Charmless B $\rightarrow \rho^0\rho^0$

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LPC - ClermontFerrand

- Motivation
- Analysis strategy
- Preliminary unofficial results

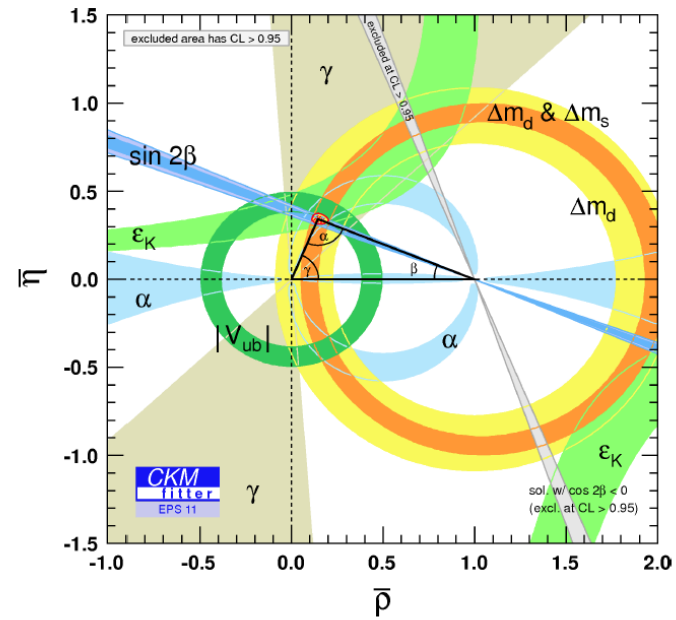
Flavour physics

- Flavour physics & CKM triangles

The quarks that interact via the weak interaction are superpositions of mass eigenstates.

The Cabibbo-Kobayashi-Maskawa (CKM) matrix links the mass eigenstates for the down-type quarks, with the weak eigenstates.

$$V_{CKM} = \begin{pmatrix} 1-\lambda^2/2 & \lambda & A\lambda^3(\rho - i\eta) \\ -\lambda & 1-\lambda^2/2 & A\lambda^2 \\ A\lambda^3(1-\rho-i\eta) & -A\lambda^2 & 1 \end{pmatrix} + \mathcal{O}(\lambda^4)$$



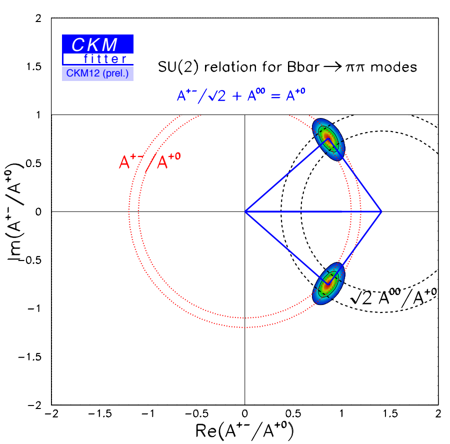
- Measurement of angle α
  - The time-dependent CP asymmetry in B meson decaying to CP eigenstates measures $\sin 2\alpha_{eff}$ which is dominated by the tree-level amplitude $b \rightarrow uud$
  - $\alpha_{eff} = \arg[-V_{td}V^*_{tb}/V_{ud}V^*_{ub}]$ (Tree) + $\Delta\alpha$ (Penguin)
  - $B^0 \rightarrow \rho^0\rho^0$ is color supressed and sensitive to the penguin amplitude
    - Accessible through isospin analysis or time-dependent Dalitz analysis

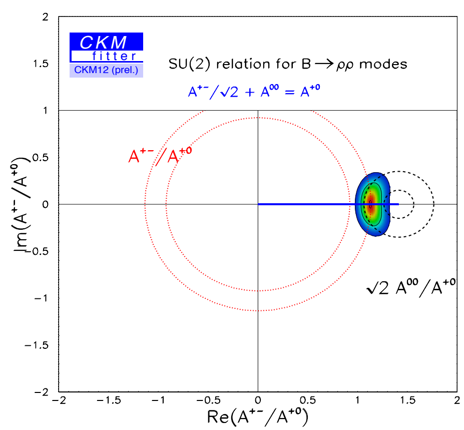
B→VV→(hh)(hh) Q2B decays

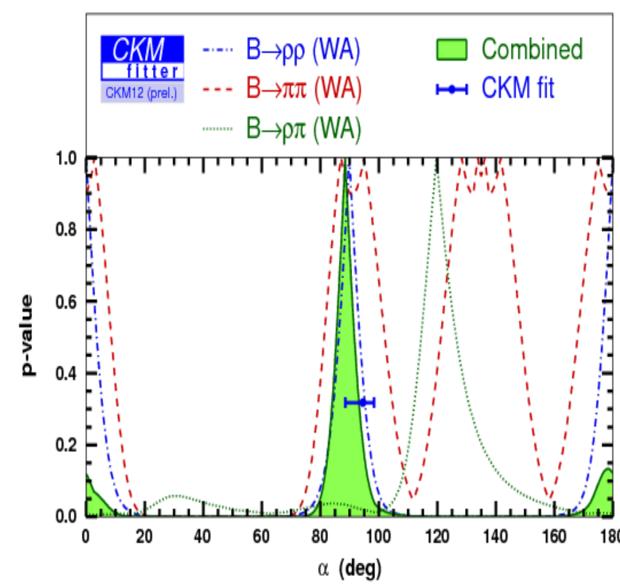
- The extraction of α from $B\to\pi\pi(\rho\rho)$ BRs and A_{CP} is a simple geometrical problem

$$\boxed{\begin{aligned}\sqrt{2}\,A^{+0} &= \sqrt{2}\,A(B_u \to \pi^+\pi^0) = e^{-i\alpha}\,(T^{+-} + T^{00})\\ A^{+-} &= A(B_d \to \pi^+\pi^-) = e^{-i\alpha}\,T^{+-} + P^{+-}\\ \sqrt{2}\,A^{00} &= \sqrt{2}\,A(B_d \to \pi^0\pi^0) = e^{-i\alpha}\,T^{00} - P^{+-}\end{aligned}}$$

- Using WA measurements, both $B\to\pi\pi(\rho\rho)$ SU(2) triangles do not close
  - The fact that triangles do not close is a further constraint to α. LHCb can help to remove this lucky situation.
  - Mirror solutions collapse → 2-fold a solution



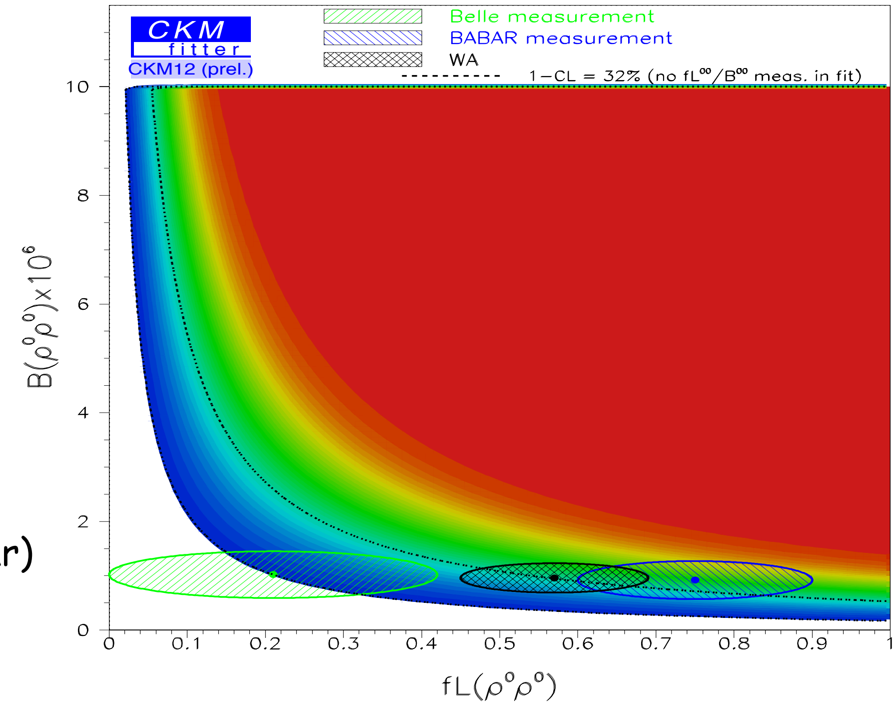




$B \to \rho^0\rho^0$ motivation

- **Motivation**
  - $B^0 \to \rho^0\rho^0$ signal observation & precise measurement of BR & f_L for α constrain
  - Along this program some Bs decays should show up

- **B-factory status**
  - 3σ evidence at both BaBar & Belle
    - $BR_{WA} = (0.96 \pm 0.27)\times 10^{-6}$
    - Measured BR, f_L (& C^{00}, S^{00} BaBar)
      → major impact on α extraction based signal evidence only !
    - Recent Belle update @ CKM12 :
      - small f_L measured (2.5σ from Babar)
      - Hint for $B \to \rho^0 \to \rho^0 f^0$



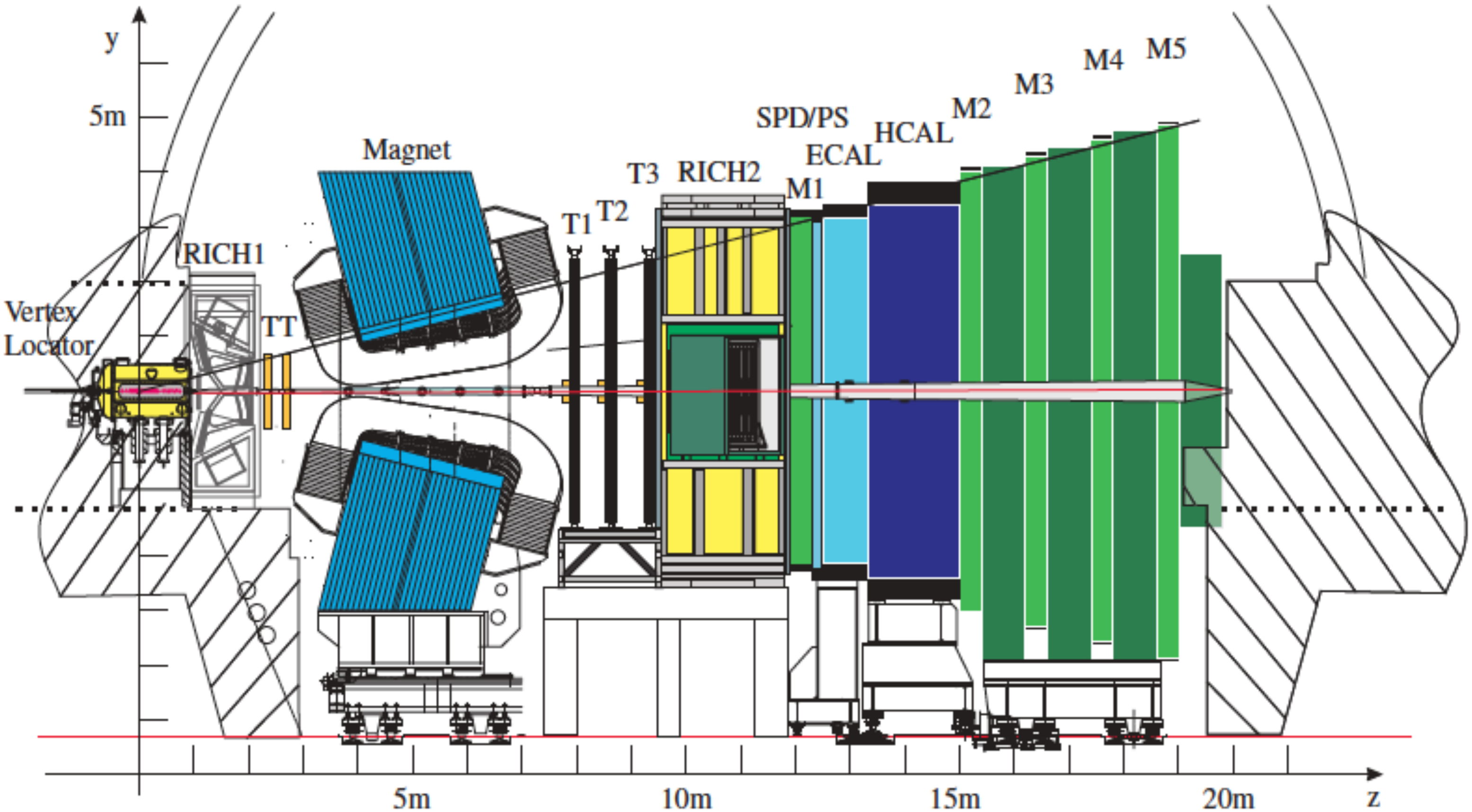
- LHCb

$3fb^{-1}$ 2011-2012 data

1 fb^{-1} 2011 data (R12S17b) + 2 fb^{-1} 2012 data (Reco14S20)

Analysis strategy

Simultaneous fit of $B_{(s)} \rightarrow (\pi\pi)(\pi\pi)$, $B_{(s)} \rightarrow (K\pi)(\pi\pi)$, $B_{s(d)} \rightarrow (K\pi)(\pi K)$ mass distributions



$B \to \rho^0\rho^0$ selection

- ## Stripping & Trigger

Use Quasi2Body stripping lines:

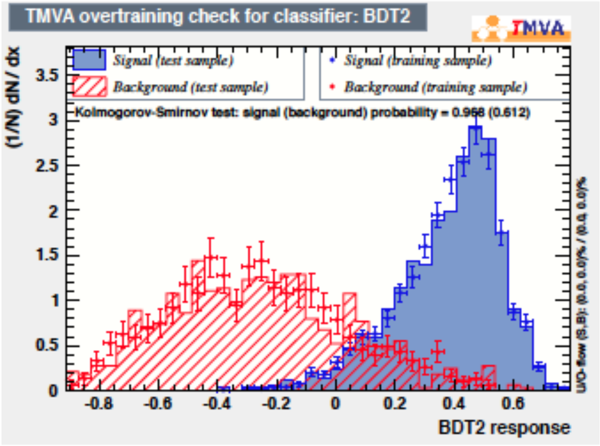
Build displaced $V_1(\pi\pi)V_2(\pi\pi)$ with $M(\pi\pi)< 1$ GeV and $pT(V)>600$ GeV (quality vertex $\chi2 < 9$)
B pt > 2.5 GeV, B vertex quality $\chi2 < 6$, B mass [3.8 - 5.7] Gev/c^2

L0 Hadron trigger plus reconstruction of 2,3,4 bodydecay

- ## Selection

Obvious sanity cuts (IP, sanity check,...)

Multivariate selection (BDT)
- Use $\rho^0\rho^0$ to train the smaple
- Isolation, pointing, flight distance B
- IP, pt (hadrons and $\pi\pi$ or $K\pi$)



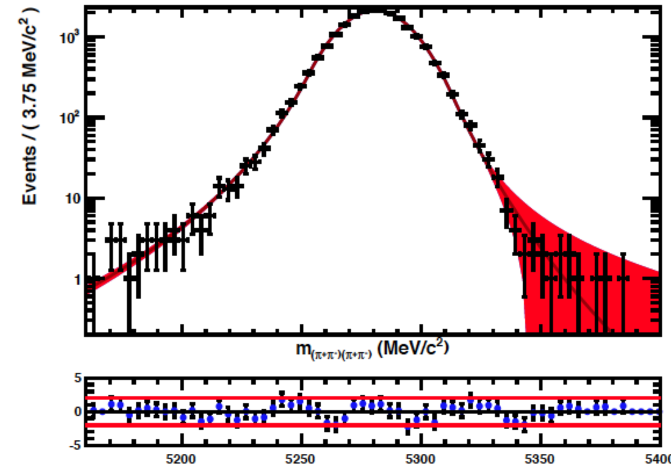
Particel Identification (RICH)
Mass cuts:

$M(\rho)$ ±225 MeV/c^2 ($\pi\pi$)
$M(K^*)$ ± 100 MeV/c^2 ($K\pi$)
anti-D cuts Mijk > 2.1 GeV, |Mij ($K\pi$)-MD|>30
anti-J/ψ cuts |Mij-MJ/ψ|>30 && isMuon==0
anti Λ cuts M_{ij} < 2.5 GeV

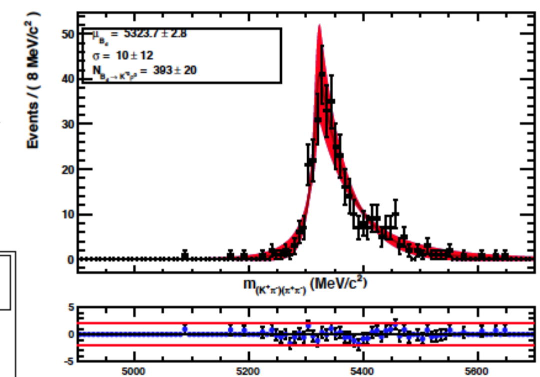
B→ (ππ) (ππ) Fit model

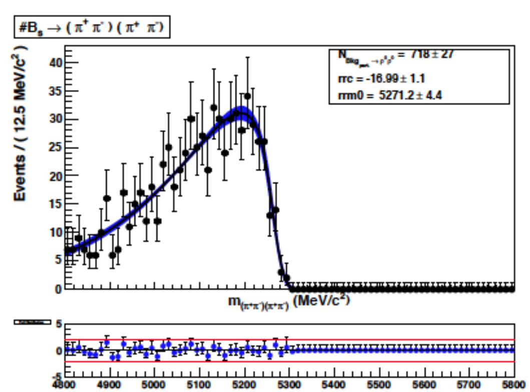
Simultaneous fit of $B_{(s)} \rightarrow (\pi\pi)(\pi\pi)$, $B_{(s)} \rightarrow (K\pi)(\pi\pi)$, $B_{s(d)} \rightarrow (K\pi)(\pi K)$ mass distributions

- **Signal**
  - bifurcated CB with tails parameters fixed from MC
  - single resolution parameter for B_d & B_s signal (free)
  - constrained M_{Bs}-M_{Bd} = 86.8±0.5 MeV/c^2



- **Background**
  - Peaking background vetoed by PID cuts
  - Cross feed bkg from misID (i.e π misID as K)
  - Partially reconstructed bkg (missing π/γ)
  - Combinatorial bkg (free exp)



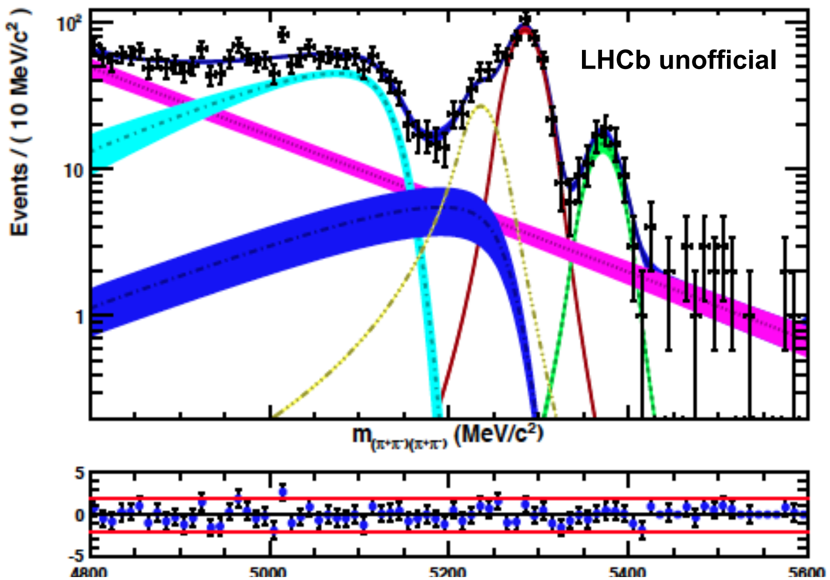


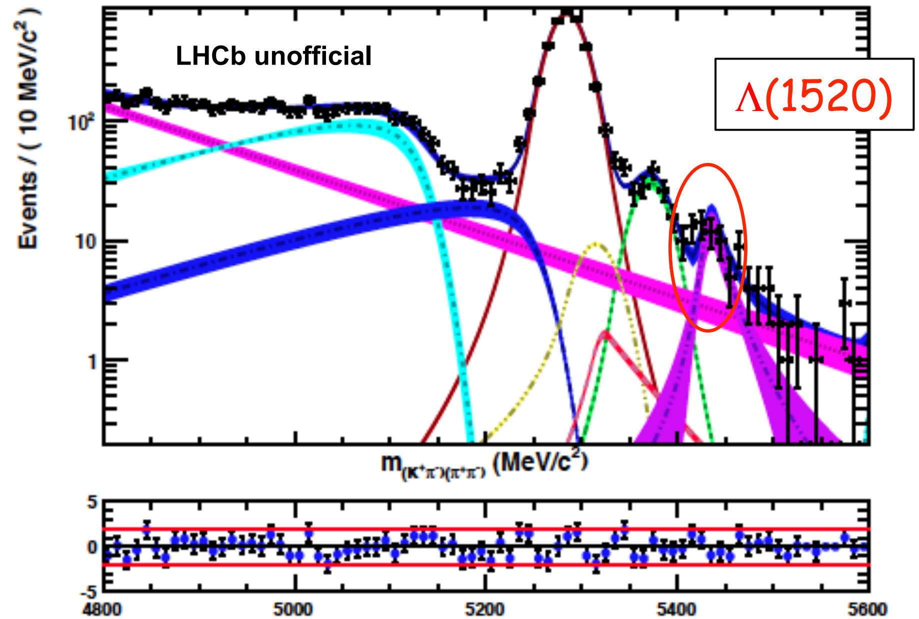
Argus ⊕ Gauss(σ_B)

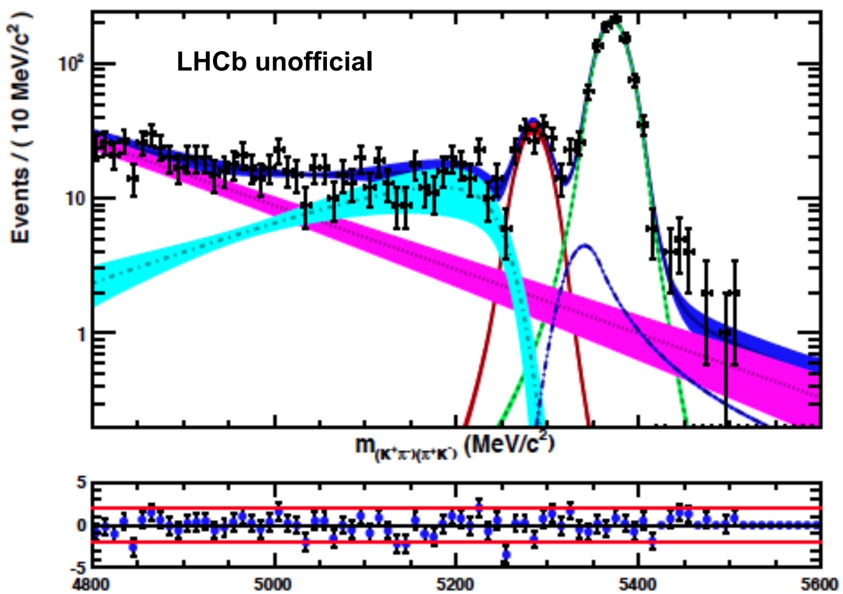
$$A(m : m_t, c, p) = \frac{m}{m_t^2}(1 - \frac{m^2}{m_t^2})^p \exp\left[-\frac{1}{2}c^2(1 - \frac{m^2}{m_t^2})\right],$$

Unofficial fit results

~ $3fb^{-1}$ from 2011 + 2012 data







Signal resolution σ ~ $18 MeV/c^2$

Clear contributions of:
Bs $\rightarrow 4\pi$, Bs $\rightarrow K^*\pi\pi$ and Bd $\rightarrow K^*K^*$

Fit model nearly ready:
– $\Lambda(1520)$ MC already asked

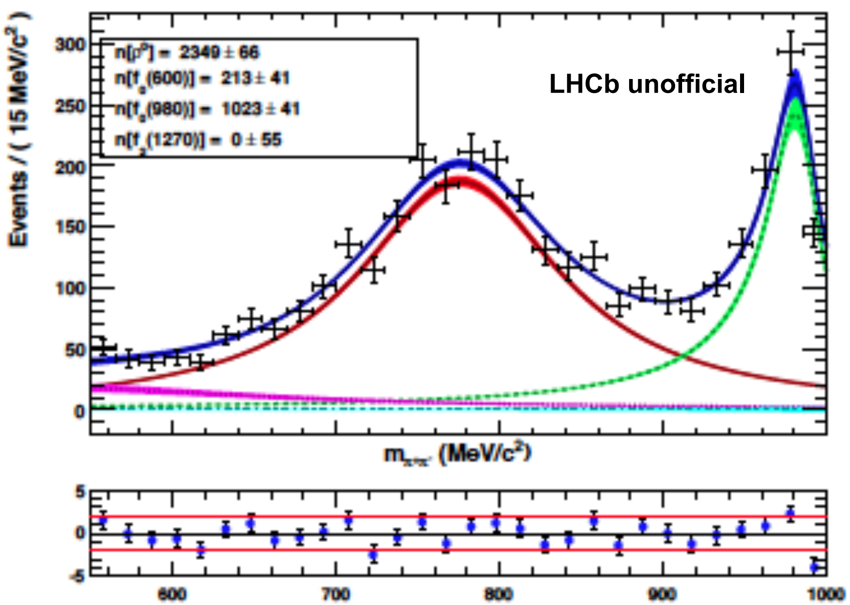
$\pi\pi$ lineshapes fit model

A full angular analysis will be applied but a preliminary fit model for the $\pi\pi$ lineshape can be extracted using sWeights

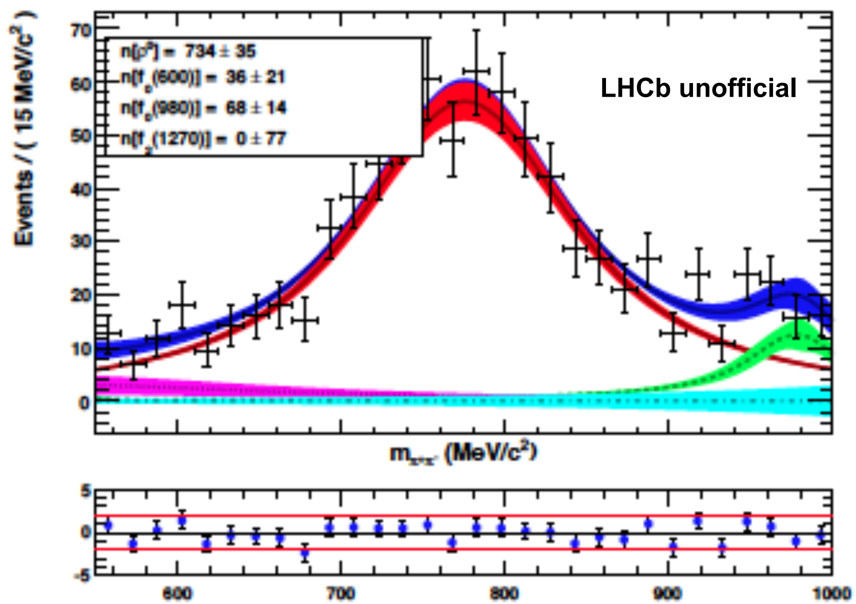
f0(980)[Flatte] + ρ^0 [BW] + f0(600)[BW] + f2(1270)[BW]

Parameters fixed from BES and Syracuse studies

$\pi\pi$ lineshape in B$\rightarrow$ (Kπ)($\pi\pi$)



$\pi\pi$ lineshape in B$\rightarrow$ ($\pi\pi$)($\pi\pi$)

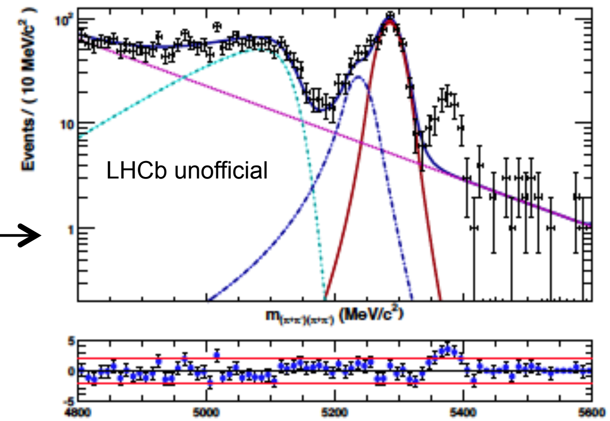


$\rightarrow$ Work ongoing through Angular analysis

Clear evidences on all 6 studied modes

- Significance:

Difference in NLL with/without peak contribution



Preliminary unofficial fit gives > 5σ

- Branching fraction: use $B_s \to K^*K^*$ $[(K\pi)(\pi K)]$ as normalization channel

$$\mathcal{B}(B^0_{d,s} \to h^\pm h^\pm h^\pm h^\pm) = \lambda_{f_L} \times \frac{\epsilon_{TotSel}^{B^0_s \to K^{*0}K^{*0}}}{\epsilon_{TotSel}^{B^0_{d,s} \to h^\pm h^\pm h^\pm h^\pm}} \times \frac{\epsilon_{PID}^{B^0_s \to K^{*0}K^{*0}}}{\epsilon_{PID}^{B^0_{d,s} \to h^\pm h^\pm h^\pm h^\pm}} \times \frac{N(B^0_{d,s} \to h^\pm h^\pm h^\pm h^\pm)}{N(B^0_s \to K^{*0}K^{*0})}$$
$$\times \frac{f_s}{f_{(d,s)}} \times BR_{vis}(B^0_s \to K^{*0}K^{*0})$$

Very promising results ahead ☺

Conclusion

- Clear $(\pi\pi)(\pi\pi)$ signal from both B_d and B_s
  - Very promising with the full 3 fb^{-1}
  - Analysis based on a simultaneous fit with $(K\pi)(\pi\pi)$ & $(K\pi)(K\pi)$ Q2B decays

- Selection & Fit Model
  - Stripping, triggers and BTD used in selection process are ready
  - Fit model:
    - Signal: defined & modeled (biCB)
    - Bkg: identified and modeled (fixed yield when possible, missing Λ_b)
    - Ready for ToyMC
  - Efficiencies: (MCgeneration, Reco-Strip-Sele, PID, trigger) nearly ready
  - Systematics: Work started

- Angular analysis
  - Huge work ahead, but work started

- Promising results ahead:
  - Unofficial preliminary significance > 5σ
  - BR $[B \rightarrow (\pi\pi)(\pi\pi)]$ measurement expected soon
    - B_s-> K*K* $[(K\pi)(\pi K)]$ as normalization channel

Stay tuned !

BackUp

SELECTION: Q2B stripping line

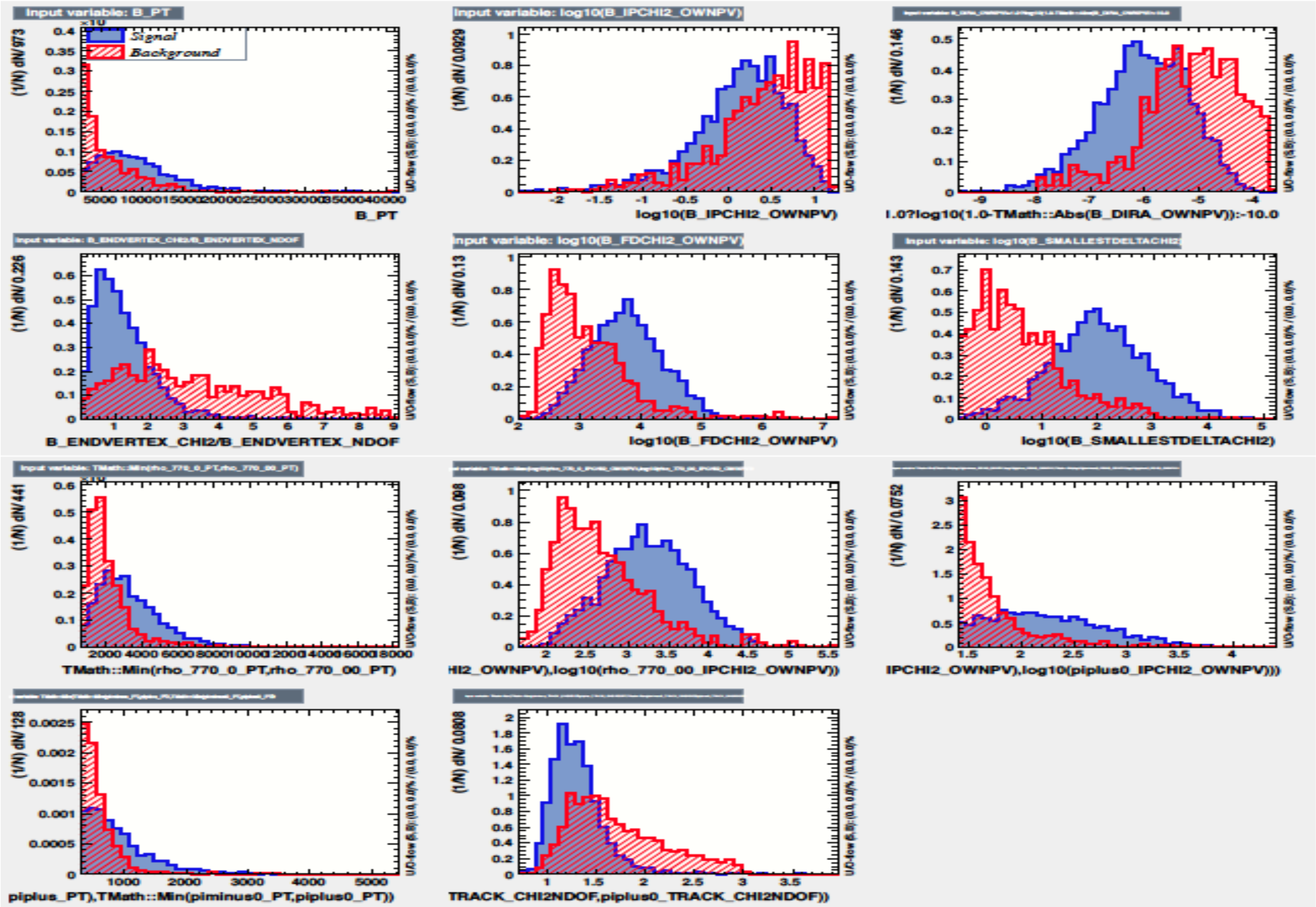
Variable Definition	StrippingBetaSQ2B4piSelection
B candidates selection cuts	
Transverse momentum of the B candidate	$p_T > 2500\,\mathrm{MeV}/c$
Min Mass of 4π	$M_{\pi\pi\pi\pi} > 3.8\,\mathrm{GeV}/c^2$
Max Mass of B	$M_B < 5.7\,\mathrm{GeV}/c^2$
Max Corrected B Mass	$< 6\,\mathrm{GeV}/c^2$
χ^2 of B vertex fit	$\chi^2_{B\,\mathrm{vtx}} < 6$
Vector meson selection Cuts	
Transverse momentum of the resonance candidate	$p_T > 600\,\mathrm{MeV}/c$
Mass of the resonance candidate	$M_{\pi(K)\pi(K)} < 1\,\mathrm{GeV}/c^2$
χ^2 of resonance vertex fit	$\chi^2_{(\pi\pi)\,\mathrm{vtx}} < 9$
Hadron selection Cuts	
Track ghost probability	GhostProb < 0.5
IP wrt PV	$\mathrm{IP} > 25\,\mathrm{mm}$

SELECTION: Pre-Selection

- A preselection to reduce the background level based on sanity cuts

Variable	Cut
B_FDCHI2_OWNPV	> 20
B_IPCHI2_OWNPV	< 30
B_DIRA_OWNPV	> 0.999
B_ENDVERTEX_CHI2/B_ENDVERTEX_NDOF	< 20
B_PT	$> 1200(2500)$
B_SMALLESTDELTACHI2	> 0.3
V_ENDVERTEX_CHI2	< 20
V_PT	> 200
V_ΔM	$\mathrm{M}(\rho) \pm 300$, $\mathrm{M}(\mathrm{K}^*) \pm 200$
h_P	< 100000
h_TRACK_GhostProb	< 0.5
h_isMuon	$== 0$
h_IPCHI2_OWNPV	> 5
h_PT	> 100

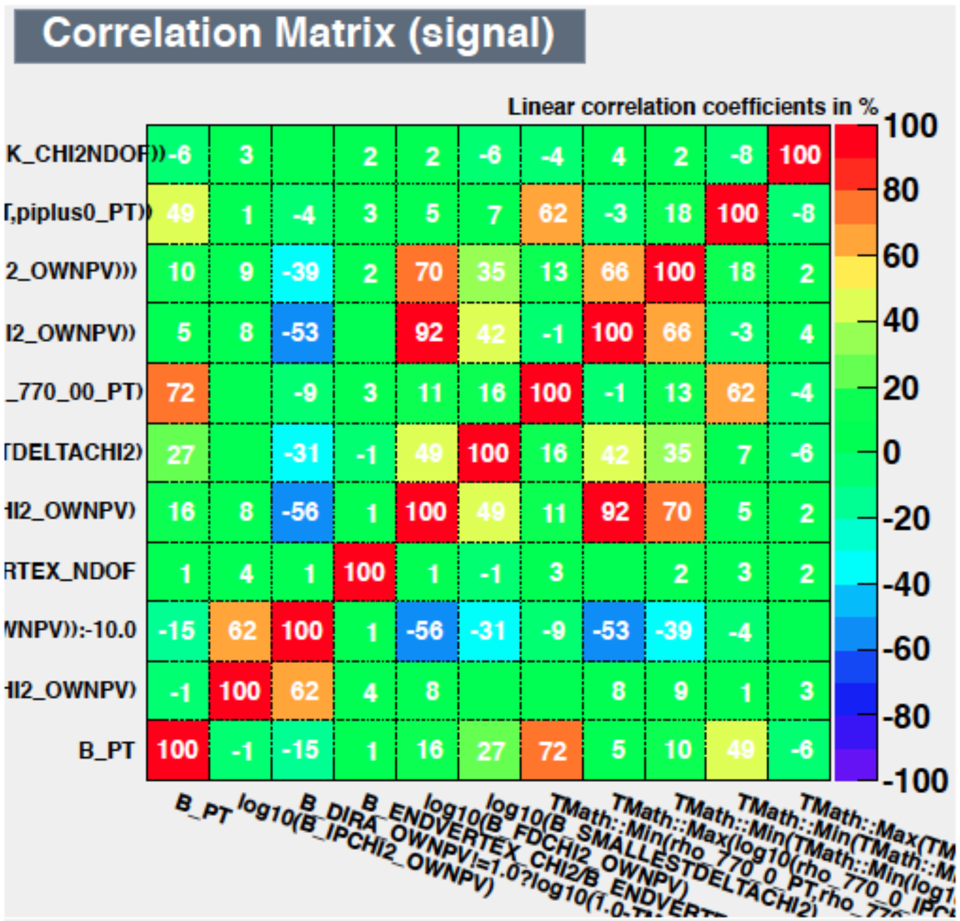
SELECTION: BDT variables

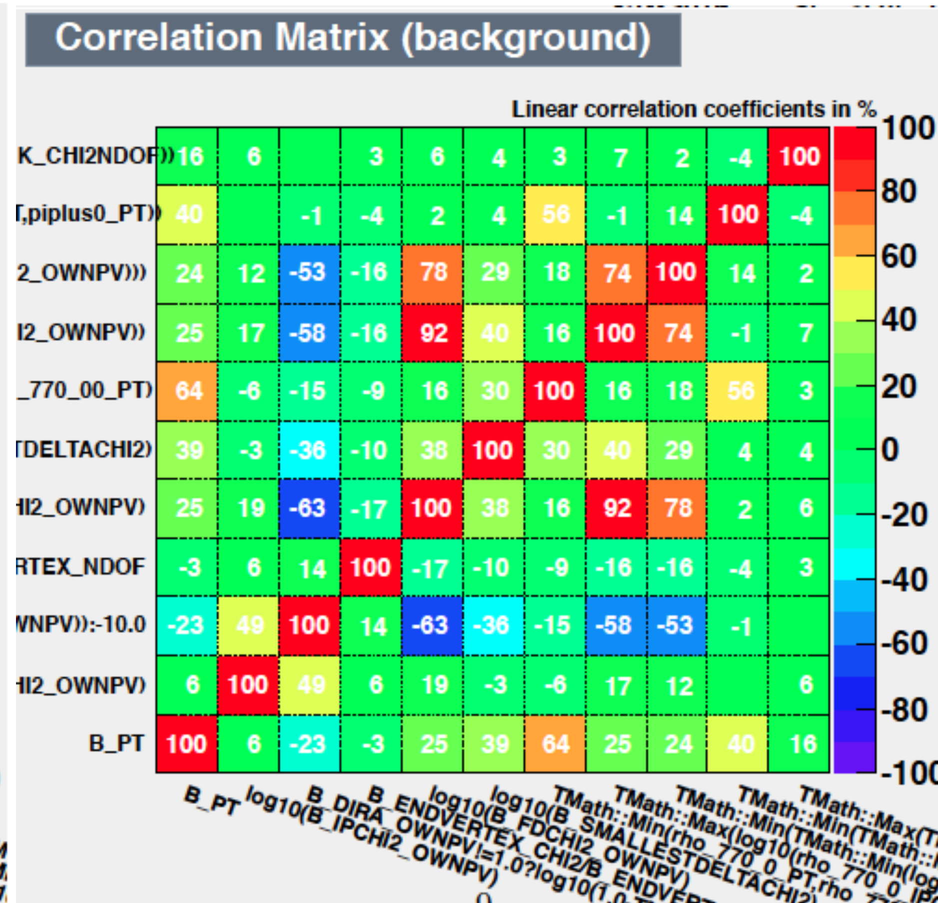


SELECTION: BDT variables

Variable	Description	BDT 1	BDT 2
log10(B_SMALLESTDELTACHI2)	Isolation of the B vertex [1]	0.225	0.224
B_ENDVERTEX_CHI2/B_ENDVERTEX_NDOF	B vertex fit	0.224	0.218
Max(h_TRACK_CHI2NDOF)	hadron track quality	0.143	0.148
Min(log10(h_IPCHI2_OWNPV))	Minimal hadron IP significance w.r.t PV	0.136	0.123
Max(log10(V_IPCHI2_OWNPV))	Maximal meson (ρ^0,K^{*0}) IP significance w.r.t PV	0.134	0.132
log10(B_FDCHI2_OWNPV)	B flight distance w.r.t PV	0.132	0.128
log10(1.0-Abs(B_DIRA_OWNPV)	B pointing angle	0.131	0.130
B_PT	B tranverse momentum	0.081	0.080
Min(V_PT)	Minimal meson transverse momentum	0.073	0.070
Min(h_PT)	Minimal hadron transverse momentum	0.055	0.064
log10(B_IPCHI2_OWNPV)	B IP significance w.r.t PV	0.045	0.043

SELECTION: BDT variables correlations





EFFICIENCIES 1/4

- Generator efficiencies

Channel	particle	antiparticle	average
$B_s^0 \to K^{*0}K^{*0}$	$16.59 \pm 0.08\%$	$16.59 \pm 0.08\%$	$16.59 \pm 0.06\%$
$B^0 \to \rho^0\rho^0$	$15.60 \pm 0.07\%$	$15.42 \pm 0.07\%$	$15.51 \pm 0.05\%$
$B^0 \to K^{*0}\rho^0$	$15.90 \pm 0.08\%$	$15.75 \pm 0.08\%$	$15.83 \pm 0.05\%$

- Reconstruction, stripping and selection

Channel	Magnet Up	Magnet Down	Average
$B_s^0 \to K^{*0}K^{*0}$	$1.212 \pm 0.012\%$	-	$1.212 \pm 0.012\%$
$B^0 \to \rho^0\rho^0\ ^{Long}$	$0.322 \pm 0.006\%$	$0.322 \pm 0.006\%$	$0.322 \pm 0.004\%$
$B^0 \to \rho^0\rho^0\ ^{Trans}$	$1.586 \pm 0.019\%$	$1.562 \pm 0.026\%$	$1.577 \pm 0.016\%$
$B^0 \to K^{*0}\rho^0$	$1.475 \pm 0.016\%$	$1.492 \pm 0.013\%$	$1.486 \pm 0.010\%$

Channel	Magnet Up	Magnet Down	Average
$B_s^0 \to K^{*0}K^{*0}$ reco as $B \to K^{*0}\rho^0$	$1.238 \pm 0.012\%$	-	$1.238 \pm 0.012\%$
$B^0 \to \rho^0\rho^0\ ^{Long}$ reco as $B \to K^{*0}\rho^0$	$0.365 \pm 0.006\%$	$0.359 \pm 0.006\%$	$0.362 \pm 0.004\%$
$B^0 \to \rho^0\rho^0\ ^{Trans}$ reco as $B \to K^{*0}\rho^0$	$1.588 \pm 0.019\%$	$1.578 \pm 0.026\%$	$1.585 \pm 0.016\%$
$B^0 \to K^{*0}\rho^0$ reco as $B \to \rho^0\rho^0$	$1.020 \pm 0.013\%$	$1.040 \pm 0.011\%$	$1.032 \pm 0.009\%$
$B^0 \to K^{*0}\rho^0$ reco as $B \to K^{*0}K^{*0}$	$0.644 \pm 0.011\%$	$0.613 \pm 0.008\%$	$0.612 \pm 0.007\%$

EFFICIENCIES 2/4

- Trigger efficiencies

Channel	Magnet Up	Magnet Down	Average
$B_s^0 \to K^{*0} K^{*0}$	$87.72 \pm 0.32\%$	-	$87.72 \pm 0.32\%$
$B^0 \to \rho^0 \rho^0$ ^{Long}	$87.36 \pm 0.59\%$	$86.72 \pm 0.63\%$	$87.06 \pm 0.43\%$
$B^0 \to \rho^0 \rho^0$ ^{Trans}	$87.89 \pm 0.40\%$	$87.03 \pm 0.56\%$	$87.59 \pm 0.33\%$
$B^0 \to K^{*0} \rho^0$	$87.09 \pm 0.37\%$	$87.60 \pm 0.29\%$	$87.41 \pm 0.23\%$

Channel	Magnet Up	Magnet Down	Average
$B_s^0 \to K^{*0} K^{*0}$ reco as $B \to K^{*0} \rho^0$	$87.89 \pm 0.32\%$	-	$87.89 \pm 0.32\%$
$B^0 \to \rho^0 \rho^0$ ^{Long} reco as $B \to K^{*0} \rho^0$	$87.07 \pm 0.56\%$	$87.16 \pm 0.59\%$	$87.11 \pm 0.41\%$
$B^0 \to \rho^0 \rho^0$ ^{Trans} reco as $B \to K^{*0} \rho^0$	$87.42 \pm 0.41\%$	$86.66 \pm 0.57\%$	$87.15 \pm 0.33\%$
$B^0 \to K^{*0} \rho^0$ reco as $B \to \rho^0 \rho^0$	$87.48 \pm 0.44\%$	$87.58 \pm 0.35\%$	$87.54 \pm 0.28\%$
$B^0 \to K^{*0} \rho^0$ reco as $B \to K^{*0} K^{*0}$	$86.35 \pm 0.60\%$	$87.53 \pm 0.46\%$	$87.07 \pm 0.36\%$

To be redone with the proper configuration adapted to different runing conditions during 2011 and 2012

→ Split according to TCK 'categories'

EFFICIENCIES 3/4

- PID efficiencies

Use the PIDCalib tool to reweight track PID according to variables to which the DLL distribution is sensitive

→ Bining in momentum and pseudorapidity

$B \to \rho^0\rho^0$ All	Magnet Up	Magnet Down	Average
$\pi^- \to \pi^-$	$87.766 \pm 0.052\%$	$87.993 \pm 0.051\%$	$87.858 \pm 0.051\%$
$\pi^+ \to \pi^+$	$87.811 \pm 0.050\%$	$87.592 \pm 0.050\%$	$87.723 \pm 0.050\%$
$\rho^0 \to \rho^0$	$77.065 \pm 0.072\%$	$77.019 \pm 0.072\%$	$77.047 \pm 0.072\%$
$\pi^- \to \pi^-$	$88.364 \pm 0.050\%$	$89.048 \pm 0.049\%$	$88.639 \pm 0.049\%$
$\pi^+ \to \pi^+$	$88.704 \pm 0.051\%$	$89.182 \pm 0.047\%$	$88.897 \pm 0.049\%$
$\rho^0 \to \rho^0$	$78.304 \pm 0.072\%$	$79.317 \pm 0.069\%$	$78.712 \pm 0.070\%$
$\rho^0\rho^0 \to \rho^0\rho^0$	$60.350 \pm 0.107\%$	$61.044 \pm 0.104\%$	$60.629 \pm 0.106\%$
$4\pi \to K3\pi$	$1.438 \pm 0.071\%$	$1.416 \pm 0.066\%$	$1.429 \pm 0.069\%$

- PID efficiencies

$B \to K^{*0}\rho^0$	Magnet Up	Magnet Down	Average
$\pi^- \to \pi^-$	$88.099 \pm 0.051\%$	$89.272 \pm 0.047\%$	$88.816 \pm 0.048\%$
$\pi^+ \to \pi^+$	$88.406 \pm 0.049\%$	$88.979 \pm 0.048\%$	$88.756 \pm 0.049\%$
$\rho^0 \to \rho^0$	$77.892 \pm 0.070\%$	$79.455 \pm 0.068\%$	$78.847 \pm 0.068\%$
$\pi^- \to \pi^-$	$88.716 \pm 0.046\%$	$88.854 \pm 0.045\%$	$88.800 \pm 0.045\%$
$K^+ \to K^+$	$73.947 \pm 0.063\%$	$74.044 \pm 0.061\%$	$74.006 \pm 0.062\%$
$K^{*0} \to K^{*0}$	$65.853 \pm 0.071\%$	$66.057 \pm 0.069\%$	$65.977 \pm 0.070\%$
$K^{*0}\rho^0 \to K^{*0}\rho^0$	$51.155 \pm 0.100\%$	$52.415 \pm 0.097\%$	$51.925 \pm 0.096\%$
$K3\pi \to 4\pi$	$3.340 \pm 0.101\%$	$3.391 \pm 0.097\%$	$3.371 \pm 0.099\%$
$K3\pi \to K\pi K\pi$	$1.227 \pm 0.084\%$	$1.142 \pm 0.082\%$	$1.175 \pm 0.083\%$

$B \to K^{*0}K^{*0}$	Magnet Up	Magnet Down	Average
$K^- \to K^-$	$89.557 \pm 0.050\%$	-	$89.557 \pm 0.050\%$
$\pi^+ \to \pi^+$	$88.261 \pm 0.046\%$	-	$88.261 \pm 0.046\%$
$K^{*0} \to K^{*0}$	$79.110 \pm 0.066\%$	-	$79.110 \pm 0.066\%$
$\pi^- \to \pi^-$	$88.247 \pm 0.048\%$	-	$88.247 \pm 0.048\%$
$K^+ \to K^+$	$74.125 \pm 0.062\%$	-	$74.125 \pm 0.062\%$
$K^{*0} \to K^{*0}$	$65.561 \pm 0.071\%$	-	$65.561 \pm 0.071\%$
$K^{*0}K^{*0} \to K^{*0}K^{*0}$	$51.814 \pm 0.097\%$	-	$51.814 \pm 0.097\%$
$K\pi K\pi \to K3\pi$	$3.119 \pm 0.096\%$	-	$3.119 \pm 0.096\%$

Angular analysis

Amplitude in the V_1 rest frame

$$A(B \to V_1V_2) = A_0\varepsilon_1^{*L}\varepsilon_2^{*L} - \frac{A_\parallel}{\sqrt{2}}\vec{\varepsilon}_1^{*T}\cdot\vec{\varepsilon}_2^{*T} - i\frac{A_\perp}{\sqrt{2}}\underbrace{(\vec{\varepsilon}_1^{*T}\times\vec{\varepsilon}_2^{*T})\cdot\hat{p}}$$

Triple Product (TP) (Odd under T transformations)

$\vec{\varepsilon}_1, \vec{\varepsilon}_2$: Polarization vectors

$\hat{p}$: Unit vector along the direction of motion of V_2

$\varepsilon_i^{*L} \equiv \vec{\varepsilon}_i^{*} \cdot \hat{p}$

$\vec{\varepsilon}_i^{*T} = \vec{\varepsilon}_i^{*} - \varepsilon_i^{*L}\hat{p}$

Applying CP on $A(B \to V_1V_2)$:

opposite sign

$$A(\bar{B} \to \bar{V}_1\bar{V}_2) = \bar{A}_0\varepsilon_1^{*L}\varepsilon_2^{*L} - \frac{\bar{A}_\parallel}{\sqrt{2}}\vec{\varepsilon}_1^{*T}\cdot\vec{\varepsilon}_2^{*T} + i\frac{\bar{A}_\perp}{\sqrt{2}}(\vec{\varepsilon}_1^{*T}\times\vec{\varepsilon}_2^{*T})\cdot\hat{p}$$

(Amplitude for the CP-conjugated process)

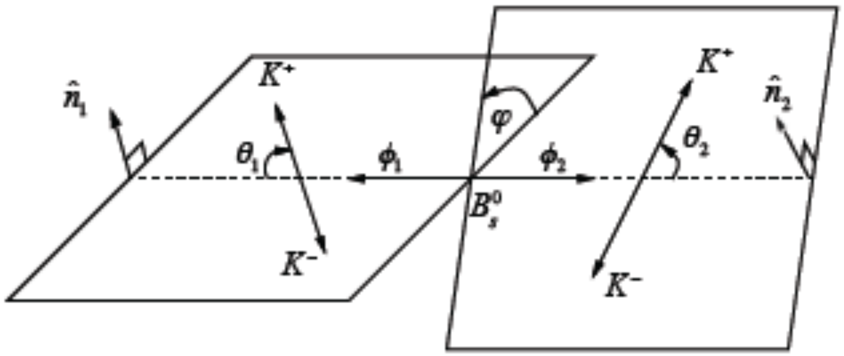
Triple product

$$V = sign(\cos\theta_1\cos\theta_2)\sin\varphi = sign(\cos\theta_1\cos\theta_2)(\hat{n}_1\times\hat{n}_2)\cdot\hat{p}_1$$

$$U = \frac{\sin 2\varphi}{2} = 2(\hat{n}_1\cdot\hat{n}_2)(\hat{n}_1\times\hat{n}_2)\cdot\hat{p}_1$$

$$A_V = \frac{N_V^+ - N_V^-}{N_V^+ + N_V^-} = -\frac{2\sqrt{2}}{\pi}\frac{\mathrm{Im}(A_\perp A_0^*)}{|A_0|^2+|A_\parallel|^2+|A_\perp|^2}$$

$$A_U = \frac{N_U^+ - N_U^-}{N_U^+ + N_U^-} = -\frac{4}{\pi}\frac{\mathrm{Im}(A_\perp A_\parallel^*)}{|A_0|^2+|A_\parallel|^2+|A_\perp|^2}$$



Decay amplitudes

$$A(B \to V_1V_2) = A_0\cos\theta_1\cos\theta_2 + \frac{A_\parallel}{\sqrt{2}}\sin\theta_1\sin\theta_2\cos\varphi + i\frac{A_\perp}{\sqrt{2}}\sin\theta_1\sin\theta_2\sin\varphi$$

$$\bar{A}(\bar{B} \to \bar{V}_1\bar{V}_2) = \bar{A}_0\cos\theta_1\cos\theta_2 + \frac{\bar{A}_\parallel}{\sqrt{2}}\sin\theta_1\sin\theta_2\cos\varphi - i\frac{\bar{A}_\perp}{\sqrt{2}}\sin\theta_1\sin\theta_2\sin\varphi$$

$$f_L = \frac{|A_0|^2}{|A_0|^2+|A_\parallel|^2+|A_\perp|^2}$$

$$f_\perp = \frac{|A_\perp|^2}{|A_0|^2+|A_\parallel|^2+|A_\perp|^2}$$

$$f_\parallel = \frac{|A_\parallel|^2}{|A_0|^2+|A_\parallel|^2+|A_\perp|^2}$$

FIT SIGNIFICANCE

Refit assuming no Bd or Bs peak (use NLL)

- Yields from crossfeeds are fixed

All peaks above 5σ