$D_{s0}^{*\pm}(2317)$ and KD scattering from B_s^0 decay

Miguel Albaladejo,[1, *] Marina Nielsen,[2, †] and Eulogio Oset[1, ‡]

[1] Departamento de Física Teórica and IFIC, Centro Mixto Universidad de Valencia-CSIC,
Institutos de Investigación de Paterna, Aptdo. 22085, 46071 Valencia, Spain

[2] Instituto de Física, Universidade de São Paulo, C.P. 66318, 05389-970, São Paulo, SP, Brazil

We study the $\bar{B}_s^0 \to D_s^- (DK)^+$ weak decay, and look at the DK invariant mass distribution with the aim of obtaining relevant information on the nature of the $D_{s0}^{*+}(2317)$ resonance. We make a simulation of the experiment using the actual mass of the $D_{s0}^{*+}(2317)$ resonance and recent lattice QCD relevant parameters of the KD scattering amplitude. We then solve the inverse problem of obtaining the KD amplitude from these synthetic data, to which we have added a 5% or 10% error. We prove that one can obtain from these "data" the existence of a bound KD state, the KD scattering length and effective range, and most importantly, the KD probability in the wave function of the bound state obtained, which was found to be largely dominant from the lattice QCD results. This means that one can obtain information on the nature of the $D_{s0}^{*+}(2317)$ resonance from the implementation of this experiment, in the line of finding the structure of resonances, which is one of the main aims in hadron spectroscopy.

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I. INTRODUCTION

The very narrow charmed scalar meson $D_{s0}^{*+}(2317)$ was first observed in the $D_s^+ \pi^0$ channel by the BABAR Collaboration [1] and its existence was confirmed by CLEO [2], BELLE [3] and FOCUS [4] Collaborations. Its mass was commonly measured as 2317 MeV, which is approximately 160 MeV below the prediction of the very successful quark model for the charmed mesons [5]. Due to its low mass, the structure of the meson $D_{s0}^{*\pm}(2317)$ has been extensively debated. It has been interpreted as a $c\bar{s}$ state [6–10], two-meson molecular state [11–18], $K-D$- mixing [19], four-quark states [20–23] or a mixture between two-meson and four-quark states [24]. Additional support to the molecular interpretation came recently from lattice QCD simulations [25–28]. In previous lattice studies of the $D_{s0}^*(2317)$, it was treated as a conventional quark-antiquark state and no states with the correct mass (below the KD threshold) were found. In Refs. [25, 27], with the introduction of KD meson operators and using the effective range formula, a bound state is obtained about 40 MeV below the KD threshold. The fact that the bound state appears with the KD interpolator may be interpreted as a possible KD molecular structure, but more precise statements cannot be done. In Ref. [26] lattice QCD results for the KD scattering length are extrapolated to physical pion masses by means of unitarized chiral perturbation theory, and by means of the Weinberg compositeness condition [29, 30] the amount of KD content in the $D_{s0}^*(2317)$ is determined, resulting in a sizable fraction of the order of 70% within errors. A reanalyis of the lattice spectra of Refs. [25, 27] has been recently done

in Ref. [28], going beyond the effective range approximation and making use of the three levels of Refs. [25, 27]. As a consequence, one can be more quantitative about the nature of the $D_{s0}(2317)$, which appears with a KD component of about 70%, within errors.

In addition to these lattice results, and more precise ones that should be available in the future, it is very important to have some experimental data that could be used to test the internal structure of this exotic state.

Here we propose to use the experimental KD invariant mass distribution of the weak decay of $\bar{B}_s^0 \to D_s^-(DK)^{+1}$ in order to obtain information about the internal structure of the $D_{s0}^{*+}(2317)$ state. There are not yet experimental data for the decay $\bar{B}_s^0 \to D_s^-(DK)^+$. However, since the branching fractions for the decays $\bar{B}_s^0 \to D_s^{*+} D_s^{*-}$ and $\bar{B}_s^0 \to D_s^+ D_s^{*-} + D_s^{*+} D_s^-$ are respectively 1.85% and 1.28%, we believe that the branching fraction for the $\bar{B}_s^0 \to D_s^- D_{s0}^{*+}$ decay, should not be so different from that and it will be seen through the channel $\bar{B}_s^0 \to D_s^-(DK)^+$. This is why it is really important to have theoretical predictions for the DK invariant mass distribution that considers the formation of the $D_{s0}^{*+}(2317)$ state. At this point, it is worth stressing that recently, in the reactions $B^0 \to D^- D^0 K^+$ and $B^+ \to \bar{D}^0 D^0 K^+$ studied by the BABAR Collaboration [31], an enhancement in the invariant DK mass in the range $2.35 - 2.50$ GeV is observed, which could be associated with this $D_{s0}^{*+}(2317)$ state. It is also interesting to quote that in a different reaction, $B_s^0 \to \bar{D}^0 K^- \pi^+$, the LHCb Collaboration also finds an enhancement close to the KD threshold in the $\bar{D}^0 K^-$ invariant mass distribution, which is partly associated to the $D_{s0}^*(2317)$ resonance [32].

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*Electronic address: Miguel.Albaladejo@ific.uv.es
†Electronic address: mnielsen@if.usp.br
‡Electronic address: oset@ific.uv.es

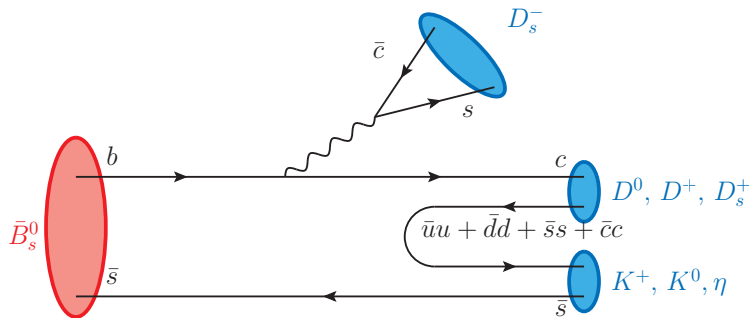[1] Throughout this work, the notation $(DK)^+$ refers to the isoscalar combination $D^0 K^+ + D^+ K^0$.

FIG. 1: Mechanism for the decay $\bar{B}_s^0 \to D_s^-(DK)^+$.

In Fig. 1 we show the mechanism for the decay $\bar{B}_s^0 \to D_s^-(DK)^+$. The idea is to take the dominant mechanism for the weak decay of the $\bar{B}_s^0$ into D_s^- plus a primary $c\bar{s}$ pair. The hadronization of the initial $c\bar{s}$ pair is achieved by inserting a $q\bar{q}$ pair with the quantum numbers of the vacuum: $u\bar{u} + d\bar{d} + s\bar{s} + c\bar{c}$, as shown in Fig. 1. Therefore, the $c\bar{s}$ pair is hadronized into a pair of pseudoscalar mesons. This pair of pseudoscalar mesons is then allowed to interact to produce the $D_{s0}^{*+}(2317)$ resonance, which is considered here as mainly a DK molecule [15]. The idea is similar to the one used in Ref. [33] for the formation of the $f_0(980)$ and $f_0(500)$ scalar resonances in the decays of B^0 and B_s^0.

The paper is organized as follows. In Section II we settle the formalism for our study. Namely, in Subsection II A we study the $(DK)^+$ elastic scattering amplitude, and in Subsection II B we study the differential decay width for the process $B_s^0 \to D_s^-(DK)^+$. As said before, there is not yet experimental information concerning the differential decay width for this process. For this reason, we will have to generate synthetic data for this decay in order to explore if this reaction is suitable for the study of the $(DK)^+$ final state interactions and the $D_{s0}^{*+}(2317)$ bound state. The generation and analysis of these synthetic data, which constitutes the results of the work, are done in Subsection III. Conclusions are delivered in Section IV.

II. FORMALISM

In this work the influence of the presence of the $D_{s0}^{*+}(2317)$ in the process $\bar{B}_s^0 \to D_s^-(DK)^+$ is investigated. The $D_{s0}^{*+}(2317)$ is considered mainly as a bound state of the DK system, so we address the elastic DK scattering amplitude in Subsection II A. Then, the differential decay width for the $\bar{B}_s^0 \to D_s^-(DK)^+$ reaction in terms of the DK invariant mass is considered in Subsection II B.

A. Elastic DK scattering amplitude

Let us start by discussing the S-wave amplitude for the isospin $I = 0$ DK elastic scattering, which we denote T. It can be written as

$$T^{-1}(s) = V^{-1}(s) - G(s) \Rightarrow T(s) = V(s)(1 + G(s)T(s)) , \tag{1}$$

where $G(s)$ is a loop function bearing the unitary or right hand cut,

$$G(s) \equiv i \int \frac{d^4l}{(2\pi)^4} \frac{1}{l^2 - m_K^2 + i\epsilon} \frac{1}{(q-l)^2 - m_D^2 + i\epsilon}, \tag{2}$$

and $s = q^2$ is the invariant mass squared of the DK system. This function needs to be regularized, and this is accomplished in this work by means of a subtraction constant, $a(\mu)$. In this way, the G function can be written as:

$$16\pi^2 G(s) = a(\mu) + \log \frac{m_D m_K}{\mu^2} + \frac{\Delta}{2s} \log \frac{m_D^2}{m_K^2}$$
$$+ \frac{\nu}{2s} \left(\log \frac{s - \Delta + \nu}{-s + \Delta + \nu} + \log \frac{s + \Delta + \nu}{-s - \Delta + \nu} \right) , \tag{3}$$
$$\Delta = m_D^2 - m_K^2 , \quad \nu = \lambda^{1/2}(s, m_D^2, m_K^2) ,$$

where $\lambda(x, y, z) = x^2 + y^2 + z^2 - 2xy - 2yz - 2zx$ is the Källen or triangle function. In Eq. (1), $V(s)$ is the potential, typically extracted from some effective field theory, although a different approach will be followed here (see below).

The amplitude $T(s)$ can also be written in terms of the phase shift $\delta(s)$ and/or effective range expansion parameters,

$$T(s) = -\frac{8\pi\sqrt{s}}{p_K \text{ctg}\delta - ip_K} \simeq -\frac{8\pi\sqrt{s}}{\frac{1}{a} + \frac{1}{2}r_0 p_K^2 - ip_K}, \tag{4}$$

with

$$p_K(s) = \frac{\lambda^{1/2}(s, M_K^2, M_D^2)}{2\sqrt{s}} , \tag{5}$$

the momentum of the K meson in the DK center of mass system. Above, a and r_0 are the scattering length and the effective range, respectively.

In this channel and linked to it we find the $D_{s0}^{*+}(2317)$ resonance, the object of study of this paper, below the DK threshold, the latter being located roughly above 2360 MeV. This means that the amplitude has a pole at the squared mass of this state, $M^2 \equiv s_0$, so that, around the pole,

$$T(s) = \frac{g^2}{s - s_0} + \text{regular terms}, \qquad (6)$$

being g the coupling of the state to the DK channel. From Eqs. (1) and (6), we see that (the following derivatives are meant to be calculated at $s = s_0$):

$$\frac{1}{g^2} = \frac{\partial T^{-1}(s)}{\partial s} = \frac{\partial V^{-1}(s)}{\partial s} - \frac{\partial G(s)}{\partial s} . \qquad (7)$$

We have thus the following exact sum rule,

$$1 = g^2 \left(-\frac{\partial G(s)}{\partial s} + \frac{\partial V^{-1}(s)}{\partial s} \right) . \qquad (8)$$

In Ref. [34] it has been shown, as a generalization of the Weinberg compositeness condition [29] (see also Ref. [35] and references therein), that the probability P of finding the channel under study (in this case, DK) in the wave function of the bound state is given by:

$$P = -g^2 \frac{\partial G(s)}{\partial s} , \qquad (9)$$

while the rest of the r.h.s. of Eq. (8) represents the probability of other channels, and hence the probabilities add up to 1. Finally, if one has an energy independent potential the second term of Eq. (8) vanishes, and then $P = 1$, that is, the bound state is purely given by the channel under consideration. In Ref. [34], these ideas are generalized to the coupled channels case.

Let us now apply these ideas to the case of DK scattering. From Eq. (1) it can be seen that the existence of a pole implies

$$V^{-1}(s) \simeq G(s_0) + \alpha(s - s_0) + \cdots , \qquad (10)$$

$$\alpha \equiv \left. \frac{\partial V^{-1}(s)}{\partial s} \right|_{s=s_0} , \qquad (11)$$

in the neighbourhood of the pole. If we assume that the energy dependence is smooth enough to allow us to retain only the linear term in s, we can now write the amplitude as

$$T^{-1}(s) = G(s_0) - G(s) + \alpha(s - s_0) , \qquad (12)$$

and the sum rule in Eq. (8) becomes:

$$P_{DK} = 1 - \alpha g^2 . \qquad (13)$$

In this way, the quantity αg^2 represents the probability of finding other components beyond DK in the wave function of $D_{s0}^{*+}(2317)$. The following relation can also be deduced from Eqs. (13) and (9):

$$\alpha = -\frac{1 - P_{DK}}{P_{DK}} \left. \frac{\partial G(s)}{\partial s} \right|_{s=s_0} . \qquad (14)$$

We can now link this formalism with the results of Ref. [28], where a reanalysis is done of the energy levels found in the lattice simulations of Ref. [27]. In Ref. [28], the following values for the effective range parameters are found:

$$a_0 = -1.4 \pm 0.6 \text{ fm} , \quad r_0 = -0.1 \pm 0.2 \text{ fm} . \qquad (15)$$

Also, in studying the $D_{s0}^{*+}(2317)$ bound state, a binding energy $B = M_D + M_K - M_{D_{s0}^{*+}} = 31 \pm 17$ MeV is found in Ref. [28]. The probability P_{DK} is also studied, and the value $P_{DK} = 0.72 \pm 0.12$ is found. Hence, for our analysis, in which synthetic data for the reaction $\bar{B}_s^0 \to (DK)^+ D_s^-$ will be generated, we can start from the hypothesis that a bound state exists in the DK channel, with a mass $M_{D_{s0}^{*+}} = 2317$ MeV (the nominal one), and with a probability $P_{DK} = 0.75$. This implies, from Eq. (14), the value $\alpha = 2.06 \cdot 10^{-3} \text{ GeV}^{-2}$. Finally, for the subtraction constant in the G function, Eq. (3), we shall take, as in Ref. [15], the value $a(\mu) = -1.3$ for $\mu = 1.5$ GeV. Note that $\partial G(s)/\partial s$ does not depend on μ or $a(\mu)$.

B. Decay amplitude and invariant DK mass distribution in the $\bar{B}_s^0 \to D_s^-(DK)^+$ decay

We now discuss the amplitude for the decay $B_s^0 \to D_s^-(DK)^+$ decay, and its relation to the DK elastic scattering amplitude studied above. The basic mechanism for this process is depicted in Fig. 1, where, from the $\bar{s}b$ initial pair constituting the B_s^0, a $\bar{c}s$ pair and a $\bar{s}c$ pair are created. The first pair produces the D_s^-, and the DK state arises from the hadronization of the second pair. Let us consider in some more detail the hadronization mechanism. To construct a two meson final state, the $c\bar{s}$ pair has to combine with another $\bar{q}q$ pair created from the vacuum. We introduce the following matrix,

$$M = v\bar{v} = \begin{pmatrix} u \\ d \\ s \\ c \end{pmatrix} \begin{pmatrix} \bar{u} & \bar{d} & \bar{s} & \bar{c} \end{pmatrix}$$

$$= \begin{pmatrix} u\bar{u} & u\bar{d} & u\bar{s} & u\bar{c} \\ d\bar{u} & d\bar{d} & d\bar{s} & d\bar{c} \\ s\bar{u} & s\bar{d} & s\bar{s} & s\bar{c} \\ c\bar{u} & c\bar{d} & c\bar{s} & c\bar{c} \end{pmatrix} , \qquad (16)$$

which fulfils:

$$M^2 = (v\bar{v})(v\bar{v}) = v(\bar{v}v)\bar{v}$$
$$= (\bar{u}u + \bar{d}d + \bar{s}s + \bar{c}c) M . \qquad (17)$$

The first factor in the last equality represents the $\bar{q}q$ creation. This matrix M is in correspondence with the meson matrix ϕ:

$$\phi = \begin{pmatrix} \frac{\eta}{\sqrt{3}} + \frac{\pi^0}{\sqrt{2}} + \frac{\eta'}{\sqrt{6}} & \pi^+ & K^+ & \bar{D}^0 \\ \pi^- & \frac{\eta}{\sqrt{3}} - \frac{\pi^0}{\sqrt{2}} + \frac{\eta'}{\sqrt{6}} & K^0 & D^- \\ K^- & \bar{K}^0 & \frac{\sqrt{2}\eta'}{\sqrt{3}} - \frac{\eta}{\sqrt{3}} & D_s^- \\ D^0 & D^+ & D_s^+ & \eta_c \end{pmatrix} .$$

(18)

The hadronization of the $c\bar{s}$ pair proceeds then through the matrix element $\left(M^2\right)_{43}$, which in terms of mesons reads:

$$(\phi^2)_{43} = K^+ D^0 + K^0 D^+ + \cdots , \qquad (19)$$

where only terms containing a KD pair are retained, since coupled channels are not considered in this work. We note that this KD combination has $I = 0$, as it should, since it is produced from a $c\bar{s}$, which has $I = 0$, and the strong interaction hadronization which conserves isospin (the $\bar{q}q$ with the quantum numbers of the vacuum has $I = 0$).

Let t be the full amplitude for the process $B_s^0 \to D_s^-(DK)^+$, which already takes into account the final state interaction of the DK pair. Also, let us denote by v the bare vertex for the same reaction. To relate t and v, that is, to take into account the final state interaction of the DK pair, as sketched in Fig. 2, we write:

$$t = v + vG(s)T(s) = v(1 + G(s)T(s)) . \qquad (20)$$

From Eq. (1), the previous equation can also be written as:

$$t = v\frac{T(s)}{V(s)} . \qquad (21)$$

Because of the presence of the bound state below threshold, this process will depend strongly on s in the kinematical window ranging from threshold to 100 MeV above it, so we can safely assume that t depends only on s. Hence, the differential width for the process under consideration is given by:

$$\frac{d\Gamma}{d\sqrt{s}} = \frac{1}{32\pi^2 M_{\bar{B}_s^0}^2} p_{D_s^-} p_K |t|^2 = \mathcal{C} p_{D_s^-} p_K \left|\frac{T(s)}{V(s)}\right|^2 , \quad (22)$$

where the bare vertex v has been absorbed in $\mathcal{C}$, a global (but otherwise not relevant) constant, and where p_K is given in Eq. (5) and $p_{D_s^-}$ is the momentum of the D_s^- meson in the rest frame of the decaying $\bar{B}_s^0$, given by:

$$p_{D_s^-} = \frac{\lambda^{1/2}(M_{\bar{B}_s^0}^2, M_{D_s^-}^2, s)}{2M_{\bar{B}_s^0}} . \qquad (23)$$

III. RESULTS

We want to investigate the presence of the $D_{s0}^{*+}(2317)$ state in the $(DK)^+$ scattering amplitude. In order to

	Central Value	5 %	10 %
$10^3\,\alpha$ (GeV^{-2})	2.06	$^{+0.17}_{-0.40}$	$^{+0.10}_{-1.09}$
$M_{D_{s0}^*}$ (MeV)	2317	$^{+14}_{-24}$	$^{+21}_{-73}$
$a(\mu)$	-1.30	$^{+0.15}_{-0.37}$	$^{+0.27}_{-0.49}$
$|g|$ (GeV)	11.0	$^{+1.0}_{-0.6}$	$^{+2.2}_{-1.1}$
a_0 (fm)	-1.0	$^{+0.2}_{-0.2}$	$^{+0.4}_{-0.5}$
r_0 (fm)	-0.14	$^{+0.06}_{-0.03}$	$^{+0.16}_{-0.04}$
P_{DK}	0.75	$^{+0.07}_{-0.06}$	$^{+0.16}_{-0.11}$

TABLE I: Fitted parameters (α, $M_{D_{s0}^{*+}}$ and $a(\mu)$) and predicted quantities ($|g|$, a_0, r_0, P_{DK}) for $\mu = 1.5$ GeV. The second column shows the central value of the fit, whereas the third (fourth) column presents the errors (estimated by means of MC simulation) when the experimental error is 5% (10%).

explore the sensitivity of the decay $\bar{B}_s^0 \to (DK)^+ D_s^-$ to the presence of this bound state, we generate synthetic data from our theory for the differential decay width for the process with Eqs. (22) and (12). We generate 10 synthetic points in a range of 100 MeV starting from threshold. To each centroid, we assign the value obtained with the central values explained in Subsection II A ($10^3\alpha = 2.06$ GeV^{-2}, $a(\mu) = -1.3$, and $M_{D_{s0}^{*+}} = 2317$ MeV). We shall study two different cases, in which each experimental point is given an error of a 5% or a 10% of the highest value of the differential decay width. Taking these synthetic data as experiment-given data, we perform the inverse problem of analysing them with our theory. Obviously, the reproduction of the data must be perfect, but we recall that the scope here is to investigate the experimental accuracy that is actually needed to obtain reliable values for the quantities fitted or predicted from our theory ($M_{D_{s0}^{*+}}$, a_0, r_0, and P_{DK}). The analysis of these synthetic data goes as follows. We generate around $2\cdot 10^3$ sets of random experimental points, in which each centroid is varied around its theoretical value according to a Gaussian distribution with the error given to each point. For each of these sets of random points, the parameters are fitted to the data. After the whole run, a central range, containing a 68% of the values of the considered quantities (the differential decay width, the fitted parameters, and the predicted values) is retained. It is worth stressing here that, since the centroid of the experimental point in each set of random experimental points is varied, a good reproduction of the random synthetic data is quite natural but not completely trivial.

The generated synthetic data are shown in Fig. 3. As explained, they have two different error bars, the smaller one corresponding to a 5% experimental error and the larger one to a 10%. As commented above, they exactly match the central curve (dash-dotted line) produced with the central parameters of the theory. A solely phase space distribution (i.e., a differential decay width proportional to $p_{D_s^-} p_K$, but with no other kinematical dependence
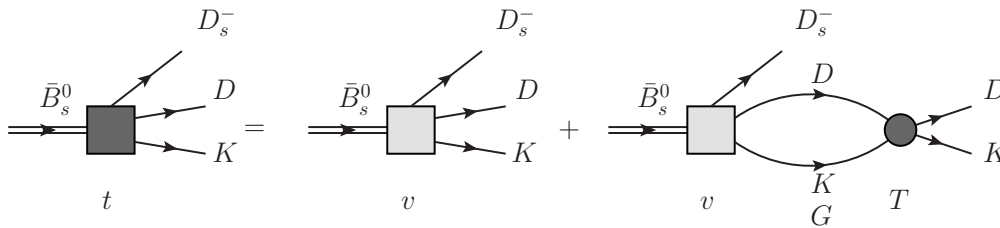
FIG. 2: Diagrammatical interpretation of Eq. (20), in which DK final state interaction is taken into account for the decay $\bar{B}_s^0 \to D_s^-(DK)^+$. The dark square represents the amplitude t for the process, in which the final state interaction is already taken into account. The light square represents the bare vertex for the process, denoted by v. Finally, the circle represents the hadronic amplitude for the elastic DK scattering.
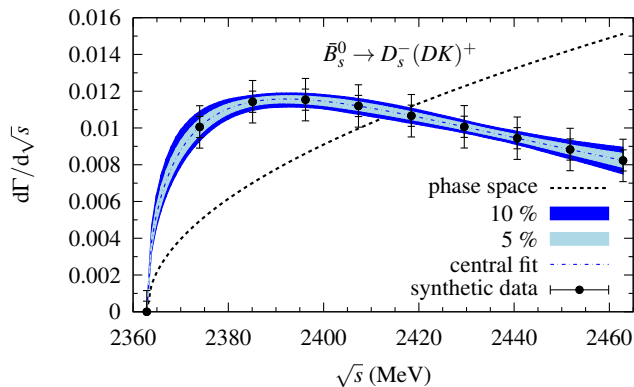

FIG. 3: Differential decay width for the reaction $\bar{B}_s^0 \to D_s^-(DK)^+$. The synthetic data (generated as explained in the text) are shown with black points. The smaller (larger) error bars correspond to a 5% (10%) experimental error. The dash-dotted line represents the theoretical prediction obtained with the central values of the fit. The light (dark) bands correspond to the estimation of the error (by means of a MC simulation) when fitting the data with 5% (10%) experimental error. The dashed line corresponds to a phase space distribution normalized to the same area in the range examined.

of dynamical origin) is also shown in the figure (dashed line). The first important information to be extracted from the figure is that the data are clearly incompatible with this phase space distribution. This points to the presence of a resonant or bound state or, at least, to some strong final state interactions. Two error bands are shown in the same figure, the lighter and smaller (darker and larger) one corresponding to a 5% (10%) experimental error. The fitted parameters ($a(\mu)$, $M_{D_{s0}^{*+}}$, and α) are shown in Table I, together with their errors.[2] Note that, with a 5% experimental error, we get $M_{D_{s0}^{*+}} =$

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[2] To avoid unphysical values of the fitted parameters $a(\mu)$ and α, which could numerically reproduce each set of the randomly generated experimental points, they are restricted to vary within a sensible range, but making sure that this range is larger than the error obtained for these two parameters and shown in Table I.

2317^{+14}_{-24} MeV, and if the error is increased to 10%, the value is $M_{D_{s0}^{*+}} = 2317^{+21}_{-73}$ MeV. Here we are mainly concerned with the upper error, in the sense that it is the one that defines if the bound state is clearly below the DK threshold (which is slightly above 2360 MeV) or not. Considering this error, we see that the mass obtained is well below the threshold, at the level of 2σ (3σ) for the case of a 5% (10%) experimental error. This is a good information: experimental data with a 10% error, which is clearly feasible with nowadays experimental facilities, can clearly determine the presence of this below threshold state $D_{s0}^{*+}(2317)$.

We can also determine P_{DK}, the probability of finding the DK channel in the $D_{s0}^{*+}(2317)$ wave function. It is shown in the last row of Table I. As stated, the central value $P_{DK} = 0.75$ is the same as the initial one, but we are here interested in the errors, which are small enough even in the case of a 10% experimental error. This means that with the analysis of such an experiment one could address with enough accuracy the question of the molecular nature of the state ($D_{s0}^{*+}(2317)$, in this case).

Finally, it is also possible to determine other parameters related with DK scattering, such as the scattering length (a_0) and the effective range (r_0). They are also shown in Table I. They are compatible with the lattice QCD studies presented in Refs. [27, 28]. Namely, the results from Ref. [28] are shown in Eqs. (15), and their mutual compatibility is clear.

IV. CONCLUSIONS

In the present work we have selected a reaction which is both Cabbibo and color favored, the $\bar{B}_s^0 \to D_s^-(DK)^+$ weak decay, and have looked at the DK invariant mass distribution from where we expect to obtain relevant information on the nature of the $D_{s0}^{*+}(2317)$ resonance when actual data are available. For this purpose we have performed a simulation of the experiment taking information from experiment about the mass of the $D_{s0}^{*+}(2317)$ resonance and from a recent QCD lattice analysis on an analytical representation of the KD scattering ampli-

tude. This information has served us to make predictions on the shape of the KD invariant mass distribution close to the KD threshold. After that we have taken these results and we have assumed they are actual "experimental data", associating to them an "experimental error" of 5% or 10%. Then we have made a fit to these "synthetic data" in order to extract from there the KD scattering amplitude, above and below threshold. We prove that with both errors, typical of present experimental data of spectra in B decays, one can obtain the KD scattering amplitude with enough precision to predict that there is a KD bound state. We also predict the scattering lenght and effective range of the KD interaction and, very important, we show that we can predict, with relatively small error, the probability of the mesonic KD component in the wave function of the $D_{s0}^{*+}(2317)$ resonance. From the QCD lattice results one induces about 70% probability and we show that this number can be obtained from the analysis of the B decay spectra with sufficient precission to make the number significative of the main nature of the $D_{s0}^{*+}(2317)$ resonance as a basically KD molecular state with a smaller mixture of other components.

The study done here should stimulate the implementation of the experiment, for which we have made estimates of a relatively large branching fraction.

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