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$B_s \to \bar{D}^0 \bar{K}^0 X$, $D^- K^- X^{++}$ } Fiërz rearrangement needed?

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Estimates of Decay Branching Ratios for Hadrons Containing Charm and Bottom Quarks

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I. Introduction

With increasing samples of F, D, B, ..., there will come the possibility of discovery of more exotic species of hadrons containing c and b quarks, e.g. $b\bar{c}$, ssc, ccu, ccc, bcs, ... In order to search for these, it is useful to anticipate their decay modes and branching fractions. This note attempts to do this via an unsophisticated, common-sense approach. Our output is a set of (theoretical) "Rosenfeld tables" of lifetimes and Cabibbo allowed branching fractions of hadrons containing c and b quarks. How the tables are generated will be described as we go along.

II. Charm Decays

A. D^+ decay

A lot is known about this particle. We don't make use of this information here, and in the end compare with the data to get an idea of how accurately we do.

1) Lifetime

The spectator model should work best for D^+ (i.e. $c\bar{d} \to (su\bar{d})\bar{d}$). We take a lifetime $\tau \sim 9 \times 10^{-13}$ sec, consistent with the spectator model.

2) Semileptonic Branching Ratios

With no nonleptonic enhancements, we expect

$$e\nu/\mu\nu/u\bar{d} = 1/1/3$$

We assume (in general for charm decays) that the final hadrons are in the ground-state hyperfine multiplet, in this case either 0^- (K) or 1^- (K^*). We choose to favor K^* over K out of gut instinct (M1 weak transitions are robust).

3) Nonleptonic Branching Ratios

We assume

$$\frac{\Gamma\,(D^+ \rightarrow K^- + ...)}{\Gamma\,(D^+ \rightarrow \bar{K}^0 + ...)} = 1$$

This assumption will be generalized throughout; different charge states of interesting final-state particles (i.e. K's, baryons; not pions) are given equal weight in the inclusive spectra.

In partitioning out the exclusive channels we adopt the following procedure. (This will be generalized to all charmed hadrons)

i) Add enough π^+ or π^- to balance the charge in the decay, i.e.

$$D^+ \rightarrow K^-\pi^+\pi^+ + ... \quad \text{(branching ratio = 30\%)}$$
$$D^+ \rightarrow \bar{K}^0\pi^+ + ... \quad \text{(branching ratio = 30\%)}$$

We call these enumerated final-state particles "significant."

ii) Estimate a residual Q value for the additional pions (represented by the three dots) as follows

a) <u>Assign</u>:	for each pion	400 MeV
	for each kaon	600 MeV
	for each nucleon	1000 MeV
	for each Λ	1170 MeV
	for each Σ	1250 MeV

b) Subtract the assigned energy of each of the significant particles from the parent-particle rest energy to get the Q value. Thus

for $D^+ \rightarrow K^- \pi^+ \pi^+ + ...$ $\qquad Q \cong 470$ MeV
for $D^+ \rightarrow \bar{K}^0 \pi^+$ $\qquad Q \cong 870$ MeV

iii) Distribute all the additional pions according to a single Poisson distribution, with

$$< \bar{n} > = \frac{Q}{400 \text{MeV}}$$

iv) For a given multiplicity n of additional pions, apportion the charge states according to the following recipe:

n =0	(no additional pions)	
1	(one π^0)	
2	$\pi^+\pi^-$	60%
	$\pi^0\pi^0$	40%
3	$\pi^+\pi^-\pi^0$	70%
	$\pi^0\pi^0\pi^0$	30%
4	$\pi^+\pi^+\pi^-\pi^-$	35%
	$\pi^+\pi^-\pi^0\pi^0$	55%
	$\pi^0\pi^0\pi^0\pi^0$	10%
5	$\pi^+\pi^+\pi^-\pi^-\pi^0$	30%
	$\pi^+\pi^-\pi^0\pi^0\pi^0$	65%
	$\pi^0\pi^0\pi^0\pi^0\pi^0$	5%
6	$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	20%
	$\pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$	50%
	$\pi^+\pi^-\pi^0\pi^0\pi^0\pi^0$	25%
	$\pi^0\pi^0\pi^0\pi^0\pi^0\pi^0$	5%

The Poisson probabilities

$$P_n = \frac{\bar{n}^{\,n}\, e^{-\bar{n}}}{n!}$$

weighted by these fractions, are plotted versus $\bar{n}$ in Fig. 1.

The weights assigned to the charge states somewhat favor π^0 over $\pi^{\pm}$. This evidently is negotiable. The above algorithm is in general rather arbitrary looking. Our only justification is that we have looked at some alternatives, and they seem to be less reasonable.

4) Discussion of the "Rosenfeld Table"(Appendix):

The above information allows generation of the information in the Rosenfeld table. We divide the nonleptonic modes into two classes, those without π^0, and all others. We also classify the fraction of decays into one-prong, three-prong, etc., as well as the fraction "accessible", i.e. with no missing neutral pions.

In parentheses are shown the observed branching fractions. The agreement is not impressive. But it is not terrible either. Results should not be trusted to better than a factor of two.

B. D^0 Decay

Here there is a "capture" (W-exchange) mechanism, allowing c to annihilate its companion $\bar{u}$ into $s\bar{d}$. Presumably this kind of thing accounts for its shorter lifetime. In general, if capture is allowed we will diminish the lifetime from 9×10^{-13}sec to 4×10^{-13}sec. without changing the semileptonic partial width. Therefore the semileptonic branching ratios go down from 20% to 9%.

Note that for the D^0 the values of $\bar{n}$ increases, leading to a plethora of nonleptonic final states and smaller branching ratios.

C. F^+ Decay

Again there is a capture mechanism $c\bar{s} \rightarrow u\bar{d}$ and we assign 3×10^{-13}sec as the lifetime. For this particle, there are several judgement calls to make, e.g.

i)For semileptonic decays, what are the final states of the $s\bar{s}$ system? We choose η, η', $K\bar{K}$, ϕ. We must also not forget the pure leptonic $\tau\nu_\tau$ mode!!

ii)Where do the $s\bar{s}$ quarks go in the nonleptonic final states? We take the partitions

$F \to KKX$	15%
ηX	15%
ϕX	15%
$\eta' X$	10%

iii) What fraction of nonleptonic final states do <u>not</u> contain $s\bar{s}$ (because of the annihilation mechanism)? We take

$$F \to X \quad 30\%$$

Amongst the decay channels with decent branching ratios we find some familiar ones, such as $K^+K^-\pi^+$(2%) and $\phi\pi^+$(4%). The channels $\pi^+\pi^+\pi^-$(3%) and $\pi^+\pi^+\pi^+\pi^-\pi^-$(2.5%) look attractive as well. Also a nice one is $KK^-\pi^+\pi^+$(3%). To go much further appears to require good η detection.

D. <u>Λ_c Decay</u>

The Λ_c (cud) can undergo a capture reaction $cd \to su$, and we assume a short lifetime of 3×10^{-13}sec. Because for capture the final s and u quarks have rather large momenta relative to the spectator u quark and to each other, we believe it likely that for this mechanism the final baryon will be a nucleon.

For the spectator decay mechanism, the spectator diquark has I=0; it matches best to final-state nucleon or Λ rather than Σ. We assume for the nonleptonic processes

$\Lambda_c \to$	NKX	50%
	ΛX	25%
	ΣX	10%

For semileptonic final states, we take equal probability for N and Λ, and neglect Σ.

E. Decay of $(usc)^+$, i.e. A^+

This configuration allows no capture mechanism; hence we choose a lifetime of 9×10^{-13}sec. In semileptonic decays the final ssu system can find itself in Ξ, ΛK, or ΣK final states. We partition these (rather arbitrarily) in the ratio 2/1/1. Similarly, in the nonleptonic decays, we choose

$A^+ \to$	ΞX	30%
	$\Lambda\bar{K}$X	10%
	ΣKX	15%
	NKKX	5%

The promising decay modes seem to be $\Xi^-\pi^+\pi^+$ (7.5%) and, not surprisingly (?!), the discovery mode $\Lambda K^-\pi^+\pi^+$ (4%). The $\Xi^0\pi^+$ (3%) and $\Xi^0\pi^+\pi^+\pi^-$ (3%) modes look decent as well - assuming Ξ^0 is easy to detect.

F. Decay of $(csd)^0$, i.e. A^0

This configuration is quite distinct from A^+, inasmuch as it allows a capture mechanism cd $\to$ su; hence the lifetime and mix of final states should be in analogy to Λ_c^+. We take, therefore, the

lifetime to be 3×10^{-13} sec. The mix of semileptonic final states is the same as for A^+: $\Xi/\Lambda K/\Sigma K = 2/1/1$. However for the nonleptonics we choose

$A^o \rightarrow$	ΞX	25%
	ΛKX	20%
	ΣKX	20%
	$NKKX$	20%

Promising decay modes appear to be $\Lambda K^-\pi^+$ (5%), $\Sigma^-K^-\pi^+\pi^+$ (3%), and $pK^-K^-\pi^+$ (3%).

G. Decay of T^o (ssc)

For this interesting baryon, the spectator model should apply, and we take a lifetime of 9×10^{-13} sec, and a mix of final-state baryons similar to what was chosen for A^+ (usc). For semileptonics we take $\Omega/\Xi K = 2/1$. For nonleptonics, we assume

$T^o \rightarrow$	ΩX	30%
	ΞKX	20%
	ΛKKX	10%

It is tempting to consider NKKKX as well; at least a search for the mode $pK^-K^-K^-\pi^+\pi^+$ might be well-advised!!

In addition to the discovery (??) mode $\Xi^-K^-\pi^+\pi^+$ (5%), favorable channels include Ω^- + all charged (12%), and perhaps $\Lambda K^oK^-\pi^+$ (6%). The mode $\Lambda K^-K^-\pi^+\pi^+$ (1%) is a long shot.

H. Decay of $(ccu)^{++}$

This doubly charged stable hadron would be wonderful to see (literally; four times minimum ionization!). The spectator mechanism should dominate; however, since either c can decay, the lifetime is cut in half. We take 5×10^{-13} sec. The semileptonic branching ratio is still 40%.

The final states will be rich in A^+ (cus) and A^0 (cds), along with $D\Lambda$, $D^*\Lambda$, $K\Lambda_c$, etc. In addition, we can expect considerable amounts of $J=3/2$ $A^* \rightarrow A + \pi$. (The expected hyperfine splitting is ~ 200 MeV)

There is also <u>another</u> $J=1/2$ cus, cds doublet (the analogue of Σ^0, Λ^0 in the SU(4) <u>20</u> multiplet) sometimes called S; this pair is expected to be ~ 100 MeV in mass above the A's and decay radiatively to them. We shall, in this case and hereafter, <u>not</u> distinguish between excited hyperfine states of charmed baryon <u>or</u> meson systems, but <u>assume</u> that these radiative <u>or</u> pionic decays are incorporated into the quoted fractions.

Thus	A	stands for	A
			$(A^* \rightarrow A\gamma)$ $J=1/2$
			$(A^* \rightarrow A\pi)$ $J=3/2$
	D	stands for	D
			$D^* \rightarrow D\pi$, $D\gamma$

Note that 2 prongs dominate the $(ccu)^{++}$ decays; this is an interacting "active target" (emulsion, streamer chamber, scintillating fibers, etc.) signature: 4 x <u>minimum</u> $\rightarrow$ 2 x <u>minimum</u>.

We partition semileptonic decays as follows

$$A/D\Lambda/D\Sigma/K\Lambda_c = 6/3/1/2$$

Nonleptonic decays go according to a pattern similar to A^+ and T^0:

(ccu) $\rightarrow$	AX	30%
	ΛDX	10%
	ΣDX	10%
	Λ_cKX	10%

Interesting final states include A^+ + charged π's (6%), $A^0\pi^+\pi^+$ (8%), and $D^0\Lambda\pi^+\pi^+$ (5%), and $\Lambda_c K^-\pi^+\pi^+$ (5%).

J. Decay of $(ccd)^+$

This decay allows the capture-mechanism cd → su from either c-quark; hence we may expect this baryon to have half the lifetime of the Λ_c. We take $\tau = 1.5 \times 10^{-13}$ sec. The total semileptonic branching fraction, however, is the same as that of Λ_c, namely ~ 15%.

For semileptonic decays the final state partitions are taken the same as for $(ccu)^{++}$. However the capture mechanism should suppress Λ's in the nonleptonic final state, and the D$\bar{K}$N final state should also be included. We choose the partitioning into nonleptonic final states as follows

$(ccd)^+$	→	ΛX	30%
		DΛX	30%
		DΣX	20%
		$K\Lambda_c X$	15%
		DN$\bar{K}$X	10%

Favorable decay channels, other than Λ + all charged (8% in toto) appear to be $D^0\Lambda\pi^+$ (8%), $D^+\Lambda$ (3%), $D^+\Lambda\pi^+\pi^-$ (2%), $D^+pK^-\pi^-$ (2%), and $\Lambda_c K^-\pi^+$ (3%).

K. Decay of $(ccs)^+$

The spectator model should apply here; hence we take a lifetime of 5×10^{-13} sec and total semileptonic branching ratio of 40%. The partition among semileptonic final states is taken to be

$$T(ssc)/D\Xi/K\Lambda(qsc) = 2/1/1$$

The nonleptonic decays are given the partition

(ccs)	$\rightarrow$	TX	25%
		ΞDX	10%
		ΛKX	15%
		Λ_cKKX	10%

Note that the J=3/2 $T^* \rightarrow T + \gamma$ included in what we call T. The T^* - T mass splitting is expected to be ~ 80 MeV.

Interesting nonleptonic final state modes include T^0 + all charged (9.5%), $\Xi^- D^0 \pi^+ \pi^+$ (2%), $\Lambda^0 K^- \pi^+ \pi^+$ (4%), and $\Lambda_c^+ K^0 K^- \pi^+$ (7%).

L. <u>Decay of $(ccc)^{++}$</u>

This most elegant of the charmed baryons is of marginal accessibility, but would be a most impressive state to observe. The spectator mechanism evidently should dominate, and we take a lifetime of 3×10^{-13}sec. and total leptonic branching fraction of 40%. Doubly charmed baryons should dominate the final states; we take a partition for semileptonics of

$$(ccs)/(ccu)/(ccd) = 3/1/1$$

For nonleptonics, we include token amounts of DA. DDA final states are barely above threshold, and probably can be safely ignored. We take for the nonleptonic partition

$(ccc)^{++}$	$\rightarrow$	$(ccs)^+$X	35%
		$(ccu)^{++}$KX	10%
		$(ccd)^+$KX	10%
		ADX	5%

Favorable nonleptonic modes include $(ccs)^+$ + all charged (12%), $(ccu)^{++} K^- \pi^+$ (2.5%), and $(ccd)^+ K^- \pi^+ \pi^+$.

III. B - Decays

A. General Remarks

An easy model for B-decays seems to work in interpreting CESR data on B-meson decays. Not only is the "spectator" model expected to be dominant (corrections will be discussed later), but a "factorization" approximation seems to be reasonable as well. By factorization (Fig. 2) we mean that for nonleptonic decays, we replace the lepton pair by a quark pair ($\bar{u}d$ or $\bar{c}s$) which fragments into hadrons independently of the c-quark and the spectator quarks present in the parent hadron.

The $\ell^+\nu_\ell$ mass distribution from semileptonic b-decay is straightforward to calculate, and is exhibited in Fig. 3. The M^2 distribution is essentially a quarter of a circle, with endpoint at $M^2 \sim 10$ GeV^2. When the $\ell\nu_\ell$ is replaced by $\bar{u}d$, the final hadron system in the rest frame of the $u\bar{d}$ pair will be an isotropic distribution of pions.

Taking

$$\bar{n} = \frac{M_{\bar{u}d}}{400 MeV}$$

as before gives a reasonable charged multiplicity (e.g. $\bar{n}_{ch} = 5$ at the ψ mass), although perhaps a little on the high side. This $u\bar{d}$ system will hereafter be called the "virtual W".

The c-quark from the b-decay is assumed to fragment only into D and D^*. If the virtual-W system has low mass, the c-quark will have relatively high momentum (~ 2 GeV), and it may not easily combine with the spectator system into a ground state hadron containing hadron quantum numbers. Nevertheless the c-quark is only semirelativistic ($\gamma \lesssim 1.5$), so that it need not generate a jet of $q\bar{q}$ pairs in its own hadronization.

All this defines an easy phenomenology. The first problem is to estimate the pion multiplicities associated with the $\bar{u}d$ "virtual W". We divide the "W" masses into five bands centered at 0.8, 1.3, 1.9, 2.4, and 2.8 GeV; for each interval we compute $\bar{n}$ and distribute pions according to our Poisson distributions, finally collecting together the decay modes in Table I (Appendix). While multipion final states are prevalent, they are not overwhelmingly dominant. We see that ~ 25% of the "W" final states contain no missing π^0's, and that the mean charged "W" multiplicity is 2.9. We note that CESR quotes

$$B \to D,\ D^* + (\langle n_{ch}\rangle = 3.4) \qquad \text{Nonleptonic}$$

$$B \to D,\ D^* + (\langle n_{ch}\rangle = 0.2) + \ell\bar{\nu}_\ell \quad \text{Semileptonic}$$

implying an experimental "W" charged multiplicity ≈ 3.2.

Thus far we have neglected less common, but very significant final states. On the semileptonic side there is $b \to c\tau\bar{\nu}_\tau$, suppressed by phase space by a factor ~ 3 relative to the $ce\bar{\nu}_e$ or $c\mu\bar{\nu}_\mu$ channels. Nonleptonically, the $c\bar{c}s$ final configuration is also suppressed relative to $c\bar{u}d$ by a factor 3. We take the fractions to be

$b \to ce\bar{\nu}_e$	16%
$c\mu\bar{\nu}_\mu$	16%
$c\tau\bar{\nu}_\tau$	5%
$c\bar{u}d$	48%
$c\bar{c}s$	16%

The mass-distribution for virtual $W \to c\bar{s}$ is shown in Fig. 3. The lowest 20% of the mass distribution is dominated by F and F^*; higher up there should be a strong D, D^* + K, K^* component. We take

$c\bar{s} \to F$	20%
FX	40%
DKX	40%

In the above and hereafter we do not diminish $\bar{F}$ from F^* nor D from D^*.

Finally we note the rare but important mode

$$b \to s\psi$$

with 1% observed branching ratio. The residual s-quark has a momentum of ~ 1.6 GeV in the laboratory frame. This implies (for B_u or B_d) a mass of the residual $s\bar{q}$ system ~ 1100±500 MeV. This implies the mean number of additional pions is rather small ($\bar{n}$ ~ 1.3±1.3) and reasonably large exclusive branching fractions (relative to $b \to \psi$ + all) can be expected.

B. Decay of B_u^+

Nomenclature for B's is miserable, but we don't fight it: $B_u^+ = \bar{b}u$. The spectator system is taken to be 80% $\bar{D}^0X$ with a Q-value of 300 MeV ($\bar{n}$ = 0.7). We also admix 20% $D^-\pi^+X$. The table can be instantly constructed from the preceding material. Recall that D and D^* are not distinguished here; a D^*/D ratio of 2±1 is a reasonable choice.

We see that favorable nonleptonic search modes include $\bar{D}^0$ + all charged (11.5%) and $\bar{D}^0F^+$ + all charged (4.5%). Of the final states containing ψ, the modes ψ + all charged (0.2%) and $\psi K^0\pi^+$ (0.35%) are "accessible".

C. Decay of B_d^0

This meson, potentially important for CP violation and mixing studies, can decay via "capture": $\bar{b}d \to \bar{c}u$. Relative to the D^0, this effect should be of diminished importance. Spectator decay widths scale roughly as $(\text{Q-value})^5$, while capture goes as $(\text{Q-value})^3$. For spectator decays, e.g. B^+ and D^+, we have

$$\Gamma(D^+) \approx \Gamma(B^+) = \left(\frac{Q_B}{Q_D}\right)^5 |V_{bc}|^2\ \Gamma(D^+)$$

Taking $|V_{bc}|^2 \sim 5\%$, this gives

$$\left(\frac{Q_B}{Q_D}\right)^5 \approx 20$$

and for the suppression-factor.

$$\left(\frac{Q_D}{Q_B}\right)^2 \approx (0.3)$$

However, the capture also depends upon $|\psi(0)|^2$, the square of the wave function at the origin which probably increases somewhat in going from D to B (we take 25%). This leads to the estimate

	Charm	Bottom
Spectator width	$10^{12}sec^{-1}$	$10^{12}sec^{-1}$
Capture width	$1.5x10^{12}sec^{-1}$	$.55x10^{12}sec^{-1}$
Total $D^o(B^o)$width	$2.5x10^{12}sec^{-1}$	$1.55x10^{12}sec^{-1}$
Lifetime	$4x10^{-13}sec$	$6.5x10^{-13}sec$

We round off to $7x10^{-13}$sec. (The message here is not that capture effects <u>are</u> this important in B-decays, but that they <u>may</u> be important)

Final states from the capture mechanism are emergent from a "two jet" $c\bar{u}$ system; essentially D + jet of pions. A rough estimate gives a mean pion multiplicity $\bar{n} \sim 5\pm1$. We assign the total semileptonic branching fraction to be 25% and give 30% of the total width to the capture process. Note that the multiplicity from the $\bar{u}$ jet is different than from "fragmentation" of a low-mass "virtual W" $\bar{u}d$ system; it is bigger!

The favorable nonleptonic search modes are similar to B_u^+; D^o + all charged (4.5%), D^- + all charged (9.5%), and D^-F^+ + all charged (2.5%). The $\phi K^+\pi^-$ mode (0.35%) looks especially nice.

D. Decay of B_s^0

There does exist a capture mechanism $\bar{b}s \rightarrow \bar{c}c$ for this mode, but phase-space and dynamical suppression probably makes it less consequential than for B_d, as far as overall lifetime is concerned. We give it an overall branching ratio of 5%, just for the record. The remainder of the phenomenology closely follows that of the B_u^+. While the F^- final states presumably dominates both semileptonic and nonleptonic decays (according to "factorization") there may still be a significant fraction of $\bar{D}K$ as well. We assign 20% to these modes.

Note no DD + π's are included in the table, despite an assumed 5% total branching ratio. This is because the Q-value is so high that no single mode has a branching fraction $\gtrsim 0.5\%$. Favorable nonleptonic search modes include F^- + all charged (9%) and (?) F^-F^+ (2.5%). Decays into ψ + all charged (0.1%) and ψK_s + all charged (.15%) are available for studies of mixing and/or CP violation.

E. Decay of B_c^+

This difficult meson is an average of ψ and Υ. Either b or c can decay via spectator mechanisms, and in addition there is a capture mechanism $\bar{b}c \rightarrow u\bar{d}$, $c\bar{s}$. We assign a lifetime of 4×10^{-13}sec, with 10% of the total width allocated to capture. The semileptonic branching ratio is ~ 40%, with partition as follows

$$B_s/B_uK/B_dK/DD/\eta_c/\psi = 6/1/1/4/2/2$$

Factorization then determines the remaining nonleptonic modes.

The B_c^+ has a pure leptonic $\tau\nu_\tau$ mode which may be suppressed considerably by helicity conservation. The estimated width is

$$\frac{\Gamma(b\bar{c} \rightarrow \tau\nu_\tau)}{\Gamma(c\bar{s} \rightarrow \tau\nu_\tau)} = \frac{|F_{bc}|^2}{|F_{cs}|^2}\left(\frac{M_B}{M_F}\right) \quad |V_{bc}|^2$$

$$= (5 \pm 3?) x (3.1) x (.05)$$

$$= 0.8 \pm 0.5$$

For the F, the estimated branching ratio is 2%. Here we take 1.5%. (This estimate also looks in line with what we have taken for the nonleptonic capture (i.e. annihilation) mechanism.

We note that ~ 8% of the B_c^+ decays go through the ψ. This may be the most promising mode to pursue. Other candidates are B + all charged (11%) and DD + all charged (4%).

F. <u>Decay of $(bud)^0$ or Λ_b^0</u>

This ground-state bottom baryon can decay via a capture mechanism bu ⟶ cd analogous to that present in Λ_c. The estimate made for B_d^0 applies here, except that we should normalize to Λ_c, not to D^0. We may write

$$\frac{\tau_{B^+}}{\tau_{bud}} = 0.6 + 0.4 \; \frac{\tau_{D^+}}{\tau_{\Lambda c}}$$

or

$$\frac{\text{Nonleptonic capture rate}}{\text{Nonleptonic spectator rate}} \sim 0.6\left(\frac{\tau_{D^+}}{\tau_{\Lambda c}} - 1\right)$$

For our choice of $\tau_{D^+}/\tau_{\Lambda c} = 3$ we get $\tau_{bud} \simeq 6 \times 10^{-13}$ sec along with a very appreciable capture rate.

The presence of "capture" leads to a more energetic final-state c-quark and an enhancement of DN final states; hence a significant breakdown of "factorization". For the spectator modes we take the ratio

$$\Lambda_c^+/DN = 4/1$$

as for semileptonic decays. For the capture modes we assign the partition

$$\Lambda_c^+/DN = 1/2$$

Significant decay modes include Λ_c^+ + all charged (7.5%) and $\Lambda_c^+ F^-$ + all charged (2.5%). The ψ decay modes appear more difficult than for the B-mesons, with $\psi\Sigma^*$ + all charged (0.08%) perhaps the best bet.

Note that the other J=1/2 bud s-wave baryon and its J=3/2 hyperfine partner are expected to be more than 140 MeV above the Λ_b^+.

G. Decay of Ξ_b^o (bus)

This baryon has properties very similar to the bud baryon. The capture mechanism bu — cd again exists, and we again take $6\text{x}10^{-13}$sec. as the lifetime. For semileptonic decays we take a production ratio

$$A^+/A^o/\Lambda_c^+K/DY = 4/4/1/1$$

For capture modes the ratios are assumed to be

$$A^+/A^o/\Lambda_c^+K/DY/DKN = 1/1/1/1/1$$

The large variety of final states dilutes branching ratios; the most favorable would seem to be A + all charged (4.5%), and AF^- + all charged (3.5%). In the ϕ modes, $\phi\Xi$ + all charged (0.15%) seems somewhat favorable.

H. Decay of Ξ_b^- (bsd)

This baryon has no capture mode; we take a lifetime of 10^{-12}sec and a 40% total semileptonic branching ratio. The partition in semileptonic modes is taken to be

$$A/\Lambda_c^+K/DY = 8/1/1$$

Factorization implies the same partition for nonleptonic decays.

The decay modes of $(bsd)^-$ seem somewhat more friendly than $(bsu)^o$; promising modes include A + all charged (7.5%), AF^- + all charged (3.5%). The ϕ modes include $\phi\Xi$ + all charged (0.2%) and $\phi\Lambda K^-$ (0.2%). This latter mode may be diluted by partition into $\phi\Sigma K^-X$ modes, which we have here (unjustifiably) ignored.

J. Decay of Ω_b^- (bss)

This baryon also has no capture mode, so that its phenomenology is similar to the $(bsd)^-$. The semileptonic (and nonleptonic) partition is taken to be

$$T/AK/\Xi D = 8/1/1$$

Notice that because the final state is often T^o, of order 50% of the final states are in one-prongs! Promising decay modes include T^o + all charged (9%), T^oF^- (4.5%), $\phi\Omega^-$ + all charged (0.1%), and $\phi\Xi^-K^-\pi^+$ (0.1%).

K. Decays of bcu, bcd, bcs

These baryons are probably only marginally accessible, and the ennui of this writer prevents him from forming compendia for these decays. This lack of enthusiasm is compounded by the complexity of the decay schemes. There are two competing spectator modes

$$b \rightarrow c + W \quad (10^{12}sec^{-1})$$

$$c \rightarrow s + W \quad (10^{12}sec^{-1})$$

along with the capture mode,

$$bc \rightarrow cs \quad (2x10^{12}sec^{-1})$$

which we guess to be enhanced by a large $|\psi(0)|^2$ for the bc diquark. In addition, for the bcu there is the capture mode

$$bu \rightarrow cd \quad (0.6x10^{12}sec^{-1})$$

while for bcd one has

$$cd \rightarrow su \quad (1.5x10^{12}sec^{-1})$$

This leads to the expectation that, of these three baryons, bcd has the shortest lifetime and bcs the longest. We guess as follows:

$$(bcu) \quad \tau = 2x10^{-13}sec$$

$$(bcd) \quad \tau = 1.5x10^{-13}sec$$

$$(bcs) \quad \tau = 2.5x10^{-13}sec$$

However, if the Λ_c^+ lifetime is shorter than our estimate of $3x10^{-13}$sec., the estimated lifetime for the (bcd) should be reduced accordingly.

TABLE II: Decay Modes of the Virtual W

$W \to u\bar{d}$

M_W(GeV)	$\bar{n}$	Fraction	Exclusive					Inclusive				
			1	3	5	7	9	1	3	5	7	9
0.6±0.4	$\gtrsim$ 0.5	13%	6.5%	0.5%	—	—	—	12%	1%	—	—	—
1.3±0.3	2.3	20%	2.0%	3.0%	1.0%	—	—	10%	8%	2%	—	—
1.9±0.3	3.8	26%	0.5%	2.5%	1.5%	0.5%	—	8%	13%	4%	1%	—
2.4±0.2	5.0	21%	—	1.0%	1.0%	0.5%	—	2.5%	10%	7%	1%	—
2.8±0.2	6.0	19%	—	0.5%	1.0%	0.5%	0.5%	2%	9%	6%	2%	1%
Sum		99%	9.0%	7.5%	4.5%	1.5%	0.5%	35%	41%	19%	4%	1%
			Exclusive fraction = 24%					$\bar{n}_{ch}$ = 2.9				

$W \to c\bar{s}$

F^+	(60%)	F^+	29%
		$F^+\pi^+\pi^-$	5%
		$F^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$F^+\pi^0$	10.5%
		$F^+\pi^0\pi^0$	2.5%
		$F^+\pi^0\pi^0\pi^0$	1.5%
		$F^+\pi^+\pi^-\pi^0$	3%
		$F^+\pi^+\pi^-\pi^0\pi^0$	1%
D^+K^0X ($\bar{n}$=1.5)	(10%)	D^+K^0	2%
		$D^+K^0\pi^+\pi^-$	1.5%
		$D^+K^0\pi^0$	3%
		$D^+K^0\pi^0\pi^0$	1%
		$D^+K^0\pi^+\pi^-\pi^0$	1%
$D^+K^+\pi^-X$ ($\bar{n}$=0.5)	(10%)	$D^+K^+\pi^-$	6%
		$D^+K^+\pi^-\pi^0$	3%
D^0K^+X ($\bar{n}$=1.5)	(10%)	D^0K^+	2%
		$D^0K^+\pi^+\pi^-$	1.5%
		$D^0K^+\pi^0$	3%
		$D^0K^+\pi^0\pi^0$	1%
		$D^0K^+\pi^+\pi^-\pi^0$	1%
$D^0K^0\pi^+X$ ($\bar{n}$=0.5)	(10%)	$D^0K^0\pi^+$	6%
		$D^0K^0\pi^+\pi^0$	3%

Appendix: Estimated Decay Properties of Hadrons Containing Charm and Bottom Quarks

D^+ $(c\bar{d})$ m=1870 $\tau=9\times10^{-13}$sec.

Semileptonic Decays

$e^+\nu_e X$	(20%)	$K^0 e^+\nu_e$	8%
$\mu^+\nu_\mu X$	(20%)	$K^-\pi^+ e^+\nu_e$	6%
		$K^0\pi^0 e^+\nu_e$	6%

Nonleptonic Decays

$K^-\pi^+\pi^+X$	(30%)	$K^-\pi^+\pi^+$	8%
$(\bar{n}=1.4)$		$K^-\pi^+\pi^+\pi^+\pi^-$	4.5%
		$K^-\pi^+\pi^+\pi^0$	10%
		$K^-\pi^+\pi^+\pi^0\pi^0$	3%
		$K^-\pi^+\pi^+\pi^0\pi^0\pi^0$	1%
		$K^-\pi^+\pi^+\pi^+\pi^-\pi^0$	2%
$K^0\pi^+X$	(30%)	$K^0\pi^+$	3%
$(\bar{n}=2.4)$		$K^0\pi^+\pi^+\pi^-$	4.5%
		$K^0\pi^+\pi^+\pi^+\pi^-\pi^-$	1%
		$K^0\pi^+\pi^0$	7.5%
		$K^0\pi^+\pi^0\pi^0$	3%
		$K^0\pi^+\pi^0\pi^0\pi^0$	1.5%
		$K^0\pi^+\pi^+\pi^-\pi^0$	4.5%
		$K^0\pi^+\pi^+\pi^-\pi^0\pi^0$	1.5%
		$K^0\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	28%	15%	43%
3	12%	33%	45%
5	--	8%	8%

Accessible Fractions

13%	all charged
9%	$\bar{K}$ + all charged

D^0 $(c\bar{u})$ m=1870 $\tau=4\times10^{-13}$ sec.

Semileptonic Decays

$e^+\nu_e X$	(9%)	$K^-e^+\nu_e$	4%
$\mu^+\nu_\mu X$	(9%)	$K^0\pi^-e^+\nu_e$	2%
		$K^-\pi^0e^+\nu_e$	2%

Nonleptonic Decays

$K^-\pi^+X$	(40%)	$K^-\pi^+$	3.5%
$(\bar{n}=2.4)$		$K^-\pi^+\pi^+\pi^-$	5.5%
		$K^-\pi^+\pi^+\pi^+\pi^-\pi^-$	1.5%
		$K^-\pi^+\pi^0$	6%
		$K^-\pi^+\pi^0\pi^0$	4%
		$K^-\pi^+\pi^0\pi^0\pi^0$	2.5%
		$K^-\pi^+\pi^+\pi^-\pi^0$	5.5%
		$K^-\pi^+\pi^+\pi^-\pi^0\pi^0$	2.5%
		$K^-\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	1.5%
		$K^-\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	1%
K^0X	(40%)	$K^0\pi^+\pi^-$	5%
$(\bar{n}=3.4)$		$K^0\pi^+\pi^+\pi^-\pi^-$	3%
		$K^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0.5%
		$K^0\pi^0$	5%
		$K^0\pi^0\pi^0$	3%
		$K^0\pi^0\pi^0\pi^0$	3%
		$K^0\pi^0\pi^0\pi^0\pi^0$	1%
		$K^0\pi^+\pi^-\pi^0$	7%
		$K^0\pi^+\pi^-\pi^0\pi^0$	4%
		$K^0\pi^+\pi^-\pi^0\pi^0\pi^0$	3%
		$K^0\pi^+\pi^+\pi^-\pi^-\pi^0$	1.5%
		$K^0\pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$	1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	–	12%	12%
2	16%	37%	55%
4	–	21%	21%
6	–	3%	3%

Accessible Fractions

11%	all charged
9%	K + all charged

F^+ ($c\bar{s}$) m= 1975MeV τ = 3×10^{-13}sec

Semileptonic decays

Inclusive		Mode	Fraction
$e^+\nu_e X$	(7%)	$K^+K^-e^+\nu_e$	1.5%
$\mu^+\nu_\mu X$	(7%)	$K^0\bar{K}^0e^+\nu_e$	1.5%
$\tau^+\nu_\tau$	(2%)	$\phi e^+\nu_e$	2%
		$\eta e^+\nu_e$	1%
		$\eta' e^+\nu_e$	1%

Nonleptonic Decays

Inclusive		Mode	Fraction
$K^+K^-\pi^+X$ ($\bar{n}$=1)	(5%)	$K^+K^-\pi^+$	2%
		$K^+K^-\pi^+\pi^+\pi^-$	0.5%
		$K^+K^-\pi^+\pi^0$	2%
$K^0K^-\pi^+\pi^+X$ ($\bar{n}$=0)	(5%)	$K^0K^-\pi^+\pi^+$	5%
K^+K^0X ($\bar{n}$=2)	(5%)	K^0K^+	0.5%
		$K^0K^+\pi^+\pi^-$	0.5%
		$K^0K^+\pi^0$	1%
		$K^0K^+\pi^0\pi^0$	0.5%
		$K^0K^+\pi^+\pi^-\pi^0$	0.5%
$K^0K^0\pi^+X$ ($\bar{n}$=1)	(5%)	$K^0\bar{K}^0\pi^+$	2%
		$K^0\bar{K}^0\pi^+\pi^+\pi^-$	0.5%
		$K^0\bar{K}^0\pi^+\pi^0$	2%
$\eta\pi^+X$ ($\bar{n}$=2.3)	(15%)	$\eta\pi^+$	1.5%
		$\eta\pi^+\pi^+\pi^-$	2%
		$\eta\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$\eta\pi^+\pi^0$	4%
		$\eta\pi^+\pi^0\pi^0$	1.5%
		$\eta\pi^+\pi^0\pi^0\pi^0$	1.0%
		$\eta\pi^+\pi^+\pi^-\pi^0$	2%
		$\eta\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
$\eta'\pi^+X$ ($\bar{n}$=1.4)	(10%)	$\eta'\pi^+$	2%
		$\eta'\pi^+\pi^+\pi^-$	1.5%
		$\eta'\pi^+\pi^0$	3%
		$\eta'\pi^+\pi^0\pi^0$	1%
		$\eta'\pi^+\pi^+\pi^-\pi^0$	1%
$\phi\pi^+X$ ($\bar{n}$=1.3)	(15%)	$\phi\pi^+$	4%
		$\phi\pi^+\pi^+\pi^-$	2%
		$\phi\pi^+\pi^0$	5%
		$\phi\pi^+\pi^0\pi^0$	1.5%
		$\phi\pi^+\pi^+\pi^-\pi^0$	1%
π^+X ($\bar{n}$=4.0)	(30%)	$\pi^+\pi^+\pi^-$	3%
		$\pi^+\pi^+\pi^+\pi^-\pi^-$	2.5%
		$\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0.5%
		$\pi^+\pi^0$	2.5%
		$\pi^+\pi^0\pi^0$	2%
		$\pi^+\pi^0\pi^0\pi^0$	2.5%
		$\pi^+\pi^+\pi^-\pi^0$	4.5%
		$\pi^+\pi^+\pi^-\pi^0\pi^0$	4%
		$\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	3%
		$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0$	1.5%
		$\pi^+\pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$	1.5%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	9%	27%	36%
3	5%	37%	42%
5	-	11%	11%
7	-	1%	1%

Accessible Fractions

8.5%	all charged
6%	ϕ + all charged
4%	η + all charged
3.5%	η' + all charged
6%	K^0,K + all charged

Λ_c^+ (cud)   m = 2280MeV $\tau = 3 \times 10^{-13}$ sec

Semileptonic Decays

$e^+\nu_e X$	(7%)	$\Lambda e^+\nu_e$	3%
$\mu^+\nu_\mu X$	(7%)	$K^- p e^+\nu_e$	2%
		$K^0 n e^+\nu_e$	2%

Nonleptonic Decays

$\Lambda\pi^+ X$ ($\bar{n}$=1.7)	(25%)	$\Lambda\pi^+$	5%
		$\Lambda\pi^+\pi^+\pi^-$	4%
		$\Lambda\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$\Lambda\pi^+\pi^0$	7.5%
		$\Lambda\pi^+\pi^0\pi^0$	2.5%
		$\Lambda\pi^+\pi^0\pi^0\pi^0$	1%
		$\Lambda\pi^+\pi^+\pi^-\pi^0$	2.5%
		$\Lambda\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
$\Sigma^-\pi^+\pi^+ X$ ($\bar{n}$=0.6)	(3%)	$\Sigma^-\pi^+\pi^+$	2%
		$\Sigma^-\pi^+\pi^+\pi^0$	1%
$\Sigma^0\pi^+ X$ ($\bar{n}$=1.6)	(3%)	$\Sigma^0\pi^+$	1%
		$\Sigma^0\pi^+\pi^+\pi^-$	0.5%
		$\Sigma^0\pi^+\pi^0$	0.5%
$\Sigma^+ X$ ($\bar{n}$=2.6)	(4%)	$\Sigma^+\pi^+\pi^-$	0.5%
		$\Sigma^+\pi^0$	1%
		$\Sigma^+\pi^0\pi^0$	0.5%
		$\Sigma^+\pi^+\pi^-\pi^0$	0.5%

$pK^-\pi^+ X$ ($\bar{n}$=0.7)	(15%)	$pK^-\pi^+$	7%
		$pK^-\pi^+\pi^+\pi^-$	1%
		$pK^-\pi^+\pi^0$	5%
		$pK^-\pi^+\pi^0\pi^0$	1%
		$pK^-\pi^+\pi^+\pi^-\pi^0$	0.5%
$pK^0 X$ ($\bar{n}$=1.7)	(15%)	pK^0	3.0%
		$pK^0\pi^+\pi^-$	3.0%
		$pK^0\pi^0$	4.5%
		$pK^0\pi^0\pi^0$	1.5%
		$pK^0\pi^+\pi^-\pi^0$	1.5%
$nK^-\pi^+\pi^+ X$ ($\bar{n}$=-0.3)	(5%)	$nK^-\pi^+\pi^+$	5%
$nK^0\pi^+ X$ ($\bar{n}$=0.7)	(15%)	$nK^0\pi^+$	7.5%
		$nK^0\pi^+\pi^+\pi^-$	1%
		$nK^0\pi^+\pi^0$	5%
		$nK^0\pi^+\pi^0\pi^0$	1%
		$nK^0\pi^+\pi^+\pi^-\pi^0$	0.5%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	10%	42%	52%
3	4%	31%	35%
5	-	2%	2%

Accessible Fractions

8%	all charged
10%	Λ + all charged
6%	$\bar{K}$ + all charged
4%	Σ + all charged

A^+ (csu) m=2460MeV $\tau=9\mathrm{x}10^{-13}$sec.

Semileptonic Decays

$e^+\nu_e X$	(20%)	$\Xi^0 e^+\nu_e$	6%
$\mu^+\nu_\mu X$	(20%)	$\Xi^-\pi^+ e^+\nu_e$	2%
		$\Xi^0\pi^0 e^+\nu_e$	2%
		$\Lambda K^0 e^+\nu_e$	3%
		$\Lambda K^0\pi^0 e^+\nu_e$	1.5%
		$\Lambda K^-\pi^+ e^+\nu_e$	1.5%
		$\Sigma^+ K^- e^+\nu_e$	2%
		$\Sigma^0 K^0 e^+\nu_e$	2%

Nonleptonic Decays

$\Xi^-\pi^+\pi^+ X$ ($\bar{n}$=0.7)	(15%)	$\Xi^-\pi^+\pi^+$	7.5%
		$\Xi^-\pi^+\pi^+\pi^+\pi^-$	1%
		$\Xi^-\pi^+\pi^+\pi^0$	5%
		$\Xi^-\pi^+\pi^+\pi^0\pi^0$	1%
$\Xi^0\pi^+ X$ ($\bar{n}$=1.7)	(15%)	$\Xi^0\pi^+$	3%
		$\Xi^0\pi^+\pi^+\pi^-$	3%
		$\Xi^0\pi^+\pi^0$	4.5%
		$\Xi^0\pi^+\pi^0\pi^0$	1.5%
		$\Xi^0\pi^+\pi^+\pi^-\pi^0$	1.5%
$\Lambda K^0\pi^+ X$ ($\bar{n}$=0.7)	(5%)	$\Lambda K^0\pi^+$	2.5%
		$\Lambda K^0\pi^+\pi^0$	1.5%
$\Lambda K^-\pi^+\pi^+ X$ ($\bar{n}$=0.3)	(4%)	$\Lambda K^-\pi^+\pi^+$	4%

$\Sigma^+ K^0 X$ ($\bar{n}$=1.5)	(2.5%)	$\Sigma^+ K^0$	0.5%
		$\Sigma^+ K^0\pi^0$	1.0%
$\Sigma^+ K^-\pi^+ X$ ($\bar{n}$=0.5)	(2.5%)	$\Sigma^+ K^-\pi^+$	1.5%
		$\Sigma^+ K^-\pi^+\pi^0$	1%
$\Sigma^0 K^0\pi^+ X$ ($\bar{n}$=0.5)	(2.5%)	$\Sigma^0 K^0\pi^+$	1.5%
		$\Sigma^0 K^0\pi^+\pi^0$	1%
$\Sigma^0 K^-\pi^+\pi^+ X$ ($\bar{n}$=-0.5)	(2.5%)	$\Sigma^0 K^-\pi^+\pi^+$	2%
$\Sigma^- K^0\pi^+\pi^+ X$ ($\bar{n}$=-0.5)	(2.5%)	$\Sigma^- K^0\pi^+\pi^+$	2%
NKKX ($\bar{n}$=0.7)	(5%)	pK^0K^0	1%
		$pK^0K^0\pi^0$	0.5%
		$pK^0K^-\pi^+$	1.5%
		$nK^0K^0\pi^+$	1.5%

Prong Distribution

Prongs	Semileptonic	Nonleptonic	Total
1	30%	33%	63%
3	12%	18%	30%
5	–	1%	1%

Accessible Fractions

8.5%	Ξ^- + all charged
6%	Ξ^0 + all charged
1.5%	K + all charged
4%	Λ + all charged
1.5%	$\Sigma^\pm$ + all charged
2.5%	ΛK^0 + all charged

A^0 (csd) m = 2460MeV $\tau = 3\text{x}10^{-13}$sec.

Semileptonic Decays

Inclusive	Fraction	Mode		Mode	
$e^+\nu_e X$	(7%)	$\Xi^- e^+\nu_e$	2%	$\Lambda K^-\pi^0 e^+\nu_e$	0.5%
$\mu^+\nu\bar{\mu}X$	(7%)	$\Xi^-\pi^0 e^+\nu_e$	1%	$\Lambda \bar{K}^0\pi^- e^+\nu_e$	0.5%
		$\Xi^0\pi^- e^+\nu_e$	1%	$\Sigma^0 K^-\nu_e$	1%
		$\Lambda K^- e^+\nu_e$	1%	$\Sigma^- K^0 e^+\nu_e$	1%

Nonleptonic Decays

Inclusive	Fraction	Mode	
$\Xi^-\pi^+X$ ($\bar{n}$=1.7)	(12%)	$\Xi^-\pi^+$	2%
		$\Xi^-\pi^+\pi^+\pi^-$	2%
		$\Xi^-\pi^+\pi^0$	4%
		$\Xi^-\pi^+\pi^0\pi^0$	1%
		$\Xi^-\pi^+\pi^+\pi^-\pi^0$	1%
Ξ^0X ($\bar{n}$=2.7)	(12%)	$\Xi^0\pi^+\pi^-$	1.5%
		$\Xi^0\pi^+\pi^+\pi^-\pi^-$	0.5%
		$\Xi^0\pi^0$	2%
		$\Xi^0\pi^0\pi^0$	1%
		$\Xi^0\pi^0\pi^0\pi^0$	1%
		$\Xi^0\pi^+\pi^-\pi^0$	1.5%
		$\Xi^0\pi^+\pi^-\pi^0\pi^0$	1%
		$\Xi^0\pi^+\pi^-\pi^0\pi^0\pi^0$	0.5%
ΛK^0X ($\bar{n}$=1.7)	(12%)	ΛK^0	1.5%
		$\Lambda K^0\pi^+\pi^-$	1.5%
		$\Lambda K^0\pi^0$	3%
		$\Lambda K^0\pi^0\pi^0$	1%
		$\Lambda K^0\pi^+\pi^-\pi^0$	1%
$\Lambda K^-\pi^+X$ ($\bar{n}$=0.7)	(10%)	$\Lambda K^-\pi^+$	5%
		$\Lambda K^-\pi^+\pi^+\pi^-$	1%
		$\Lambda K^-\pi^+\pi^0$	3%
		$\Lambda K^-\pi^+\pi^0\pi^0$	0.5%
$\Sigma^+K^0\pi^-X$ ($\bar{n}$=0.5)	(3%)	$\Sigma^+K^0\pi^-$	2%
		$\Sigma^+K^0\pi^-\pi^0$	1%
Σ^+K^-X ($\bar{n}$=1.5)	(3%)	Σ^+K^-	0.5%
		$\Sigma^+K^-\pi^+\pi^-$	0.5%
		$\Sigma^+K^-\pi^0$	1%
Σ^0K^0X ($\bar{n}$=1.5)	(3%)	Σ^0K^0	0.5%
		$\Sigma^0K^0\pi^+\pi^-$	0.5%
		$\Sigma^0K^0\pi^0$	1%
Σ^0K^0X ($\bar{n}$=1.5)	(3%)	Σ^0K^0	0.5%
		$\Sigma^0K^0\pi^+\pi^-$	0.5%
		$\Sigma^0K^0\pi^0$	1%
$\Sigma^0K^-\pi^+X$ ($\bar{n}$=0.5)	(3%)	$\Sigma^0K^-\pi^+$	2%
		$\Sigma^0K^-\pi^+\pi^0$	1%
$\Sigma^-K^0\pi^+X$ ($\bar{n}$=0.5)	(3%)	$\Sigma^-K^0\pi^+$	2%
		$\Sigma^-K^0\pi^+\pi^0$	1%
$\Sigma^-K^-\pi^+\pi^+X$ ($\bar{n}$=-0.5)	(3%)	$\Sigma^-K^-\pi^+\pi^+$	3%
$pK^0K^0\pi^-X$ ($\bar{n}$=-0.3)	(3%)	$pK^0K^0\pi^-$	3%
pK^0K^-X ($\bar{n}$=0.7)	(6%)	pK^0K^-	3%
		$pK^0K^-\pi^+\pi^-$	0.5%
		$pK^0K^-\pi^0$	2%
$pK^-K^-\pi^+X$ ($\bar{n}$=-0.3)	(3%)	$pK^-K^-\pi^+$	3%
nK^0K^0X ($\bar{n}$=0.7)	(3%)	nK^0K^0	1.5%
		$nK^0K^0\pi^0$	1%
$nK^0K^-\pi^+X$ ($\bar{n}$=-0.3)	(6%)	$nK^0K^-\pi^+$	5%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	–	14%	14%
2	16%	47%	63%
4	–	12%	12%

Accessible Fractions

3%	all charged
4%	Ξ^- + all charged
2%	Ξ^0 + all charged
3%	$\bar{K}^0$ + all charged
6%	$\Lambda_\pm$ + all charged
4%	$\Sigma^\pm$ + all charged
3%	ΛK_0 + all charged

T^0 (ssc) M ~ 2740 MeV τ ~ 9×10^{-13}sec.

Semileptonic Decays

$e^+\nu_e X$	(20%)	$\Omega^-e^+\nu_e$	8%
$\mu^+\nu_\mu X$	(20%)	$\Omega^-\pi^0e^+\nu_e$	4%
		$\Xi^0K^-e^+\nu_e$	4%
		$\Xi^-K^0e^+\nu_e$	4%

Nonleptonic Decays

$\Omega^-\pi^+X$ ($\bar{n}$=1.6)	(30%)	$\Omega^-\pi^+$	6%
		$\Omega^-\pi^+\pi^+\pi^-$	5%
		$\Omega^-\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$\Omega^-\pi^+\pi^0$	9%
		$\Omega^-\pi^+\pi^0\pi^0$	3%
		$\Omega^-\pi^+\pi^0\pi^0\pi^0$	1%
		$\Omega^-\pi^+\pi^+\pi^-\pi^0$	3%
		$\Omega^-\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
$\Xi K^0\pi^+X$ ($\bar{n}$=0.9)	(5%)	$\Xi^-K^0\pi^+$	2%
		$\Xi^-K^0\pi^+\pi^+\pi^-$	0.5%
		$\Xi^-K^0\pi^+\pi^0$	2%
		$\Xi^-K^0\pi^+\pi^0\pi^0$	0.5%
$\Xi^-K^-\pi^+\pi^+X$ ($\bar{n}$=-0.1)	(5%)	$\Xi^-K^-\pi^+\pi^+$	5%
Ξ^0K^0X ($\bar{n}$=1.9)	(5%)	Ξ^0K^0	1%
		$\Xi^0K^0\pi^+\pi^-$	1%
		$\Xi^0K^0\pi^0$	1.5%
		$\Xi^0K^0\pi^0\pi^0$	0.5%
		$\Xi^0K^0\pi^+\pi^-\pi^0$	0.5%
$\Xi^0K^-\pi^+X$ ($\bar{n}$=0.9)	(5%)	$\Xi^0K^-\pi^+$	2%
		$\Xi^0K^-\pi^+\pi^+\pi^-$	0.5%
		$\Xi^0K^-\pi^+\pi^0$	2%
		$\Xi^0K^-\pi^+\pi^0\pi^0$	0.5%
ΛK^0K^0X ($\bar{n}$=0.9)	(3%)	ΛK^0K^0	1%
		$\Lambda K^0K^0\pi^0$	1%
$\Lambda K^0K^-\pi^+X$ ($\bar{n}$=-0.1)	(6%)	$\Lambda K^0K^-\pi^+$	6%
$\Lambda K^-K^-\pi^+\pi^+X$ ($\bar{n}$=-1.1)	(1%)	$\Lambda K^-K^-\pi^+\pi^+$	1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	—	6%	6%
2	40%	35%	75%
4	—	16%	16%
6	—	1%	1%

Accessible Fractions

12%	Ω^- + all charged
5%	Ξ^- + all charged
2.5%	Ξ^-K^0 + all charged
2.5%	Ξ^0 + all charged
2%	Ξ^0K^0 + all charged
1%	Λ + all charged
6%	Λ + all charged

$(ccu)^{++}$ $m = 3640$ MeV $\tau = 5\mathrm{x}10^{-13}$ sec

Semileptonic Decays

$e^+\nu_e X$	(20%)	$A^+e^+\nu_e$	5%	$D^0\Lambda\pi^+e^+\nu_e$	1%
$\mu^+\nu_\mu X$	(20%)	$A^+\pi^0e^+\nu_e$	2.5%	$D^0\Sigma^+e^+\nu_e$	1%
		$A^0\pi^+e^+\nu_e$	2.5%	$D^+\Sigma^0e^+\nu_e$	1%
		$D^+\Lambda e^+\nu_e$	3%	$K^0\Lambda_c^+e^+\nu_e$	1%
		$D^+\Lambda\pi^0e^+\nu_e$	1%	$K^-\Lambda_c^+\pi^+e^+\nu_e$	1%

Nonleptonic Decays

$A^+\pi^+X$ ($\bar{n}$=2.1)	(15%)	$A^+\pi^+$	1.5%
		$A^+\pi^+\pi^+\pi^-$	2%
		$A^+\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$A^+\pi^+\pi^0$	4%
		$A^+\pi^+\pi^0\pi^0$	1.5%
		$A^+\pi^+\pi^0\pi^0\pi^0$	1%
		$A^+\pi^+\pi^+\pi^-\pi^0$	1.5%
		$A^+\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
		$A^+\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	0.5%
$A^0\pi^+\pi^+X$ ($\bar{n}$=1.1)	(15%)	$A^0\pi^+\pi^+$	4.5%
		$A^0\pi^+\pi^+\pi^+\pi^-$	2%
		$A^0\pi^+\pi^+\pi^0$	5%
		$A^0\pi^+\pi^+\pi^0\pi^0$	1%
		$A^0\pi^+\pi^+\pi^0\pi^0\pi^0$	0.5%
		$A^0\pi^+\pi^+\pi^+\pi^-\pi^0$	1%

$D^+\Lambda\pi^+X$ ($\bar{n}$=0.4)	(5%)	$D^+\Lambda\pi^+$	3%
		$D^+\Lambda\pi^+\pi^0$	1%
$D^0\Lambda\pi^+\pi^+X$ ($\bar{n}$=-0.6)	(5%)	$D^0\Lambda\pi^+\pi^+$	5%
$D^+\Sigma^+X$ ($\bar{n}$=1.2)	(2%)	$D^+\Sigma^+$	0.5%
		$D^+\Sigma^+\pi^0$	0.5%
$D\Sigma\pi^+X$ ($\bar{n}$=0.2)	(4%)	$D^0\Sigma^+\pi^+$	2%
		$D^+\Sigma^0\pi^+$	2%
$D\Sigma\pi^+\pi^+X$ ($\bar{n}$=-0.8)	(2%)	$D^0\Sigma^0\pi^+\pi^+$	1%
		$D^+\Sigma^-\pi^+\pi^+$	1%
$\Lambda_c^+K^0\pi^+X$ ($\bar{n}$=0.8)	(5%)	$\Lambda_c^+K^0\pi^+$	2.5%
		$\Lambda_c^+K^0\pi^+\pi^+\pi^-$	0.5%
		$\Lambda_c^+K^0\pi^+\pi^0$	1.5%
		$\Lambda_c^+K^0\pi^+\pi^0\pi^0$	0.5%
$K^-\Lambda_c^+\pi^+\pi^+X$ ($\bar{n}$=-0.2)	(5%)	$\Lambda_c^+K^-\pi^+\pi^+$	5%

Prong Distributions

Prongs	Semileptonics	Nonleptonic	Total
2	36%	38%	74%
4	4%	15%	19%
6	–	1%	1%

Accessible Nonleptonics

4%	A^+ + all charged
7%	A^0 + all charged
5%	Λ_c^+ all charged
3%	$\Lambda_c K^0$ + all charged
8%	$D\Lambda$ + all charged
6%	$D\Sigma$ + all charged

$(ccd)^+$ $m = 3640$ MeV $\tau = 1.5 \times 10^{-13}$ sec

Semileptonic Decays

$e^+\nu_e X$	(7%)	$A^0e^+\nu_e$	2%	$D^0\Lambda e^+\nu_e$	1%
$\mu^+\nu_\mu X$	(7%)	$A^0\pi^0e^+\nu_e$	1%	$D^+\Lambda\pi^-e^+\nu_e$	0.5%
		$A^+\pi^-e^+\nu_e$	1%	$K^0\Lambda_c^+\pi^-e^+\bar{\nu}_e$	0.5%
				$K^-\Lambda_c^+e^+\nu_e$	0.5%

Nonleptonic Decays

A^+X ($\bar{n}$=3.1)	(15%)	$A^+\pi^+\pi^-$	2%
		$A^+\pi^+\pi^+\pi^-\pi^-$	1%
		$A^+\pi^0$	2%
		$A^+\pi^0\pi^0$	1%
		$A^+\pi^0\pi^0\pi^0$	1%
		$A^+\pi^+\pi^-\pi^0$	2%
		$A^+\pi^+\pi^-\pi^0\pi^0$	1%
		$A^+\pi^+\pi^-\pi^0\pi^0\pi^0$	1%
		$A^+\pi^+\pi^+\pi^-\pi^-\pi^0$	0.5%
		$A^+\pi^+\pi^+\pi^-\pi^-\pi^0\pi^0$	0.5%
$A^0\pi^+X$ ($\bar{n}$=2.1)	(15%)	$A^0\pi^+$	1.5%
		$A^0\pi^+\pi^+\pi^-$	2.5%
		$A^0\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$A^0\pi^+\pi^0$	4.5%
		$A^0\pi^+\pi^0\pi^0$	1.5%
		$A^0\pi^+\pi^0\pi^0\pi^0$	1%
		$A^0\pi^+\pi^+\pi^-\pi^0$	1.5%
		$A^0\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
		$A^0\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	0.5%
$D^+\Lambda X$ ($\bar{n}$=1.4)	(10%)	$D^+\Lambda$	2.5%
		$D^+\Lambda\pi^+\pi^-$	1.5%
		$D^+\Lambda\pi^0$	5%
		$D^+\Lambda\pi^0\pi^0$	1%
		$D^+\Lambda\pi^0\pi^0\pi^0$	0.5%
		$D^+\Lambda\pi^+\pi^-\pi^0$	1%
$D^0\Lambda\pi^+X$ ($\bar{n}$=0.4)	(10%)	$D^0\Lambda\pi^+$	7%
		$D^0\Lambda\pi^+\pi^0$	3%

$D\Sigma X$ ($\bar{n}$=1.2)	(4%)	$D^+\Sigma^0$	0.5%
		$D^+\Sigma^0\pi^0$	0.5%
		$D^0\Sigma^+$	0.5%
		$D^0\Sigma^+\pi^0$	0.5%
$D\Sigma\pi^+X$ ($\bar{n}$=0.2)	(6%)	$D^+\Sigma^+\pi^-$	2%
		$D^0\Sigma^0\pi^+$	2%
		$D^+\Sigma^-\pi^+$	2%
$D^0\Sigma^-\pi^+\pi^+X$ ($\bar{n}$=-0.8)	(1%)	$D^0\Sigma^-\pi^+\pi^+$	1%
$\Lambda_c^+K^0X$ ($\bar{n}$=1.8)	(8%)	$\Lambda_c^+K^0$	1%
		$\Lambda_c^+K^0\pi^+\pi^-$	1%
		$\Lambda_c^+K^0\pi^0$	2.5%
		$\Lambda_c^+K^0\pi^0\pi^0$	1%
		$\Lambda_c^+K^0\pi^+\pi^-\pi^0$	1%
$\Lambda_c^+K^-\pi^+X$ ($\bar{n}$=0.8)	(7%)	$\Lambda_c^+K^-\pi^+$	3%
		$\Lambda_c^+K^-\pi^+\pi^+\pi^-$	0.5%
		$\Lambda_c^+K^-\pi^+\pi^0$	2.5%
		$\Lambda_c^+K^-\pi^+\pi^0\pi^0$	0.5%
$D\bar{K}NX$ ($\bar{n}$=0.3)	(5%)	D^+K^0n	1.5%
		$D^+K^0n\pi^0$	0.5%
		D^0K^0p	1.5%
		$D^0K^0p\pi^0$	0.5%
$D\bar{K}N\pi X$ ($\bar{n}$=-0.7)	(5%)	$D^+K^0p\pi^-$	1%
		$D^+K^-n\pi^+$	1%
		D^+K^-p	1%
		D^+K^0n	1%
		$D^0K^0n\pi^+$	1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	8%	45%	53%
3	5%	30%	35%
5	–	3%	3%

Accessible Fractions

3.5%	A^+ + all charged
4.5%	A^0 + all charged
11%	$D\Lambda$ + all charged
8%	$D\Sigma$ + all charged
3.5%	Λ_c^+ + all charged
2%	$\Lambda_c^+K^0$ + all charged
2.5%	$D\bar{K}^0$ + all charged
1%	D + all charged

3800

$(cc s)^+$ m = ~~2800~~ MeV $\tau = 5\times10^{-13}$ sec

Semileptonic Decays

$e^+\nu_e X$	(20%)	$T^0 e^+\nu_e$	6%
$\mu^+\nu_\mu X$	(20%)	$T^0\pi^0 e^+\nu_e$	4%
		$\Xi^0 D^0 e^+\nu_e$	2.5%
		$\Xi^- D^+ e^+\nu_e$	2.5%
		$A^+K^- e^+\nu_e$	2.5%
		$A^0K^0 e^+\nu_e$	2.5%

Nonleptonic Decays

$T^0\pi^+X$ ($\bar{n}$=1.6)	(25%)	$T^0\pi^+$	5%
		$T^0\pi^+\pi^+\pi^-$	4%
		$T^0\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$T^0\pi^+\pi^0$	7.5%
		$T^0\pi^+\pi^0\pi^0$	2.5%
		$T^0\pi^+\pi^0\pi^0\pi^0$	1%
		$T^0\pi^+\pi^+\pi^-\pi^0$	2.5%
		$T^0\pi^+\pi^+\pi^-\pi^0\pi^0$	1%
Ξ^0D^+X ($\bar{n}$=1.3)	(2.5%)	Ξ^0D^+	0.5%
		$\Xi^0D^+\pi^+\pi^-$	0.5%
		$\Xi^0D^+\pi^0$	1%
$\Xi^0D^0\pi^+X$ ($\bar{n}$=0.3)	(2.5%)	$\Xi^0D^0\pi^+$	2%
		$\Xi^0D^0\pi^+\pi^0$	0.5%
$\Xi^-D^+\pi^+X$ ($\bar{n}$=0.3)	(2.5%)	$\Xi^-D^+\pi^+$	2%
		$\Xi^-D^+\pi^+\pi^0$	0.5%
$\Xi^-D^0\pi^+\pi^+X$ ($\bar{n}$=-0.7)	(2%)	$\Xi^-D^0\pi^+\pi^+$	2%

A^+K^0X ($\bar{n}$=1.8)	(4%)	A^+K^0	0.5%
		$A^+K^0\pi^+\pi^-$	0.5%
		$A^+K^0\pi^0$	1%
		$A^+K^0\pi^0\pi^0$	0.5%
		$A^+K^0\pi^+\pi^-\pi^0$	0.5%
$A^+K^-\pi^+X$ ($\bar{n}$=0.8)	(4%)	$A^+K^-\pi^+$	1.5%
		$A^+K^-\pi^+\pi^0$	1.5%
$A^0K^0\pi^+X$ ($\bar{n}$=0.8)	(4%)	$A^0K^0\pi^+$	1.5%
		$A^0K^0\pi^+\pi^0$	1.5%
$A^0K^-\pi^+\pi^+X$ ($\bar{n}$=-0.2)	(4%)	$A^0K^-\pi^+\pi^+$	4%
$A_c^+K^0K^0X$ ($\bar{n}$=0.8)	(3.5%)	$A_c^+K^0K^0$	1.5%
		$A_c^+K^0K^0\pi^0$	1.5%
$A_c^+K^0K^-\pi^+X$ ($\bar{n}$=-0.2)	(7%)	$A_c^+K^0K^-\pi^+$	7%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	30%	28%	58%
3	10%	28%	38%
5	–	1%	1%

Accessible Fractions

9.5%	T^0 + all charged
7%	ΞD + all charged
5.5%	A + all charged
2.5%	AK^0 + all charged
7%	$A_c^+K^0$ + all charged

$(ccc)^{++}$ $m = 4925$ MeV $\tau = 3\times10^{-13}$ sec

Semileptonic Decays

Inclusive	Fraction	Channel	BR
$e^+\nu_e X$	(20%)	$(ccs)^+ e^+ \nu_e$	6%
$\mu^+\nu_\mu X$	(20%)	$(ccs)^+ \pi^0 e^+ \nu_e$	4%
		$(ccs)^+ \pi^+ \pi^- e^+ \nu_e$	2%
		$(ccu)^{++} K^- e^+ \nu_e$	2%
		$(ccu)^{++} K^0 \pi^- e^+ \nu_e$	1%
		$(ccu)^{++} K^- \pi^0 e^+ \nu_e$	1%
		$(ccd)^+ K^0 e^+ \nu_e$	2%
		$(ccd)^+ K^0 \pi^0 e^+ \nu_e$	1%
		$(ccd)^+ K^- \pi^+ e^+ \nu_e$	1%

Nonleptonic Decays

Inclusive	Fraction	Channel	BR
$(ccs)^+\pi^+X$ ($\bar{n}=1.7$)	(35%)	$(ccs)^+\pi^+$	5.5%
		$(ccs)^+\pi^+\pi^+\pi^-$	5.5%
		$(ccs)^+\pi^+\pi^+\pi^+\pi^-\pi^-$	1%
		$(ccs)^+\pi^+\pi^0$	10%
		$(ccs)^+\pi^+\pi^0\pi^0$	3.5%
		$(ccs)^+\pi^+\pi^0\pi^0\pi^0$	2%
		$(ccs)^+\pi^+\pi^+\pi^-\pi^0$	3.5%
		$(ccs)^+\pi^+\pi^+\pi^-\pi^0\pi^0$	1.5%
		$(ccs)^+\pi^+\pi^+\pi^-\pi^0\pi^0\pi^0$	0.5%
$(ccu)^{++}K^0X$ ($\bar{n}=1.6$)	(5%)	$(ccu)^{++}K^0$	1%
		$(ccu)^{++}K^0\pi^+\pi^-$	1%
		$(ccu)^{++}K^0\pi^0$	1.5%
		$(ccu)^{++}K^0\pi^0\pi^0$	0.5%
		$(ccu)^{++}K^0\pi^+\pi^-\pi^0$	0.5%
$(ccu)^{++}K^-\pi^+X$ ($\bar{n}=0.6$)	(5%)	$(ccu)^{++}K^-\pi^+$	2.5%
		$(ccu)^{++}K^-\pi^+\pi^+\pi^-$	0.5%
		$(ccu)^{++}K^-\pi^+\pi^0$	1.5%
$(ccd)^+K^0\pi^+X$ ($\bar{n}=0.6$)	(5%)	$(ccd)^+K^0\pi^+$	2.5%
		$(ccd)^+K^0\pi^+\pi^+\pi^-$	0.5%
		$(ccd)^+K^0\pi^+\pi^0$	1.5%
$(ccd)^+K^-\pi^+\pi^+X$ ($\bar{n}=-0.4$)	(5%)	$(ccd)^+K^-\pi^+\pi^+$	5%
ADX ($\bar{n}=1.3$)	(5%)	A^+D^+	0.5%
		$A^+D^+\pi^0$	0.5%
		$A^+D^0\pi^+$	1%
		$A^+D^+\pi^+$	1%
		$A^0D^0\pi^+\pi^+$	1.5%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	–	3%	3%
2	26%	30%	56%
3	8%	6%	14%
4	6%	17%	23%
5	–	1%	1%
6	–	1%	1%

Accessible Fractions

12%	$(ccs)^+$ + all charged
3%	$(ccu)^{++}$ + all charged
2%	$(ccu)^{++}K^0$ + all charged
5%	$(ccd)^+$ + all charged
3%	$(ccd)^+K^0$ + all charged
3%	AD + all charged

A12

$B_u^+(\bar{b}u)$ m = 5270 MeV $\tau = 10^{-12}$ sec.

Semileptonic Decays

$e^+\nu_e$	(16%)	$D^0 e^+\nu_e$	6.5%
$\mu^+\nu_\mu$	(16%)	$D^0\pi^+\pi^- e^+\nu_e$	0.5%
$\tau^+\nu_\tau$	(5%)	$D^0\pi^0 e^+\nu_e$	4%
		$D^-\pi^+ e^+\nu_e$	3%

Nonleptonic Decays

$D^0\pi^+X$	(38%)	$D^0\pi^+$	2%
		$D^0\pi^+\pi^+\pi^-$	2%
		$D^0\pi^+\pi^+\pi^+\pi^-\pi^-$	2%
		$D^0\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0.5%
		$D^0\pi^+$ + neutrals	8%
		$D^0\pi^+\pi^+\pi^-$ + neutrals	11%
		$D^0\pi^+\pi^+\pi^+\pi^-\pi^-$ +neutrals	5.5%
		$D^0\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$ +neutrals	1%
$D^-\pi^+\pi^+$	(10%)	$D^-\pi^+\pi^+$	1%
		$D^-\pi^+\pi^+\pi^+\pi^-$	1%
		$D^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-$	0.5%
		$D^-\pi^+\pi^+$ + neutrals	2.5%
		$D^-\pi^+\pi^+\pi^+\pi^-$ + neutrals	3%
		$D^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-$ +neutrals	1.5%

$D(c\bar{s})^+$	(16%)	D^0F^+	2.5%
		$D^0F^+\pi^+\pi^-$	0.5%
		$D^0F^+\pi^0$	2%
		$D^-F^+\pi^+$	1.5%
		$D^-F^+\pi^+\pi^0$	0.5%
		$D^0D^+K^+\pi^-$	0.5%
		$D^0D^0K^0\pi^+$	0.5%
		$D^0D^+K\pi^0X$	1%
		$D^0D^0K\pi^0X$	1%
ψK^+X ($\bar{n}$=1.3)	(0.5%)	ψK^+	0.1%
		$\psi K^+\pi^+\pi^-$	0.1%
		$\psi K^+\pi^0$	0.15%
		$\psi K^+\pi^0\pi^0$	0.05%
		$\psi K^+\pi^+\pi^-\pi^0$	0.05%
$\psi K^0\pi^+X$ ($\bar{n}$=0.5%)	(0.5%)	$\psi K^0\pi^+$	0.35%
		$\psi K^0\pi^+\pi^0$	0.1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	25%	19%	44%
3	8%	23%	31%
5	–	12%	12%
7	–	4%	4%

Accessible Fractions

9%	D^0 + all charged
2.5%	D^- + all charged
4.5%	DF^+ + all charged
1%	DD + all charged
1%	DDK^0 + all charged
0.2%	ψ + all charged
0.35%	ψK^0 + all charged

A13

$B^0_d(\bar{b}d)$ M = 5275 MeV $\tau = 7 \times 10^{-13}$ sec.

Semileptonic Decays

$e^+\nu_e$	(10%)	$D^-e^+\nu_e$	4.5%
$\mu^+\nu_\mu$	(10%)	$D^-\pi^+\pi^-e^+\nu_e$	0.5%
$\tau^+\nu_\tau$	(4%)	$D^-\pi^0e^+\nu_e$	3%
		$D^0\pi^-e^+\nu_e$	2%

Nonleptonic Decays

$D^-\pi^+X$	(42%)	$D^-\pi^+$	2.5%+0.5%=3.0%
Spectator:27%		$D^-\pi^+\pi^+\pi^-$	2%+1.5%=3.5%
Capture: 15%		$D^-\pi^+\pi^+\pi^+\pi^-\pi^-$	1.5%+1%= 2.5%
$(\bar{n}=4)$		$D^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	.5%+0 = 0.5%
		$D^-\pi^+$ + neutrals	7%+5% = 12%
		$D^-\pi^+\pi^+\pi^-$ + neutrals	9%+8% = 17%
		$D^-\pi^+\pi^+\pi^+\pi^-\pi^-$ + neutrals	4%+2.5%=6.5%
		$D^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$+neutrals	1%+ 0= 1%
D^0X	(22%)	$D^0\pi^+\pi^-$	1%+ 1%= 2%
Spectator: 7%		$D^0\pi^+\pi^+\pi^-\pi^-$	1%+ 1%= 2%
Capture: 15%		$D^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0%+0.5%=0.5%
$(\bar{n}=5)$			
		D^0 + neutrals	2%+ 1%= 3%
		$D^0\pi^+\pi^-$ + neutrals	2%+6.5%=8.5%
		$D^0\pi^+\pi^+\pi^-\pi^-$ + neutrals	1%+4.5%=5.5%
		$D^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0%+ 1%= 1%

$D(c\bar{s})^+$	(10%)	D^-F^+	2%
		$D^-F^+\pi^+\pi^-$	0.5%
		$D^-F^+\pi^0$	1%
		$D^0F^+\pi^-$	1%
		$D^-D^+K^+\pi^-$	1%
		$D^-D^0K^0\pi^+$	1%
		$D^-D^+K\pi^0X$	1%
		$D^-D^0K\pi^0X$	1%
$\psi K^+\pi^-X$	(0.35%)	$\psi K^+\pi^-$	0.25%
$(\bar{n}=0.3)$		$\psi K^+\pi^-\pi^0$	0.1%
ψK^0X	(0.35%)	ψK^0	0.07%
$(\bar{n}=1.3)$		$\psi K^0\pi^+\pi^-$	0.07%
		$\psi K^0\pi^0$	0.1%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	–	3%	3%
2	23%	32%	55%
4	1.5%	31%	32%
6	–	–	11%
8	–	2%	2%

Accessible Fractions

4.5%	D^0 + all charged
9.5%	D^- + all charged
3.5%	DF^+ + all charged
1%	DD + all charged
1%	DDK^0 + all charged
0.25%	ψ + all charged
0.15%	ψK^0 + all charged

B^0_s ($\bar{b}s$) m = 5370? $\tau = 10^{-12}$sec

Semileptonic Decays

$e^+\nu_e$	(16%)	$F^-e^+\nu_e$	6.5%
$\mu^+\nu_\mu$	(16%)	$F^-\pi^+\pi^-e^+\nu_e$	0.5%
$\tau^+\nu_\tau$	(5%)	$F^-\pi^0e^+\nu_e$	4%
		$D^0K^-e^+\nu_e$	1.5%
		$D^-\bar{K}^0e^+\nu_e$	1.5%

Nonleptonic Decays

$F^-\pi^+X$	(35%)	$F^-\pi^+$	3.5%
		$F^-\pi^+\pi^+\pi^-$	3%
		$F^-\pi^+\pi^+\pi^+\pi^-\pi^-$	2%
		$F^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0.5%
		$F^-\pi^+$ + neutrals	10%
		$F^-\pi^+\pi^+\pi^-$ + neutrals	13%
		$F^-\pi^+\pi^+\pi^+\pi^-\pi^-$ + neutrals	5.5%
		$F^-\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	1%
$D^0K^-\pi^+X$	(4%)	$D^0K^-\pi^+$	0.5%
		$D^0K^-\pi^+\pi^+\pi^-$	0.5%
		$D^0K^-\pi^+$ + neutrals	1%
		$D^0K^-\pi^+\pi^+\pi^-$ + neutrals	1.5%
		$D^0K^-\pi^+\pi^+\pi^+\pi^-\pi^-$ + neutrals	0.5%
$D^-\bar{K}^0\pi^+X$	(4%)	$D^-\bar{K}^0\pi^+$	0.5%
		$D^-\bar{K}^0\pi^+\pi^+\pi^-$	0.5%
		$D^-\bar{K}^0\pi^+$ + neutrals	1%
		$D^-\bar{K}^0\pi^+\pi^+\pi^-$ + neutrals	1.5%
		$D^-\bar{K}^0\pi^+\pi^+\pi^+\pi^-\pi^-$ + neutrals	0.5%

$F^-(c\bar{s})^+$	(15%)	F^-F^+	2.5%
		$F^-F^+\pi^+\pi^-$	0.5%
		$F^-F^+\pi^0$	2%
		$F^-D^+K^+\pi^-$	0.5%
		$F^-D^0K^0\pi^+$	0.5%
		$F^-D^+K\pi^0X$	1%
		$F^-D^0K\pi^0X$	1%
		$D^0K^-F^+$	0.5%
		$D^-\bar{K}^0F^+$	0.5%
ϕK^+K^-X ($\bar{n}$=1.4)	(.25%)	ϕK^+K^-	.05%
		$\phi K^+K^-\pi^+\pi^-$	.05%
		$\phi K^+K^-\pi^0$	.05%
$\phi K^0\bar{K}^0X$ ($\bar{n}$=1.4)	(.25%)	$\phi K^0\bar{K}^0$	.05%
		$\phi K^0\bar{K}^0\pi^+\pi^-$	.05%
		$\phi K^0\bar{K}^0\pi^0$	.05%
$\phi K^+\bar{K}^0\pi^-X$ ($\bar{n}$=0.4)	(.25%)	$\phi K^+\bar{K}^0\pi^-$	.15%
		$\phi K^+\bar{K}^0\pi^-\pi^0$	.07%
$\phi K^0K^-\pi^+X$ ($\bar{n}$=0.4)	(.25%)	$\phi K^0K^-\pi^+$	.15%
		$\phi K^0K^-\pi^+\pi^0$	.07%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	–	–	0
2	31%	25%	56%
4	1%	21%	22%
6	–	9%	9%
8	–	2%	2%

Accessible Fractions

9%	F^- + all charged
1%	D + all charged
1%	DK^0 + all charged
3%	F^-F^+ + all charged
1.5%	F^*D + all charged
0.1%	ϕ + all charged
0.15%	ϕK + all charged
1%	DD^* + all charged

B_c^+ ($\bar{b}c$) m = 6300 MeV $\tau = 4\times10^{-13}$sec

Semileptonic Decays

$e\nu_e$	(16%)	$B_s^0 e^+ \nu$	6%
$\mu\nu_\mu$	(16%)	$B_s K^- e^+ \nu_e$	1%
$\tau\nu_\tau$	(5%)	$B_d^0 K^0 e^+ \nu_e$	1%
		$D^+ D^- e^+ \nu_e$	2%
		$D^0 \bar{D}^0 e^+ \nu_e$	2%
		$\eta_c e^+ \nu_e$	2%
		$\psi e^+ \nu_e$	2%
		$\tau^+ \nu_\tau$	1.5%

Nonleptonic Decays

$B^0\pi^+X$ ($\bar{n}$=1.1)	(20%)	$B_s^0 \pi^+$	6%
		$B_s \pi^+ \pi^+ \pi^-$	2.5%
		$B_s^0 \pi^+ \pi^0$	7%
		$B_s \pi^+ \pi^0 \pi^0$	1.5%
		$B_s \pi^+ \pi^0 \pi^0 \pi^0$	0.5%
		$B_s \pi^+ \pi^+ \pi^- \pi^0$	1%
$B_u^+K^0X$ ($\bar{n}$=1)	(1.5%)	$B_u^+ K^0$	0.5%
		$B_u K^0 \pi^0$	0.5%
$B_u^+K^-\pi^+X$ ($\bar{n}$=0)	(1.5%)	$B_u^+ K^- \pi^+$	1.5%
$B_d^0K^0\pi^+X$ ($\bar{n}$=0)	(1.5%)	$B_d^0 K^0 \pi^+$	1.5%
$B_d^0K^-\pi^+\pi^+X$ ($\bar{n}$=-1)	(1.5%)	$B_d^0 K^- \pi^+ \pi^+$	1%
D^+D^-X	(7%)	$D^+ D^- \pi^+$	1%
		$D^+ D^- \pi^+ \pi^+ \pi^-$	0.5%
		$D^+ D^- \pi^+ \pi^+ \pi^+ \pi^- \pi^-$	0.5%
		$D^+ D^- \pi^+$ + neutrals	1.5%
		$D^+ D^- \pi^+ \pi^+ \pi^-$ + neutrals	
		$D^+ D^- \pi^+ \pi^+ \pi^+ \pi^- \pi^-$ + neutrals	1%

$D^0\bar{D}^0X$	(7%)	$D^0 \bar{D}^0 \pi^+$	1%
		$D^0 \bar{D}^0 \pi^+ \pi^+ \pi^-$	0.5%
		$D^0 \bar{D}^0 \pi^+$ + neutrals	1.5%
		$D^0 \bar{D}^0 \pi^+ \pi^+ \pi^-$ +neutrals	2%
		$D^0 \bar{D}^0 \pi^+ \pi^+ \pi^+ \pi^- \pi^-$ +neutrals	1%
η_cX	(6%)	$\eta_c \pi^+$	0.5%
		$\eta_c \pi^+ \pi^+ \pi^-$	0.5%
		$\eta_c \pi^+$ + neutrals	1.5%
		$\eta_c \pi^+ \pi^+ \pi^-$ + neutrals	2%
		$\eta_c \pi^+ \pi^+ \pi^+ \pi^- \pi^-$ + neutrals	1%
ψX	(6%)	$\psi \pi^+$	0.6%
		$\psi \pi^+ \pi^+ \pi^-$	0.4%
		$\psi \pi^+ \pi^+ \pi^+ \pi^- \pi^-$	0.2%
		$\psi \pi^+$ + neutrals	1.5%
		$\psi \pi^+ \pi^+ \pi^-$ + neutrals	2%
		$\psi \pi^+ \pi^+ \pi^+ \pi^- \pi^-$ + neutrals	1%
X(all pions) ($\bar{n}$=6)	(5%)	No tabulation	
DKX ($\bar{n}$=6)	(5%)	No tabulation	

Prong Distributions*

Prongs	Semileptonic	Nonleptonic	Total
1	30%	25%	55%
3	6%	19%	25%
5	–	10%	10%
7	–	4%	4%

* η_c & ψ are taken as zero prong (!)

Accessible Fractions

1.2%	ψ + all charged
4.5%	ψ + all charged + neutrals
8.5%	B_s + all charged
2.5%	$B^{u,d}$ + all charged
2%	$B^{u,d}K$ + all charged
4%	$D\bar{D}$ + all charged

Λ_b^0 (bud) m = 5600 MeV $\tau = 6x10^{-13}$sec

Semileptonic Decays

$c \bar{\nu}_e e$	(10%)	$\Lambda_c^+ e \bar{\nu}_e$	6%
$\mu \bar{\nu}_\mu$	(10%)	$\Lambda_c^+ \pi^0 e^- \bar{\nu}_e$	2%
$\tau \bar{\nu}_\tau$ (4%)		$D^+ n e \bar{\nu}_e$	1%
		$D^0 p e \bar{\nu}_e$	1%

Nonleptonic Decays

$\Lambda_c^+ \pi^- X$	(37%)	$\Lambda_c^+ \pi^-$	1.5%+0=2%
spectator:	25%	$\Lambda_c^+ \pi^+ \pi^- \pi^-$	1.5%+0.5%=2.5%
capture:	12%	$\Lambda_c^+ \pi^+ \pi^+ \pi^- \pi^- \pi^-$	1%+0.5%=2%
($\bar{n}$=5)		$\Lambda_c^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^-$	0.5%+0.5%=1%
		$\Lambda_c^+ \pi^-$ + neutrals	6.5%+1.5%=8%
		$\Lambda_c^+ \pi^+ \pi^- \pi^-$ + neutrals	8.5%+5%=14%
		$\Lambda_c^+ \pi^+ \pi^+ \pi^- \pi^- \pi^-$ + neutrals	4%+3%=7%
		$\Lambda_c^+ \pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^-$ +neutrals	0.5%+0=0.5%
$D^+ n \pi^- X$	(8%)	$D^+ n \pi^+ \pi^- \pi^-$	0+0.5%=0.5%
spectator:	3%	$D^+ n \pi^+ \pi^+ \pi^- \pi^- \pi^-$	0+0.5%=0.5%
capture:	5%		
($\bar{n}$=4.5)		$D^+ n \pi^-$ + neutrals	1%+1%= 2%
		$D^+ n \pi^+ \pi^- \pi^-$ + neutrals	1%+2%= 3%
		$D^+ n \pi^+ \pi^+ \pi^- \pi^- \pi^-$ + neutrals	0.5%+1%=1.5%
$D^+ p \pi^- \pi^- X$	(5%)	$D^+ p \pi^- \pi^-$	0.5%
spectator:	0	$D^+ p \pi^+ \pi^- \pi^-$ + neutrals	1.5%
capture:	5%	$D^+ p \pi^+ \pi^+ \pi^- \pi^- \pi^-$ + neutrals	2.5%
($\bar{n}$=3.5)		$D^+ p \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^-$ +neutrals	1%
$D^0 n X$	(5%)	$D^0 n$ + neutrals	0.5%
spectator:	0	$D^0 n \pi^+ \pi^-$ + neutrals	2.5%
capture:	5%	$D^0 n \pi^+ \pi^+ \pi^- \pi^-$ + neutrals	1.5%
($\bar{n}$=5.5)			
$D^0 p \pi^- X$	(8%)	$D^0 p \pi^+ \pi^- \pi^-$	0+0.5%=0.5%
spectator:	3%	$D^0 p \pi^+ \pi^+ \pi^- \pi^- \pi^-$	0+0.5%=0.5%
capture:	5%		
		$D^0 p \pi^-$ + neutrals	1%+1%=2%
		$D^0 p \pi^+ \pi^- \pi^-$ + neutrals	1%+2%=3%
		$D^0 p \pi^+ \pi^+ \pi^- \pi^- \pi^-$ + neutrals	0.5%+1%=1.5%

$\Lambda_c^+ (\bar{c}s)^- X$	(8%)	$\Lambda_c^+ F^-$	2%
		$\Lambda_c^+ F^- \pi^0$	1%
		$\Lambda_c^+ F^- \pi^+ \pi^-$	0.5%
		$\Lambda_c^+ D^- K^+ \pi^-$	0.5%
		$\Lambda_c^+ D^0 K^0 \pi^+$	0.5%
$DN(c\bar{s})^- X$	(2%)	$D^+ n F^-$	0.5%
		$D^0 p F^-$	0.5%
$\phi Y X$	(0.04%)	$\phi \Lambda$	.002%
($\bar{n}$=2)		$\phi \Lambda \pi^+ \pi^-$	.002%
		$\phi \Lambda \pi^0$	.005%
		$\phi \Sigma^\pm \pi^\mp$	.002%x2=.004%
		$\phi \Sigma^\pm \pi^\mp \pi^+ \pi^-$	.002%x2=.004%
		$\phi \Sigma^\pm \pi^\mp \pi^0$	.005%x2= .01%
$\phi K N X$	(0.02%)	$\phi K^- p$	.005%
($\bar{n}$=1)			

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	--	1%	1%
2	25%	21%	46%
4	--	28%	28%
6	--	16%	16%
8	--	3%	3%

Accessible Fractions

7.5% Λ_c^+ + all charged
2.5% Λ_c^+ + all charged
1.5% D^+ + all charged
.01% ϕY + all charged

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Semileptonic Decays

$e^+\nu_e$	(10%)	$A^+ e^- \bar{\nu}_e$	3%
$\mu^+\nu_\mu$	(10%)	$A^+\pi^0 e^- \bar{\nu}_e$	1%
$\tau^+\nu_\tau$	(4%)	$A^0\pi^+ e^- \bar{\nu}_e$	4%
		$A_c^+ K^0 e^- \nu_e$	1%

Nonleptonic Decays

$A^+\pi^-X$	(22%)	$A^+\pi^-$	1%+0=1%
Spectator:	14%	$A^+\pi^+\pi^-\pi^-$	1%+0.5%=1.5%
Capture:	8%	$A^+\pi^+\pi^+\pi^-\pi^-\pi^-$	1%+0.5%=1.5%
($\bar{n}$=5)			
		$A^+\pi^-$ + neutrals	3.5%+1%=4.5%
		$A^+\pi^+\pi^-\pi^-$ + neutrals	5%+3.5%=8.5%
		$A^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	2%+2.5%=4.5%
		$A^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$ + neutrals	0.5%+0.5%=1%
A^0X	(12%)	$A^0\pi^+\pi^-$	0.5%+0=0.5%
Spectator:	4%	$A^0\pi^+\pi^+\pi^-\pi^-$	0.5%+0=0.5%
Capture:	8%	$A^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$	0+0.5%=0.5%
($\bar{n}$=6)			
		A^0 + neutrals	1%+1%=2%
		$A^0\pi^+\pi^-$ + neutrals	1.5%+3.5%=5%
		$A^0\pi^+\pi^+\pi^-\pi^-$ + neutrals	.5%+2.5%=3%
		$A^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0+0.5%=0.5%
		$A^0\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$ + neutrals	0+0.5%=0.5%
DYX	(12%)	(Too many modes to tabulate)	
Spectator:	4%		
Capture:	8%		
($\bar{n}$=5)			
DKNX	(8%)	(Too many modes to tabulate)	
($\bar{n}$=3.5)			

A_c^+KX	(8%)	$A_c^+K^0\pi^+\pi^-\pi^-$	0.5%
($\bar{n}$=5)		$A_c^+K^0\pi^+\pi^+\pi^-\pi^-\pi^-$	0.5%
		$A_c^+K^0\pi^-$ + neutrals	1.5%
		$A_c^+K^0\pi^+\pi^-\pi^-$ + neutrals	2%
		$A_c^+K^0\pi^+\pi^+\pi^-\pi^-\pi^-$+neutrals	0.5%
		$A_c^+K^-$ + neutrals	0.5%
		$A_c^+K^-\pi^+\pi^-$ + neutrals	2.5%
		$A_c^+K^-\pi^+\pi^+\pi^-\pi^-$ + neutrals	1%
$A^+(\bar{c}s)^-$	(5%)	A^+F^-	1.0%
		$A^+F^-\pi^0$	1.5%
		$A^+F^-\pi^+\pi^-$	0.5%
$A^0\pi^+(c\bar{s})^-$	(5%)	$A^0F^-\pi^+$	1.5%
		$A^0F^-\pi^+\pi^+\pi^-$	0.5%
		$A^0F^-\pi^+\pi^0$	0.5%
$\phi\Xi X$	(0.3%)	$\phi\Xi^-\pi^+$	0.1%
($\bar{n}$=2)		$\phi\Xi^-\pi^+\pi^0$	0.1%
		$\phi\Xi^0$	0.05%
		$\phi\Xi^0\pi^0$	0.07%
		$\phi\Xi^0\pi^+\pi^-$	0.05%
ϕKYX	(0.3%)	$\phi A_c^+K^-\pi^+$	0.1%
($\bar{n}$=1)		$\phi A_c^+K^0$	0.05%
		$\phi A_c K^0\pi^0$	0.05%
		$\phi\Sigma^+K^-$	0.03%
		$\phi\Sigma^0K^0$	0.03%
		$\phi\Sigma^-K^0\pi^+$	0.03%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
0	–	2%	2%
2	24%	18%	42%
4	–	20%	20%
6	–	9%	9%
8	–	2%	2%

Accessible Fractions

3%	A^+ + all charged
1.5%	A^0 + all charged
1%	$A_c K^0$ + all charged
1.5%	$A_c F^-$ + all charged
2%	A^0F^- + all charged
0.15%	$\phi\Xi$ + all charged
0.1%	ϕA + all charged

Semileptonic Decays

Ξ^- (bds) $m = 5800$ MeV $\tau = 1$ ps

$e\bar{\nu}_e$	(16%)	$A^+\pi^-e^-\bar{\nu}_e$	6%
$\mu\bar{\nu}_\mu$	(16%)	$A^0e^-\bar{\nu}_e$	3%
$\tau\bar{\nu}_\tau$	(5%)	$A^0\pi^0e^-\bar{\nu}_e$	3%
		$\Lambda_c^+K^-e^-\bar{\nu}_e$	1%
		$\Lambda_c^+K^0\pi^-e^-\bar{\nu}_e$	0.5%
		$D^+\Lambda\pi^-e^-\bar{\nu}_e$	0.5%
		$D^0\Lambda e^-\bar{\nu}_e$	1%

Nonleptonic Decays

$A^+\pi^-\pi^-X$	(20%)	$A^+\pi^-\pi^-$	2%
		$A^+\pi^-\pi^+\pi^-\pi^-$	1.5%
		$A^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$	1%
		$A^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$	0.5%
		$A^+\pi^-\pi^-$ + neutrals	5%
		$A^+\pi^-\pi^+\pi^-\pi^-$ + neutrals	7%
		$A^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$ + neutrals	3%
		$A^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$ + neutrals	0.5%
$A^0\pi^-X$	(20%)	$A^0\pi^-$	1%
		$A^0\pi^-\pi^+\pi^-$	1%
		$A^0\pi^-\pi^+\pi^-\pi^+\pi^-$	0.5%
		$A^0\pi^-$ + neutrals	5%
		$A^0\pi^-\pi^+\pi^-$ + neutrals	8%
		$A^0\pi^-\pi^+\pi^-\pi^+\pi^-$ + neutrals	3.5%
		$A^0\pi^-\pi^+\pi^-\pi^+\pi^-\pi^+\pi^-$ + neutrals	0.5%
Λ_c^+KX	(5%)	$\Lambda_c^+K^-\pi^-$	0.5%
		$\Lambda_c^+K^-\pi^-$ + neutrals	0.5%
		$\Lambda_c^+K^-\pi^-\pi^+\pi^-$ + neutrals	1%
		$\Lambda_c^+K^-\pi^-\pi^+\pi^-\pi^+\pi^-$ + neutrals	0.5%
		$\Lambda_c^+K^0\pi^-\pi^-$ + neutrals	0.5%
		$\Lambda_c^+K^0\pi^-\pi^+\pi^-\pi^-$ + neutrals	0.5%
		$\Lambda_c^+K^0\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$ + neutrals	0.5%
$D\Lambda X$	(5%)	$D^+\Lambda\pi^-\pi^-$ + neutrals	0.5%
		$D^+\Lambda\pi^-\pi^+\pi^-\pi^-$ + neutrals	0.5%
		$D^+\Lambda\pi^-\pi^+\pi^-\pi^+\pi^-\pi^-$ + neutrals	0.5%
		$D^0\Lambda\pi^-$	0.5%
		$D^0\Lambda\pi^-$ + neutrals	0.5%
		$D^0\Lambda\pi^-\pi^+\pi^-$ + neutrals	1%
		$D^0\Lambda\pi^-\pi^+\pi^-\pi^+\pi^-$ + neutrals	0.5%

$A^+\pi^-(\bar{c}s)X$	(6%)	$A^+F^-\pi^-$	2%
		$A^+F^-\pi^-\pi^+\pi^-$	0.5%
		$A^+F^-\pi^-\pi^0$	0.5%
		$A^+D^-K^-\pi^+\pi^-$	0.5%
		$A^+D^0K^0\pi^-\pi^-$	0.5%
$A^0(\bar{c}s)^-X$	(6%)	A^0F^-	1%
		$A^0F^-\pi^0$	1.5%
$\psi\Xi X$ ($\bar{n}$=1.8)	(0.5%)	$\psi\Xi^-$	.04%
		$\psi\Xi^-\pi^+\pi^-$	.04%
		$\psi\Xi^-\pi^0$	.07%
		$\psi\Xi^0\pi^-$	0.1%
		$\psi\Xi^0\pi^-\pi^0$	0.1%
$\psi K\Lambda X$ ($\bar{n}$=0.5)	(0.5%)	$\psi\Lambda K^-$	0.2%
		$\psi\Lambda K^-\pi^0$	0.1%
		$\psi\Lambda K^0\pi^-$	0.2%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	16%	11%	27%
3	19%	21%	40%
5	–	17%	17%
7	–	7%	7%
9	–	1%	1%

Accessible Fractions

5% A^+ + all charged
2.5% A^0 + all charged
3.5% AF^- + all charged
0.2% $\psi\Xi$ + all charged
0.2% $\psi\Lambda K^-$ + all charged

Ω_b^- (bss) m = 6100 MeV $\tau = 10^{-12}$ sec

Semileptonic Decays

$e^+\bar{\nu}_e$	(16%)	$T^0 e^-\bar{\nu}_e$	6%
$\mu^+\nu_\mu$	(16%)	$T^0\pi^0 e^-\bar{\nu}_e$	6%
$\tau^+\nu_\tau$	(5%)	$A^+K^- e^-\bar{\nu}_e$	1%
		$A^0\bar{K}^0 e^-\bar{\nu}_e$	1%
		$\Xi^0 D^0 e^-\bar{\nu}_e$	1%
		$\Xi^- D^+ e^-\bar{\nu}_e$	1%

Nonleptonic Decays

$T^0\pi^-X$	(40%)	$T^0\pi^-$	3.5%
		$T^0\pi^+\pi^-\pi^-$	3%
		$T^0\pi^+\pi^+\pi^-\pi^-\pi^-$	2%
		$T^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$	0.5%
		$T^0\pi^-$ + neutrals	10%
		$T^0\pi^+\pi^-\pi^-$ + neutrals	15%
		$T^0\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	5.5%
		$T^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-$ + neutrals	1%
		$T^0\pi^+\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-\pi^-\pi^-$ + neutrals	0.5%
AKX	(5%)	$A^+K^-\pi^-$ + neutrals	0.5%
		$A^+K^-\pi^+\pi^-\pi^-$ + neutrals	1%
		$A^+K^-\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0.5%
		$A^0\bar{K}^0\pi^-$ + neutrals	0.5%
		$A^0\bar{K}^0\pi^+\pi^-\pi^-$ + neutrals	1%
		$A^0\bar{K}^0\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0.5%
ΞDX	(5%)	$\Xi^0 D^0\pi^-$ + neutrals	0.5%
		$\Xi^0 D^0\pi^+\pi^-\pi^-$ + neutrals	1%
		$\Xi^0 D^0\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0.5%
		$\Xi^- D^+\pi^-$ + neutrals	0.5%
		$\Xi^- D^+\pi^+\pi^-\pi^-$ + neutrals	1%
		$\Xi^- D^+\pi^+\pi^+\pi^-\pi^-\pi^-$ + neutrals	0.5%

$T^0(\bar{c}s)X$	(13%)	T^0F^-	4%
		$T^0F^-\pi^+\pi^-$	0.5%
		$T^0F^-\pi^0$	1.5%
		$T^0F^-\pi^0\pi^0$	0.5%
		$T^0D^-\bar{K}^0\pi^0$	0.5%
		$T^0D^-K^-\pi^+$	1%
		$T^0D^-K^-\pi^+\pi^0$	0.5%
		$T^0D^0K^-\pi^0$	0.5%
		$T^0D^0\bar{K}^0\pi^-$	1%
		$T^0D^0\bar{K}^0\pi^-\pi^0$	0.5%
$\psi\Omega^-X$ ($\bar{n}$=2.1)	(0.5%)	$\psi\Omega^-$	.05%
		$\psi\Omega^-\pi^+\pi^-$	.07%
		$\psi\Omega^-\pi^0$	.1%
		$\psi\Omega^-\pi^0\pi^0$	.05%
		$\psi\Omega^-\pi^+\pi^-\pi^0$	.05%
$\psi K\Xi X$ ($\bar{n}$=1.4)	(0.5%)	$\psi K^-\Xi^-\pi^+$	0.1%
		$\psi\bar{K}^0\Xi^0\pi^-$	0.1%
		$\psi\bar{K}^0\Xi^-$	.03%
		$\psi K^-\Xi^0$	.03%
		$\psi\bar{K}^0\Xi^-\pi^0$	.05%
		$\psi K^-\Xi^0\pi^0$	.05%

Prong Distributions

Prongs	Semileptonic	Nonleptonic	Total
1	30%	22%	52%
3	5%	23%	28%
5	–	11%	11%
7	–	3%	3%
9	–	1%	1%

Accessible Fractions

9%	T^0 + all charged
4.5%	T^0F^- + all charged
0.1%	$\psi\Omega^-$ + all charged
0.1%	$\psi\Xi^-K^-\pi^+$ + all charged