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NEW EXPERIMENTAL RESULTS ON STRANGENESS PRODUCTION

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1 Introduction

The interest to the strange particles production is motivated by some unexpected results obtained recently on the role of the strange quarks in the nucleon. Intuitively, it is expected that the $\bar{s}s$ pairs in the nucleon are not significant, being a component of the nucleon sea quarks. Indeed, recent analysis of the parton distributions [1] shows that the fraction of the total momentum of the proton carried by strange quarks is 4.6% at $Q^2 = 20\ GeV^2$. However, the evaluation of the π-nucleon σ term shows that the contribution of the $\bar{s}s$ quarks to the nucleon mass is by no means negligible, about 130 MeV [2]. The analysis of the lepton deep-inelastic scattering (DIS) data by the EMC and successor experiments has indicated that the $\bar{s}s$ pairs in the nucleon are polarized (for review see [3]). Finally, the strong apparent violation of the Okubo-Zweig-Iizuka (OZI) rule was seen in LEAR experiments with stopped antiprotons (for review see [4]). The ϕ production in some reactions of $\bar{p}p$ annihilation at rest exceeds the OZI rule prediction by a factor 30-50.

To explain these unusual experimental results a model was proposed [5] based on a nucleon wave function containing negatively polarized $s\bar{s}$ pairs, as suggested by the DIS experiments. The main aim of this review is to clarify to what extent the new experimental facts agree with the predictions of this model.

It is worthwhile from the very beginning to define which nucleon strangeness we are interested in. Following Brodsky [6], it is useful to distinguish between the extrinsic and intrinsic nucleon strangeness. Extrinsic $\bar{s}s$ quarks are generated from the processes of the QCD hard bremsstrahlung and gluon splitting $g \to \bar{s}s$. The lifetime of this component is short. The extrinsic sea quarks obey the QCD evolution equations. From this point of view the extrinsic strangeness is something which is under control.

The notion of the intrinsic nucleon strangeness is less self-evident. It is assumed that the strange quarks created in the nucleon form a longlived configuration and the proton wave function can be decomposed as follows:

$$|p>= a \sum_{X=0}^{\infty} |uudX> + b \sum_{X=0}^{\infty} |uud\bar{s}sX> \qquad (1)$$

where X stands for any number of gluons and light $\bar{q}q$ pairs and the condition $|a|^2 + |b|^2 = 1$ holds neglecting the admixture of more than one $\bar{s}s$ pair.

The intrinsic nucleon strangeness, in contrast with the extrinsic strangeness, should be essentially non-perturbative phenomenon. The question about the existence of the intrinsic nucleon strangeness is still open. However, the problems with πN σ–term, possible polarization of the nucleon strange sea observed in DIS and apparent violation of the OZI rule in antiproton annihilation at rest could be regarded as indications on the existence of the intrinsic nucleon strangeness.

A reason to expect a non-negligible role of strange quarks in the nucleon follows from the properties of the QCD vacuum. From the QCD sum rules calculations [7], it is well known that the condensate of the strange quarks in the vacuum is not small and is comparable with the condensate of the light quarks:

$$< 0 |\bar{s}s| 0 >= (0.8 \pm 0.1) < 0 |\bar{q}q| 0 >, \quad q = (u, d) \tag{2}$$

Thus, the density of $\bar{s}s$ pairs in the QCD vacuum is quite high and one may expect that the effects of strange quarks in the nucleon will be also non-negligible.

2 Intrinsic nucleon strangeness

There are different possibilities for the quantum numbers of $\bar{s}s$ pair in the nucleon. Let us consider the proton consisting from the uud and $\bar{s}s$ clusters and assume that the quantum numbers of the uud cluster is the same as for the proton $J^P = 1/2^+$. Then some possible quantum numbers of the $\bar{s}s$ quarks are shown in the Table 1.

Table 1: The possible quantum numbers of the $\bar{s}s$ quarks in the nucleon. $\vec{S}$ and $\vec{L}$ are the total spin and orbital angular momentum of the $\bar{s}s$ pair. $\vec{J} = \vec{L} + \vec{S}$. The relative angular momentum between the $\bar{s}s$ and uud clusters is $\vec{j}$.

S	L	j	J^{PC}	State
0	0	1	0^{-+}	"η"
1	0	1	1^{--}	"ϕ"
1	1	0	0^{++}	$^3P_0$
1	1	0	1^{++}	$^3P_1$
0	1	0	1^{+-}	$^1P_1$

One could see that the $\bar{s}s$ could be stored in the nucleon with the quantum numbers of η and ϕ if the relative angular momentum between the $\bar{s}s$ and the uud clusters is $j = 1$. But if $j = 0$, then the quantum numbers of $\bar{s}s$ pair may be different , including the vacuum quantum numbers $J^{PC} = 0^{++}$. Predictions of the model will depend drastically on the assumption about the $\bar{s}s$ quantum numbers.

It was established earlier[8] that the existing experimental data on the production of η and η' mesons exclude the 0^{-+} quantum numbers for the $\bar{s}s$ admixture in the nucleon.

The assumption that the $\bar{s}s$ pair has quantum numbers of ϕ also leads to some problems. In this case one might expect some additional ϕ production due to this strangeness, stored in the nucleon. This quasi-ϕ pair could be easily shaken-out from the nucleon. Then one should observe the strong apparent violation of the OZI rule [9].

The OZI rule predicts that diagrams with disconnected quark lines should be suppressed compared to connected quark diagrams. The $\bar{s}s$ strangeonia (like ϕ or $f'(1525)$ mesons) should be produced only via light quark admixture in their wave functions. It means that the production of strangeonia is possible only due to the departure from the ideal mixing. The OZI rule in formulation of Okubo [10] strictly forbids formation of $\bar{s}s$ meson in pp or $\bar{p}p$ interaction. In spite of some deviation from the OZI rule predictions observed earlier (for review, see [4, 5]), the violation of the OZI rule does not exceed the 10% level.

The situation has changed since a wealth of new high-statistics data in various $p\bar{p}$ annihilation channels became available from the experiments at LEAR. They provide information on several final states including $\phi\gamma$, $\phi\pi$, $\phi\eta$, $\phi\pi\pi$, $f'\pi$ and $\phi\phi$, in different experimental conditions which allow initial-state spin and orbital angular momentum states to be distinguished.

Anomalously high ϕ production was seen in different channels of annihilation in liquid and gas hydrogen and deuterium targets [11, 12, 13, 14, 15]. The highest deviation is for the $\bar{p}p \to \phi\gamma$ channel where the ratio $R(\phi/\omega)$ between the yields of ϕ and ω meson production is $R(\phi/\omega) = (243 \pm 86) \cdot 10^{-3}$, i.e. about 50 times larger than the OZI prediction $R(\phi/\omega) = 4.2 \cdot 10^{-3}$ (for the quadratic Gell-Mann-Okubo mass formula).

The most striking feature of the OZI rule violation found in the experiments at LEAR is its strong dependence on the quantum numbers of the initial state.

Thus, the OBELIX collaboration studied the channel $\bar{p}p \to \phi\pi^0$ for annihilation in the hydrogen targets with different densities [15]. The conservation of P and C–parities strictly fixes the possible quantum numbers of the $\bar{p}p$ initial state to be either the spin triplet state $^3S_1$, or the spin singlet state $^1P_1$. It was found that for annihilation in liquid, where the $^3S_1$ state is dominant, the $\phi\pi^0$ yield is substantial and the ratio $R(\phi/\omega) = (129 \pm 35) \cdot 10^{-3}$, by a factor of 30 higher than the naïve OZI rule prediction.

At the same time, no ϕ's were found when annihilation took place from the $^1P_1$ initial state. The same $^3S_1$ dominance had been observed earlier by the ASTERIX collaboration [11].

So, not only a large ratio ϕ/ω was found, it turns out that this ratio miraculously changes depending upon the initial state. If the $\bar{s}s$ pair was stored in the nucleon with the ϕ quantum number, it is not clear why the shake-out of this pair depends on the value of the total spin of *both* nucleons.

Moreover, the shake-out of the $\bar{s}s$ pair with ϕ quantum numbers should lead to the same, "universal" violation of the OZI rule in different annihilation channels. However, the deviations from the OZI-rule predictions was found only in some channels. It is not clear how to explain, for instance, why the annihilation in $\phi\pi$ channel exceeds the OZI rule prediction by a factor of 30, but the annihilation in liquid hydrogen in $\phi\rho$ exhibits no strong violation of the OZI rule.

To explain these experimental features, a model of ϕ production was proposed [5], based on a nucleon wave function containing negatively polarized $s\bar{s}$ pairs.

It was extended to $\Lambda\bar{\Lambda}$ production in [16], where arguments were given on the basis of chiral symmetry that the $s\bar{s}$ pair in the nucleon wave function might be in a $^3P_0$ state.

3 Polarized intrinsic strangeness model

Let us consider the production of $\bar{s}s$ strangeonia in NN interaction assuming that the nucleon wave function contains an admixture of polarized $\bar{s}s$ pairs with $J^{PC} = 0^{++}$ and 1^{++} [1].

Then the shake-out of such pairs will not create ϕ, but, for instance, a scalar strangeonium. The concrete candidate on this state is not firmly established now (see, for discussion [17]). The lowest $\bar{s}s$ scalar seems to be around 1700 MeV. Therefore the shake-out of the scalar $\bar{s}s$ pair from the nucleon will be a source of channels with open strangeness, like $\bar{K}K$ and KK^*.

The ϕ should produced due to a process where strange quarks from *both* nucleons are participating. An example of such rearrangement diagram is shown in Fig. 1.

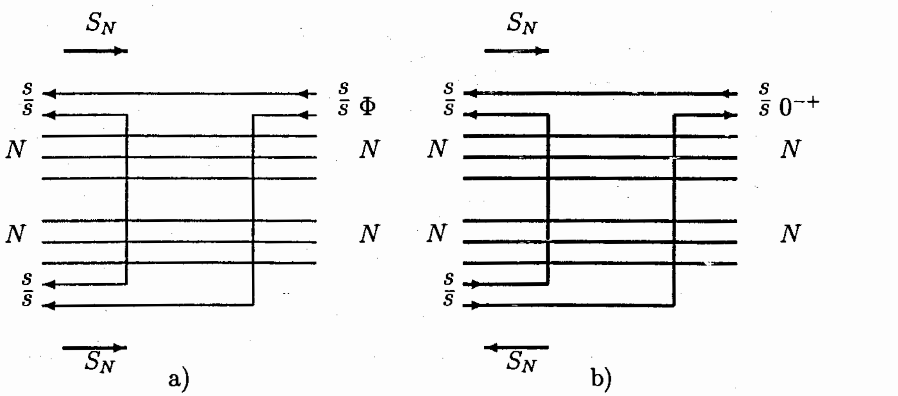

Figure 1: Production of the $\bar{s}s$ mesons in NN interaction from the spin-triplet (a) and spin-singlet (b) states. The arrows show the direction of spins of the nucleons and strange quarks.

If the nucleon spins are parallel (Fig. 1a), then the spins of the $\bar{s}$ and s quarks in both nucleons are also parallel. If the polarization of the strange quarks is not changed during the interaction, then the $\bar{s}$ and s quarks will have parallel spins in the final state. The total spin of $\bar{s}s$ quarks will be $S = 1$ and if their relative orbital momentum is $L = 0$, it means that the strangeonium has the ϕ quantum numbers, if $L = 1$, it will correspond to the creation of tensor strangeonium, $f_2'(1525)$.

If the initial NN state is a spin-singlet, the spins of strange quarks in different nucleons are antiparallel and the rearrangement diagrams like that in Fig.1b may lead to the $\bar{s}s$ system in the final state with total spin $S = 0$. It means that for $L = 0$ a strangeonium with the pseudoscalar quantum numbers 0^{-+} is produced. One may expect that the formation of η meson will be enhanced from the spin-singlet state.

[1] I would like to thank V.Markushin for pointing out the importance of different $\bar{s}s$ configurations.

The model predicts that the energy dependence of the ϕ production should follow the percentage of the $^3S_1$ state. It means that in antiproton annihilation in flight the ϕ yield will decrease with increasing of the antiproton energy.

It is important to note that these rules should hold as for antiproton-proton annihilation, as for nucleon-nucleon interaction.

Therefore, the predictions of the polarized strangeness model are quite definite:

- the ϕ should produce mainly from the $^3S_1$ state
- the $f_2'(1525)$ should produce mainly from the ^3P_J states
- the spin-singlet initial states favour the formation of pseudoscalar strangeonia.

It is also quite straightforward to consider formation of $\bar{\Lambda}\Lambda$ and $\phi\phi$ systems.

Let us confront the predictions of the model with the new experimental results.

4 Experiment and the polarized strangeness model

Recently the measurements of the $\bar{p}p \to K^+K^-\pi^0$ channel for annihilation of stopped antiprotons in liquid, gas at NTP and 5 mbar pressure, was performed by the OBELIX collaboration [18]. The invariant mass distributions of the K^+K^- and $K^\pm\pi^0$ systems are shown in fig. 2.

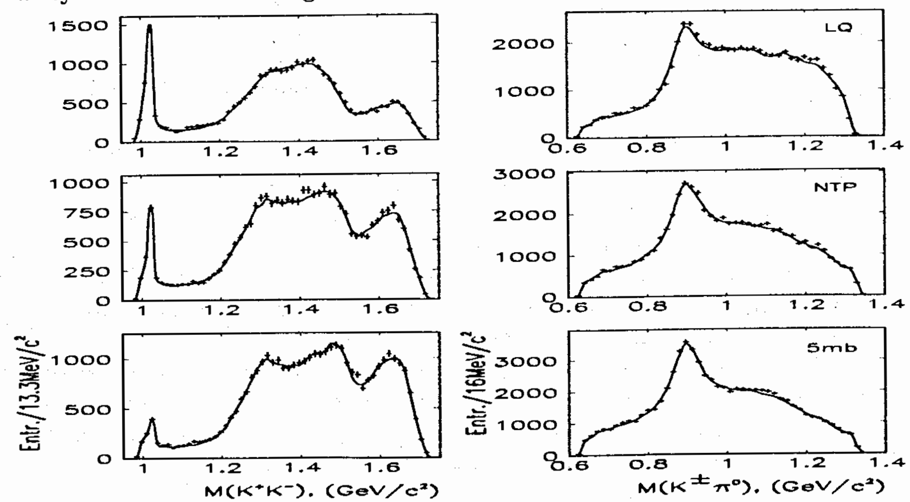

Figure 2: $K^\pm\pi^0$ and K^+K^- invariant mass distributions for $\bar{p}p \to K^+K^-\pi^0$ annihilations in the H_2 target: liquid (top), gas at NTP (middle), and 5 mbar (bottom).

One could see that the peak from the ϕ meson reduces with decreasing of the density of the target whereas the part of the K^+K^- spectra with high invariant masses $M > 1.5$ GeV/c^2 is more prominent for the low pressure data.

The dependence of the ϕ yield on the density clearly indicates the dominance of the production from the $^3S_1$ state. Using the parameters of the $\bar{p}p$ cascade from [19], it is possible to evaluate from the OBELIX data [18] the branching ratios of the $\bar{p}p \to \phi\pi^0$ channel for definite initial states:

$$Br(\bar{p}p \to \phi\pi^0,\ ^3S_1) = (7.57 \pm 0.62) \cdot 10^{-4}\ , \quad (3)$$

$$Br(\bar{p}p \to \phi\pi^0,\ ^1P_1) < 0.5 \cdot 10^{-4}\ , \text{ with 95\% CL} \quad (4)$$

Therefore, the indication of strong dependence of the $\phi\pi^0$ production on quantum numbers of the initial $\bar{p}p$ state, obtained by the ASTERIX collaboration [11], is confirmed with the statistics of factor 100 higher. The branching ratio of the $\phi\pi^0$ channel from the $^3S_1$ initial state is at least by 15 times larger than that from the $^1P_1$ state. There is no theoretical model except the polarized nucleon strangeness approach to explain this remarkable selection rule.

It is interesting to compare characteristics of the $\bar{p}p \to \phi\pi$ channel with the $\bar{p}p \to \omega\pi$ ones. Does the same selection rule exist also for the $\omega\pi$ final state? New results from the OBELIX collaboration [20, 21] presented at this Conference do not confirm this guess.

It turns out that for $\omega\pi$ channel the branching ratio of annihilation from $^1P_1$ state is not negligible. It leads to different dependences of the $\phi\pi$ and $\omega\pi$ annihilation frequencies on the target density. Preliminary results [20] for the measurements of the ratio $R = Y(\phi\pi)/Y(\omega\pi)$ are: $R = (114 \pm 10) \cdot 10^{-3}$ for annihilation in liquid and $R = (83 \pm 10) \cdot 10^{-3}$ for annihilation in gas at NTP.

The difference between $\phi\pi$ and $\omega\pi$ channels is even more pronounced in the measurements of antineutron-proton annihilation [21]. The cross sections of the $\bar{n}p \to \phi(\omega)\pi^+$ channels was measured for antineutron momenta 50-405 MeV/c. It turns out that the $\phi\pi^+$ cross section drops with energy, strictly following the decreasing of S-wave. The $\omega\pi^+$ cross section has different energy dependence with the contribution of $^1P_1$ component as large as 34 ± 7 % !

It seems that the production mechanisms of the $\bar{N}N \to \phi\pi$ and $\bar{N}N \to \omega\pi$ reactions near the threshold are quite different. As a result the ϕ/ω ratio is not constant with the energy of antiproton but decreases.

Probably this effect of decreasing of the ϕ/ω ratio at high energies is responsible for the result obtained by the DISTO collaboration in the measurements of the ϕ and ω production in pp interactions [22]. At the proton energy of 2.85 GeV, i.e. at 83 MeV above the ϕ production threshold, it was found that

$$R = \frac{\sigma(pp \to pp\phi)}{\sigma(pp \to pp\omega)} = (3.0 \pm 0.5^{+1.0}_{-0.8}) \cdot 10^{-3} \quad (5)$$

One may interpret this fact as a dilution of the S-wave spin-triplet initial state at

high energies. However, direct experimental measurements of this ratio near the threshold are badly needed.

Important information on the dynamics of strangeonia comes from the OBELIX analysis of the formation of the tensor $\bar{s}s$ meson $f_2'(1525)$ [18]. From the OZI–rule it is expected that the ratio between the yield of $f_2'(1525)$ production and that of $f_2(1270)$ meson, which consists from the light quarks only, is on the level of $R(f_2'/f_2) = (3 - 16) \cdot 10^{-3}$. The measurements of the $K^+K^-\pi^0$ channel at three hydrogen densities [18] provide a possibility to determine this ratio for annihilation from the S- and P-wave. It turns out that

$$R(f_2'(1525)\pi^0/f_2(1270)\pi^0) = (47 \pm 14) \cdot 10^{-3}\ , \quad \text{S-wave} \quad (6)$$

$$= (149 \pm 20) \cdot 10^{-3}\ , \quad \text{P-wave} \quad (7)$$

Indeed, the strong apparent violation of the OZI rule is seen just for annihilation from the P-wave, as predicted by the polarized strangeness model.

Another interesting result concerns the measurement of the $\bar{p}p$ annihilation at rest into the $\phi\eta$ final state for liquid hydrogen, gas at NTP and at a low pressure of 5 mbar, which was performed by the OBELIX collaboration [23]. The $\phi\eta$ final state has the same J^{PC} as the $\phi\pi^0$ final state. So, one may expect to see the same decreasing of the ϕ yield with the target density, as it was observed for the $\phi\pi^0$ channel (see, Fig. 2). However, unexpectedly, the reverse trend is seen: the yield of the $\bar{p}p \to \phi\eta$ channel grows with decreasing of the target density.

Using the same parameters of $\bar{p}p$ atom cascade for the evaluation of the branching ratios as in [18], it is obtained that

$$B.R.(\bar{p}p \to \phi\eta,^3S_1) = (0.76 \pm 0.31) \cdot 10^{-4} \quad (8)$$

$$B.R.(\bar{p}p \to \phi\eta,^1P_1) = (7.72 \pm 1.65) \cdot 10^{-4} \quad (9)$$

One should compare these results with those of (3-4). Again we see a strong dependence of the yield on the initial state quantum numbers.

The interpretation of the $\phi\eta$ production in the framework of the polarized intrinsic strangeness model is not straightforward. Since η meson has a substantial $\bar{s}s$ component, the production of the $\phi\eta$ final state could be regarded as the production of two $\bar{s}s$ pairs, one in the spin triplet state and the other in the spin singlet state.

If we treat the reaction $\bar{p}p \to \phi\eta$ as formation of pseudoscalar $\bar{s}s$ strangeonium, then the polarized intrinsic strangeness model predicts that it should be formed from the spin singlet initial state. It is interesting that the same strong enhancement of the η production from the initial spin singlet state was observed in $pp \to pp\eta$ and $pn \to pn\eta$ reactions [24]. An attempt to interpret this effect in the polarized nucleon strangeness model was done in [25]. They pointed out that at threshold the ratio between η production on neutron and on proton is quite simple:

$$R_\eta = \frac{\sigma(np \to np\eta)}{\sigma(pp \to pp\eta)} = \frac{1}{4}(1 + \frac{|f_0|^2}{|f_1|^2}) \quad (10)$$

where f_1 and f_0 are the amplitudes corresponding to the total isospin $I = 1$ and $I = 0$, respectively. At threshold, when the orbital momentum of two nucleons in the final state is $l_1 = 0$ and the orbital momentum of the produced meson relative to the center of mass system of these two nucleons is also $l_2 = 0$, the connection between the isospin and the total spin of two nucleons in the initial state is fixed. The amplitude f_1 corresponds to the spin-triplet initial nucleon state and the amplitude f_0 corresponds to the spin-singlet one. Therefore, using the experimental data on the pp and np cross sections, it is possible to estimate the ratio between spin-singlet and spin-triplet amplitudes.

Recent measurements of the η production in the threshold region [24] show that the ratio is fairly constant at approximately $R_\eta \approx 6.5$. It means from (10) that the spin-singlet amplitude dominates $|f_0|^2/|f_1|^2 \approx 25$.

It resembles the dominance of the η formation from the spin-singlet initial state observed in $\bar{p}p$ annihilation, where from (8)-(9) it follows that

$$\frac{Y(\bar{p}p \to \phi\eta; S=0)}{Y(\bar{p}p \to \phi\eta; S=1)} = 9.2 \pm 2.0 \qquad (11)$$

The polarized strangeness model explains not only the $\bar{s}s$ meson production. In [16] it was extended to $\bar{p}p \to \Lambda\bar{\Lambda}$ channel. The PS 185 experiment [26] observe a remarkable absence of spin-singlet fraction F_s in the $\Lambda\bar{\Lambda}$ final state $F_s = 0.00014 \pm 0.00735$. That is in agreement with the polarized strangeness model expectations. If the strange $\bar{s}s$ quarks were polarized in the initial state, it is natural to expect that they will keep the total spin $S = 1$ in the final state.

The PS 185 collaboration has also measured the $\bar{p}p \to \Lambda\bar{\Lambda}$ channel for annihilation on the polarized target to evaluate the target spin depolarization D_{nn}. The polarized strangeness model predicts [16] that the D_{nn} value is negative.

The JETSET collaboration has seen unusually high apparent violation of the OZI-rule in the $\bar{p} + p \to \phi + \phi$ channel [27], [28]. The measured cross section of this reaction turns out to be 2-4 μb for the momenta of incoming antiprotons from 1.1 to 2.0 GeV/c. It is by two orders of magnitude higher than the value of 10 nb expected from the OZI-rule. If this apparent OZI violation is due to presence of the polarized strangeness in the nucleon, then it was predicted [5] that the $\phi\phi$ system should be produced mainly from the initial spin–triplet state. Indeed, recent data of the JETSET collaboration [27] have demonstrated that the initial spin–triplet state with 2^{++} is dominated.

Moreover, preliminary analysis [29] shows that the final states with the total spin S of $\phi\phi$ system $S = 2$ are enhanced. This fact could be naturally explained in the polarized strangeness model with the same arguments as spin–triplet dominance of $\Lambda\bar{\Lambda}$ system created in $\bar{p}p$ annihilation [16].

Of course, the polarized nucleon strangeness model is not the only possible explanation of the facts. In case of the $\phi\phi$ production the "simplest" one is that the 2^{++} dominance is the signal of a tensor glueball. The absence of the spin–singlet state in the $\Lambda\bar{\Lambda}$ system could be reproduced in meson-exchange models (see, for instance,

[30]). The anomalously high yield of the $\bar{p}p \to \phi\pi^0$ channel could be explained (see [31, 32, 33]) by the rescattering diagrams with the OZI-allowed transitions in the intermediate state, for instance, $\bar{p}p \to K^*\bar{K} \to \phi\pi^0$. The calculations [31, 32, 33] provide a reasonable agreement (within a factor of two) with the experimental data on the $\phi\pi$ yield for annihilation from the S-wave.

However, what is not explained today is the reason of the strong dependence of the ϕ yield on the spin of the initial state. In the conventional approaches, without assumption about the polarized nucleon strangeness, it is unclear why the $\phi\pi$ yield for annihilation from the S-wave is so strong but from the P-wave it is absent. Even more strange that for the $\phi\eta$ channel the situation is reversed: P-wave is dominant and the annihilation from the S-wave is suppressed.

Unexplainable in the standard mechanisms is the opulent production of the tensor strangeonia from the P-wave. The production of f_2' in the $\bar{p}p \to f_2'\pi^0$ reaction was calculated in [34] via final state interactions of K^*K and $\rho\pi$. The obtained production rates of f_2' are rather small, about 10^{-6}. That is by two orders of magnitude less than the values measured by the OBELIX collaboration [18].

5 Future experiments

A number of interesting experiments could be proposed searching for the effects of nucleon intrinsic strangeness. For instance, it is important to verify if the selection rules found in the antiproton annihilation at rest exist also for the nucleon-nucleon or electron-nucleon interactions. Thus, at the ANKE spectrometer at COSY it is planned [35] to measure the ϕ production in the polarized proton interactions with the polarized proton target

$$\vec{p} + \vec{p} \to p + p + \phi \qquad (12)$$

If the ϕ production in the nucleon-nucleon interaction is dominated by the spin-triplet amplitude, as was observed in the antiproton annihilation, then the ϕ production should be maximal when the beam and target nucleons have parallel polarization and suppressed when they are antiparallel.

It is possible also to verify the spin dependence of the ϕ production amplitude using non-polarized nucleons. The ϕ production in np and pp collisions at threshold should also follow Eq.(10). If ϕ is not produced from the spin-singlet states, then the ratio of the np and pp cross sections at threshold is

$$R_\phi = \frac{\sigma(np \to np\phi)}{\sigma(pp \to pp\phi)} = \frac{1}{4}(1 + \frac{|f_0|^2}{|f_1|^2}) \approx \frac{1}{4} \qquad (13)$$

Remarkably that recently this ratio was calculated [36] in the framework of one-boson exchange model, i.e. without assumption about the nucleon intrinsic strangeness. It turns out to be $R_\phi = 5$. Therefore experimental measurements of this ratio near the threshold could discriminate between the predictions of these theoretical models.

An interesting programme of measurements which could verify the nucleon intrinsic strangeness is planned by the COMPASS collaboration [37] at CERN. The measurements of the deep inelastic scattering of polarized muons on polarized target are planned to study contributions from quarks and gluons to the nucleon spin. The intrinsic strangeness model predicts [38] that the Λ hyperons created in the target fragmentation region should have large negative longitudinal polarization. It will be possible to verify this prediction in the COMPASS experiment with a large statistics of the order of 10^5 Λ hyperons.

As we see, up to now there are no experimental facts which could be ruled out the intrinsic nucleon strangeness hypothesis. It gives credence to the approach and stimulates further investigations.

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Новые экспериментальные результаты
по рождению странных частиц

Обсуждаются новые экспериментальные данные по рождению φ- и f_2'(1525)-мезонов в аннигиляции покоящихся антипротонов. Рассматривается объяснение этих данных в модели поляризованной странности нуклона.

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New Experimental Results on Strangeness Production

New experimental results on the production of φ and f_2'(1525) mesons in the annihilation of stopped antiprotons are discussed. The explanation of these facts in the framework of the polarized strangeness model is considered.

The investigation has been performed at the Laboratory of Particle Physics, JINR.

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