

Charmless - Progress report

- Last Meeting
 - Identified 160 papers
 - Identified ~8 virtual sub-sections + general introduction
 - Identified key physics topics
 - Identified overlap with other sections
 - Dalitz
 - Φ_1, Φ_2, Φ_3
 - Inclusive charmless decays

Example of table of papers

Decay	BABAR	Belle	\mathcal{B}	Dalitz	Decay	BABAR	Belle	\mathcal{B}	Dalitz
General 3B	[1]	[2]			$\omega (K^*, \rho, f_0(980))$	[98]	[99]		
General 2B/Q2B	[3]	[4–6]			$\omega (K^*, \rho, \omega, \phi, f_0(980))$	[100]			
General Dalitz	[7]				$K_S^0 (\omega, \eta', \pi^0)$	[101, 102]			
$a_1^\pm(1260) \pi^\pm$	[8, 9]				$\phi K_S^0 \pi^0, \phi K^+ \pi^-$	[103]			
$a_1^+(1260) K^0, a_1^-(1260) K^+$	[10]				$\phi K^+ \pi^-$	[104]			
$a_1^\pm(1260) \pi^0, a_1^0(1260) \pi^+$	[11]				ϕK^*	[105]	[106, 107]		
$a_1^\pm(1260) \pi^\mp$	[12, 13]				$\phi\phi, \phi\rho, \phi f_0(980), f_0(980) f_0(980)$	[108]			
$a_1^\pm(1260) \rho^\mp$	[14]				$\phi K_1^+, \phi K_2^{*\pm}$	[109]			
$a_0^+ \pi^0$	[15]				$\phi\phi K, \phi\phi K_s^0$	[110]	[111]		
$a_0 \pi, a_0 K, \eta\rho^0, \eta f_0(980)$	[16]				$\phi\pi^0, \phi\pi^+$	[112]			
$b_1 \rho$	[17]				ϕK_s^0	[87]	[38, 89, 113]		
$b_1 K^0, b_1^0 K^0, b_1 \pi^0$	[18]				$\rho^+ \rho^0$	[114, 115]	[116]		
$b_1 \pi, b_1 K$	[19]				$\rho^0 \rho^0$	[117–119]	[120]		
$\omega K, \omega\pi$	[20, 21]	[22–24]			$\rho^+ \rho^-$	[121, 122]	[123–125]		
$\eta\eta, \eta\eta'$	[25, 26]				$\rho\rho$	[126]			
$\eta\eta^+, \eta\eta', \eta' \pi^0, \omega\pi^0$	[27, 28]				$(\rho\pi)^0$	[127, 128]	[129–132]		
$\eta K^\pm, \eta\pi^\pm$	[21]				$\rho\pi$		[133]		
$\eta K, \eta\pi$		[29]			$\rho^+ \pi^0$	[134]	[135]		
$\eta K^*, \eta\rho$	[30]	[31, 32]			$\rho^+ K_s^0$	[136]			
$\eta K_s^0, \eta\eta, \eta' \eta', \eta\phi, \eta' \phi$	[33]				$\rho^0 K_s^0$	[137]			
$\eta\pi^+, \eta K^+, \eta\rho^+, \eta' \pi^+$	[34]				$\rho^0 K^+$		[81]		
$\eta' K, \eta'\pi$	[21]	[35–39]			$\rho^- K^+$		[76]		
$\eta' (\rho, K^*, \phi, \omega, \eta')$		[40]			$\rho^+ K^*$	[138]	[139]		
$\eta' K^*, \eta' \rho^+$	[41]				$\rho^0 K^+ \pi^-$		[140]		
$\eta' \eta' K$	[42]				$K^{*0} K$	[141]			
$K_S^0 \pi^0, K^0 \pi^0$	[43, 44]	[45]			$\bar{K}^{*0} K^{*+}$	[142, 143]			
$K^0 K^+, K^0 \bar{K}^0, K^0 \pi^+, K^0 K^0, K^+ \bar{K}^0$	[46, 47]	[48, 49]			$K^{*0} \chi_{c0}, K^{*+} \chi_{c0}$	[144, 145]			
$K^+ \pi^-$	[50, 51]	[52]			$K^{*0} \bar{K}^{*0}, K^{*0} K^{*0}$	[146]	[147]		
$\pi^+ \pi^-$	[51, 53]	[54–57]			$K^{*+} K^{*-}$	[148]			
$K\pi, \pi\pi$		[58–61]			$K^{*0} K^+ K^-, K^{*0} \pi^+ K^-, K^{*0} K^+ \pi^-, K^{*0} \pi^+ \pi^-$	[149]			
KK		[59, 61–63]			$K^{*+} K^+ K^-, K^{*+} \pi^+ K^-, K^{*+} K^+ \pi^-, K^{*+} \pi^+ \pi^-$	[150]			
$\pi^0 \pi^0, \pi^\pm \pi^0, K^\pm \pi^0$	[64, 65]	[66, 67]			$p \bar{p} K^{*0}$		[151]		
hh		[68]			$p \bar{p} K^+, p \bar{p} \pi^+$		[152]		
$K_S^0 \pi^- \pi^+$	[69–71]	[72, 73]			$p \bar{p}, \Lambda\bar{\Lambda}, p\bar{p}$		[153]		
$K_S^0 \pi^0 \pi^0$	[74]				$s\bar{s}$		[154]		
$K^\pm \pi^\mp \pi^0$	[75]	[76]							
$K^+ K^- \pi^+$	[77]								
$K^+ \pi^- \pi^-, K^- K^- \pi^+$	[78]								
$K^\pm \pi^\mp \pi^\pm$	[79, 80]	[81, 82]							
$K^+ K^- K^+$	[83]	[82]							
$\chi_{c0} K^+$		[84]							
$K^+ K^- K_S^0$	[85–87]	[38, 88, 89]							
$K_S^0 K_S^0 (\pi^0, \eta, \eta')$	[90]								
$K_S^0 K_S^0 \pi^+$	[91]								
$K_S^0 K_S^0 K_S^0$	[92, 93]	[94, 95]							
$\pi^+ \pi^+ \pi^-$	[96, 97]								

Table 1: Charmless two- and three-body decays Part I.

Progress over the summer

- Over the summer
 - Read the first 50 papers from three sub-sections (a_n / $b_n + X$, $\eta/\omega + X$, $\varphi + X$)
 - Extracted the key motivations
 - Identified common experimental strategies and features.
 - Left summarising results to later (just book-keeping)
 - Still in the form of notes.
 - Hope to have a draft in next 3 weeks.
 - Then aim to update every two weeks

Table of symbols

BB	$B\bar{B}$	Bz	B^0	Bzb	\bar{B}^0
BzBzb	$B^0\bar{B}^0$	Bp	B^+	Bm	B^-
Bpm	B^\pm	Bmp	B^\mp	Bs	B_s
Bsb	\bar{B}_s	BsBsb	$B_s\bar{B}_s$	jpsi	J/ψ
psitwos	$\psi(2S)$	psiprpr	$\psi(3770)$	etac	η_c
chiczero	χ_{c0}	chicone	χ_{c1}	chictwo	χ_{c2}
chic{n}	χ_{cn}	OneS	$\Upsilon(1S)$	TwoS	$\Upsilon(2S)$
ThreeS	$\Upsilon(3S)$	FourS	$\Upsilon(4S)$	FiveS	$\Upsilon(5S)$
NS	$\Upsilon(nS)$	proton	p	antiproton	\bar{p}
neutron	n	antineutron	\bar{n}	X	X
BR	\mathcal{B}	BRtauptoe	$\mathcal{B}(\tau^+ \rightarrow e^+)$	BRtaumtoe	$\mathcal{B}(\tau^- \rightarrow e^-)$
BRtauptomu	$\mathcal{B}(\tau^+ \rightarrow \mu^+)$	BRtaumtomu	$\mathcal{B}(\tau^- \rightarrow \mu^-)$	etaprep	$\eta' \rightarrow \eta\pi^+\pi^-$
etaprrg	$\eta' \rightarrow \rho^0\gamma$	bpsiks	$B^0 \rightarrow J/\psi K_s^0$	bpsikst	$B^0 \rightarrow J/\psi K^*$
bpsikl	$B^0 \rightarrow J/\psi K_L^0$	bpsiX	$B^0 \rightarrow J/\psi X$	Bzbtomu	$\bar{B}^0 \rightarrow \mu X$
Bzbtox	$\bar{B}^0 \rightarrow X$	Bztopipi	$B^0 \rightarrow \pi^+\pi^-$	Bztokpi	$B^0 \rightarrow K^\pm\pi^\mp$
Bztorhopi	$B^0 \rightarrow \rho^+\pi^-$	Bztorhorho	$B^0 \rightarrow \rho\rho$	Bztokrho	$B^0 \rightarrow K\rho$
Bztokstpi	$B^0 \rightarrow K^*\pi$	Bztopi	$B^0 \rightarrow a_1\pi$	Bztodd	$B^0 \rightarrow D^+D^-$
Bztodstd	$B^0 \rightarrow D^{*+}D^-$	Bztodstdst	$B^0 \rightarrow D^{*+}D^{*-}$	BtoDK	$B \rightarrow DK$
Btodstlnu	$B \rightarrow D^*\ell\nu$	Btodstlnu	$B \rightarrow D^*(D)\ell\nu$	Btorholnu	$B \rightarrow \rho\ell\nu$
Btopilnu	$B \rightarrow \pi\ell\nu$	Btoetah	$B \rightarrow \eta h$	Btoetaph	$B \rightarrow \eta'h$
Betaprks	$B^0 \rightarrow \eta'K_s^0$	Betaprkz	$B^0 \rightarrow \eta'K^0$	btolnu	$B^\pm \rightarrow \ell^\pm\nu$
btoenu	$B^\pm \rightarrow e^\pm\nu$	btomunu	$B^\pm \rightarrow \mu^\pm\nu$	btotaunu	$B^\pm \rightarrow \tau^\pm\nu$
btosgam	$b \rightarrow s\gamma$	btodgam	$b \rightarrow d\gamma$	btosll	$b \rightarrow s\ell^+\ell^-$
btosnumu	$b \rightarrow s\nu\bar{\nu}$	btosgaga	$b \rightarrow s\gamma\gamma$	btosglue	$b \rightarrow sg$
upsbb	$\Upsilon(4S) \rightarrow B\bar{B}$	upsbzbz	$\Upsilon(4S) \rightarrow B^0\bar{B}^0$	upsbpbm	$\Upsilon(4S) \rightarrow B^+\bar{B}^-$
tauptoe	$\tau^+ \rightarrow e^-\nu\bar{\nu}$	taumptoe	$\tau^- \rightarrow e^-\nu\bar{\nu}$	tauptomu	$\tau^+ \rightarrow \mu^+\nu\bar{\nu}$
taumtomu	$\tau^- \rightarrow \mu^-\nu\bar{\nu}$	tauptopi	$\tau^+ \rightarrow \pi^+\bar{\nu}$	taumtopi	$\tau^- \rightarrow \pi^-\nu$
taumg	$\tau^\pm \rightarrow \mu^\pm\gamma$	taueg	$\tau^\pm \rightarrow e^\pm\gamma$	taulg	$\tau^\pm \rightarrow \ell^\pm\gamma$
taueee	$\tau^\pm \rightarrow e^\pm e^+e^-$	taummm	$\tau^\pm \rightarrow \mu^\pm\mu^+\mu^-$	tauemmm	$\tau^\pm \rightarrow e^\pm\mu^+\mu^-$
taumee	$\tau^\pm \rightarrow \mu^\pm e^+e^-$	taulh	$\tau^\pm \rightarrow \ell^\pm h^0$	ggtopi	$\gamma\gamma \rightarrow \pi^+\pi^-$
ggtopiz	$\gamma\gamma \rightarrow \pi^0\pi^0$	ptot	p	pxy	p_T
pt	p_T	mes	m_{ES}	mec	m_{EC}
DeltaE	ΔE	pbcm	p_{B^0}	mphi	ϕ
mtheta	θ	ctheta	$\cos\theta$	tev	TeV
gev	GeV	mev	MeV	kev	keV
ev	eV	gevc	GeV/c	mevc	MeV/c
gevcc	GeV/c^2	mevcc	MeV/c^2	syn	"
inch	in	ft	ft	km	km
m	m	cm	cm	mm	mm
mum	μm	nm	nm	fm	fm
picom	pm	cma	cm^2	mma	mm^2
muma	μm^2	barn	b	barnhyp	-b
mbarn	mb	mbarnhyp	-mb	nb	nb
pb	pb	fb	fb	ab	ab
invnb	nb^{-1}	invpb	pb^{-1}	invfb	fb^{-1}
invab	ab^{-1}	mus	μs	ns	ns
ps	ps	fs	fs	gm	g
sec	s	ms	ms	mus	μs
ns	ns	ps	ps	eg	e.g.
etc	etc.	Xrad	X_0	NIL	λ_{int}

belle	Belle	lbabar	BABAR	babar	BABAR
superb	SuperB	sff	Super Flavour Factory	lhcb	LHCb
pep2	PEP-II	BF	<i>B</i> Factory	abf	asymmetric <i>B</i> Factory
electron	e	en	e^-	ep	e^+
epm	e^\pm	epem	e^+e^-	ee	e^-e^-
mmu	μ	mup	μ^+	mun	μ^-
mumu	$\mu^+\mu^-$	mtau	τ	taup	τ^+
taum	τ^-	tautau	$\tau^+\tau^-$	ellm	ℓ^-
ellp	ℓ^+	ellell	$\ell^+\ell^-$	nub	$\bar{\nu}$
numub	$\nu\bar{\nu}$	nue	ν_e	nueb	$\bar{\nu}_e$
numneub	$\nu_e\bar{\nu}_e$	num	ν_μ	numb	$\bar{\nu}_\mu$
numnumb	$\nu_\mu\bar{\nu}_\mu$	nut	ν_τ	nutb	$\bar{\nu}_\tau$
nutnub	$\nu_\tau\bar{\nu}_\tau$	nul	ν_ℓ	nulb	$\bar{\nu}_\ell$
nulnulb	$\nu_\ell\bar{\nu}_\ell$	g	γ	gaga	$\gamma\gamma$
ggstar	$\gamma\gamma^*$	ega	$e\gamma$	game	γe^-
epeng	$e^+e^- \gamma$	H	H^0	Hp	H^+
Hm	H^-	Hpm	H^\pm	W	W
Wp	W^+	Wm	W^-	Wpm	W^\pm
Z	Z^0	q	q	qbar	\bar{q}
qqbar	$q\bar{q}$	u	u	ubar	\bar{u}
uubar	$u\bar{u}$	d	d	dbar	\bar{d}
ddbar	$d\bar{d}$	s	s	sbar	\bar{s}
ssbar	$s\bar{s}$	c	c	cbar	\bar{c}
ccbar	$c\bar{c}$	b	b	bbar	\bar{b}
bbbar	$b\bar{b}$	t	t	tbar	\bar{t}
ttbar	$t\bar{t}$	ccbars	$c\bar{c}s$	piz	π^0
pizs	$\pi^0 s$	ppz	$\pi^0\pi^0$	pip	π^+
pim	π^-	pipi	$\pi^+\pi^-$	pipm	π^\pm
pimp	π^\mp	kaon	K	Kb	\bar{K}
Kz	K^0	Kzb	\bar{K}^0	KzKzb	$K^0\bar{K}^0$
Kp	K^+	Km	K^-	Kpm	K^\pm
Kmp	K^\mp	KpKm	K^+K^-	KS	K_s^0
KL	K_L^0	Kstarz	K^{*0}	Kstarzb	\bar{K}^{*0}
Kstar	K^*	Kstarb	\bar{K}^*	Kstarp	K^{*+}
Kstarm	K^{*-}	Kstarpm	$K^{*\pm}$	Kstarmp	$K^{*\mp}$
etapr	η'	azero	a_0	azeroz	a_0^0
azerop	a_0^+	azerom	a_0^-	azeropm	a_0^\pm
aone	$a_1(1260)$	aonez	$a_1^0(1260)$	aonep	$a_1^+(1260)$
aonem	$a_1^-(1260)$	aonepm	$a_1^\pm(1260)$	bone	b_1
bonez	b_1^0	bonep	b_1^\pm	bonem	\bar{b}_1^-
bonepm	b_1^\pm	rholz	ρ^0	rhop	ρ^+
rhom	ρ^-	rhomp	ρ^\pm	rhomp	ρ^\mp
fz	$f_0(980)$	Db	\bar{D}	Dz	D^0
Dzb	\bar{D}^0	DzDzb	$D^0\bar{D}^0$	Dp	D^+
Dm	D^-	Dpm	D^\pm	Dmp	D^\mp
DpDm	D^+D^-	Dstar	D^*	Dstarb	\bar{D}^*
Dstarz	D^{*0}	Dstarzb	\bar{D}^{*0}	Dstarp	D^{*+}
Dstarm	D^{*-}	Dstarpm	$D^{*\pm}$	Dstarmp	$D^{*\mp}$
Ds	D_s^+	Dsb	\bar{D}_s^+	Dss	D_s^{++}
dstrstr	D^{**}	B	B	Bb	\bar{B}

Table 1: Major symbols defined in plb.symbols.tex