Generic MC update with new photon cuts

$B^+ \to K^+ tau^- mu^+$

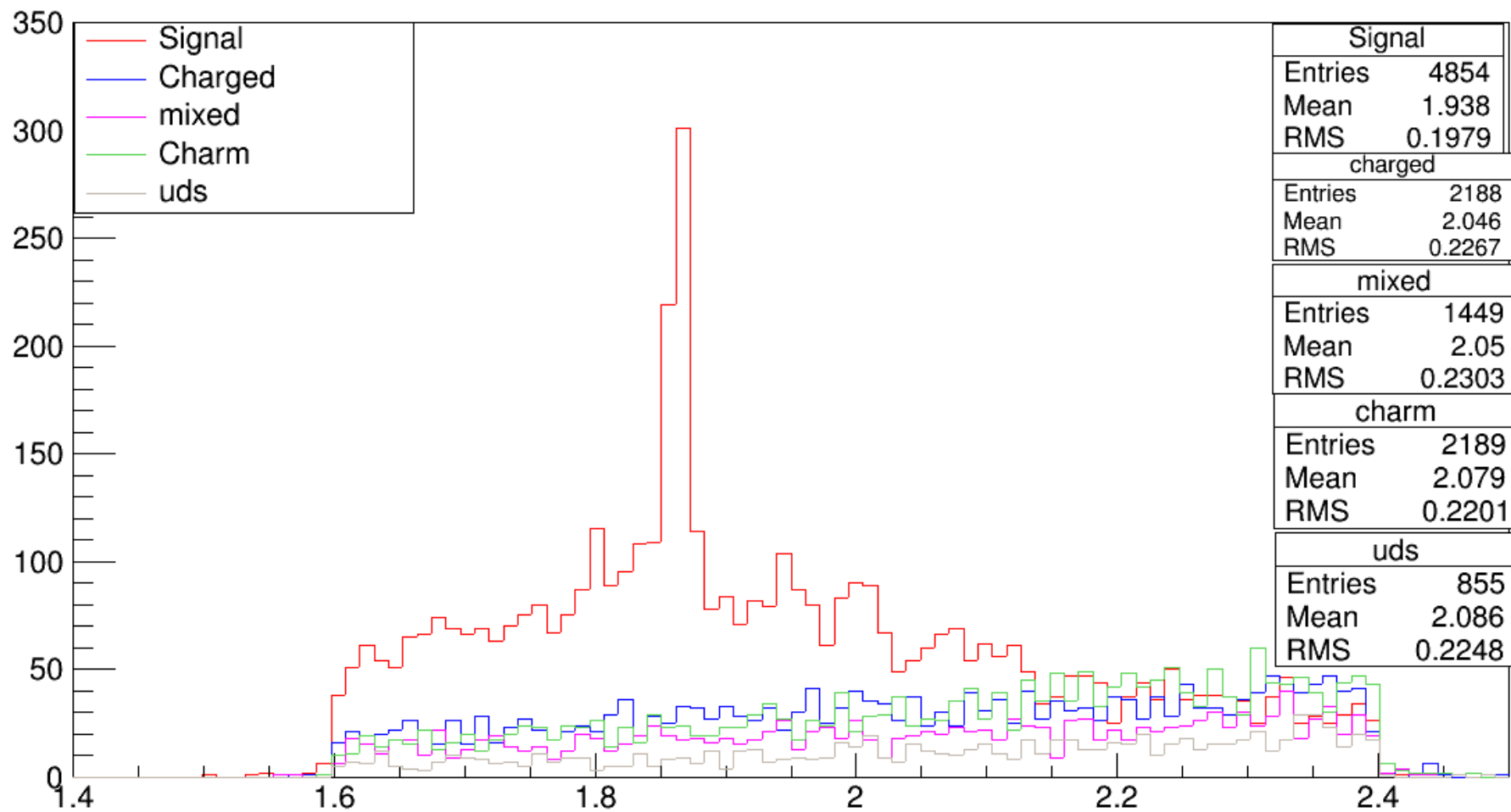1.0 M signal events
3 Streams of generic MC

06 Nov. 2023

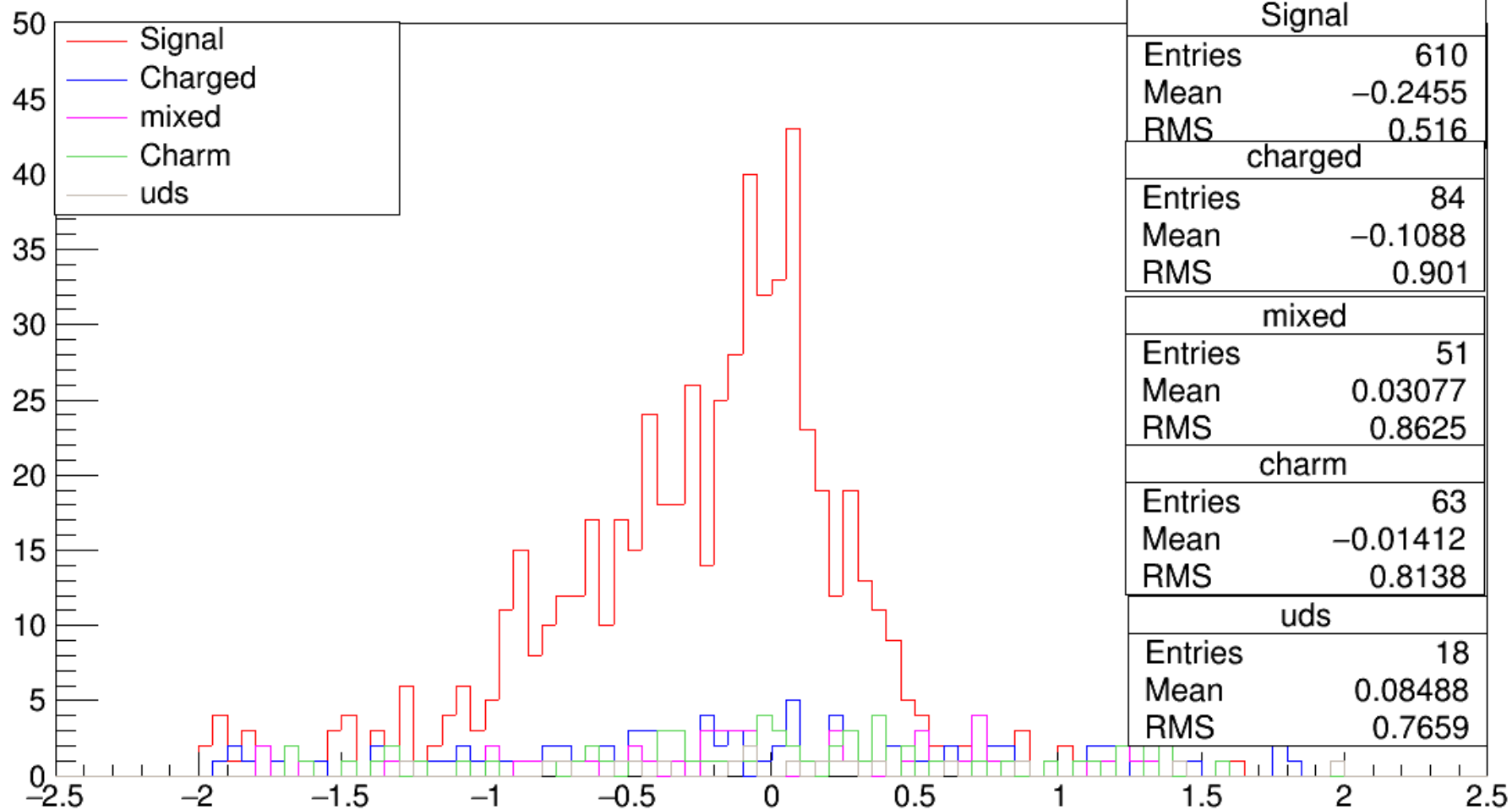# Cuts used in the reco. program

- abs(sin_phi)<1.5

- abs(m_lpi-3.1)>0.015

- m_Kpi>0.7

- abs(cos_pBtag_Dltag)<2

- 1.6 < m_D <2.4

m_D with nLepton==2,m_Kpi>2,abs(best_soln)<2,abs(m_D-1.865)<2 and rank 1 cut

Signal — Signal
Charged — Entries 4854, Mean 1.938, RMS 0.1979
mixed — charged
Charm — Entries 2188, Mean 2.046, RMS 0.2267
uds — mixed
Entries 1449, Mean 2.05, RMS 0.2303
charm
Entries 2189, Mean 2.079, RMS 0.2201
uds
Entries 855, Mean 2.086, RMS 0.2248

Best sum of cosine angles with nLepton==2,m_Kpi>2,abs(best_soln)<2,abs(m_D-1.865)<0.015 and rank 1 cut

Legend:
- Signal (red)
- Charged (blue)
- mixed (magenta)
- Charm (green)
- uds (gray)

Signal	
Entries	610
Mean	−0.2455
RMS	0.516

charged	
Entries	84
Mean	−0.1088
RMS	0.901

mixed	
Entries	51
Mean	0.03077
RMS	0.8625

charm	
Entries	63
Mean	−0.01412
RMS	0.8138

uds	
Entries	18
Mean	0.08488
RMS	0.7659

cos(PBtag,Pvis) with nLepton==2,m_Kpi>2,abs(best_soln)<2,abs(m_D-1.865)<0.015 and rank 1 cut

Signal	
Entries	610
Mean	−0.226
RMS	0.7454

charged	
Entries	84
Mean	−0.06296
RMS	1.045

mixed	
Entries	51
Mean	−0.05562
RMS	1.103

charm	
Entries	63
Mean	−0.0374
RMS	1.046

uds	
Entries	18
Mean	0.1309
RMS	0.7529

Legend:
- Signal
- Charged
- mixed
- Charm
- uds
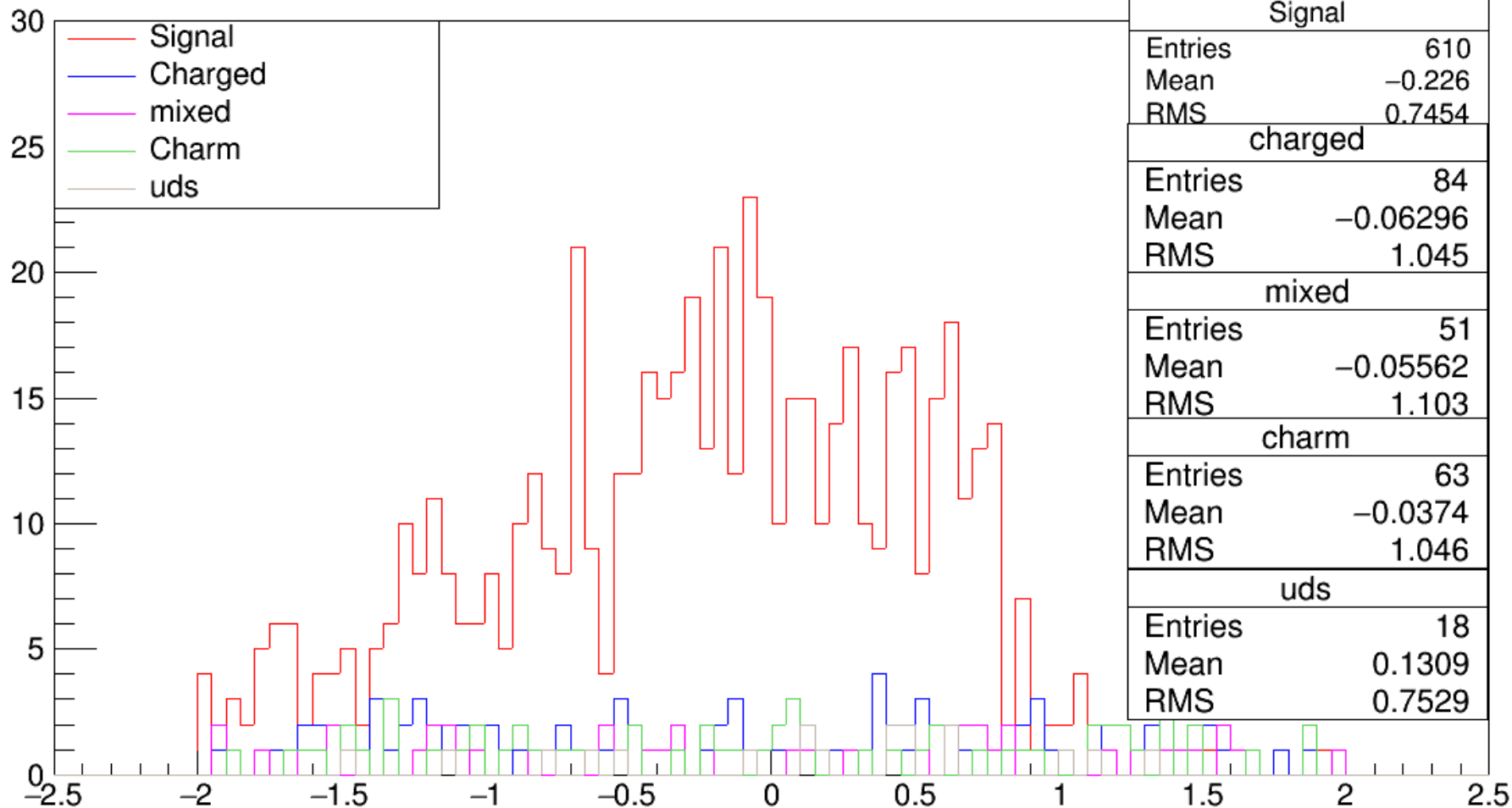
m_D with nLepton==2,m_Kpi>2,abs(best_soln)<2,abs(m_D-1.86)<0.3 and rank 1 cut

- Signal
- Charged
- mixed
- Charm
- uds

charged		Signal	
Entries	1624	Entries	3971
Mean	2.026	Mean	1.951
RMS	0.1689	RMS	0.1529
		mixed	
		Entries	1061
		Mean	2.031
		RMS	0.1722
		charm	
		Entries	1633
		Mean	2.052
		RMS	0.1682
		uds	
		Entries	606
		Mean	2.055
		RMS	0.1671
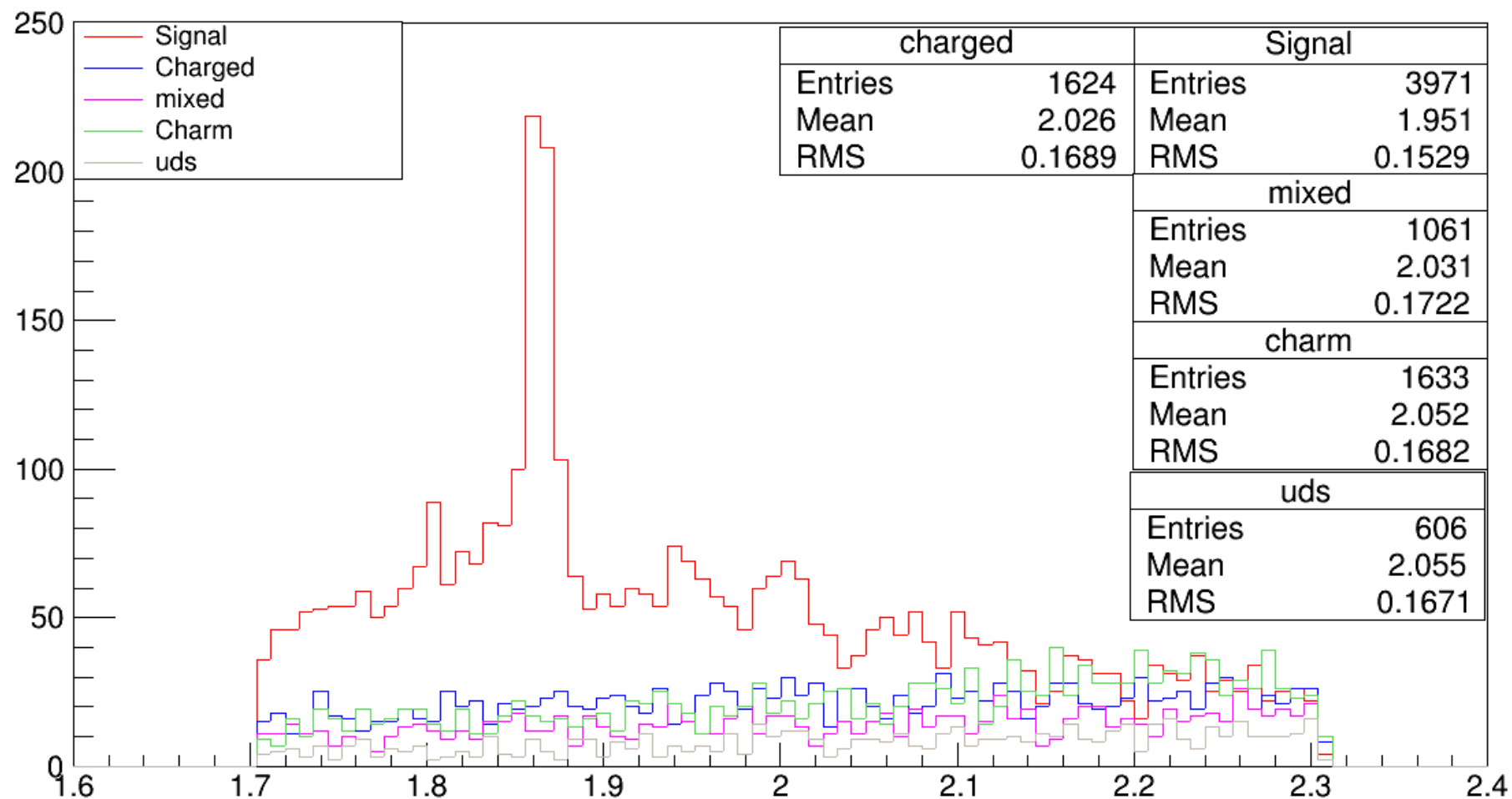
Summary

- By adding new photon cuts, the number of entries(for the best sum of cosine angles with all cuts) as compared to the previous MC checks

    1) 25% reduced for Sig. events.

    2) 32% reduced for charged background.

    3) Almost remained same for mixed background.

    4) 48% reduced for Charm background.

    5) 77% reduced for uds background.

Backup

Plot with the old photon cut

Best sum of cosine angles with nLeptons cut and with m_Kpi>2

Signal	
Entries	806
Mean	−0.3465
RMS	0.5068
charged	
Entries	122
Mean	0.0001172
RMS	0.8643
mixed	
Entries	50
Mean	0.1461
RMS	0.9824
charm	
Entries	121
Mean	−0.1731
RMS	0.978
uds	
Entries	77
Mean	−0.02639
RMS	0.9051

Legend:
- Signal
- Charged
- mixed
- Charm
- uds