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STUDY OF THE REACTION $p + N \to [\Sigma(1385)^o K^+] + N$ AT THE ENERGY OF 70 GeV

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Abstract

Balatz M.Ya., Belyaev I.M., Dorofeev V.A et al. Study of the Reaction $p + N \to [\Sigma(1385)^o K^+] + N$ at the energy of 70 GeV: IHEP Preprint 93-6. – Protvino, 1993. – p. 18, figs. 11, refs.: 4.

In the experiments on the SPHINX facility the diffractive production reaction $p + N \to [\Sigma(1385)^o K^+] + N$, $\Sigma(1385)^o \to \Lambda\pi^o$ was studied at the proton energy $E_p = 70$ GeV (here N is nucleon or light nucleus). In the effective mass spectrum of $[\Sigma(1385)^o K^+]$ system in this diffractive process there was no signal from anomalously narrow baryon state $N_\phi(1960)$ which had been cbserved earlier on the BIS-2 setup. A possible structure $X(2050)$ in the mass spectrum of $[\Sigma(1385)^o K^+]$ in the coherent diffractive process on carbon nuclei is discussed.

Аннотация

Балац Б.Я., Беляев И.М., Дорофеев В.А. и др. Исследование реакции $p + N \to [\Sigma(1385)^o K^+] + N$ при энергии 70 ГэВ: Препринт ИФВЭ 93-6. – Протвино, 1993. – 18 с., 11 рис., библиогр.: 4.

В опытах на установке СФИНКС исследовался процесс дифракционного образования $p + N \to \Sigma(1385)^o K^+ + N$ протонами с энергией E_p=70 ГэВ (здесь N-нуклон или легкое ядро). При анализе спектра масс $[\Sigma(1385)^o K^+]$-системы не найдено аномально-узкое барионное состояние $B_\phi(1960)$, наблюдавшееся ранее в опытах на БИС-2. Обсуждается возможная структура $X(2050)$ в массовом спектре $[\Sigma(1385)^o K^+]$-системы, проявляющаяся в когерентном дифракционном процессе на ядре углерода.

INTRODUCTION

In the experiments with the SPHINX facility, which was described in our previous publication [1], a wide program of studying the hadron diffractive production by protons with $E_p = 70$ GeV and search for exotic baryons in these processes are carried out. This program has been detailed in Refs. [1,2].

The SPHINX facility includes a wide-aperture magnet spectrometer with scintillation counter hodoscopes, proportional chambers, drift chambers and multichannel γ-spectrometer with lead glass detectors. The charged particles in the final state were identified by means of RICH differential Cherenkov spectrometer and two threshold gas Cherenkov hodoscope counters.

In this paper the data on the reaction

$$p + N \rightarrow [\Sigma(1385)^o K^+] + N \qquad (1)$$

are presented which have been obtained simultaneously with studying the reaction $p + N \rightarrow (K^+K^-p) + N$ (see Ref. [1]). Here and in what follows N signifies nucleon or light nucleus (C, Be).

1. MEASUREMENTS ON THE BEAM AND DATA ANALYSIS

Reaction (1) was singled out in the analysis of the same trigger events with 3 charged particles in the final state which were discussed in Ref.[1] (trigger T_A type). The analyzed statistics corresponds to the total flux of $N_p = 0.9 \cdot 10^{11}$ protons which have passed through the setup target. The effective thickness of this polyethylene target is $0.485 \cdot 10^{24}\ CH_2/\mathrm{cm}^2$.

For the selection of reaction (1) at the first stage of the data processing the events with 3 charged particles and 2 γ clusters in the photon detector are chosen, which must satisfy the requirement for the identification of $p\pi^- K^+$ system in the RICH counter (see [1]).

For further study of these events the following selection criteria are used:

a) the total energy of charged particles in $p\pi^- K^+$ system is limited by the value of 65 GeV ($\Sigma E_{ch} < 65$ GeV);

b) there are two and only two γ clusters in the γ detector not associated with charged tracks;

c) the energy of every γ cluster must be not smaller than 0.65 GeV ($E_{\gamma_1;\gamma_2} >$ 0.65 GeV);

d) the distance between two photons in the γ detector is $R_{12} > 7.5$ cm.

The invariant mass spectrum of two γ clusters for these selected events is presented on Fig. 1a. If the condition 0.10 GeV $< M(\gamma, \gamma_2) <$ 0.17 GeV is fulfilled, the corresponding events would be classified as the events of the $p\pi^-\pi^o K^+$ type. For these events the constraint procedure for the energy and coordinates of photon is performed with of tabulated value of π^o mass, the resolution of the γ detector is taken into account (the π^o mass constraint).

As the result of this analysis the process

$$p + N \rightarrow (p\pi^-\pi^o K^+) + N \tag{2}$$

is finally singled out with total energy which satisfies the "elastic" requirement

$$65\ GeV < E_p + E_{\pi^-} + E_{\pi^o} + E_{K^+} < 75 \text{ GeV} \tag{3}$$

(5989 events of (2), see Fig.1b). As is seen from the two-dimensional plot of Fig.2. the main contribution to the events of type (2) results from the hyperon decays ($\Lambda \rightarrow p\pi^-$ and $\Sigma^+ \rightarrow p\pi^o$). The decay path for Λ hyperons in the exposition on the SPHINX setup is limited to $\sim$ 30 cm by trigger requirements. The registration of the decay $\Sigma^+ \rightarrow p\pi^o$ is possible practically on all decay base for Σ^+ hyperons.

Thus, from the analysis of reaction (2) the processes with Λ- and Σ^+-hyperons were singled out

$$p + N \rightarrow \quad [\Lambda \quad \pi^o K^+] + N, \qquad \Lambda \rightarrow p\pi^- \tag{4}$$

$$p + N \rightarrow \quad [\Sigma^+ \quad \pi^- K^+] + N \qquad \Sigma^+ \rightarrow p\pi^o \tag{5}$$

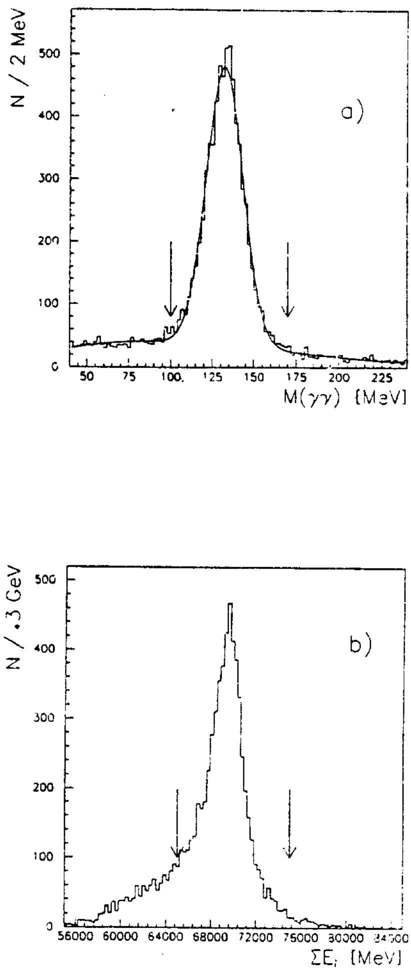

Figure 1. a) The effective mass spectrum of two γ clusters in the photon detector. The condition for π^o selection is 0.10 GeV $< M(\gamma_1\gamma_2) <$ 0.17 GeV (the events of $p\pi^-\pi^oK^+$ type). b) The distribution of the events over the total energy $\sum_i E_i = E_{\pi^-} + E_{\pi^o} + E_{K^+} + E_p$. The elastic requirement is 65 GeV $< \sum_i E_i <$ 75 GeV. The arrows point to the cuts for the selection of events.

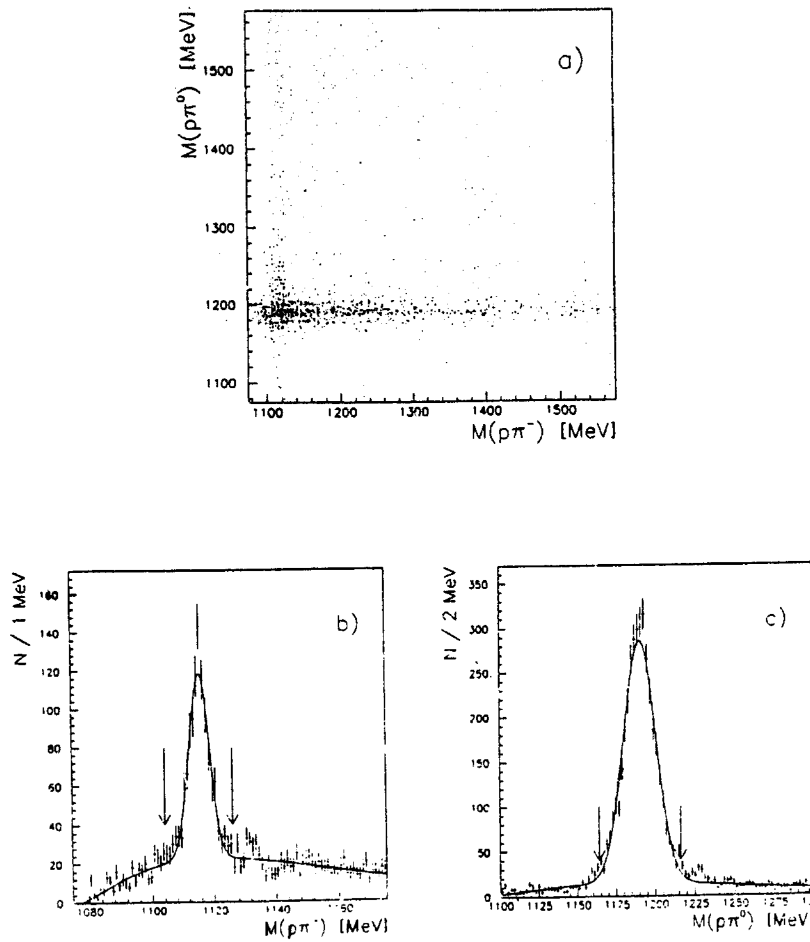

Figure 2. The analysis of the events of the reaction $p + N \rightarrow (p\pi^-\pi^\circ K^+) + N$: a) biplot distribution for the events on $M(p\pi^-)$ and $M(p\pi^\circ)$; b) the invariant mass spectrum of $p\pi^-$ system (the signal from the decay $\Lambda \rightarrow p\pi^-$ is seen); c) the invariant mass spectrum of $p\pi^\circ$ system (the signal from the decay $\Sigma^+ \rightarrow p\pi^\circ$ is seen). The arrows point to the cuts for Λ and Σ^+ events. As it is clear from this figure, the main contribution to the reaction under study is connected with the production and decay of Λ and Σ^+ hyperons.

On Fig.3 the effective mass spectrum of $\Lambda\pi^o$ system in reaction (4) is presented. In this spectrum the peak of $\Sigma(1385)^o \to \Lambda\pi^o$ is dominating. The background level under $\Sigma(1385)^o$ peak is quite small. This fact simplifies the selection of reaction (4) because there is no need in background subtraction procedure in this case.

Fig.4 shows the P_T^2 distributions of events of (1) and (2) types. The dominant role of the coherent production reactions on carbon nucleus with the slope $b \geq 30$ $(\mathrm{GeV})^2$ in dN/dP_T^2 distributions is evident from this figure.

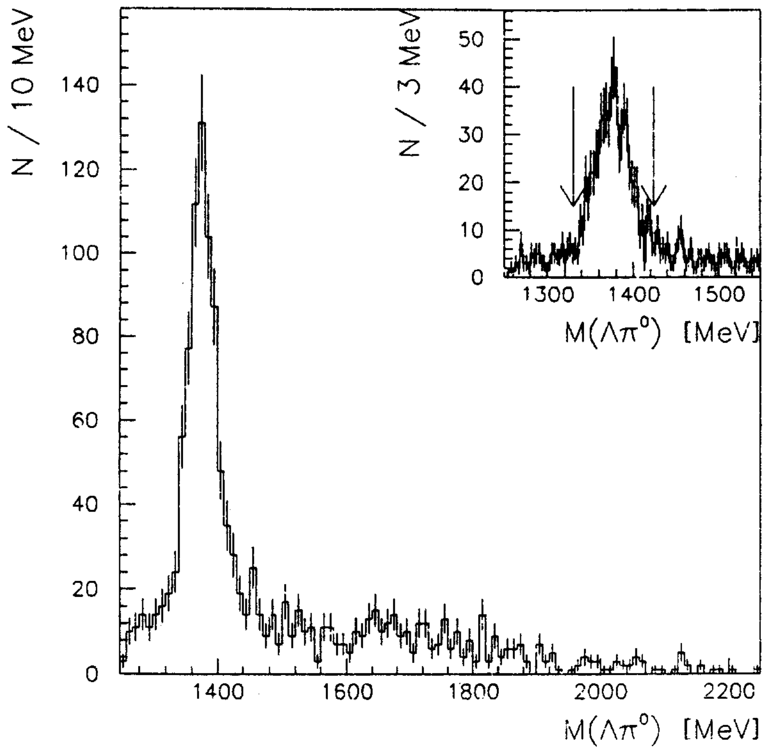

Figure 3. The invariant mass spectrum of $\Lambda\pi^0$ system in reaction (4). The parameters of the $\Sigma(1385)^o$ peak are $M = 1377 \pm 3$ MeV and $\Gamma = 39 \pm 3$ MeV. They are in agreement with tabulated values of these parameters (with the account of the apparatus mass resolution $\sigma = \pm 9$ MeV and systematic errors). The arrows indicate the region of $\Sigma(1385)$ band.

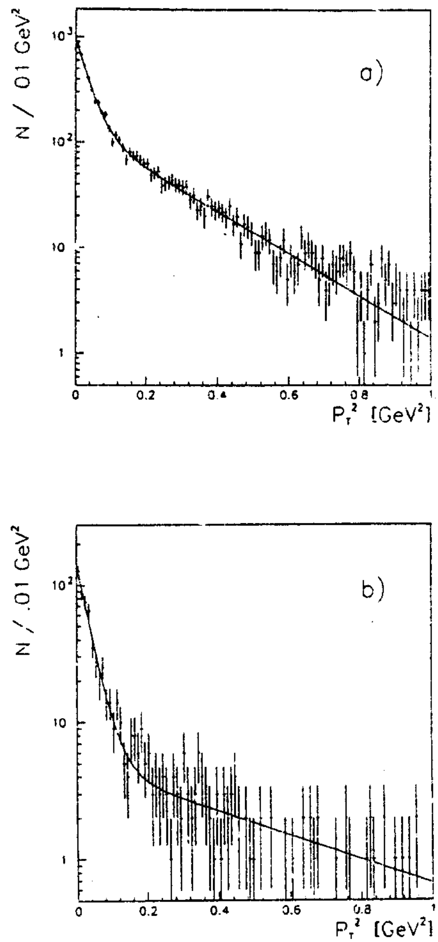

Figure 4. The dN/dP_T^2 distribution: a) for all the events (2) with $p\pi^-\pi^\circ K^+$ in the final state; b) for the events (1) with $\Sigma(1385)^\circ K^+$ in the final state. These distributions were fitted in the form $dN/dP_T^2 = c_1 exp(-b_1 P_T^2) + c_2 exp(-b_2 P_T^2)$. The values of the slope b_1 in this distribution are 31 ± 2 (GeV)$^{-2}$ (Fig.4a) and 30 ± 8 (GeV)$^{-2}$ (Fig.4b). These large values of the slope show that there are strong contributions of coherent production reactions on carbon nuclei.

2. THE MAIN PHYSICAL RESULTS

2.1. Search for $N_\phi(1960)$ baryon

The existence of the $N_\phi(1960)$ baryon with anomalously narrow decay width was claimed in Ref. [3] as the result of the experiment on the BIS-2 apparatus on the study of the reaction

$$n + (C) \to [\Sigma(1385)^- K^+] + \cdots \tag{6}$$

at the average energy of neutrons $< E_n > \simeq 40$ GeV. In the effective mass spectrum of $M[\Sigma(1385)^- K^+]$ a narrow N_ϕ peak with the mass $M = (1956^{+8}_{-6})$ MeV and the width $\Gamma = 27 \pm 15$ MeV was observed. This $N_\phi(1960)$ peak was interpreted in Ref. [3] as a candidate for the cryptoexotic baryon with hidden strangeness $|uddss\bar{s} >$.

The notation (C) in (6) and hereafter means that this reaction was not a coherent production process on carbon nuclei. Reaction (6) with limited charge multiplicity took place in neutron fragmentation region and it was not an inclusive process. However, there was a possibility for the production of additional neutral particles together with $N_\phi(1960)$ in the final state of (6).

The cross section for the $N_\phi(1960)^o$ production in (6) was obtained in Ref. [3] to be

$$\sigma[n + (C) \to N_\phi(1960) + \cdots)] \cdot BR[N_\phi(1960)^o \to \Sigma(1385)^- K^+] =$$

$$= (1150 \pm 190) \ \ \text{nb/C} \ . \tag{7}$$

From (7) with the account of isotopic conditions for the decays on different final states $N_\phi^o \to \Sigma(1385)K$ it is possible to obtain

$$\sigma[n + (C) \to N_\phi(1960)^o + \cdots] \cdot BR[N_\phi(1960)^o \to \Sigma(1385)K] =$$

$$= (1725 \pm 285) \ \ \text{nb/C} \ . \tag{8}$$

(if the isospin of $N_\phi(1960)$ is $I = 1/2$).[1]

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[1]It must be bear in mind that cross section (7) in the experiment [3] was obtained not very correctly. As it was shown by fitting the $[\Sigma(1385)^- K^+]$ effective mass spectrum from the BIS data [3] the number of the events in the N_ϕ-peak as well as cross section in (7) (and hence also in (8)) must be increased by a factor of $1.7 \div 2.0$ as compared with the published values in Ref. [3].

In the SPHINX measurement of reaction (1), which is an analog of reaction (6), the effective mass spectrum $M[\Sigma(1385)^o K^+]$ in the different regions of the transverse momenta has thoroughly been studied (see Fig.5). These data include coherent diffractive production of $[\Sigma(1385)^o K^+]$ on carbon nuclei (in the region of $P_T^2 < 0.075$ GeV^2) as well as the events with larger transverse momenta.

As it is clear from the data of Fig.5, the anomalously narrow $N_\phi(1960)$ baryon, which was earlier observed by the BIS-2 group, has not been seen in the SPHINX experiment. The upper limit for the cross section of coherent diffractive production of the N_ϕ baryon on carbon nuclei has been obtained from the SPHINX data

$$\sigma[p + C \to N_\phi(1960)^+ + C] \cdot BR[N_\phi(1960)^+ \to \Sigma(1385)^o K^+] \leq$$

$$220 \text{ nb/C} \quad (95\% \text{ C.L.}). \tag{9}$$

By using the isotopic relations for the decays $N_\phi^+ \to \Sigma(1385)K$ more general limitation is found

$$\sigma[p + C \to N_\phi(1960)^+ + C] \cdot BR[N_\phi(1960)^+ \to \Sigma(1385)K] \leq$$

$$\leq 660 \; nb/C \quad (95\% C.L.) \tag{10}$$

This upper limit (10) is significantly lower than the value of the cross section for $N_\phi(1960)$ production (8) from BIS-2 experiment (see also the footnote on page 4). Which is still more important, there is a sharp difference in the forms of effective mass spectra for these two experiments (see Fig.6).

In the comparison of the results of these studies one must bear in mind some significant differences between the SPHINX and BIS-2 experiments.

a) The BIS-2 setup has a very limited acceptance which quickly decreases with increasing of the effective mass $M[\Sigma(1385)^- K^+]$.

For the SPHINX setup the efficiency is much more uniform and still significant up to $M \simeq 3.5 \div 4$ GeV (Fig.7).

b) There is no direct identification of charged secondaries in the BIS-2 experiment. Such identification can be done only by kinematical fitting. For the SPHINX setup there is a very good identification of charged particles with RICH spectrometer and two threshold Cherenkov counters (see Ref. [1]).

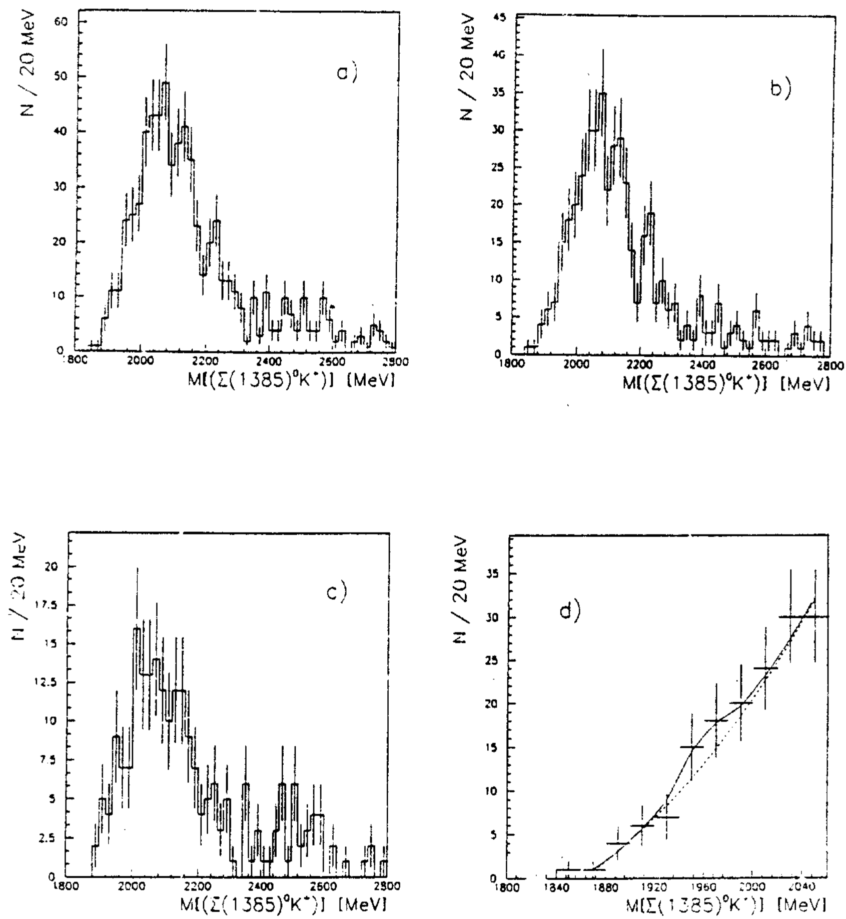


Figure 5. The invariant mass spectra of $\Sigma(1385)^o K^+$ system in reaction (1) in the SPHINX experiment: a) for all P_T^2; b) for $P_T^2 < 0.075$ (GeV)^2 (coherent production process on carbon nuclei); c) for $P_T^2 > 0.075$ (GeV)^2; d) the same as b), but only for the mass region of $N_\phi(1960)$.

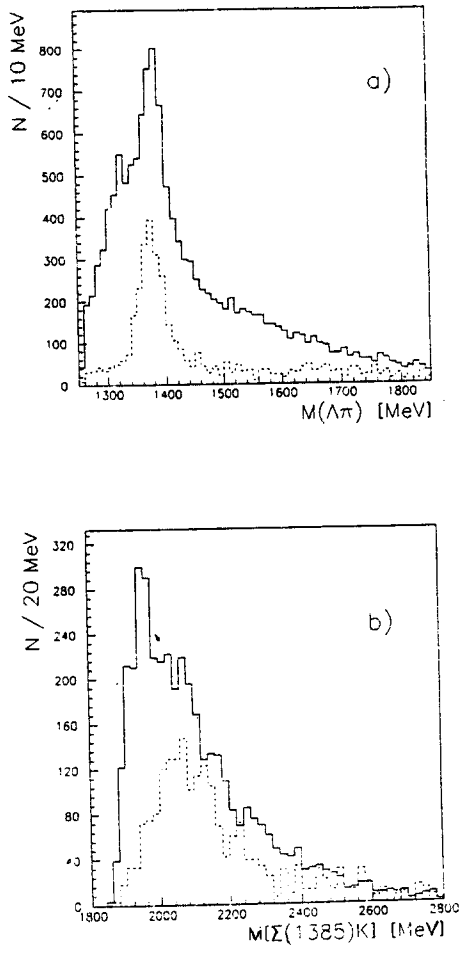


Figure 6. The comparison of the SPHINX (dotted line) and the BIS-2 (solid line) data, which were normalized to the same number of the $\Sigma(1385)$ hyperons: a) the invariant mass spectra of $\Lambda\pi^o$ (SPHINX) and $\Lambda\pi^-$ (BIS-2); b) the invariant mass spectra of $\Sigma(1385)K^+$ systems: $\Sigma(1385)^o K^+$ (SPHINX) and $\Sigma(1385)^- K^+$ (BIS-2). In the last spectra the full "$\Sigma(1385)$-band" is used ($1350 < M(\Lambda\pi) < 1420$ MeV). Thus in the BIS-2 spectrum 2/3 of events are from the background under the $\Sigma(1385)$ peak. For the SPHINX data this background is negligible.

c) In the SPHINX measurement additional elastic condition (3) for the total energy is used in the analysis. For the BIS-2 spectrometer such requirement could not to be realized because of nonmonochromatic and unknown energy of the initial neutrons. Furthermore, in the SPHINX experiment the charged secondaries as well as neutral ones are detected whereas in the BIS-2 measurement only charge particles were registered.

d) As is seen from dN/dP_T^2 distribution in the SPHINX experiment the coherent diffractive production of the $[\Sigma(1385)^o K^+]$ system on the carbon nuclei is the main production process for this system. For the BIS-2 experiment the slope b in dN/dP_T^2 distribution is $\sim$ three times smaller than in the SPHINX measurement. Thus it seems that $\Sigma(1385)^- K^+$ production in Ref. 3 has nondiffractive character (in spite of the claim in Ref. [3] about the diffractive production of $N_\phi(1960)$ on nucleons in these data).

e) In the invariant mass spectra of $\Lambda\pi^o$ in the SPHINX measurement the peak for the decay $\Sigma(1385) \rightarrow \Lambda\pi^o$ is clearly singled out with a very small background under the peak. Meanwhile, for the BIS-2 the background under $\Sigma(1385)^-$ peak is 2 times larger than resonance effect (see Fig. 6).

f) In the experiments on the BIS-2 facility only decays with charged secondaries were detected ($\Sigma(1385)^- K^+ \rightarrow \Lambda\pi^- K^+ \rightarrow p\pi^-\pi^- K^+$), the mass resolution in these measurements was very good. It was equal to $\sigma = \pm 4$ MeV in the $N_\phi(1960)$ mass region. In the SPHINX measurements with π^o production the mass resolution for $\Sigma(1385)^o K^+ \rightarrow \Lambda\pi^o K^+ \rightarrow p\pi^-\pi^o K^+$ is $\sigma = \pm 11$ MeV. In spite of worse mass resolution for the SPHINX data it is quite sufficient for the selection of $N_\phi(1960)$ peak with $\Gamma = 27 \pm 15$ MeV if this state really exists. Certainly this mass resolution is taken into account in the procedure of evaluating cross-section limits (7) and (8).

Thus, from experimental point of view the study of the $[\Sigma(1385)K]$ system in our measurement on the SPHINX facility is carried out under much better background conditions as compared with the BIS-2 run.

Let us express some opinion about the reasons of the considerable disagreement between the results of these two experiments. There are two possibilities.

a). The N_ϕ baryon exists but is not produced in the diffractive production reactions. Such situation would take place, for example, if the isospin of $N_\phi(1960)$ was I = 3/2. Thus $N_\phi(1960)$ baryon has not been seen in the SPHINX experiment where from the very beginning the conditions for the selection of diffractive production are fulfilled (the trigger, the elastic energy requirement 65 GeV $< \Sigma E_i <$ 75 GeV).

b). Because of the poor background conditions for the isolation of reaction (6) the procedure of the background subtraction in the BIS-2 experiment is not correct and the narrow $N_{\phi}(1960)^{o} \to \Sigma(1385)^{-}K^{+}$ baryon from [3] is, in fact, fake. This last explanation seems to be the most natural one. The BIS-2 spectrum on Fig.6 corresponds to full "$\Sigma(1385)$-band" on $\Lambda\pi^{-}$ spectrum and 2/3 of all these events are due to the background under $\Sigma(1385)$ peak Both spectra on Fig.6 are normalized to the same number of $\Sigma(1385)$ events and are in a reasonable agreement between themselves in the mass region $2 \div 2.3$ GeV. Then the differences between two spectra are due to the events not caused by the $\Sigma(1385)$ production. If one assumes that the SPHINX data can be used for the estimation of $\Sigma(1385)$ part of the BIS-2 spectrum, then after a simple subtraction procedure the resulting mass spectrum on Fig.8 corresponds to the $\Lambda\pi^{-}K^{+}$ BIS-2 events not connected with $\Sigma(1385)$ hyperons. The events from "N_{ϕ}-peak" are also in this subtracted spectrum, but now it is clear that there is no statistically significant narrow structure in it and these $\Lambda\pi^{-}K^{+}$ events can be the decay products of some Δ^{*} isobars with masses 1900-2000 MeV. Certainly, Δ^{*} isobars can't be produced in the diffractive processes. Thus the BIS-2 signal of the so-called anomalously narrow $N_{\phi}(1960)$ peak seems to be a fake signal and can be simulated by the $\Delta(\sim 2000) \to \Lambda\pi^{-}K$ decays with normal hadronic width.

2.2. Further Analysis of the Effective Mass Spectrum of $\Sigma(1385)^{o}K^{+}$ System

Let us return to the analysis of the effective mass spectra of $\Sigma(1385)^{o}K^{+}$ in reaction (1). These spectra obtained in different regions of transfer momenta are presented on Fig.5. As indicated in this figure the form of the observed spectra does not change too much in going from the region $P_T^2 < 0.075$ $(\text{GeV})^2$ to the region of $P_T^2 > 0.075$ $(\text{GeV})^2$. There is a structure with mass $M \simeq 2060$ MeV and width $\Gamma \simeq 120$ MeV in all these spectra. The nature of this "X(2060)" structure is quite unclear now. There is a feasibility of its resonance interpretation, but it also plausible to explain the form of the observed spectra due to the diffractive nonresonance production with account of the Deck-effect (see diagram on Fig.9a). The inverted commas in the notation "X(2060)" are used to stress this uncertainty.

It must be stated that the data on effective mass spectra on Fig. 5 are in agreement with the results of the experiments [4], in which the neutron diffractive producton of $\Sigma(1385)K$ system on proton target in the energy range of 6-24 GeV seems to take place. But the statistics obtained in Ref. [4] is quite small.

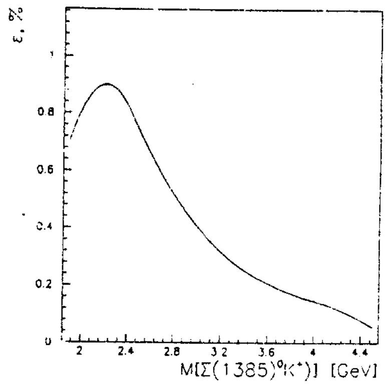


Figure 7. Efficiency for the registration of reaction (1) on the SPHINX setup. A small value for the efficiency is caused by small decay path for $\Lambda \rightarrow p\pi^-(\lesssim 30$ cm) because of the trigger requirement. The geometrical acceptance of the setup is big enough (in the mass region of 2 GeV it is around 35%).

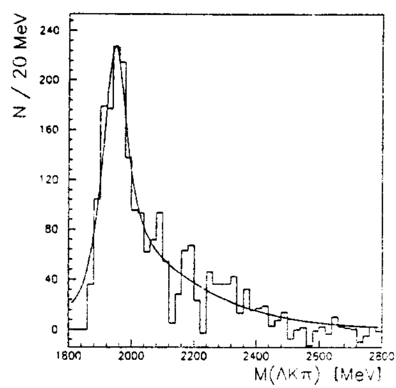


Figure 8. The "difference spectrum" for $\Lambda\pi^-K^+$ events in the BIS-2 experiment, which are not connected with $\Sigma(1385)$ hyperon production. This spectrum was obtained as the difference between two spectra on Fig.6b on the assumption that the $\Sigma(1385)$ contribution in the BIS-2 spectrum is correctly reproduced by normalized SPHINX data. Certainly, this "difference spectrum" is a model dependent.

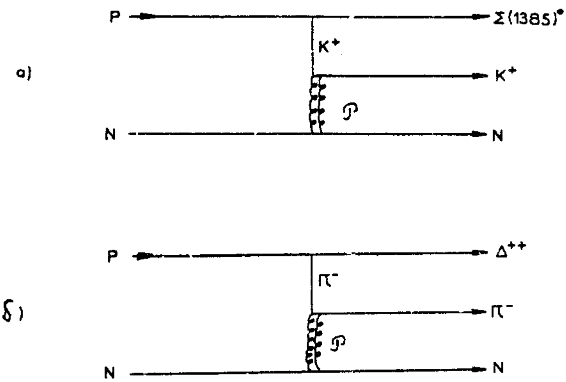


Figure 9. Diagrams for the nonresonance diffractive production: a) $p + N \rightarrow [\Sigma(1385)^o K^+] + N$; b) $p + N \rightarrow [\Delta(1238)^{++}\pi^-] + N$. The corresponding matrix elements decrease fairly rapidly with increasing mass $\Sigma^* K$ ($\Delta\pi$) near the threshold, and this may lead to a resonance-like behaviour of the spectrum of the effective masses in the reaction under study (the Deck effect).

To obtain some ideas about possible properties of resonance and nonresonance diffractive production mechanisms the data on the reaction

$$p + Be \rightarrow \Delta(1232)^{++}\pi^- + Be \tag{11}$$

are presented on Fig. 10 (these data are also obtained from the SPHINX exposition). As it is seen from this figure there are clear peaks from isobars $N(1440) \rightarrow \Delta^{++}\pi^-$ and $N(1710)^+ \rightarrow \Delta^{++}\pi^-$ in the effective mass spectrum $M[\Delta(1238)^{++}\pi^-]$ in reaction (11) as well as smooth background. It seems that this background can be caused by nonresonance diffractive dissociation process (see the diagram on Fig.9b). In this case we can expect that in reaction (1) the nonresonance diffractive production mechanism (see diagram on Fig.9a) is also characterized by large width of the Deck maximum ($\gtrsim 500 - 600$ MeV).

As an illustration, the effective mass spectrum $M[\Sigma(1385)^o K^+]$ for reaction (1) in the region of $P_T^2 < 0.075$ (GeV)^3 is fitted with the sum of Breit-Wigner peak "X(2060)" and smooth polynomial background (Fig.11a). In this approximation the cross section of the coherent "X(2060)" production on the carbon nucleus was obtained:

$$\sigma["X(2060)"]|_C \cdot BR = \sigma[p + C \rightarrow "X(2060)" + C] \cdot$$

$$\cdot BR["X(2060)" \rightarrow \Sigma(1385)^o K^+] \simeq 1300 \; nb \quad (\pm 20\%). \tag{12}$$

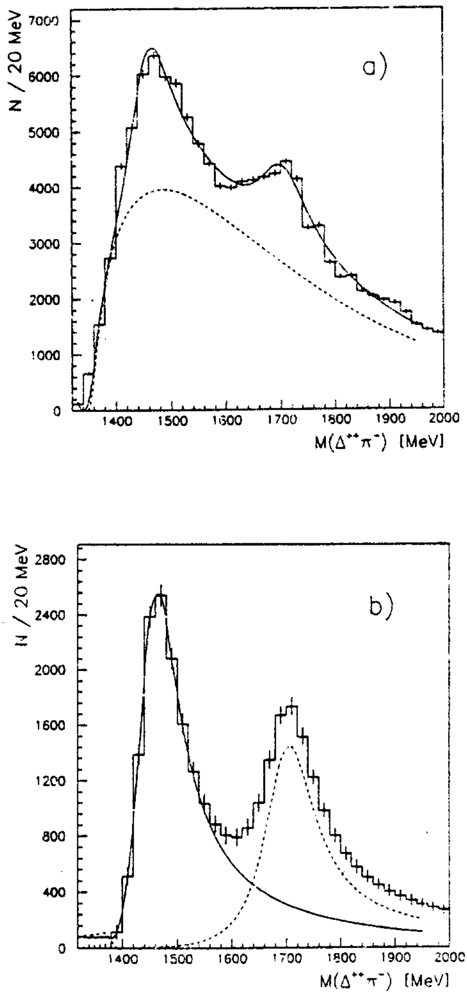
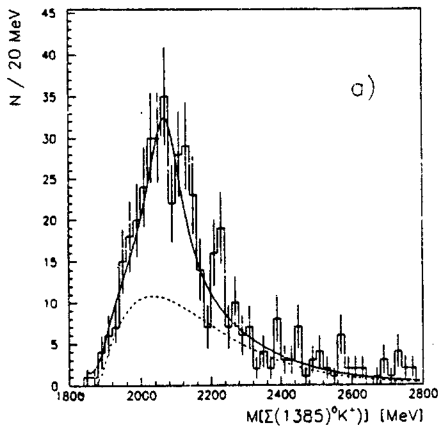


Figure 10. The effective mass spectrum of $\Delta(1232)^{++}\pi^-$ system in reaction (11), obtained in the SPHINX measurement: a) the total spectrum; the dotted curve is nonresonance smooth background, which may be connected with nonresonance Deck mechanism; b) the spectrum, which is obtained after background subtraction, is presented as a sum of two Breit-Wigner peaks with parameters: $M_1 \simeq 1503$ MeV, $\Gamma \simeq 300$ MeV and $M_2 \simeq 1715$ MeV, $\Gamma_2 \simeq 128$ MeV.



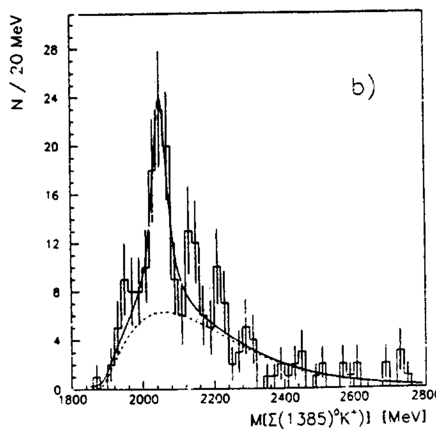


Figure 11. a) The invariant mass spectrum of the $\Sigma(1385)^{o}K^{+}$ system on the SPHINX experiment for the coherent production process on carbon nuclei (i.e. at $P_T^2 < 0.075$ (GeV)^2). The spectrum is fitted by the sum of polynomial background and the Breit-Wigner peak with $M = 2065 \pm 11$ MeV and $\Gamma = 118 \pm 19$ MeV. The soft P_T^2 cut which is used in this spectrum leads to significant noncoherent background ($\gtrsim 30\%$, see the text). b) The same spectrum, but with more stringent cut ($P_T^2 < 0.02$ (GeV)^2) to stress the selection of coherent events. The spectrum is fitted by the sum of smooth polynomial background and the Breit-Wigner peak with $M = 2050 \pm 6$ MeV and $\Gamma = 50 \pm 20$ MeV.

It is also possible to estimate the cross section of "X(2060)" diffractive production per nucleon:

$$\sigma[\text{"}X(2060)\text{"}]|_{nucleon} \cdot BR \simeq \begin{cases} 110\ nb/nucleon & (\sigma \sim A) \\ 250\ nb/nucleon & (\sigma \sim A^{2/3}) \end{cases} \qquad (13)$$

The linear dependence of the cross section with atomic number of nuclei can take place for coherent process.

It should be emphasized once more that the nature of "X(2060)" is unclear now. This drastically calls for the determination of quantum numbers of "X(2060)" as well as thorough study of the dynamics of reaction (1). As the first step in this direction let one analyze the role of the P_T^2 cut in singling out the coherent diffractive production process on carbon nuclei.

Basing on the study of dN/dP_T^2 distributions (see Fig. 4) we use up to now the cut $P_T^2 < 0.075$ GeV$)^2$ for the selection of coherent production reaction and the rejection of noncoherent events.

It is a soft cut which allows for $\gtrsim 30\%$ of the noncoherent background in the mass spectrum on Fig. 11a. Besides, the measured value of the slope of the diffractive cone for carbon nuclei $b_1 \simeq 30$ (GeV)^2 seems to be somewhat reduced due to the instrumental uncertainties. The expected value of this slope for pA interactions is $b_1 \simeq 10\ A^{2/3}$ (GeV)$^{-2}$ and for carbon nuclei it can be $\gtrsim 50$ (GeV)$^{-2}$. If the real value of b_1 is in agreement with this expected value then one would anticipate the additional increase of noncoherent background in the mass spectrum on Fig. 11a.

In order to reduce this noncoherent background and to obtain the $\Sigma(1385)^o K^+$ mass spectrum for "pure" coherent production reaction a stringent requirement $P_T^2 < 0.02$ (GeV)^2 was used (see Fig. 11b). As is seen from the comparison of the mass spectra on Figs. 11a and b, under the stringent P_T^2 cut the narrow peak with mass $M = 2050 \pm 6$ MeV and $\Gamma \leq 50 \pm 19$ MeV is clearly observed. This narrow structure can not be explained by diffractive nonresonant process of Deck type and seems to be caused by the production of new baryon with hidden strangeness. This conclusion must be considered as preliminary one and needs to be confirmed with further measurements with increased statistics.

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