1 - 13　B^0 and B_s^0 Decays into J/ψ and $f_0(1370)$, $f_0(1710)$, $f_2(1270)$, $f_2'(1525)$, and $K_2^*(1430)$

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There is a growing support for the low lying scalar mesons $f_0(500)$, $f_0(980)$, $a_0(980)$, and $\kappa(800)$ to be generated dynamically from the interaction of pseudoscalar mesons, while the case of the next set of scalar resonances at higher energies, $f_0(1370)$, $f_0(1710)$, $K_0^*(1430)$ is more a question of debate. So is the case of the tensor resonances $f_2(1270)$, $f_2'(1525)$, $K_2^*(1430)$. A new perspective on these states has been offered in Ref. [1] where the $f_0(1370)$ and $f_2(1270)$ resonances are shown to be generated from the $\rho\rho$ interaction provided by the local hidden gauge Lagrangians implementing unitarization. It is shown that the idea of the nature of these states as vector meson-vector meson composite states has been tested in many reactions. Yet, the permanent discussion of the issue demands extra checks for other observables and, in this sense, the weak decays bring a new source of valuable information that should serve to test different models.

The experimental results[2,3] show that the $\bar{B}_s^0$ has a pronounced peak for the decay into J/ψ $f_0(980)$, while no appreciable signal is seen for the $f_0(500)$. These results have been also supported by other experiments. From the perspective of the scalar mesons as being dynamically generated from the meson meson interaction, a work has been recently done where the decay of B^0 and B_s^0 into J/ψ and one of the resonances $f_0(1370)$, $f_0(1710)$, $f_2(1270)$, $f_2'(1525)$, and $K_2^*(1430)$ are studied. The elementary mechanism of these decays is J/ψ formation from $c\bar{c}$ pair, and the other $q\bar{q}$ is hadronized into a meson-meson pair. The resulting meson-meson pairs are allowed to interact, using for this purpose the chiral unitary approach, and the desired final state is dynamically generated. This approach allows us to get independent decay rates which can be compared with the experimental measurements. The theoretical numerical results are compared with the experimental data.

The potential of the ratios predicted to tell us about the dynamics of vector interaction and the nature of the resonances discussed is great. This should serve to encourage further measurements and analysis of data. At the same time, it would be most advisable that other groups, with other theories, make also predictions for these rates that allow one to make comparisons and advance in our understanding of the nature of the scalar and tensor resonances.

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1 - 14　Role of $\Delta^*(1940)$ in $\pi^+ p \to K^+ \Sigma^+(1385)$ and $pp \to nK^+\Sigma^+(1385)$ Reactions

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The spectrum of isospin 3/2 $\Delta^{++}(1232)$ excited states is one of the most important issues in hadronic physics and is attracting much attention because it is the most experimentally accessible system composed of three identical valence quarks. However, our knowledge on these resonances mainly comes from old πN experiments and is still very poor[1]. In the energy region around or above 2.0 GeV, there are still many theoretical predictions of missing Δ^* states which have so far not been observed. Searching for these missing states from other production processes is necessary. A possible new excellent source for studying these Δ^* resonance comprises the $\pi^+ p \to K^+\Sigma^+(1385)$ and $pp \to nK^+\Sigma^+(1385)$ reactions, which have a special advantage, $i.e.$, there is no contributions from isospin 1/2 nucleon resonances due to the isospin and charge conservations.

Within the effective Lagrangian method the $\pi^+ p \to K^+\Sigma^+(1385)$ and $pp \to nK^+\Sigma^+(1385)$ reactions are studied by examining the important role of the $\Delta^*(1940)$ resonances in these reactions. It is found that the inclusion of the $\Delta^*(1940)$ resonance leads to a fairly good description on the low-energy experimental total cross section data[2] of
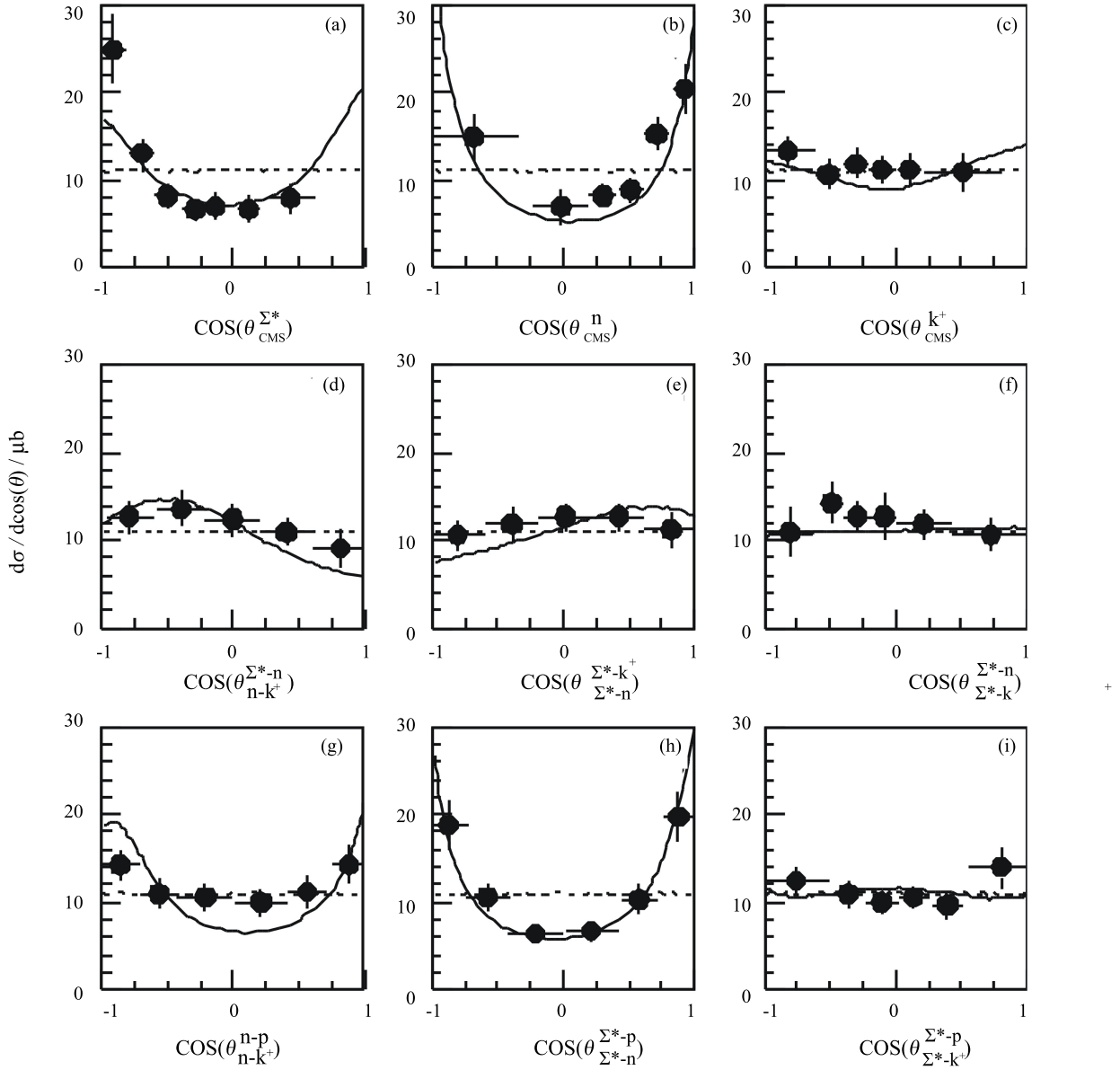
Fig. 1   Angular differential cross sections for the pp $\rightarrow n\mathrm{K}^+\Sigma^+(1385)$ reaction.

$\pi^+\mathrm{p} \rightarrow \mathrm{K}^+\Sigma^+(1385)$ reaction. Basing on the study of the $\pi^+\mathrm{p} \rightarrow \mathrm{K}^+\Sigma^+(1385)$ reaction , the total and differential cross sections (see Fig. 1) of the pp $\rightarrow n\mathrm{K}^+\Sigma^+(1385)$ reaction are also calculated. It is shown that the experimental data[2] support the important role played by the $\Delta^*(1940)$ resonance with a mass in the region of 1 940 MeV and a width of around 200 MeV. It is also demonstrated that invariant mass distribution and the Dalitz plot provide direct information of the $\mathrm{K}^+\Sigma^+(1385)$ production and they can be tested by future experiments.

References

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