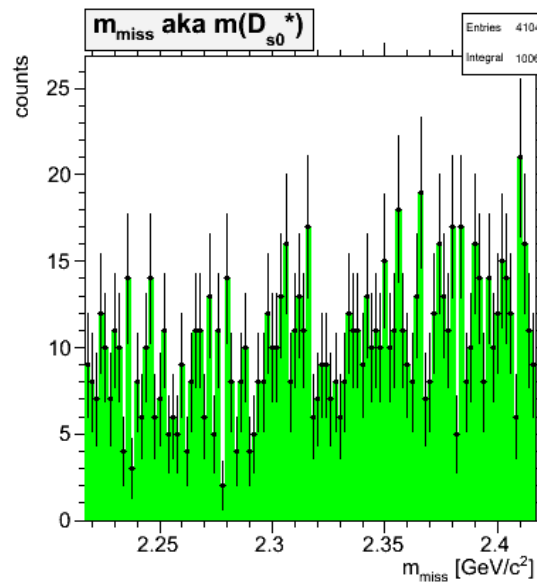
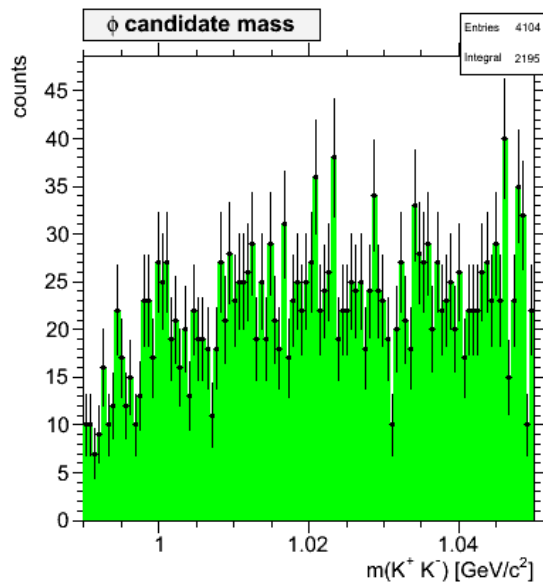
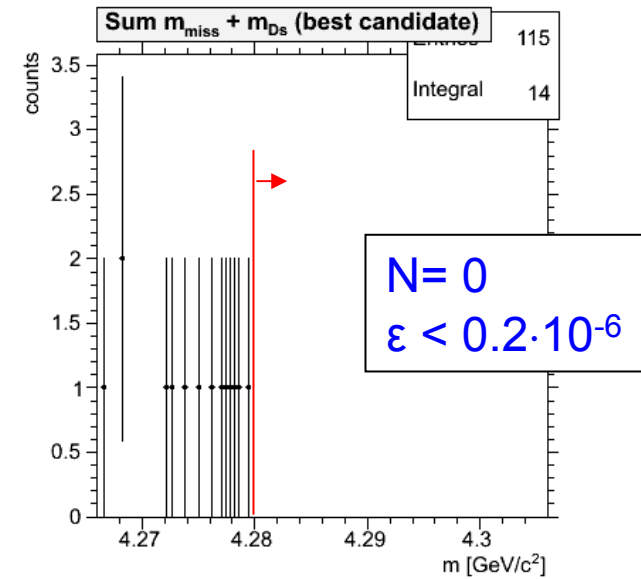
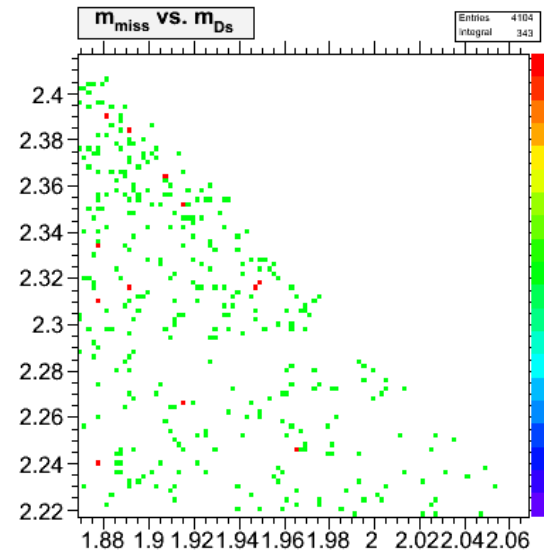
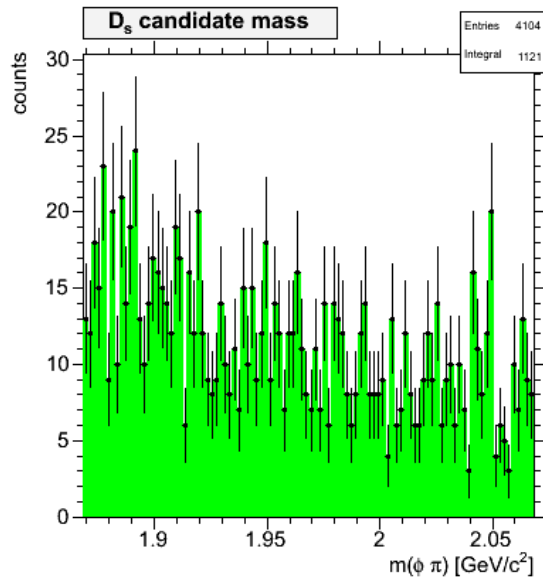
# DPM bkg events

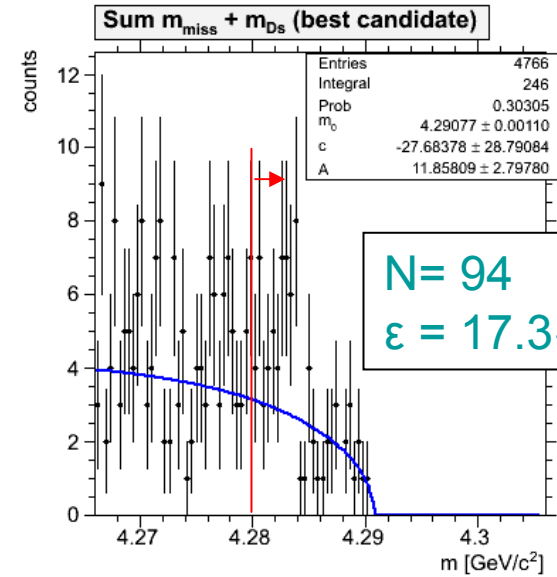
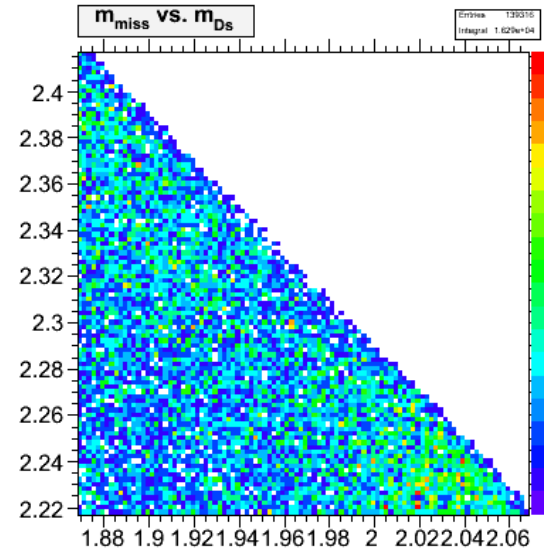
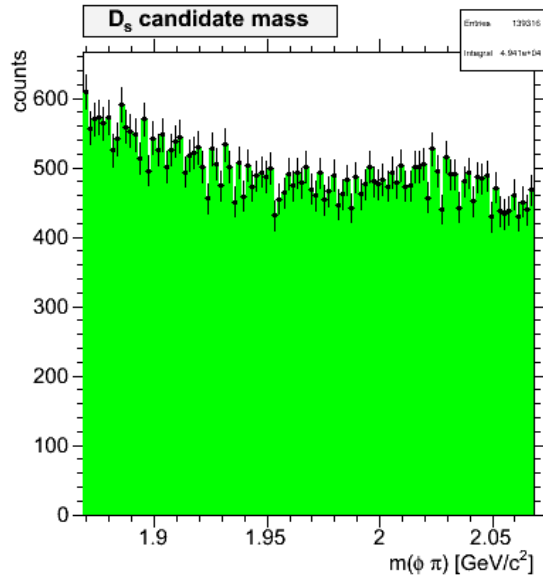




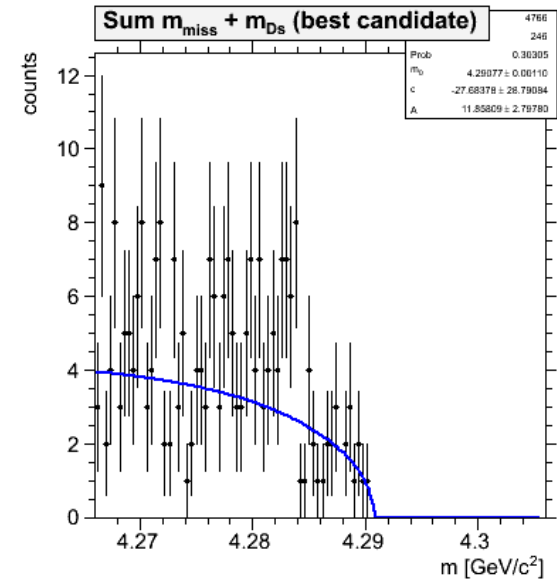
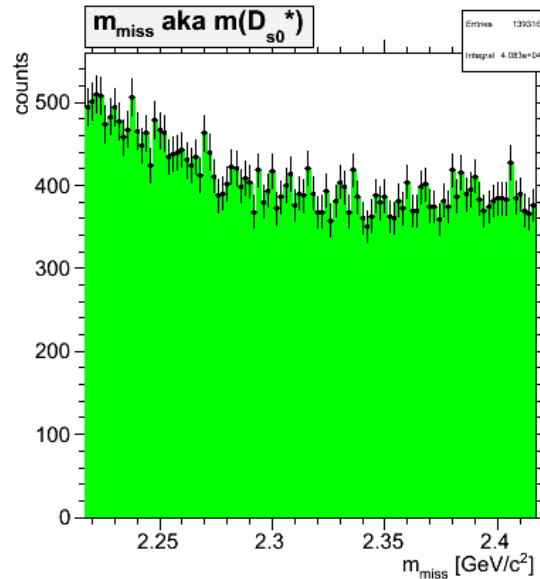
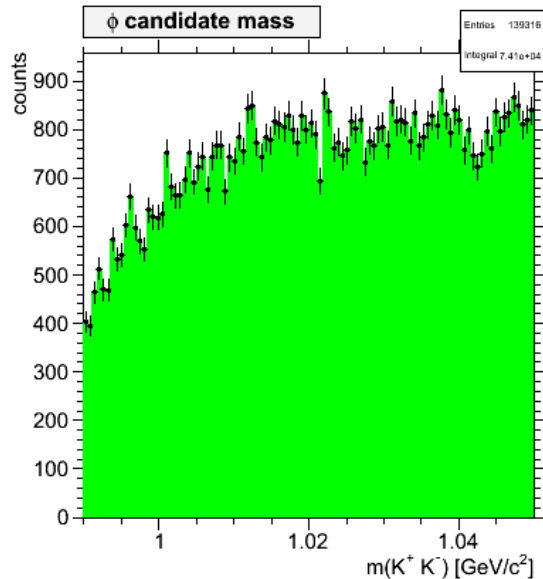


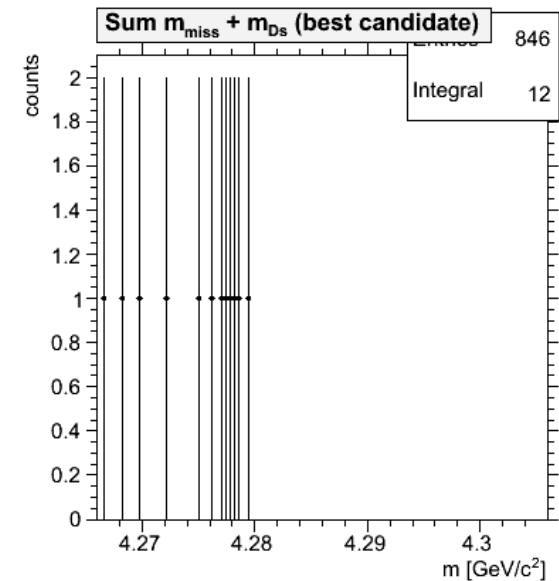
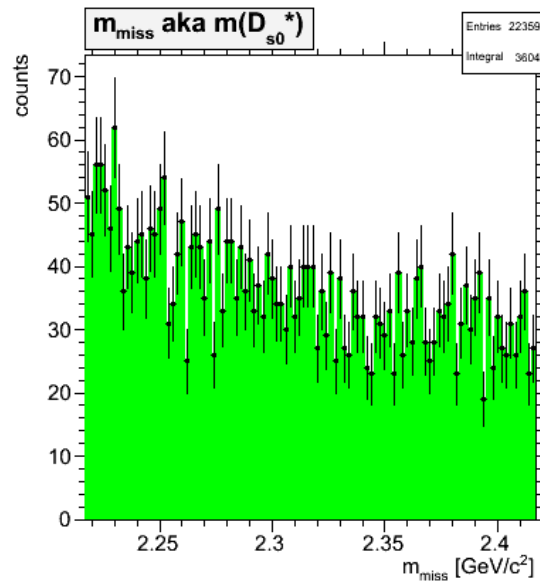
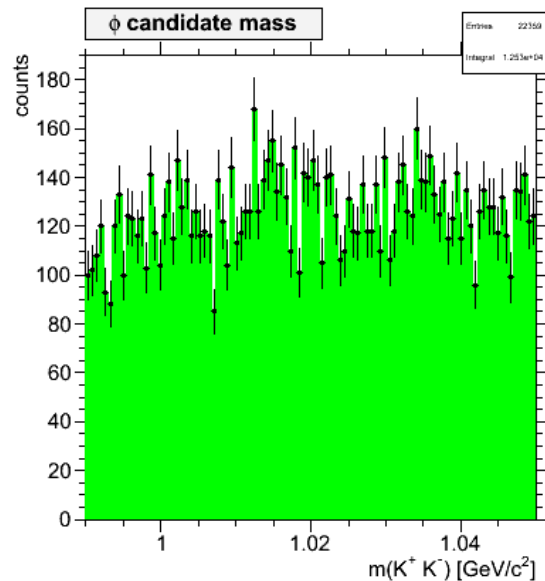
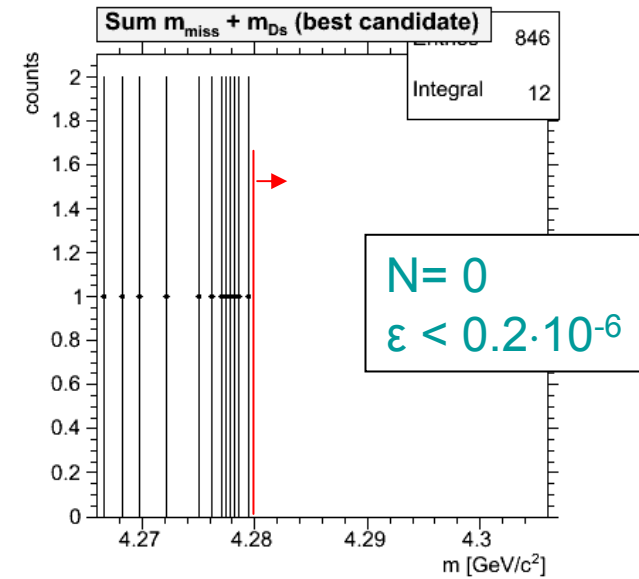
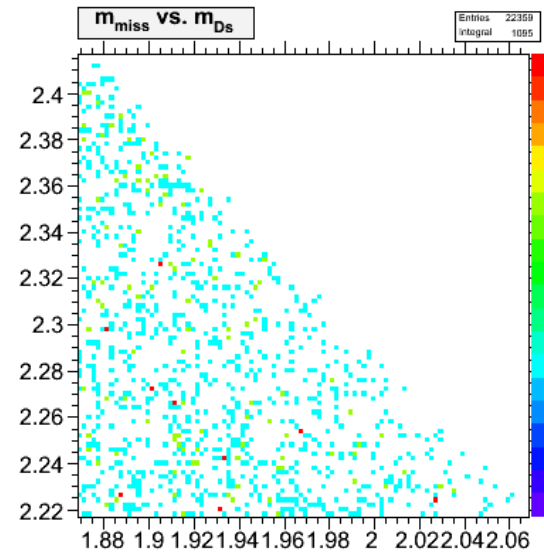
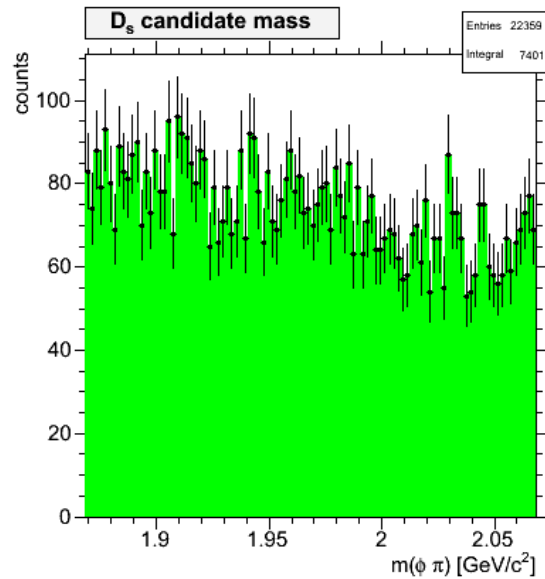
# DPM bkg with DISC / K veryTight



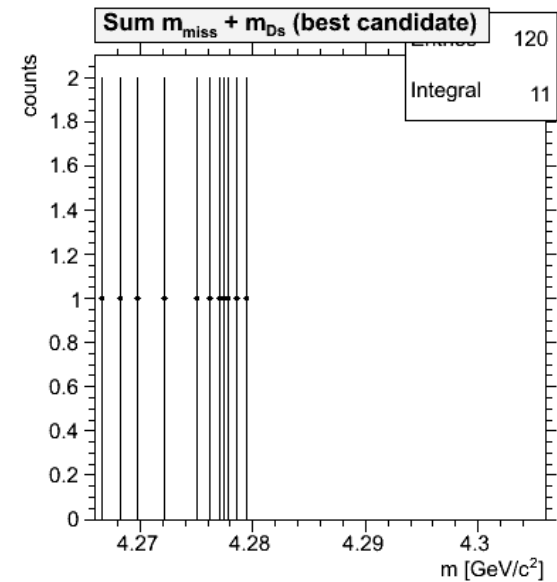
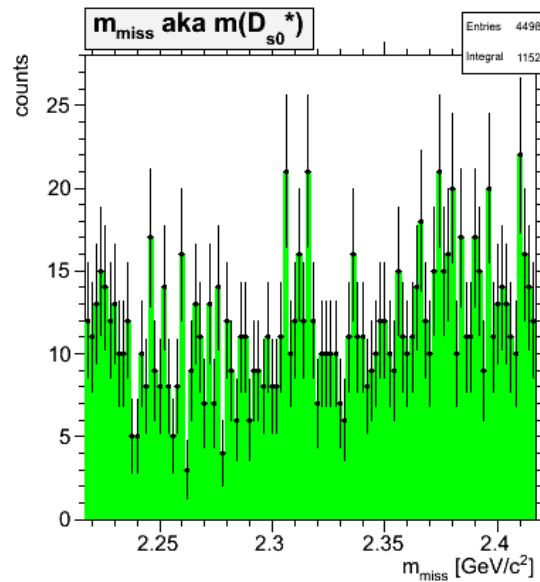
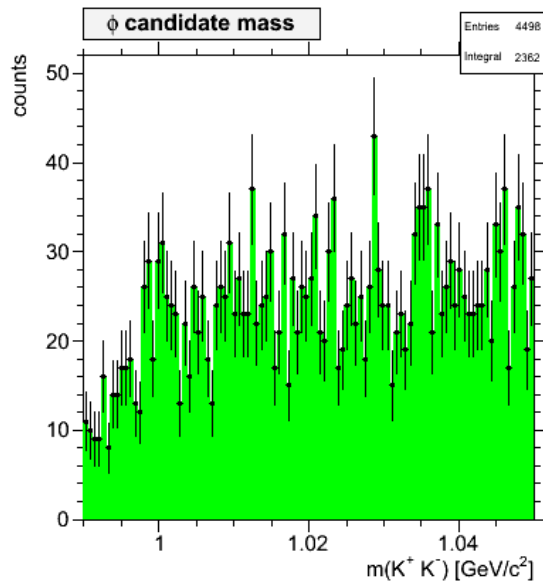
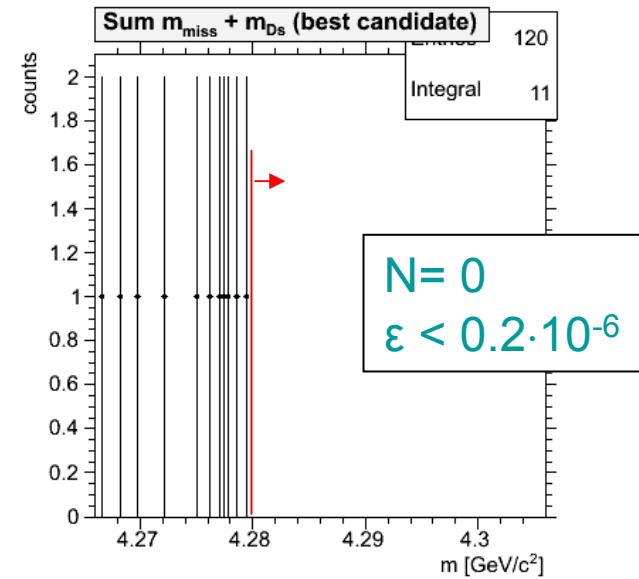
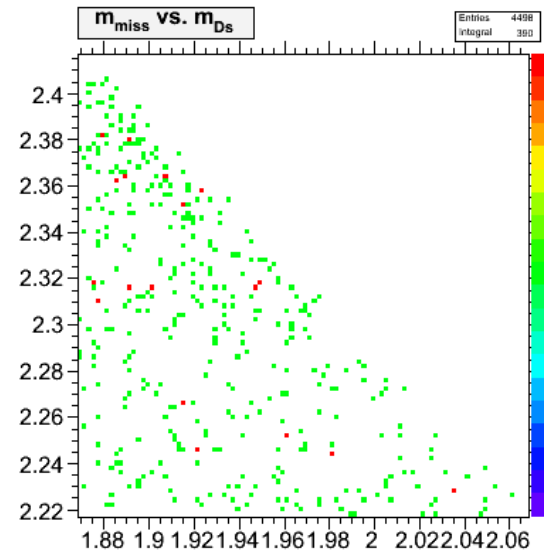
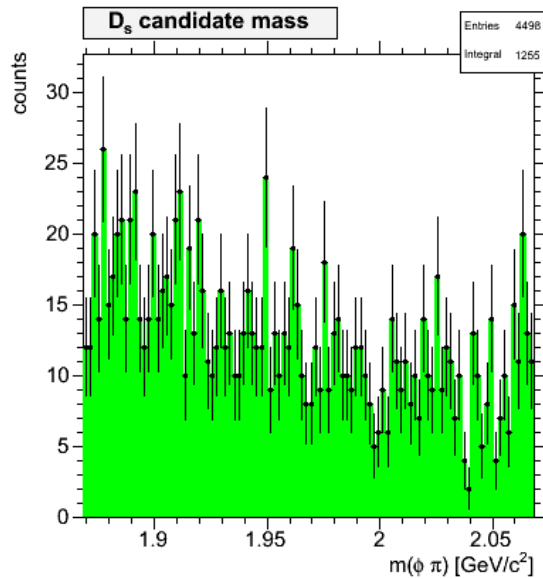


**N = 94**  
 $\epsilon = 17.3 \cdot 10^{-6}$



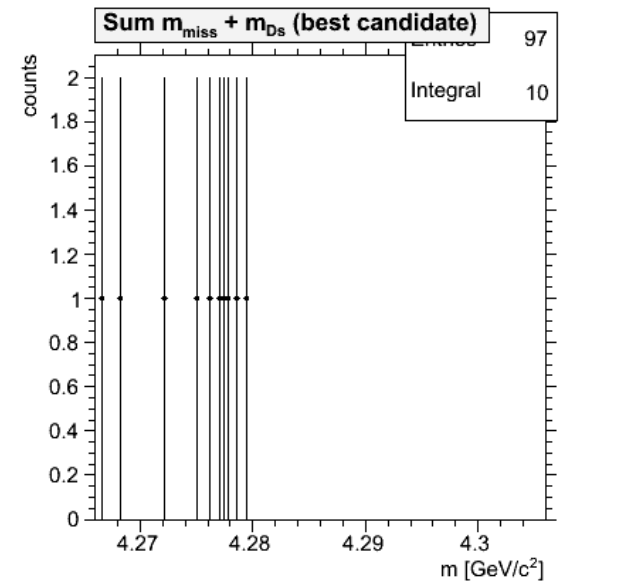
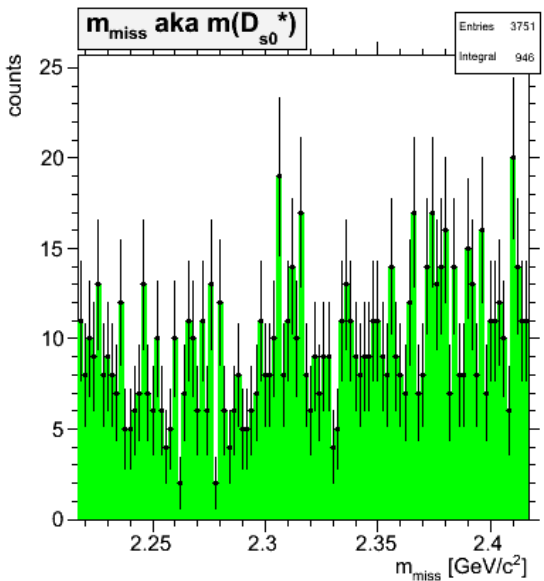
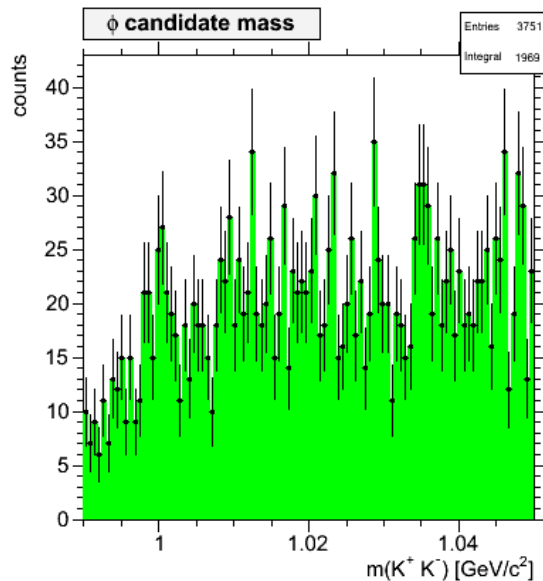
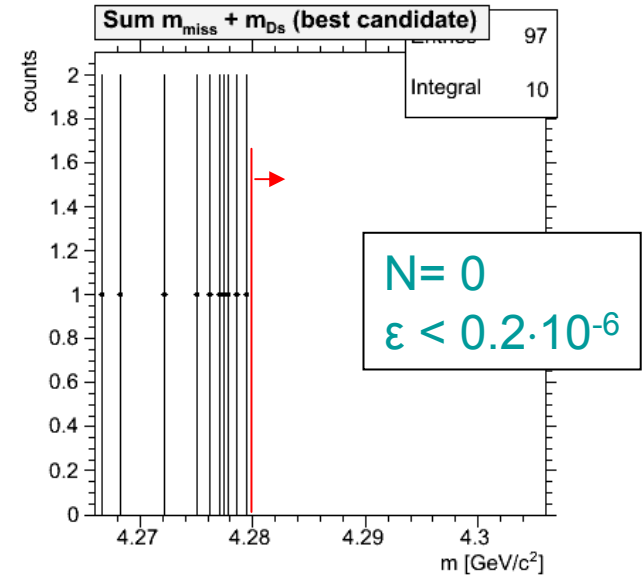
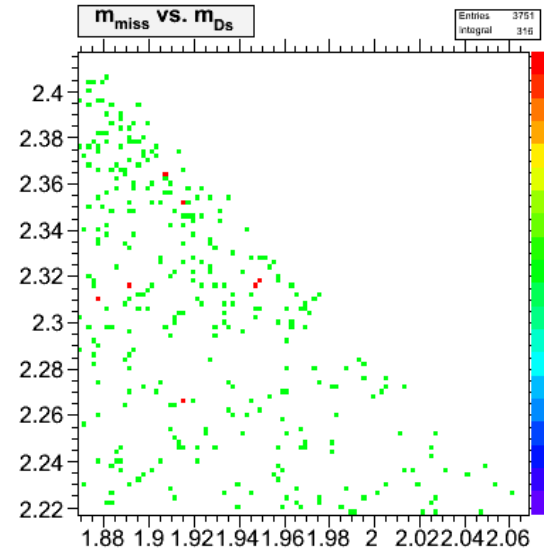
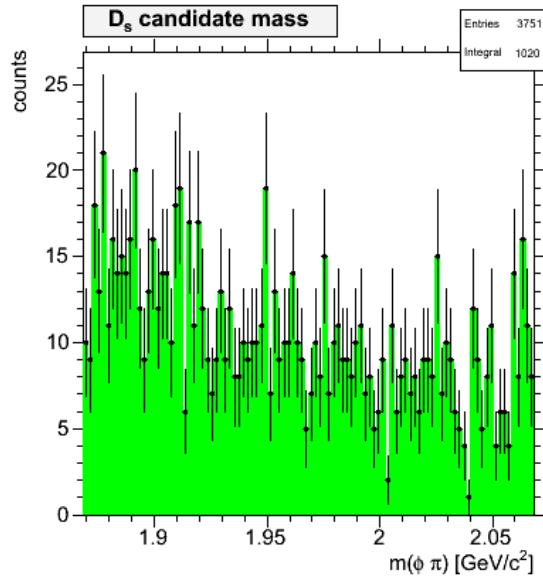


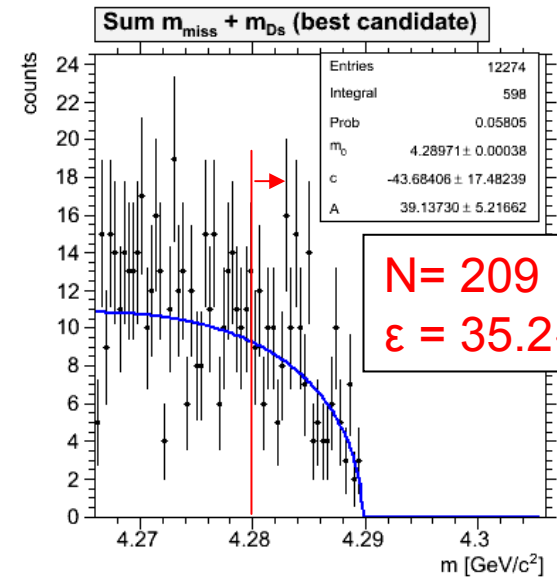
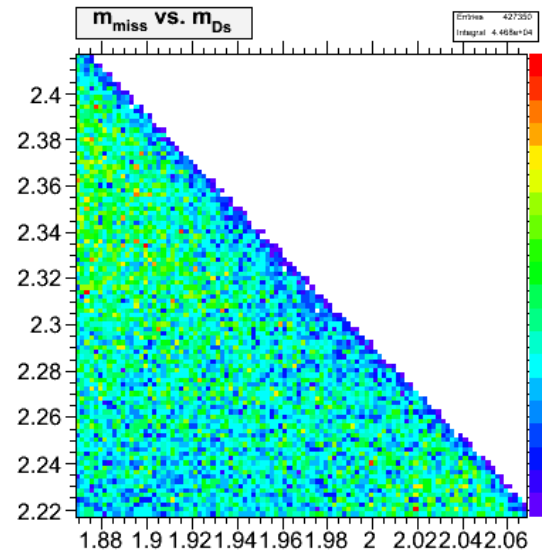
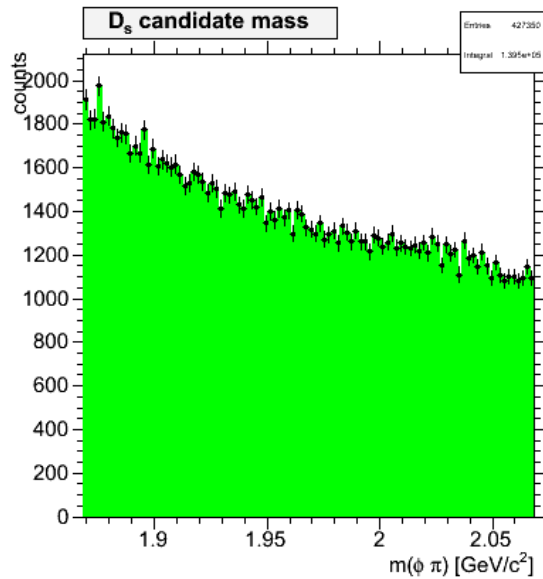
# DPM bkg with worse DISC / K Tight



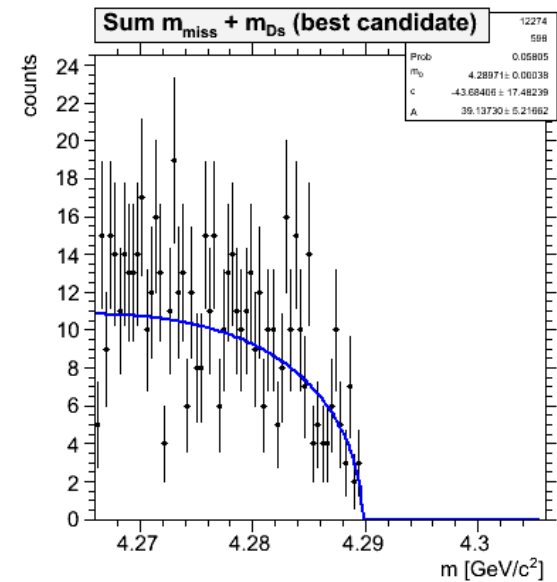
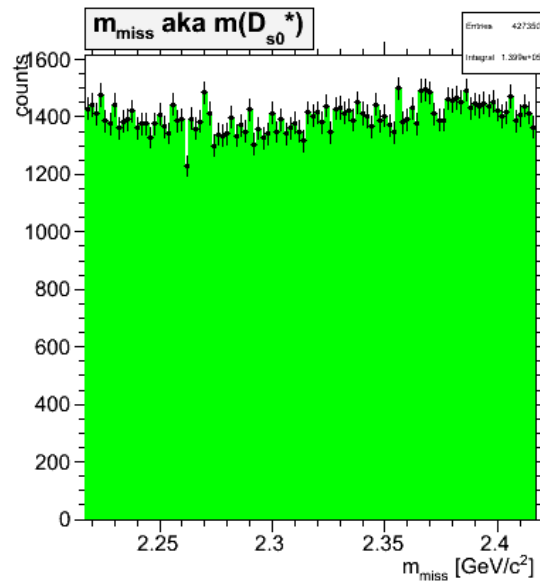
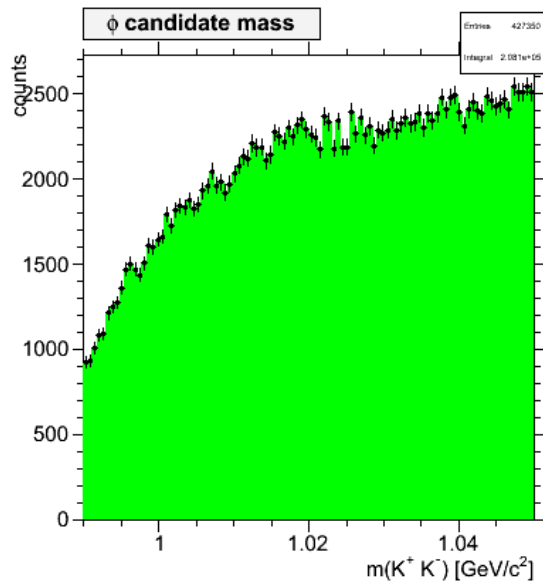


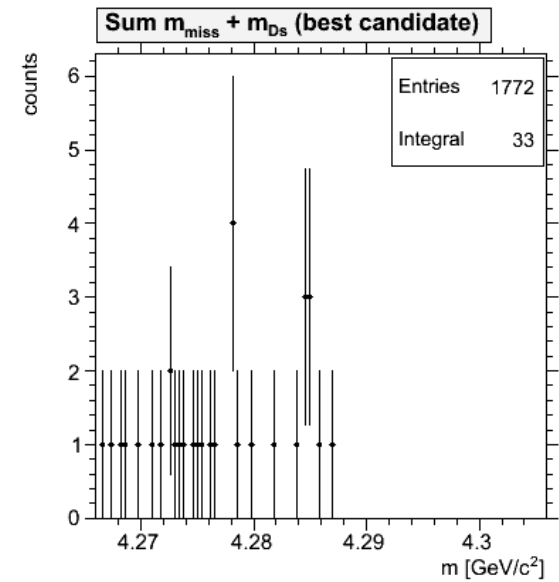
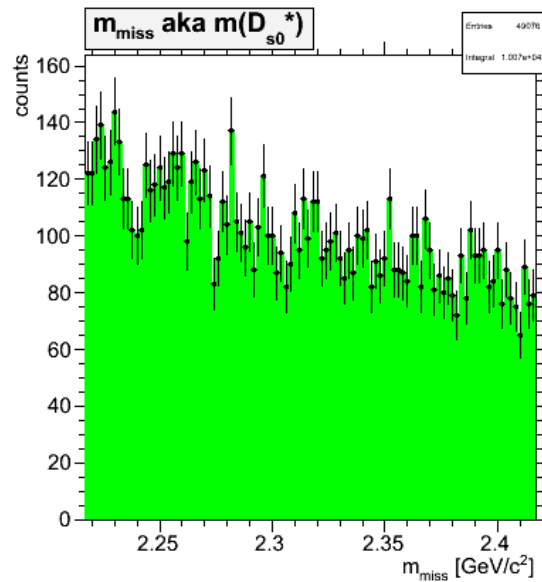
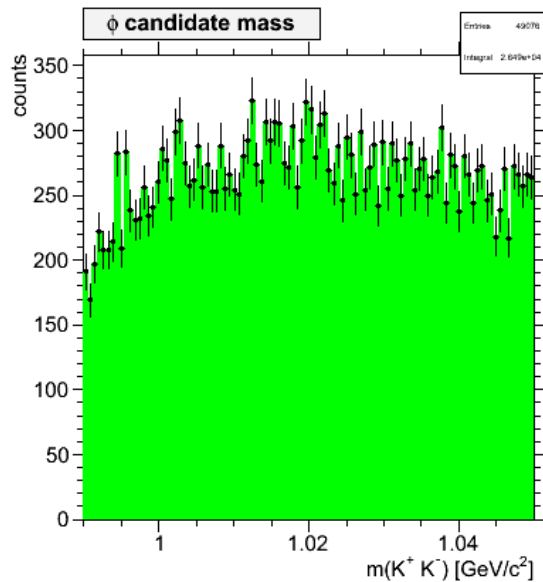
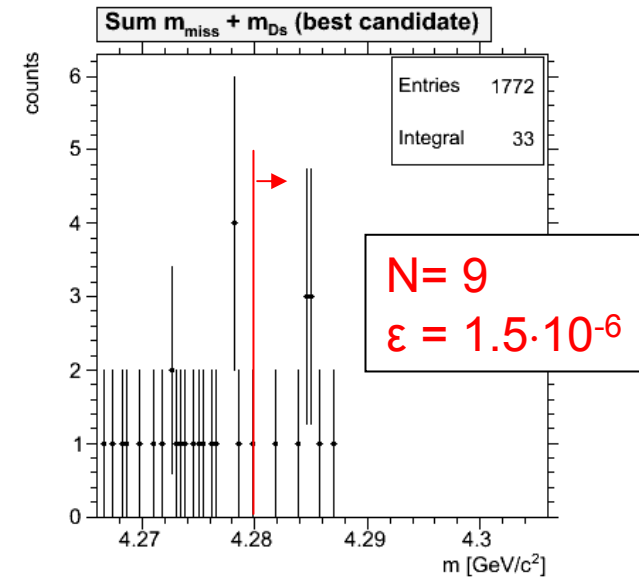
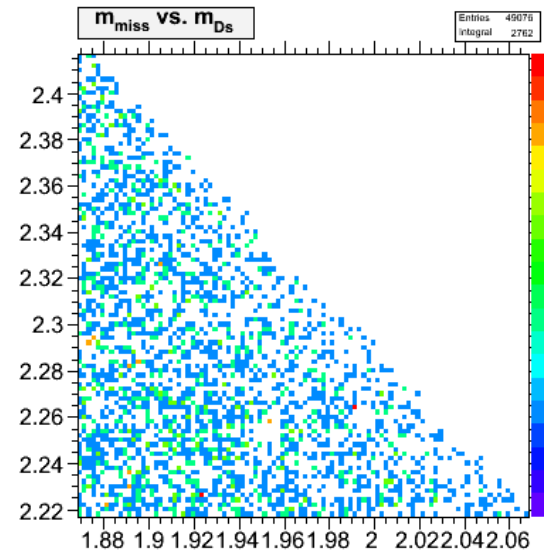
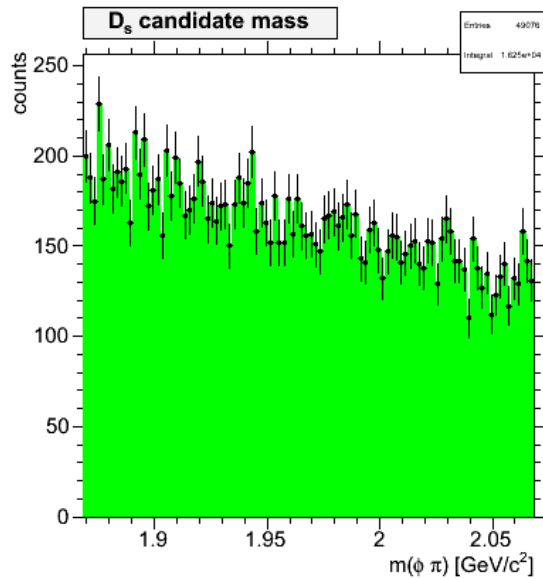
# DPM bkg with worse DISC / K veryTight



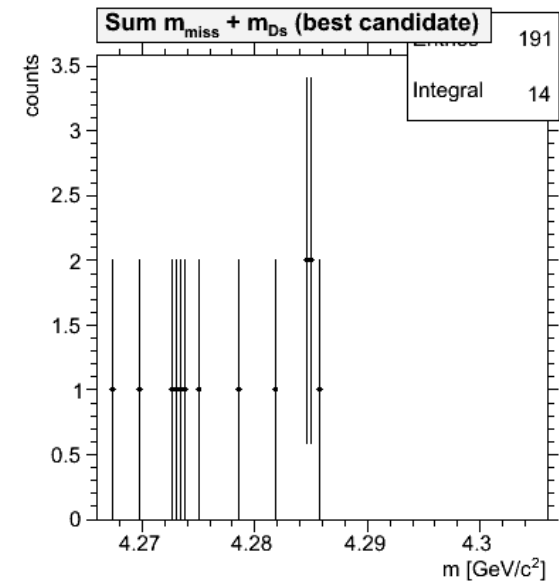
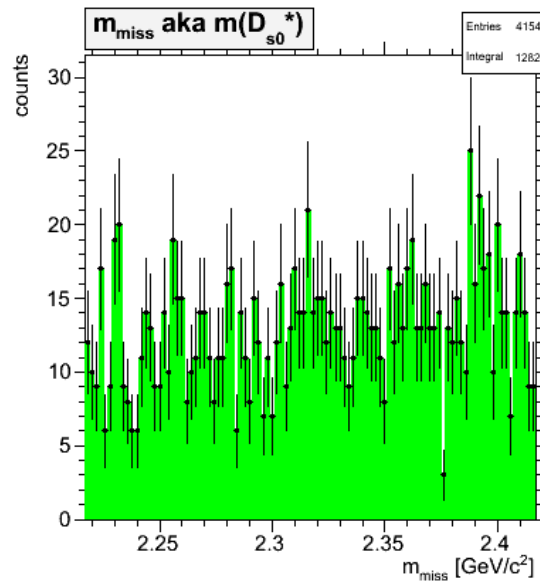
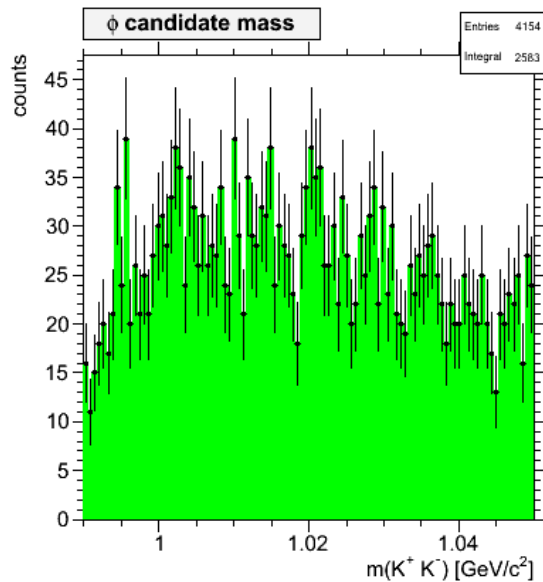
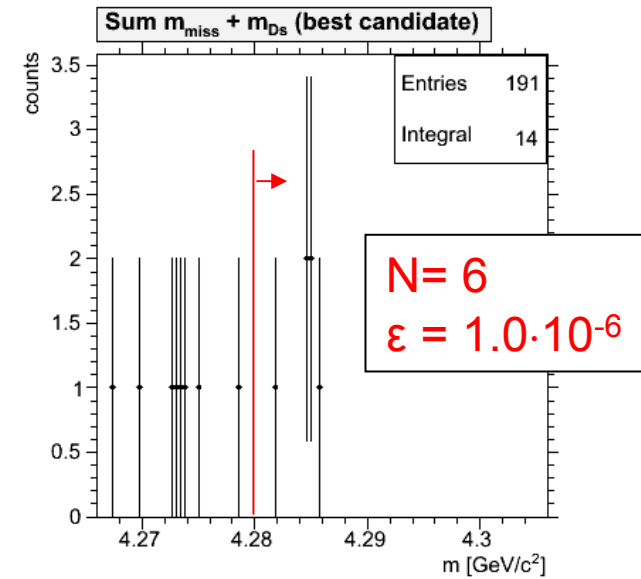
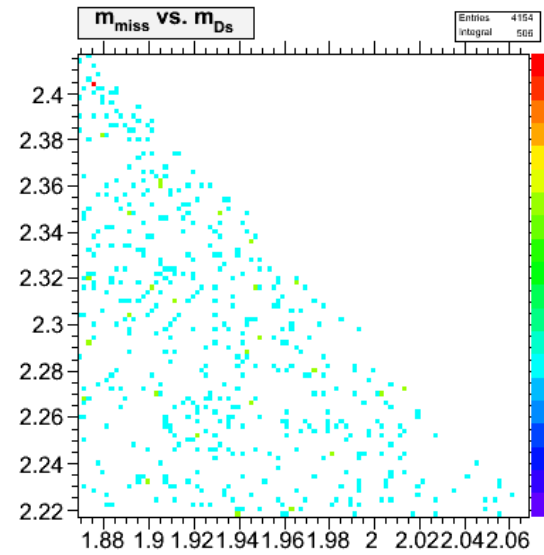
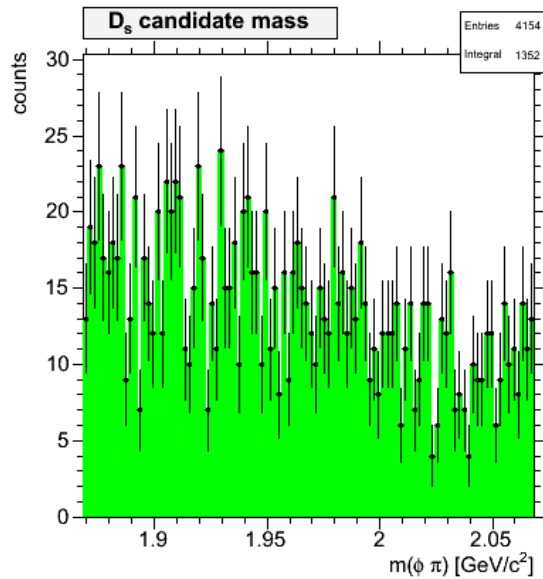


**N = 209**  
 **$\epsilon = 35.2 \cdot 10^{-6}$**

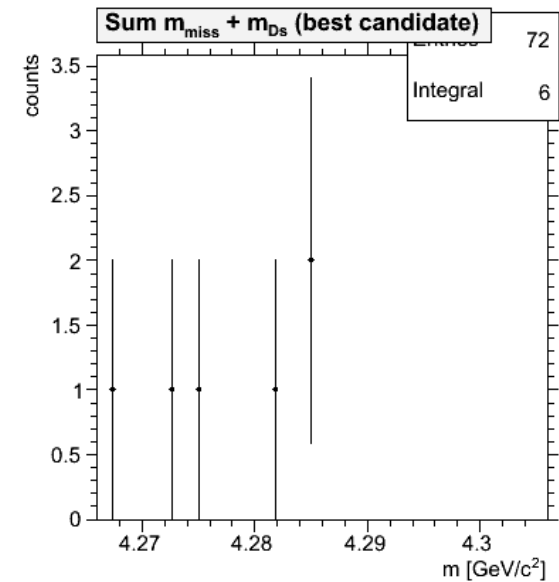
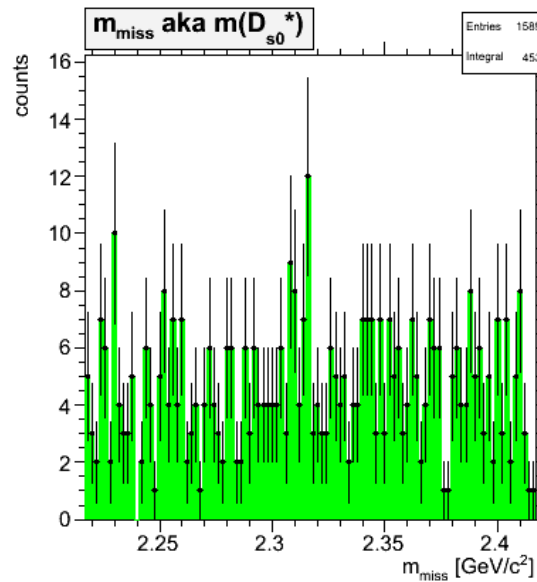
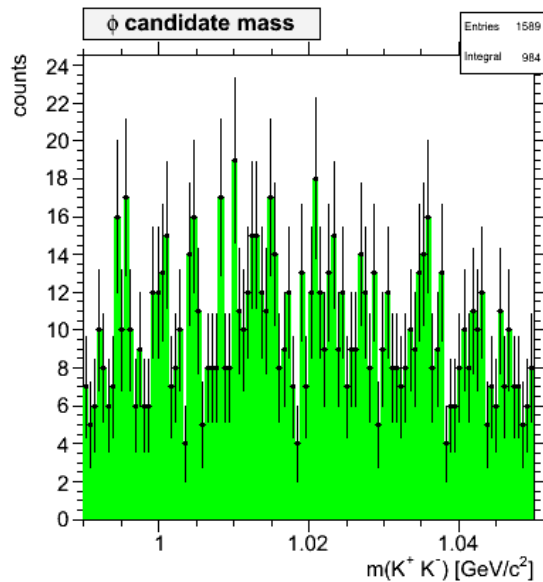
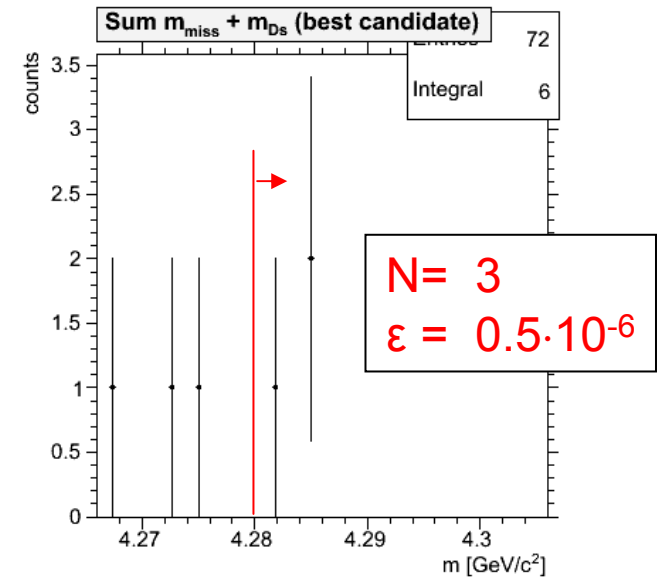
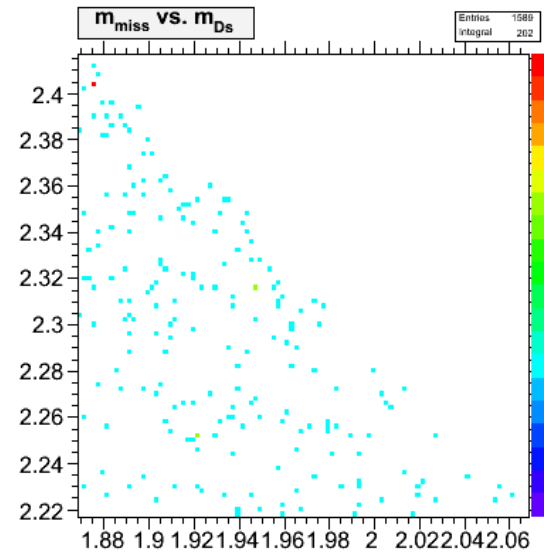
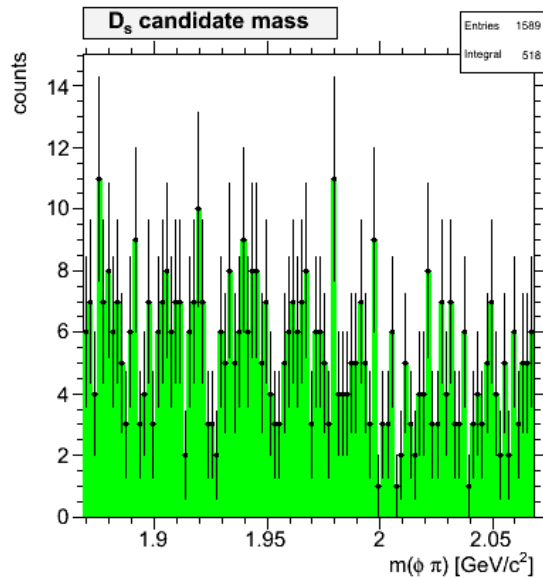




# DPM bkg w/o DISC / K Tight



# DPM bkg w/o DISC / K veryTight



- Efficiencies Signal [%]

DISC \ Select	veryLoose	Loose	tight	veryTight
w/ DISC	41.5	26.3	21.2	19.7
worse DISC	40.9	25.8	20.9	19.3
w/o DISC	32.6	10.2	4.8	2.1

- Background feed through [ $\cdot 10^{-6}$ ]

DISC \ Select	veryLoose	Loose	tight	veryTight
w/ DISC	17.3	0.3	0.3	< 0.2
worse DISC	17.3	< 0.2	< 0.2	< 0.2
w/o DISC	35.2	1.5	1.0	0.5

- S:N ratio (assume  $10^5$  more bkg, signal BR factor=0.022)

DISC \ Select	veryLoose	Loose	tight	veryTight
w/ DISC	1:189	1:5.2	1:6.4	> 1:4.6
worse DISC	1:192	> 1:3.5	> 1:4.3	> 1:4.7
w/o DISC	1:491	1:68	1:95	1:108