ԵՐԵՎԱՆԻ ՖԻԶԻԿԱՅԻ ԻՆՍՏԻՏՈՒՏ
ЕРЕВАНСКИЙ ФИЗИЧЕСКИЙ ИНСТИТУТ

ЕФИ-346(4)-79

A.Yu. KHODJAMIRIAN

ENHANCED AND SUPPRESSED TWO-AND THREE-BODY NONLEPTONIC DECAYS OF CHARMED MESONS

АРУС
ԵՐԵՎԱՆ
ЕРЕВАН
1979

ЕФИ-346(4)-79

YEREVAN PHYSICS INSTITUTE

A. Yu. KHODJAMIRIAN

ENHANCED AND SUPPRESSED TWO-AND THREE-BODY NONLEPTONIC DECAYS OF CHARMED MESONS

The relations are obtained between widths of various two- and three-body nonleptonic decays of charmed $\mathcal{D}, \mathcal{F}$ - mesons. These relations follow from the SU(3)-symmetry of the weak Hamiltonian and quark diagrams underlying these decays. Taking as an input the existing experimental data, we estimate all branching ratios of nonleptonic decay modes of considered types. We predict comparatively large branching ratios (up to 10% (up to 1 - 2%) for a few definite modes with $\Delta S=-1$ ($\Delta S=0$)) into both three pseudoscalars in the totally symmetrical state and vector plus pseudoscalar. The striking violation of Cabibbo hierarchy is also predicted when some of the modes with $\Delta S=0$ turn out to have much larger branching ratios than many of those with $\Delta S=-1$. The origin of these relative enhancement and suppression lies in relations between underlying quark diagrams when familiar short distance factors are accounted for. These results may serve as a hint in current searches for charmed mesons in different processes.

Yerevan Physics Institute

Yerevan 1979

ЕФИ-346(4)-79

А.Ю.ХОДЖАМИРЯН

УСИЛЕННЫЕ И ПОДАВЛЕННЫЕ ДВУХ- И ТРЕХЧАСТИЧНЫЕ НЕЛЕПТОННЫЕ РАСПАДЫ ЧАРМОВЫХ МЕЗОНОВ.

Получены соотношения между вероятностями различных двух- и трехчастичных нелептонных распадов чармовых $\mathcal{D}$ и $\mathcal{F}$ - мезонов, следующие из $SU(3)$ -симметрии гамильтониана и кварковых диаграмм. Используя имеющиеся экспериментальные данные, на основании этих соотношений получены оценки относительных вероятностей всех мод двух- и трехчастичных нелептонных распадов рассмотренных типов. Предсказываются сравнительно большие относительные вероятности отдельных мод с ΔS =-I (до I0%) и с ΔS =0 (до I-2%) распадов в три псевдоскалярных мезона в полностью симметричном состоянии и в векторный и псевдоскалярный мезон. Предсказывается также значительное нарушение иерархии по углу Кабиббо, которое выражается в том, что некоторые моды с ΔS =0 имеют относительные вероятности намного большие, чем у некоторых мод с ΔS = -I. Причина такого относительного усиления и подавления заключается в соотношениях между отвечающими распадам кварковыми диаграммами с учетом известных коэффициентов, возникающих из-за сильного взаимодействия на малых расстояниях. Эти результаты могут послужить ориентиром в дальнейших поисках чармовых мезонов в различных реакциях.

Ереванский физический институт
Ереван 1979

ЕФИ-346(4)-79

YEREVAN PHYSICS INSTITUTE

A.Yu. KHODJAMIRIAN

ENHANCED AND SUPPRESSED TWO-AND THREE-BODY NONLEPTONIC DECAYS OF CHARMED MESONS

Yerevan 1979

In our previous work[1] we have discussed the consequences of the SU(3) - symmetry for nonleptonic (NL) decays of charmed hadrons.

It was shown that in addition to general $\mathrm{T}, \mathcal{U}, \mathrm{V}$ -selection rules, following from the SU(3)-structure $(\{6\} \oplus \{\overline{15}\})$ of the weak nonleptonic Hamiltonian, more stringent symmetry properties emerge for NL decays of the charmed $\mathfrak{D}^0, \mathfrak{D}^+, \mathfrak{F}^\pm$ mesons if we turn to the corresponding quark diagrams.

Indeed, due to the suppression of certain diagrams, viz. annihilation type and OZI forbidden ones, the NL decays of charmed mesons are mediated by a comparatively small number of "decay" diagrams (DD). The last diagrams correspond to the c-quark decay into light quarks, the antiquark from the initial meson being a spectator. The simplest examples of forbidden and allowed diagrams are shown in Figs. 1b,c and 1a, respectively.

Recall, that the suppression of annihilation diagrams were noticed for the first time in Ref. [2]. There was also conjectured the equality of total widths of all the three charmed mesons, following from the DD – dominance. The estimates of two-particle $\Delta S=-1$ NL widths based on these diagrams were also obtained in Ref. [3].

In the SU(3) – limit to the set of DD there corresponds a considerably smaller number of SU(3)-amplitudes as compared with the general case. This manifests itself in a lot of additional relations between NL amplitudes which do not follow from the general selection rules. At the same time the $\{6\}\oplus\{15\}$ structure of the NL interaction remains and no new selection rules of $\Delta V=0$ type emerge. The above mentioned relations were obtained in Ref. [1] for various types of two - and three-body NL decays of $\mathfrak{D}$ and $\mathfrak{F}$ - mesons.

Here we present experimentally testable relations between widths of these NL decays, following from amplitude relations obtained earlier.

Then, taking as an input the existing experimental data on branching ratios (B.R.) of the separate two-and three-body NL modes, we estimate B.R. of all remaining $\Delta S=-1, 0$ modes of considered types.

For the sake of completeness, here we write down also the most general relations between three-particle NL amplitudes, following from the SU(3)-selection rules.

We assume that NL decays are mediated by the effective four-quark weak Hamiltonian [2]:

$$\mathcal{H}(\Delta C=1) = \left(\frac{G}{\sqrt{2}}\right)\frac{1}{2}\left\{c_+ O_+ + c_- O_-\right\}$$

$$O_\pm = \left[(\bar{s}c)(\bar{u}d) \pm (\bar{u}c)(\bar{s}d)\right]\cos^2\theta + \left[(\bar{s}c)(\bar{u}s) - (\bar{d}c)(\bar{u}d) \pm (\bar{u}c)(\bar{s}s) \mp (\bar{u}c)(\bar{d}d)\right]\cos\theta\sin\theta + O(\sin^2\theta) \quad (1)$$

where $(\bar{S}C) = \bar{S}^i\gamma_\mu(1+\gamma_5)C^i$ etc. are weak currents of coloured quarks; G is the Fermi constant; θ is the Cabibbo angle. Familiar QCD – coefficients $C_+ \simeq 0{,}7$; $C_- \simeq 1{,}9$ from Ref. [2] account for the strong interaction at small distances in the weak vertex (color vector gluon exchanges). The C_-/C_+ ratio fixes the $\{6\}/\{15\}$ proportion in the effective Hamiltonian (1).

The Cabibbo favoured two-body (three-body) NL decays of $\mathcal{D}, \mathcal{F}$ - mesons with $\Delta S = -1$ into two mesons 1,2 (three mesons 1,2,3) are described by DD shown in Fig1a (Fig2a,b). The four-quark interaction (1) enter the diagrams having the weak interaction vertex structure $(\bar{S}C)\cdot(\bar{u}d)$ and $(\bar{u}C)\cdot(\bar{S}d)$ with coefficients $G\alpha\cos^2\theta$ and $G\beta\cos^2\theta$ respectively, where

$$\alpha = \frac{2C_+ + C_-}{3} \simeq 1{,}10 \quad ; \quad \beta = \frac{2C_+ - C_-}{3} \simeq -0{,}17.$$

For $\Delta S = 0$ decays evident replacements are to be made in these diagrams:

$$(\bar{s}c)(\bar{u}d) \longrightarrow (\bar{s}c)(\bar{u}s) - (\bar{d}c)(\bar{u}d)$$

$$(\bar{u}c)(\bar{s}d) \longrightarrow (\bar{u}c)\left[(\bar{s}s) - (\bar{d}d)\right]$$

and in coefficients: $\cos^2\theta \to \cos\theta\sin\theta$.

Consider first the following types of two-and three-body NL decays: $\mathcal{D}, \mathcal{F} \rightarrow 2P, VP, (3P)_s$. The "s" subscript means totally symmetrical state. Here $P = \{\pi, K, \eta, \eta'\}$ and $V = \{\rho, K^*, \omega = \frac{u\bar{u}+d\bar{d}}{\sqrt{2}}, \phi = s\bar{s}\}$ are usual pseudoscalar and vector nonets.

To the first type of decays there corresponds only one diagram of Fig. 1a, symmetrized over 1,2; to the second type there correspond two diagrams of Fig 1a, where 1 or 2 is the vector meson; to the third - also two diagrams of Figs. 2a and 2b, totally symmetrized over 1,2,3. The corresponding amplitudes, proportional to α , we denote by A; A_1 and A_2 ; C and $\mathcal{D}$, respectively. The amplitudes of all $\Delta S = -1, 0 + 1$ NL decay modes of considered types can be expressed through these five amplitudes [1]. These expressions are given in the second column of Table 1 for all modes with $\Delta S = -1$ and some modes with $\Delta S = 0$. Here $\delta = \beta/\alpha \simeq -0,15$.

Note that $\mathcal{D}^0 \rightarrow \bar{K}^0 K^0 \bar{K}^0$, $\phi \bar{K}^0$ and $\mathcal{F}^+ \rightarrow 2\pi, 3\pi, \rho\pi$, $\omega\pi$ modes with $\Delta S = -1$ are forbidden in the annihilation diagrams suppression limit considered here (while at the same time $\mathcal{D}^0 \rightarrow \bar{K}^0 K^+ K^-$, $\mathcal{F} \rightarrow \pi\eta, \pi\eta', \rho\eta, \rho\eta', \pi 2\eta, \pi\eta\eta'$ modes are favoured). The vanishing of $\mathcal{F} \rightarrow (2\pi\eta)_s, (2\pi\eta')_s$ amplitudes is due to the total symmetry of the final state.

We restrict ourselves with those $\Delta S = 0$ modes for which the below estimated B.R. turn out to be more than 0,1%.

It is easy to convince oneself that the total set of amplitude relations which follow from the expressions of Table 1 includes most general relations, following from the SU(3)-selection rules which were obtained for $\mathcal{D},\mathcal{F}\to 2P$ in Ref.[4] and for $\mathcal{D},\mathcal{F}\to VP$ in Ref. [5]. General relations for $\mathcal{D},\mathcal{F}\to(3P)_s$ and for $\mathcal{D},\mathcal{F}\to V(2P)_s$ are given in Tables 2 and 3 respectively. In these Tables $(K^-\pi^+\pi^0)_{\mathcal{D}^0}$ denotes the amplitude of $\mathcal{D}^0\to K^-\pi^+\pi^0$ decay and so on. We write down only the simplest (viz. potentially testable) relations.

From the expressions for NL amplitudes presented above it is easy to obtain relations between corresponding widths taking into account the relative phase spaces determined by the SU(3) mass differences. The widths of all modes of considered decays determined by five independent amplitudes can be expressed through seven widths with regard for the A_1-A_2, $\mathcal{C}-\mathcal{D}$ interferences. These expressions are given in the third column of Table 1 in terms of $\Gamma_1=\Gamma(\mathcal{D}^0\to K^-\pi^+)$; $\Gamma_2=\Gamma(\mathcal{D}^0\to\rho^+K^-)$; $\Gamma_3=\Gamma(\mathcal{D}^0\to K^{*-}\pi^+)$; $\Gamma_4=\Gamma(\mathcal{D}^+\to\rho^+\bar{K}^0)$; $\Gamma_5=\Gamma(\mathcal{D}^0\to(\bar{K}^0\pi^+\pi^-)_s)$; $\Gamma_6=\Gamma(\mathcal{D}^+\to(K^-\pi^+\pi^+)_s)$; $\Gamma_7=\Gamma(\mathcal{D}^0\to(\bar{K}^0K^+K^-)_s)$.

Apart from these expressions, two triangle inequalities take place, restricting two of the seven Γ_i - values, for example:

$$\left(\sqrt{\Gamma_2}-0{,}17\sqrt{\Gamma_3}\right)^2\le\Gamma_4\le\left(\sqrt{\Gamma_2}+0{,}17\sqrt{\Gamma_3}\right)^2$$

$$\left(3{,}11\sqrt{\Gamma_5}-1{,}92\sqrt{\Gamma_6}\right)^2\le\Gamma_7\le\left(3{,}11\sqrt{\Gamma_5}+1{,}92\sqrt{\Gamma_6}\right)^2.$$

The direct test of these relations is impossible so far because the experimental data are insufficient.

Nevertheless, using these relations and taking as an input the measured B.R. we can easily estimate the values of B.R. of all remaining modes (or at least their lower bounds) if assuming the equality of total widths of all the three charmed mesons.

These estimates are presented in the fourthcolumn of Table 1. To obtain them we use the following facts and conjectures:

i) $B(\mathcal{D}^0 \to K^- \pi^+) = (2,2 \pm 0,6)\%$ [6].

ii) In $\mathcal{D}^0 \to \bar{K}^0 \pi^+ \pi^-$ and $\mathcal{D}^+ \to K^- \pi^+ \pi^+$ decays [7,8] there are no noticeable contributions of $K^{*-}\pi^+$, $\rho^0 \bar{K}^0$ and $\bar{K}^{*0}\pi^+$ resonant modes, respectively. Therefore, we assume that these decays go mainly into totally symmetrical $(3P)_s$ states. Using measured values of B.R. [6] we have
$B(\mathcal{D}^0 \to (\bar{K}^0\pi^+\pi^-)_s) = (4,0 \pm 1,3)\%$; $B(\mathcal{D}^+ \to (K^-\pi^+\pi^+)_s) = (3,9 \pm 1,0)\%$.
We put also $B(\mathcal{D}^0 \to K^{*-}\pi^+) \simeq 0$.

iii) The value of $B(\mathcal{D}^0 \to (K^-\pi^+\pi^0)_s) = \frac{1}{4} B(\mathcal{D}^+ \to (K^-\pi^+\pi^+)_s) \simeq 1\%$ which is much smaller than the measured value [9] $B(\mathcal{D}^0 \to K^-\pi^+\pi^0) = (12 \pm 6)\%$. Hence, we expect that in the last decay there dominates the final state antisymmetrical over $\pi^+\pi^0$ which is naturally the $\mathcal{D}^0 \to K^-\rho^+$ resonant mode as it was already noticed in Ref. [1]. So we put $B(\mathcal{D}^0 \to K^-\rho^+) = (11 \pm 6)\%$.

Note, that the obtained estimates do not contradict the experimental data remaining unexploited: the value of $B(\mathcal{D}^+ \to \bar{K}^0\pi^+) = (1,5 \pm 0,6)\%$. [6] and the absence of $\mathcal{D}^0 \to \rho^0 \bar{K}^0$ and $\mathcal{D}^+ \to \bar{K}^{*0}\pi^+$ decays with appreciable widths.

Summarizing the predictions given in Table 1, we come to the following conclusions, which are not strict, however, because of large experimental errors in the inputs:

1. We can expect that some modes with $\Delta S = 0$ (all they are presented in Table 1) should have B.R. much larger than many of those with $\Delta S = -1$. The striking violation of the original Cabibbo hierarchy is due to the relative suppression of

some quark diagrams by the factor $\delta = \beta/\alpha$ which is of the same order as the $tg\theta$.

2. The three-body (3P) NL decays should give contributions to the total widths of charmed mesons(up to 40%)much larger than the contributions of two-body ones (up to 2%). At the same time only a few definite (VP) and (3P)s modes for each meson are essential in the total (3P) contribution.

To test this conjecture it is necessary to investigate first the ($\pi^+\pi^0$) - invariant mass distribution in the $\mathcal{D}^0 \to K^-\pi^+\pi^0$ to extract the $\mathcal{D}^0 \to K^-\rho^+$ mode.

3. Some decays with η and η' in the final state should have comparatively large B.R. (up to a few %), depending on the mixing angle value (see Table 1).

Note that relations and estimates given here for decays involving η and η' are tests of the OZI rule and (or) mixing pattern for the pseudoscalar mesons.

The mean charged multiplicity $\langle n \rangle$ for the considered $\mathcal{D}^0$, $\mathcal{D}^+$ decays from our estimates turns out to be $\simeq 2,6$ (π^+,π^- from K^0_S are taken into account). These values do not contradict the measured total charged multiplicity [10] :

$\langle n_{\mathcal{D}^0} \rangle = \langle n_{\mathcal{D}^+} \rangle = 2,3 \pm 0,3$.

Consider now the $\mathcal{D},\mathcal{F} \to 2V$ and $\mathcal{D},\mathcal{F} \to V(2P)_S$ decays which are not yet well investigated.

The primary decays are identical to the $\mathcal{D},\mathcal{F} \to 2P$ decays from the point of view of SU(3) - symmetry and quark diagrams. Unfortunately, the lack of experimental data and the uncer - tainty of the relative kinematical factors mentioned in Ref. [1] do not allow to obtain reliable relations and the B.R.

estimates. We note only, that the main modes with the amplitudes proportional to $\alpha \cos^2\theta$ are apparently: $\mathcal{D}^0 \to K^{*-}\rho^+$, $\mathcal{D}^+ \to \bar{K}^{*0}\rho^0$ and $\mathcal{F}^+ \to \rho^+\phi$.

The $\mathcal{D},\mathcal{F} \to V(2P)_S$ decays are determined by the six independent DD of Fig. 2a and 2b where 1,2 or 3 is the vector meson. The preliminary data[6,7] tell us that $B(\mathcal{D}^+ \to K^-\pi^+\rho^0) \cong (3{,}2 \pm 1{,}1)\%$ and $B(\mathcal{D}^+ \to \bar{K}^{*0}\pi^+\pi^-) < 0{,}3\%$. It is easy to see that to these modes there correspond completely different combinations of diagrams. These data are quite insufficient for any predictions.

The expressions of the $\mathcal{D},\mathcal{F} \to V(2P)_S$ amplitudes in terms of relevant quark DD were given in Ref. [1]. Here in Table 4 we present the corresponding relations between widths for $\Delta S = -1$ modes. The kinematical corrections here correspond to the simplest kinematical structure symmetrical over P_1 and P_2 momenta (p_1, p_2): $V_\mu (p_1+p_2)_\mu$ and can be taken as crude estimates.

In conclusion we note that the tests of all relations obtained here for some types of charmed mesons NL decays demand more correct measurements of various relative and absolute widths of these decays. This in fact may be carried out in e^+e^- annihilation experiments due to unique features of the $\Psi(3772)$ resonance which decays totally to $\mathcal{D}\bar{\mathcal{D}}$ and possibly due to existence of analogous resonances decaying to $\mathcal{F}\bar{\mathcal{F}}$.

The obtained estimates of various decays B.R. may serve as a hint in current searches for these particles in different processes.

Table 1. : Amplitudes and widths of two- and three-body nonleptonic decays of charmed mesons.

Mode	Amplitude	Width	B(%)
$\Delta S=-1$:			
$\mathcal{D}^0 \to K^-\pi^+$	A	Γ_1	$2{,}2$ i)
$\bar{K}^0\pi^0$	$\frac{\delta}{\sqrt{2}}A$	$0{,}01\Gamma_1$	$<0{,}1$
$\bar{K}^0\eta$	$\frac{\delta}{\sqrt{6}}A$ ii)	$0{,}004\Gamma_1\ (0{,}006\Gamma_1)$ iii)	$<0{,}1\ (<0{,}1)$
$\bar{K}^0\eta'$	$\frac{\delta}{\sqrt{3}}A$	$0{,}005\Gamma_1\ (0{,}004\Gamma_1)$	$<0{,}1\ (<0{,}1)$
ρ^+K^-	A_1	Γ_2	$11{,}0$
$\rho^0\bar{K}^0$	$\frac{\delta}{\sqrt{2}}A_2$	$0{,}01\Gamma_3$	$\simeq 0$
$\omega\bar{K}^0$	$\frac{\delta}{\sqrt{2}}A_2$	$0{,}01\Gamma_3$	$\simeq 0$
$\phi\bar{K}^0$	0	0	0
$K^{*-}\pi^+$	A_2	Γ_3	$\simeq 0$
$\bar{K}^{*0}\pi^0$	$\frac{\delta}{\sqrt{2}}A_1$	$0{,}01\Gamma_2$	$0{,}1$
$\bar{K}^{*0}\eta$	$\frac{\delta}{\sqrt{6}}A_1$	$0{,}002\Gamma_2\ (0{,}003\Gamma_2)$	$<0{,}1\ (<0{,}1)$
$K^-\pi^+\pi^0$	iv) $\frac{1}{\sqrt{2}}(C+\delta\mathcal{D})$	$0{,}25\Gamma_6$	$1{,}0$
$\bar{K}^0\pi^+\pi^-$	$(1+\delta)C$	Γ_5	$4{,}0$
$\bar{K}^0\pi^0\pi^0$	$\delta(C-\mathcal{D})$	$-0{,}07\Gamma_5+0{,}03\Gamma_6+0{,}06\Gamma_7$	$\geq 0{,}2$
$K^-\pi^+\eta$	$\frac{1}{\sqrt{6}}[-C+(2+\delta)\mathcal{D}]$	$-0{,}82\Gamma_5+0{,}33\Gamma_6+1{,}36\Gamma_7$ $(-0{,}12\Gamma_5+0{,}05\Gamma_6+2{,}30\Gamma_7)$	$\geq 5{,}8$ $(\geq 12{,}8)$

i) The inputs are underlined (exp. errors omitted)

ii) Amplitudes are given for unmixed η and η' states.

iii) Widths and B.R. in (without) parenthesis correspond to the $\theta_{mix} = -11^\circ$ (unmixed η and η' states).

iv) The "s" subscript is omitted.

Mode	Amplitude	Width	B(%)
$\bar{K}^0\pi^0\eta$	$\frac{\delta}{\sqrt{3}}(C-\mathcal{D})$	$-0,02\Gamma_5+0,01\Gamma_6+0,02\Gamma_7$ $(-0,02\Gamma_5+0,01\Gamma_6+0,01\Gamma_7)$	$\geq 0,1$ $(\geq 0,02)$
$\bar{K}^0\eta\eta$	$\frac{\delta}{3}(C-\mathcal{D})$	$10^{-3}(-\Gamma_5+0,4\Gamma_6+\Gamma_7)$ $(10^{-3}(-0,6\Gamma_5+0,5\Gamma_6+0,1\Gamma_7))$	$< 0,1$ $(< 0,1)$
$\bar{K}^0K^+K^-$	$\delta C+\mathcal{D}$	Γ_7	$\geq 5,7$.
$\bar{K}^0K^0\bar{K}^0$	0	0	0
$K^-\pi^+\eta'$	$\frac{1}{\sqrt{3}}[2C+(2+\delta)\mathcal{D}]$	$1,04\Gamma_5-0,33\Gamma_6+0,54\Gamma_7$ $(0,93\Gamma_5-0,28\Gamma_6+0,40\Gamma_7)$	$\geq 5,9$ $(\geq 4,9)$
$\bar{K}^0\pi^0\eta'$	$\frac{\delta}{\sqrt{6}}(2C+\mathcal{D})$	$10^{-3}(7\Gamma_5-2\Gamma_6+2\Gamma_7)$	$< 0,1$
$\Delta S=0$:			
$\mathcal{D}^0\to\pi^+\pi^-$	$-A$ i)	$0,06\Gamma_1$	0,1
K^+K^-	A	$0,05\Gamma_1$	0,1
$\rho^+\pi^-$	$-A_1$	$0,09\Gamma_1$	1,0
$K^{*+}K^-$	A_1	$0,03\Gamma_2$	0,3
$K^+\bar{K}^0\pi^-$ $K^0K^-\pi^+$	$\left.\right\} C-\mathcal{D}$	$-0,19\Gamma_5+0,09\Gamma_6+0,15\Gamma_7$	$\geq 0,4$
$\pi^+\pi^-\eta$	$-\frac{1}{\sqrt{6}}[(2+3\delta)C+(2+\delta)\mathcal{D}]$	$0,31\Gamma_5-0,10\Gamma_6+0,21\Gamma_7$ $(0,49\Gamma_5-0,16\Gamma_6+0,30\Gamma_7)$	$\geq 2,0$ $(\geq 3,0)$
$K^+K^-\eta$	$-\frac{1}{\sqrt{6}}[(1+3\delta)C+(1-\delta)\mathcal{D}]$	$0,01\Gamma_5-0,002\Gamma_6+0,01\Gamma_7$ $(10^{-3}(\Gamma_5-0,2\Gamma_6+3\Gamma_7))$	$\geq 0,1$ $(\geq 0,02)$
$\pi^+\pi^-\eta'$	$-\frac{1}{\sqrt{3}}[2C+(2+\delta)\mathcal{D}]$	$0,28\Gamma_5-0,09\Gamma_6+0,14\Gamma_7$ $(0,19\Gamma_5-0,06\Gamma_6+0,10\Gamma_7)$	$\geq 1,6$ $(\geq 1,1)$

i) The common factor $tg\,\theta$ in $\Delta S=0$ amplitudes is omitted

Mode	Amplitude	Width	B(%)
$\underset{\sim\sim}{\Delta S=-1}$:			
$\mathcal{D}^+\to\bar{K}^0\pi^+$	$(1+\delta)A$	$0,71\Gamma_1$	1,6
$\rho^+\bar{K}^0$	$A_1+\delta A_2$	Γ_4	11,0
$\bar{K}^{*0}\pi^+$	δA_1+A_2	$-0,84\Gamma_2+0,98\Gamma_3+0,86\Gamma_4$	0,2
$K^-\pi^+\pi^+$	$2(C+\delta\mathcal{D})$	Γ_6	$\underline{3,9}$
$\bar{K}^0\pi^+\eta$	$\frac{1}{\sqrt{6}}[(2\delta-1)C+(2-\delta)\mathcal{D}]$	$-1,30\Gamma_5+0,52\Gamma_6+1,84\Gamma_7$	$\geq 7,3$
		$(-1,17\Gamma_5+0,26\Gamma_6+2,73\Gamma_7)$	$(\geq 11,9)$
$\bar{K}^0K^+\bar{K}^0$	$2(\delta C+\mathcal{D})$	$2\Gamma_7$	$\geq 11,4$
$\bar{K}^0\pi^+\eta'$	$\frac{2}{\sqrt{3}}(1+\delta)(C+\mathcal{D})$	$0,80\Gamma_5-0,25\Gamma_6+0,47\Gamma_7$	$\geq 4,8$
		$(0,72\Gamma_5-0,22\Gamma_6+0,31\Gamma_7)$	$(\geq 3,8)$
$\bar{K}^0\pi^+\pi^0$	$-\frac{1}{\sqrt{2}}(C+\delta\mathcal{D})$	$0,25\Gamma_6$	1,0
$\underset{\sim\sim}{\Delta S=0}$:			
$\mathcal{D}^+\to\bar{K}^0K^+$	A	$0,05\Gamma_1$	0,1
$\rho^+\pi^0$	$\frac{1}{\sqrt{2}}(A_1+\delta A_2)$	$0,04\Gamma_4$	0,4
$\rho^+\eta$	$-\frac{1}{\sqrt{6}}(A_1+3\delta A_2)$	$-0,02\Gamma_2+0,001\Gamma_3+0,03\Gamma_4$	0,1
		$(-0,03\Gamma_2+0,001\Gamma_3+0,04\Gamma_4)$	(0,1)
$K^{*+}\bar{K}^0$	A_1	$0,03\Gamma_2$	0,3
$\pi^+\pi^+\pi^-$	$-2(C+\delta\mathcal{D})$	$0,09\Gamma_6$	0,3
$\pi^+\pi^0\pi^0$	$-(C+\delta\mathcal{D})$	$0,02\Gamma_6$	0,1
$\pi^+\pi^0\eta$	$\frac{(1+\delta)}{\sqrt{3}}(C+\mathcal{D})$	$0,16\Gamma_5-0,05\Gamma_6+0,09\Gamma_7$	$\geq 0,9$
		$(0,24\Gamma_5-0,08\Gamma_6+0,14\Gamma_7)$	$(\geq 1,4)$
$\pi^+\eta\eta$	$-\frac{1}{3}[(1+6\delta)C+(2-3\delta)\mathcal{D}]$	$0,01\Gamma_5-0,005\Gamma_6+0,04\Gamma_7$	$\geq 0,25$
		$(0,03\Gamma_5-0,01\Gamma_6+0,08\Gamma_7)$	$(\geq 0,5)$
$\pi^+K^+K^-$	$(C+\delta\mathcal{D})$	$0,015\Gamma_6$	0,1
$\pi^+K^0\bar{K}^0$	$-(C-\mathcal{D})$	$-0,19\Gamma_5+0,09\Gamma_6+0,15\Gamma_7$	$\geq 0,4$

Mode	Amplitude	Width	B(%)
$\pi^0 K^+ \bar{K}^0$	$\frac{1}{\sqrt{2}}[(\delta-1)C+2\mathcal{D}]$	$-0{,}20\Gamma_5+0{,}09\Gamma_6+0{,}34\Gamma_7$	$\geq 1{,}5$
$\bar{K}^0 K^+ \eta$	$-\frac{1}{\sqrt{6}}[(1+3\delta)C+2\mathcal{D}]$	$0{,}02\Gamma_5-0{,}01\Gamma_6+0{,}03\Gamma_7$ $(0{,}005\Gamma_5-0{,}001\Gamma_6+0{,}02\Gamma_7)$	$\geq 0{,}2$ $(\geq 0{,}1)$
$\pi^+\pi^0\eta'$	$\sqrt{\frac{2}{3}}(1+\delta)(C+\mathcal{D})$	$0{,}11\Gamma_5-0{,}03\Gamma_6+0{,}06\Gamma_7$ $(0{,}07\Gamma_5-0{,}02\Gamma_6+0{,}04\Gamma_7)$	$\geq 0{,}6$ $(\geq 0{,}4)$
$\pi^+\eta\eta'$	$-\frac{\sqrt{2}}{3}[(1+3\delta)C+(2+3\delta)\mathcal{D}]$	$0{,}01\Gamma_5-0{,}002\Gamma_6+0{,}01\Gamma_7$ $(0{,}01\Gamma_5-0{,}003\Gamma_6+0{,}01\Gamma_7)$	$\geq 0{,}1$ $(\geq 0{,}1)$
$\Delta S=-1$:			
$F^+\to\eta\pi^+$	$-\sqrt{\frac{2}{3}}A$	$0{,}62\Gamma_1$ $(0{,}43\Gamma_1)$	1,4 (1,0)
$\pi^0\pi^+$	0	0	0
$\eta'\pi^+$	$\frac{1}{\sqrt{3}}A$	$0{,}25\Gamma_1$ $(0{,}40\Gamma_1)$	0,6 (0,9)
$K^+\bar{K}^0$	δA	$0{,}02\Gamma_1$	$<0{,}1$
$\rho^+\eta$	$-\sqrt{\frac{2}{3}}A_1$	$0{,}95\Gamma_2$ $(0{,}67\Gamma_2)$	10,4 (7,4)
$\rho^+\pi^0$ $\rho^0\pi^+$ $\omega\pi^+$	0	0	0
$\phi\pi^+$	A_2	$0{,}88\Gamma_3$	$\simeq 0$
$\rho^+\eta'$	$\frac{1}{\sqrt{3}}A_1$	$0{,}16\Gamma_2$ $(0{,}25\Gamma_2)$	1,7 (2,7)
$K^{*+}\bar{K}^0$	δA_2	$0{,}03\Gamma_3$	$\simeq 0$

Mode	Amplitude	Width	B(%)
$\bar{K}^{*0}K^+$	δA_1	$0{,}02\Gamma_2$	0,2
$\pi^+\pi^+\pi^-$	0	0	0
$\pi^+\pi^0\pi^0$	0	0	0
$\pi^+\pi^0\eta$	0	0	0
$\pi^+\eta\eta$	$\frac{4}{3}(C-\mathcal{D})$	$-3{,}2\Gamma_5+1{,}37\Gamma_6+2{,}42\Gamma_7$	$\geq 6{,}2$
		$(-2{,}29\Gamma_5+0{,}93\Gamma_6+2{,}82\Gamma_7)$	$(\geq 10{,}5)$
$K^+K^-\pi^+$	$C+\delta\mathcal{D}$	$0{,}35\Gamma_6$	1,4
$K^+\bar{K}^0\pi^0$	$\frac{\delta}{\sqrt{2}}(C-\mathcal{D})$	$-0{,}05\Gamma_5+0{,}02\Gamma_6+0{,}06\Gamma_7$	$\geq 0{,}2$
$K^0\bar{K}^0\pi^+$	$(1+\delta)C$	$0{,}70\Gamma_5$	2,8
$K^+\bar{K}^0\eta$	$-\frac{1}{\sqrt{6}}[\delta C+(2+\delta)\mathcal{D}]$	$0{,}09\Gamma_5-0{,}03\Gamma_6+0{,}85\Gamma_7$	$\geq 5{,}1$
		$(0{,}11\Gamma_5-0{,}04\Gamma_6+0{,}65\Gamma_7)$	$(\geq 4{,}0)$
$\pi^+\pi^0\eta'$	0	0	0
$\pi^+\eta\eta'$	$-\frac{\sqrt{2}}{3}(2C+\mathcal{D})$	$0{,}68\Gamma_5-0{,}19\Gamma_6+0{,}23\Gamma_7$	$\geq 3{,}3$
		$(0{,}09\Gamma_5-0{,}03\Gamma_6-0{,}004\Gamma_7)$	$(\geq 0{,}2)$
$\bar{K}^0K^+\eta'$	$\frac{1}{\sqrt{3}}[2\delta C+(1+2\delta)\mathcal{D}]$	$10^{-3}(-4\Gamma_5+\Gamma_6+8{,}5\Gamma_7)$	$< 0{,}1$
		$(10^{-3}(-5\Gamma_5+2\Gamma_6+20\Gamma_7))$	$(\geq 0{,}1)$
$\Delta S=0$:			
$F^+\to K^0\pi^+$	A	$0{,}05\Gamma_1$	0,1
ρ^+K^0	$-A_1$	$0{,}09\Gamma_2$	1,0
$K^{*+}\eta$	$-\frac{1}{\sqrt{6}}(2A_1+3\delta A_2)$	$-0{,}02\Gamma_2+0{,}001\Gamma_3+0{,}05\Gamma_4$	0,3
		$(-0{,}02\Gamma_2+0{,}001\Gamma_3+0{,}04\Gamma_4)$	(0,2)
$K^+\pi^+\pi^-$	$-(C+\delta\mathcal{D})$	$0{,}03\Gamma_6$	0,1

Mode	Amplitude	Width	B(%)
$K^0\pi^+\pi^0$	$\frac{1+\delta}{\sqrt{2}}C$	$0{,}03\Gamma_5$	0,1
$K^+K^+K^-$	$2(C+\delta\mathcal{D})$	$0{,}02\Gamma_6$	0,1
$K^+K^0\bar{K}^0$	$(C-\mathcal{D})$	$-0{,}11\Gamma_5+0{,}05\Gamma_6+0{,}08\Gamma_7$	$\geqslant 0{,}2$
$K^+\pi^0\eta$	$-\frac{1}{\sqrt{3}}[2\delta C+(1-\delta)\mathcal{D}]$	$-0{,}02\Gamma_5+0{,}01\Gamma_6+0{,}09\Gamma_7$	$\geqslant 0{,}5$
		$(-0{,}01\Gamma_5+0{,}001\Gamma_6+0{,}07\Gamma_7)$	$(\geqslant 0{,}4)$
$K^0\pi^+\eta$	$\frac{1}{\sqrt{6}}[(1-3\delta)C-4\mathcal{D}]$	$-0{,}18\Gamma_5+0{,}07\Gamma_6+0{,}55\Gamma_7$	$\geqslant 2{,}8$
		$(-0{,}11\Gamma_5+0{,}04\Gamma_6+0{,}57\Gamma_7)$	$\geqslant 3{,}0$
$K^+\eta\eta$	$\frac{1}{3}[(4+3\delta)C+(2+3\delta)\mathcal{D}]$	$0{,}05\Gamma_5-0{,}01\Gamma_6+0{,}01\Gamma_7$	$\geqslant 0{,}2$
		$(0{,}03\Gamma_5-0{,}01\Gamma_6+0{,}01\Gamma_7)$	$(\geqslant 0{,}1)$
$K^0\pi^+\eta'$	$-\frac{1}{\sqrt{3}}(C+\mathcal{D})$	$0{,}04\Gamma_5-0{,}01\Gamma_6+0{,}02\Gamma_7$	$\geqslant 0{,}2$
		$(0{,}02\Gamma_5-0{,}005\Gamma_6+0{,}005\Gamma_7)$	$(\geqslant 0{,}1)$

Table 2 ; Relations between amplitudes of $\mathcal{D},\mathcal{F}\to(3P)_S$ decays following from the general SU(3) - selection rules.

Relation	Selection rule
ΔS=-1:	
$-\frac{1}{2}(K^-\pi^+\pi^+)_{\mathcal{D}^+} = \sqrt{2}(\bar K^0\pi^+\pi^0)_{\mathcal{D}^+} = -\sqrt{2}(K^-\pi^+\pi^0)_{\mathcal{D}^0} =$	$\Delta T=1$
$= (\bar K^0\pi^0\pi^0)_{\mathcal{D}^0} - (\bar K^0\pi^+\pi^-)_{\mathcal{D}^0}$.	"
$(\bar K^0\pi^+\eta)_{\mathcal{D}^+} = (K^-\pi^+\eta)_{\mathcal{D}^0} + \sqrt{2}(\bar K^0\pi^0\eta)_{\mathcal{D}^0}$.	"
$(\bar K^0\bar K^0 K^+)_{\mathcal{D}^+} = (\bar K^0\bar K^0 K^0)_{\mathcal{D}^0} + 2(\bar K^0 K^- K^+)_{\mathcal{D}^0}$.	"
$(\bar K^0\pi^+\eta')_{\mathcal{D}^+} = (K^-\pi^+\eta')_{\mathcal{D}^0} + \sqrt{2}(\bar K^0\pi^0\eta')_{\mathcal{D}^0}$.	"
$\sqrt{2}(\bar K^0K^+\pi^0)_{\mathcal{F}^+} = -(K^-K^+\pi^+)_{\mathcal{F}^+} + (\bar K^0K^0\pi^+)_{\mathcal{F}^+}$.	"
$(\pi^+\pi^+\pi^-)_{\mathcal{F}^+} = 2(\pi^+\pi^0\pi^0)_{\mathcal{F}^+}$; $(\pi^+\pi^0\eta)_{\mathcal{F}^+} = (\pi^+\pi^0\eta')_{\mathcal{F}^+} = 0$.	"
$\frac{1}{2}(K^+\bar K^0\bar K^0)_{\mathcal{D}^+} = \frac{\sqrt{3}}{\sqrt{2}}(\bar K^0\pi^+\eta)_{\mathcal{D}^+} - \frac{1}{\sqrt{2}}(\bar K^0\pi^+\pi^0)_{\mathcal{D}^+} =$	$\Delta U=1$
$= -\frac{\sqrt{3}}{\sqrt{2}}(\bar K^0K^+\eta)_{\mathcal{F}^+} + \frac{1}{\sqrt{2}}(\bar K^0K^+\pi^0)_{\mathcal{F}^+}$.	"
$(\bar K^0\eta\eta)_{\mathcal{D}^0} + \frac{2}{\sqrt{3}}(\bar K^0\pi^0\eta)_{\mathcal{D}^0} = (\bar K^0\pi^0\pi^0)_{\mathcal{D}^0}$.	"
$(K^-\pi^+\pi^+)_{\mathcal{D}^+} = (\pi^+\pi^+\pi^-)_{\mathcal{F}^+} + 2(K^+K^-\pi^+)_{\mathcal{F}^+}$.	"
ΔS=0: $(K^+K^-\pi^+)_{\mathcal{D}^+} = -(\pi^+\pi^-K^+)_{\mathcal{F}^+}$.	$\Delta U=1$
$(\pi^+\pi^+\pi^-)_{\mathcal{D}^+} = -(K^+K^-K^+)_{\mathcal{F}^+}$; $(K^-K^0\pi^+)_{\mathcal{D}^0} = (\bar K^0K^+\pi^-)_{\mathcal{D}^0}$	"
$\sqrt{2}(\pi^+\pi^0K^0)_{\mathcal{F}^+} = -(\pi^+\pi^-K^+)_{\mathcal{F}^+} + (\pi^0\pi^0K^+)_{\mathcal{F}^+}$.	$\Delta T\leq 3/2$
$-(\pi^+\pi^-\eta)_{\mathcal{D}^0} + (\pi^0\pi^0\eta)_{\mathcal{D}^0} = \sqrt{2}(\pi^+\pi^0\eta)_{\mathcal{D}^+}$.	"
ΔS=-1,0: $(K^+K^-K^+)_{\mathcal{F}^+} = 2\,tg\theta\,(K^+K^-\pi^+)_{\mathcal{F}^+}$.	$\Delta U=1$
$(\bar K^0K^+\pi^-)_{\mathcal{D}^0} = tg\theta\,[(\bar K^0\pi^+\pi^-)_{\mathcal{D}^0} - (\bar K^0K^+K^-)_{\mathcal{D}^0}]$	"

Table 3 : Relations between amplitudes of $\mathcal{D},\mathcal{F}\to V(2P)_s$ decays, following from the general SU(3) - selection rules.

Relation $(\Delta S=-1)$	Selection rule
$-\sqrt{2}\left[(\rho^+\pi^0\bar K^0)_{\mathcal{D}^+}+(\rho^0\bar K^0\pi^+)_{\mathcal{D}^+}\right]=(\rho^+\pi^+K^-)_{\mathcal{D}^+}=$	$\Delta T=1$
$=\sqrt{2}\left[(\rho^+K^-\pi^0)_{\mathcal{D}^0}+(\rho^0K^-\pi^+)_{\mathcal{D}^0}\right].$	"
$(\rho^+\bar K^0\eta)_{\mathcal{D}^+}=\sqrt{2}(\rho^0\bar K^0\eta)_{\mathcal{D}^0}+(\rho^+K^-\eta)_{\mathcal{D}^0}.$	"
$(\omega\bar K^0\pi^+)_{\mathcal{D}^+}=\sqrt{2}(\omega\bar K^0\pi^0)_{\mathcal{D}^0}+(\omega K^-\pi^+)_{\mathcal{D}^0}.$	"
$\frac{1}{2}(K^{*-}\pi^+\pi^+)_{\mathcal{D}^+}=-\sqrt{2}(\bar K^{*0}\pi^+\pi^0)_{\mathcal{D}^+}=\sqrt{2}(K^{*-}\pi^+\pi^0)_{\mathcal{D}^0}=$	"
$=(\bar K^{*0}\pi^+\pi^-)_{\mathcal{D}^0}-(\bar K^{*0}\pi^0\pi^0)_{\mathcal{D}^0}.$	"
$(K^{*-}\pi^+\eta)_{\mathcal{D}^0}+\sqrt{2}(\bar K^{*0}\pi^0\eta)_{\mathcal{D}^0}=(\bar K^{*0}\pi^+\eta)_{\mathcal{D}^+}.$	"
$(\phi\bar K^0\pi^+)_{\mathcal{D}^+}=(\phi K^-\pi^+)_{\mathcal{D}^0}+\sqrt{2}(\phi\bar K^0\pi^0)_{\mathcal{D}^0}.$	"
$-2(\rho^0\pi^+\pi^0)_{\mathcal{F}^+}=(\rho^-\pi^+\pi^+)_{\mathcal{F}^+}=2\left[(\rho^+\pi^0\pi^0)_{\mathcal{F}^+}+(\rho^+\pi^+\pi^-)_{\mathcal{F}^+}\right].$	"
$(\rho^+\pi^0\eta)_{\mathcal{F}^+}=-(\rho^0\pi^+\eta)_{\mathcal{F}^+}.$	"
$\sqrt{2}(\rho^0\bar K^0K^+)_{\mathcal{F}^+}=(\rho^+K^0\bar K^0)_{\mathcal{F}^+}-(\rho^+K^+K^-)_{\mathcal{F}^+}.$	"
$\sqrt{2}(K^{*+}\bar K^0\pi^0)_{\mathcal{F}^+}=-(K^{*+}K^-\pi^+)_{\mathcal{F}^+}+(K^{*0}\bar K^0\pi^+)_{\mathcal{F}^+}.$	"
$\sqrt{2}(\bar K^{*0}K^+\pi^0)_{\mathcal{F}^+}=-(K^{*-}K^+\pi^+)_{\mathcal{F}^+}+(\bar K^{*0}K^0\pi^+)_{\mathcal{F}^+}.$	"
$-(\rho^+\pi^0\eta')_{\mathcal{F}^+}=(\rho^0\pi^+\eta')_{\mathcal{F}^+};\quad(\omega\pi^+\pi^0)_{\mathcal{F}^+}=(\phi\pi^+\pi^0)_{\mathcal{F}^+}=0.$	"

Table 4: Relations between widths of $\mathcal{D},\mathcal{F}\to V(2P)_s$ decays with $\Delta S=-1$ following from the amplitude relations obtained in Ref[1]. $\delta=\beta/\alpha=-0,15$.

(The numbers given in parenthesis are the symmetry factors, the numbers given in brackets are relative phase spaces)

$$\frac{(1/4)\,\Gamma(\mathcal{D}^+\to K^{*-}\pi^+\pi^+)}{[1/2]}=(2)\Gamma(\mathcal{D}^+\to \bar{K}^{*0}\pi^+\pi^0)=(2)\Gamma(\mathcal{D}^0\to K^{*-}\pi^+\pi^0)=$$

$$=\frac{\Gamma(\mathcal{D}^+\to \phi\bar{K}^0\pi^+)}{[0,03]}=\frac{\Gamma(\mathcal{F}^+\to K^{*-}K^+\pi^+)}{[0,49]};$$

$$\Gamma(\mathcal{D}^0\to \rho^+\bar{K}^0\pi^-)=\frac{\Gamma(\mathcal{F}^+\to \rho^+\bar{K}^0K^0)}{[0,25]};$$

$$\Gamma(\mathcal{D}^0\to \rho^-\bar{K}^0\pi^+)=\frac{\Gamma(\mathcal{F}^+\to K^{*0}\bar{K}^0\pi^+)}{[0,93]};$$

$$\Gamma(\mathcal{D}^0\to \bar{K}^{*0}\pi^+\pi^-)=\frac{\Gamma(\mathcal{F}^+\to \bar{K}^{*0}K^0\pi^+)}{[0,49]};$$

$$\frac{\Gamma(\mathcal{D}^0\to \bar{K}^{*0}\pi^0\pi^0)}{[1/2]}=\frac{(2)\Gamma(\mathcal{F}^+\to \bar{K}^{*0}K^+\pi^0)}{[0,49]};$$

$$\Gamma(\mathcal{D}^0\to \rho^0\bar{K}^0\pi^0)=\frac{(3)\Gamma(\mathcal{D}^0\to \rho^0\bar{K}^0\eta)}{[0,002]};$$

$$\Gamma(\mathcal{F}^+\to \rho^0\pi^+\eta)=\Gamma(\mathcal{F}^+\to \rho^+\pi^0\eta)=\frac{(2)\Gamma(\mathcal{F}^+\to \rho^0\pi^+\eta')}{[0,02]}=$$

$$=\frac{(2)\Gamma(\mathcal{F}^+\to \rho^+\pi^0\eta)}{[0,02]};$$

$$\Gamma(\mathcal{F}^+\to \rho\pi\pi)=\Gamma(\mathcal{F}^+\to \omega\pi^+\pi^0)=\Gamma(\mathcal{F}^+\to \phi\pi^+\pi^0)=0.$$

$$\Gamma(\mathcal{D}^0\to \omega\bar{K}^0\pi^0)=\frac{(3)\Gamma(\mathcal{D}^0\to \omega\bar{K}^0\eta)}{[0,002]};$$

Table 4 (continued)

$$(\sqrt{\Gamma_i}-\sqrt{\Gamma_j})^2 \leqslant \Gamma_K \leqslant (\sqrt{\Gamma_i}+\sqrt{\Gamma_j})^2.$$

Γ_K	Γ_i	Γ_j.
$\underline{\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^0\pi^0)}$	$\underline{(1/4)\Gamma(\mathcal{D}^+\to K^{*-}\pi^+\pi^+)}$	$\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^+\pi^-)$
[1/2]	[1/2]	
$(2)\Gamma(\mathcal{D}^0\to\phi\bar{K}^0\pi^0)$	$\Gamma(\mathcal{D}^+\to\phi\bar{K}^0\pi^+)$	$\Gamma(\mathcal{D}^0\to\phi K^-\pi^+)$
$\underline{(\frac{8}{\delta^2})\Gamma(\mathcal{F}^+\to K^{*+}\bar{K}^0\pi^0)}$	$\underline{(6)\Gamma(\mathcal{D}^0\to K^{*-}\pi^+\eta)}$	$\underline{(1/4)\Gamma(\mathcal{D}^+\to K^{*-}\pi^+\pi^+)}$
[0,49]	[0,10]	[1/2]
$\Gamma(\mathcal{F}^+\to\rho^+K^+K^-)$	$\Gamma(\mathcal{F}^+\to\rho^+K^0\bar{K}^0)$	$(2)\Gamma(\mathcal{F}^+\to\rho^0K^+\bar{K}^0)$
$(2)\Gamma(\mathcal{F}^+\to K^{*+}\bar{K}^0\pi^0)$	$\Gamma(\mathcal{F}^+\to K^{*+}K^-\pi^+)$	$\Gamma(\mathcal{F}^+\to K^{*0}\bar{K}^0\pi^+)$
$(2)\Gamma(\mathcal{F}^+\to\bar{K}^{*0}K^+\pi^0)$	$\Gamma(\mathcal{F}^+\to K^{*-}K^+\pi^+)$	$\Gamma(\mathcal{F}^+\to\bar{K}^{*0}K^0\pi^+)$
$\underline{(\delta^2)\Gamma(\mathcal{F}^+\to\rho^0\pi^+\eta)}$	$\underline{\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^0\eta)}$	$\underline{(1/3)\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^0\pi^0)}$
[0,95]	[0,10]	[1/2]
$(2)\Gamma(\mathcal{D}^0\to\rho^+K^-\pi^0)$	$\Gamma(\mathcal{D}^+\to\rho^+K^-\pi^+)$	$(2)\Gamma(\mathcal{D}^0\to\rho^0K^-\pi^+)$
$(2)\Gamma(\mathcal{D}^+\to\rho^+\bar{K}^0\pi^0)$	$\Gamma(\mathcal{D}^+\to\rho^+K^-\pi^+)$	$(2)\Gamma(\mathcal{D}^+\to\rho^0\bar{K}^0\pi^+)$
$\Gamma(\mathcal{D}^0\to\rho^+\bar{K}^0\eta)$	$\Gamma(\mathcal{D}^0\to\rho^+K^-\eta)$	$(2)\Gamma(\mathcal{D}^0\to\rho^0\bar{K}^0\eta)$
$(2)\Gamma(\mathcal{D}^0\to\omega\bar{K}^0\pi^0)$	$\Gamma(\mathcal{D}^0\to\omega K^-\pi^+)$	$\Gamma(\mathcal{D}^+\to\omega\bar{K}^0\pi^+)$
$(2)\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^0\eta)$	$\Gamma(\mathcal{D}^0\to K^{*-}\pi^+\eta)$	$\Gamma(\mathcal{D}^+\to\bar{K}^{*0}\pi^+\eta)$.
$\underline{(\delta^2)\Gamma(\mathcal{F}^+\to\rho^+\pi^0\eta)}$	$\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\pi^0\eta)$	$\underline{(3)\Gamma(\mathcal{D}^0\to\bar{K}^{*0}\eta\eta)}$
[9,5]		[0,10 · 1/2]

Table 4 (continued)

Γ_K	Γ_i	Γ_j
$\dfrac{(3)\,\Gamma(F^+\to\omega\pi^+\eta)}{[1,80]}$	$(2)\,\Gamma(D^0\to\omega K^-\pi^+)$	$\dfrac{\Gamma(F^+\to K^{*+}K^-\pi^+)}{[1,0]}$
$\dfrac{(3/2)\,\Gamma(F^+\to\phi\pi^+\eta)}{[3,0]}$	$\Gamma(D^0\to\phi K^-\pi^+)$	$\dfrac{(2/\delta)^2\,\Gamma(F^+\to K^{*+}\bar{K}^0\pi^0)}{[15,5]}$
$\dfrac{(3)\,\Gamma(F^+\to\rho^0\pi^+\eta)}{[1,80]}$	$(2)\,\Gamma(D^0\to\rho^0 K^-\pi^+)$	$\dfrac{\Gamma(F^+\to K^{*+}K^-\pi^+)}{[0,93]}$

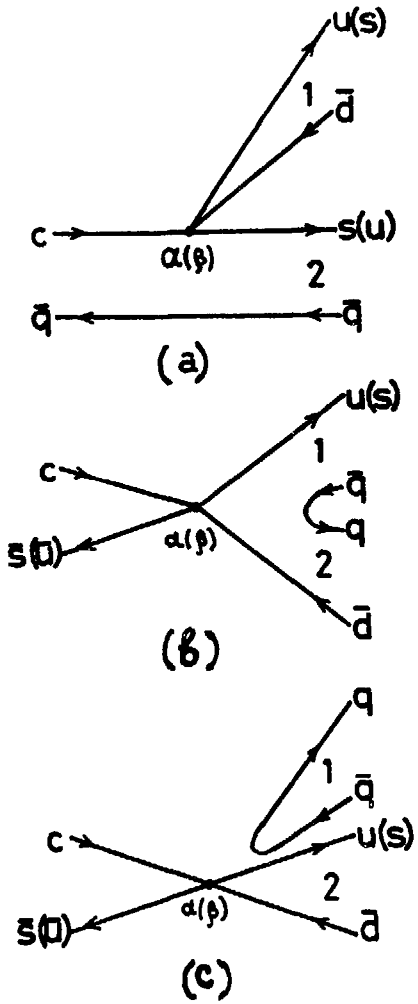
u(s)
1
$\bar{d}$
c
s(u)
α(β)
2
$\bar{q}$
(a)
u(s)
1
c
$\bar{q}$
q
$\bar{s}(\bar{u})$
α(β)
2
$\bar{d}$
(b)
q
1
$\bar{q}$
c
u(s)
α(β)
2
$\bar{s}(\bar{u})$
$\bar{d}$
(c)

Fig. 1

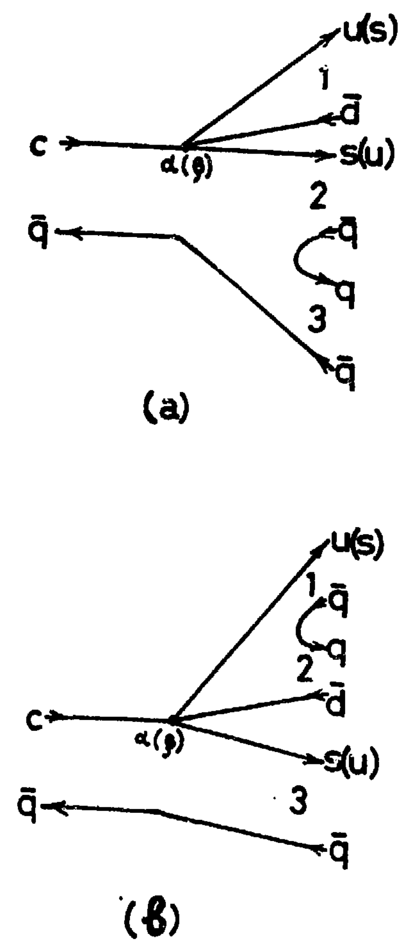
u(s)
1
$\bar{d}$
c
s(u)
α(β)
2
$\bar{q}$
q
3
(a)
u(s)
1
$\bar{q}$
q
2
$\bar{d}$
c
α(β)
s(u)
3
(b)

Fig.2

Figure Captions

Fig.1. Quark diagrams corresponding to the NL decays of charmed mesons into two mesons 1 and 2:

a) - "decay" type diagrams (DD).

b,c)- annihilation type diagrams.

Fig.2. Quark DD, corresponding to the NL decays of charmed mesons into three mesons 1,2 and 3.

References

1. A.Yu.Khodjamirian, Paper No.1033 submitted to the XIX International Conference on High Energy Physics, 1978.
2. J.Ellis, M.Gaillard, D.V.Nanopoulos, Nucl.Phys. B100, 313 (1975).
3. N.Cabibbo, L.Maiani, Phys.Lett. 73B, 418, (1978)
   D.Fakirov, B.Stech, Nucl.Phys. B133, 315, (1978)
4. G.Altarelli, N.Cabibbo, L.Maiani, Nucl.Phys. B88, 285,(1975)
   M.B.Voloshin, V.I.Zakharov,L.B.Okun, Pisma v ZhETP, 21, 403, (1975)
5. A.Yu.Khodjamirian, Yad.Fiz. 23, 1032, (1976)
6. I.Peruzzi et al., Phys.Rev.Lett. 39, 1301, (1977)
7. M.Piccolo et al, Phys.Lett. 70B, 260, (1977)
8. E.Wiss et al., Phys.Rev.Lett. 37, 1531, (1976)
9. D.L.Scharre et al., Phys.Rev.Lett. 40, 74, (1978)
10. V.Vuillemin et al., Phys.Rev.Lett. 41, 1149, (1978)

The manuscript was received on the 17-th of December,1978

А.Ю.ХОДЖАМИРЯН

УСИЛЕННЫЕ И ПОДАВЛЕННЫЕ ДВУХ- И ТРЕХЧАСТИЧНЫЕ НЕЛЕПТОННЫЕ РАСПАДЫ ЧАРМОВЫХ МЕЗОНОВ.

(на английском языке)

Ереванский физический институт)

Тех.редактор А.С.Абрамян

Заказ I4 ВФ- 06331 Тираж299

Препринт ЕФИ Формат издания 60х84/16

Подписано к печати I4/II-79г. I,5 уч.изд.л.Ц. I0 к.

Издано Отделом научно-технической информации

Ереванского физического института, Ереван-36, пер.Маркаряна 2

индекс 3624