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SURVEY OF EXPERIMENTAL DATA ON HIGH ENERGY SPIN PHYSICS

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Abstract

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The recent experimental data on High Energy Spin Physics are reviewed. The direct measurement of leptonic coupling asymmetries with polarized Z-bosonz, polarization and forward-backward asymmetries in hadronic Z decays, the first data on g-2 experiment at BNL, the unexpected behaviour of the spin structure function $g_1(x)$ at small x, the attempts to extract the high twist contributions from spin structure function $g_2(x)$, the observation of transversal handedness in the diffractive production of pion triples, the report on the discovery of the significant $\bar{\Lambda}$ polarization in pp-collisions at 27 GeV, and other fresh news on spin physics are discussed. The brief survey of the proposed polarization programs at the different High Energy Research Centers is included too.

Аннотация

Нурушев С.Б. Обзор экспериментальных данных по спиновой физике высоких энергий: Препринт ИФВЭ 97-76. – Протвино, 1997. – 10 с., библиогр.: 25.

Дается обзор новейших экспериментальных данных по спиновой физике высоких энергий. Обсуждаются данные по прямому измерению лептонных асимметрий в распаде поляризованного Z-бозона, поляризаций и асимметрий вперед-назад в адронном распаде Z-бозона, первые данные по g-2 эксперименту в БНЛ, неожиданное поведение спиновой структурной функции $g_1(x)$ при малых x, попытки извлечь вклады высоких твистов из спиновой структурной функции $g_2(x)$, наблюдение поперечной “рукастости” в диффракционном образовании пионных триплетов, сообщение об обнаружении значительной поляризации $\bar{\Lambda}$ в pp-взаимодействии при 27 ГэВ и другие новости по спиновой физике. В обзор включен также перечень предложенных в разных научно-исследовательских центрах по физике высоких энергий поляризационных программ.

Introduction

Several interesting pieces of news relevant to the spin physics news have been recently published. A brief discussion is given with the reference for details to the recent review paper [1].

1. The Polarization as a Precision Tool for Measuring the Electroweak Parameters

The SLD detector at SLC continues to collect the Z bosons, produced in collisions of polarized e^- beam with unpolarized e^+ one. The polarization leads to the left-right cross section asymmetry A_e allowing one to extract the initial state coupling. It also enables to extract the final state coupling for lepton l, A_l, directly using the polarized forward-backward asymmetry. The beam polarization improves the statistical precision on the final state parameter by a factor of about 25 compared to the unpolarized case. After analyzing 10^5 Z's, a data sample of 12063 leptonic Z decay was selected. The results for the leptonic coupling asymmetries are [2]: $A_e = 0.152 \pm 0.012(stat) \pm 0.001(syst), A_\mu = 0.102 \pm 0.034 \pm 0.002$ and $A_\tau = 0.195 \pm 0.034 \pm 0.003$. These results are consistent with lepton universality and the combined results from the four LEP experiments: $A_e = 0.1461 \pm 0.0059, A_\mu = 0.1476 \pm 0.0132,$ and $A_\tau = 0.1463 \pm 0.0062$. Assuming the lepton universality, the SLD data can be averaged and give $A_{e\mu\tau} = 0.151 \pm 0.011$. In the context of the Standard Model this observable is simply related to the electroweak mixing angle and gives $sin^2\Theta_W^{eff,lep} = 0.2310 \pm 0.0014$. This number is consistent with the published data.

Polarization and forward-backward asymmetry of Λ baryons in hadronic Z decay were measured by the OPAL Collaboration using a sample of 4.34 million hadronics Z decays [3]. Since the weak interaction violates a parity, the fermions produced in Z decay have a longitudinal polarization. Though the quark polarization is large, it is not measurable directly. Therefore, the stage of quark hadronization becomes very important for transferring the polarization to the observed hadrons, like Λ, whose polarization can be easily measured. Moreover, in the absence of beam polarization, the quarks have no transverse polarization component and any observed transverse polarization can only arise during the hadronization phase. Since there are several sources of Λ production to estimate the polarization in each of these cases, the following assumptions are made:

- In a simple quark model the spin of the Λ comes completely from the spin of the s-quark. Therefore, a directly produced Λ should be polarized in the same way as the primary s-quark (-91% polarization).
- Λ can be decay products of heavier baryons which contain the primary s quark. These Λ can inherit some fraction of parent's polarization. Estimates are given for the Σ^o, Ξ^-, $\Sigma^{\pm}(1385)$, and $\Xi(1530)$.
- If a Λ contains a primary u or d quark, those quarks do not transfer any spin information.
- Quarks produced in the fragmentation process are expected to have no longitudinal polarization and consequently do not bring any spin information to the final Λ.

In the experiment the significant longitudinal polarization has been measured at $x_E = 2E_\Lambda/\sqrt{s} \geq 0.3 : P_\Lambda = -32.9 \pm 5.5(stat) \pm 5.2(syst)\%$. It is shown that Λ and $\bar{\Lambda}$ are equally polarized: for $x_E \geq 0.3$ $P_\Lambda = -33.4 \pm 7.8\%, P_{\bar{\Lambda}} = -32.3 \pm 7.9\%$. No transverse polarization was found.

Several conclusions become obvious from these data. First, a significant part of quark longitudinal polarization transfers to the final Λ. Second, the quark and antiquark are equally polarized according to the SM model and this prediction is proved by equality $P_\Lambda = P_{\bar{\Lambda}}$. Third, there is no transverse polarization transferred to Λ during the hadronization process.

The forward/backward asymmetry for $x_E \geq 0.15$ was measured: $A_{FB} = 4.7 \pm 0.8\%$, which is consistent with ALEPH result $A_{FB} = 4.5 \pm 0.53\%$, while for $x_E \geq 0.3$ $A_{FB} = 8.3 \pm 1.3\%$, which can be compared with ALEPH: $A_{FB} = 8.5 \pm 1.2\%$ and DELPHI: $A_{FB} = 8.5 \pm 3.9\%$ for $0.25 < z = p_\Lambda/p_{beam}$. All these data confirm with high precisions the prediction of the SM.

A very deep insight into the structure of a muon can be gained by using the polarized muon and measuring the anomalous magnetic moment, a_μ. In the standard model it consists of three parts: 1) the quantum electrodynamic contribution, $a_\mu^{QED} = 116584705.7(1.9) \cdot 10^{-11}(\pm 0.016 ppm)$, 2) the hadronic contribution, $a_\mu^{had} = 6828(98) \cdot 10^{-11}(\pm 0.84 ppm)$, and 3) the electroweak contribution, $a_\mu^{weak} = 151(4) \cdot 10^{-11}(\pm 0.03 ppm)$. A full theoretical value of the anomalous magnetic moment of muon from the standard model is a sum of all three terms and equals $a_\mu = 116591685(97) \cdot 10^{-11}(\pm 0.84 ppm)$. The new experimental data can essentially reduce the uncertainty of a_μ^{had}. A very promising experiment, namely, the g-2 experiment E821 at AGS, was under intense development last 10 years and came into operation recently with a successfull checkout and initial 3 months data-taking run. The preliminary results of this experiment have been recently published [4]. More than $20 \cdot 10^6$ decay positrons with the energy greater than 1.3 GeV have been detected, which corresponded to the statistical precision of $\approx 10^{-5}$ on a_μ. This precision is similar to that of the recent CERN experiment. It is worthwhile reminding that the E821 experiment aims to improve this precision by a factor of 20. After reaching the expected precision of order 0.35 ppm the electroweak contribution of 1.3 ppm, which arises from virtual processes involving the Z and W vector bosons, should be observed.

A rather large, transversal to the production plane, handedness was measured in coherent production of $(\pi^-\pi^+\pi^-)$ triples by 40 GeV π^- beam on nuclei [5]. About 10,000 events were analyzed for each of the following nuclear targets: Be, Si, and Pb. With no cut applied the results for handedness transversal to the production plane of the triple were as follows: $H_{T1}^{Be} = 10.0 \pm 1.0\%, H_{T1}^{Si} = 7.1 \pm 1.0\%, H_{T1}^{Pb} = 6.5 \pm 1.0\%$. For transversal handedness in the production plane the result is: $H_{T2}^{Be} = -0.6 \pm 1.0\%$, while for the longitudinal handedness (along the velocity of triple) the result is: $H_{T2}^{Be} = 0.0 \pm 1.0\%$. Looking at these results, one can conclude that rather large handedness transversal to the production plane was observed in the diffractive production of $(\pi^-\pi^+\pi^-)$ triple in the 40 GeV π^- beam fragmentation region. Other components of handedness are compatible with zero. The authors are planning to continue such study using richer statistics.

2. The Spin Structure Functions

The latest results on the spin-dependent structure functions of proton, deuteron and neutron were published by the SMC [6], HERMES [7] and SLAC E154 [8]. Next-to-leading order (NLO) analyses of these data were made in [9] and [10] and the following conclusions were reached:

- The Bjorken Sum Rule (BSR) is correct at a level of 1σ.
- The Ellis-Jaffe Sum Rule (EJSR) is violated by more than 2σ.
- The first moment of the quark singlet distribution $\Delta\Sigma = 0.45 \pm 0.04(exp) \pm 0.08(th)$ is within 1σ of the quark model expectation. U(1) axial anomaly explains the rest of spin.
- The first moment of the gluon distribution $\Delta g(Q^2 = 1) = 0.10 \pm 0.05(exp) \pm 0.8(th)$. Since the gluon contribution becomes dominant at low x it is very crucial to extend the spin structure measurements to the region $x < 10^{-3}$.
- The first moments of the valence quark distributions are determined well, but the moments of the sea quark and gluon distributions are only qualitatively constrained.
- The structure function $g_1^p(x, Q^2)$ must change sign and become negative. At present x_{Bj} region measured is positive. Therefore, the measurements at the smaller x_{Bj} become very important.

The next spin-dependent structure function measured is the $g_2(x)$, probing a combination of transverse and longitudinal parton polarization distributions inside the nucleon. It is measured by scattering the longitudinally polarized lepton on transversally polarized nucleon. This function is made up of three components: a leading twist-2 part, $g_2^{WW}(x, Q^2)$, coming from the same set of operators that contribute to $g_1(x)$, another twist-2 term coming from the actual quark transverse polarization distribution, and a twist-3 part coming from quark-gluon interactions. The SMC result on the measurement of the spin structure function $g_2^p(x)$ is compatible with zero in the whole measured range of x. Confronting this result with the theoretical calculation one can conclude, that the leading twist 2, $g_2^{WW}(x,Q^2)$, describes well the g_2^p data within experimental precision, and that the twist 3 contribution may be neglected. g_2^p(x) was measured also by E143 Collaboration [11]. The asymmetries coming from two spectrometers installed at the lab. angles of 4.5^0 and 7^0 are much below the positivity limit and consistent with the assumption that the transverse spin structure function, $g_2^p(x)$, though is small, but takes positive values at $x \leq 0.1$ and becomes negative at $x \geq 0.1$. Such behaviour corresponds to the twist-2 g_2^{WW} calculation for the kinematics of this experiment. The large experimental error bars do not exclude a possible twist-3 contribution of the same order. The authors made an estimate for the Burkhardt-Cottingham sum rule (BCSR). For proton this integral is $\int_{0.03}^{1} g_2^p(x)dx = -0.013 \pm 0.028$ and for deuteron $\int_{0.03}^{1} g_2^d(x)dx = -0.033 \pm 0.082$ being consistent with zero, that is with the BCSR.

The important issue in the spin dependent deep inelastic scattering(DIS) is a way of separation of different flavor contributions to the nucleon spin. The SMC experiment furnished the first data on this subject by measuring the semi-inclusive production of charged hadrons (the experiment was not instrumented by the final hadron identification system) [12]. The up valence quarks are positively polarized (along the initial proton spin) over the whole measured x_{Bj} region, while the down valence quarks are polarized oppositely to the proton spin. For the first moments the following values were obtained: $\Delta u_v = 0.85 \pm 0.14 \pm 0.12, \Delta d_v = -0.58 \pm 0.16 \pm 0.11$, and $\Delta \bar{q} = 0.02 \pm 0.06 \pm 0.03$, where $\Delta \bar{u} = \Delta \bar{d} = \Delta \bar{q}$ was assumed. The HERMES experiment is able to identify the final hadrons in semi-inclusive measurements and their first results seem compatible with SMC data [13].

There is an interesting suggestion to use the Bjorken sum rule for precise determination of the running strong coupling constant $\alpha_s(Q^2)$ [14] instead of checking it. From the combined result for the BSR

$$\Gamma_1^p - \Gamma_1^n = 0.164 \pm 0.011,$$

it was extracted

$$\alpha_s(M_Z^2) = 0.116^{+0.003}_{-0.005}\ ,$$

which can be compared with the world average

$$\alpha_s(M_Z^2) = 0.117 \pm 0.005.$$

One expects much better accuracy from future experimental data on the spin structure function measurements, opening a new way for the determination of the running strong coupling constant through the use of Bjorken sum rule.

3. The Anti-Lambda Hyperon Polarization

Experiment E766 at BNL published very exciting data on the inclusive $\bar{\Lambda}$ polarization [15]. Approximately $3 \cdot 10^8$ inclusive pp-events were collected in this experiment at initial momentum of 27.5 GeV/c. After selection $1.5 \cdot 10^7$ inclusive $\Lambda's$ and $0.8 \cdot 10^6 \bar{\Lambda}$'s were reconstructed. First of all the Λ polarization was checked by comparing it with the published data. It was good. Then the fake asymmetry was studied by reconstructing the " K_S^o polarization" which was zero as it must be. Finally the $\bar{\Lambda}$ polarization was investigated for two different kinematical regions: $x_F > 0$ and $x_F < 0$. In the first case the zero polarization was measured in function of transverse momentum of $\bar{\Lambda}$. In the second case the essential polarization versus p_T was discovered. The $\bar{\Lambda}$-hyperon is polarized and its magnitude is the same or bigger than for Λ!. This is against a common belief, that just $\bar{\Lambda}$ inclusively produced on the different nuclear targets and on the various beams is not polarized. Therefore, we must revise our point of view or something is contradictory in experiments. The E766 Collaboration promoted the idea, that in the previous measurements all $\bar{\Lambda}'s$ practically came up from $x_F \approx 0$ region, where we have two different normals to the production plane depending which of two protons we take as a parent one. Since the protons in initial state are identical we have no chance to separate which proton produced the final $\bar{\Lambda}$ and therefore we have a zero polarization. In the case of E766 experiment only those $\bar{\Lambda}$'s are polarized which are from $x_F < 0$ region. This assumption must be checked by experiments in order to clearly make a statement that $\bar{\Lambda}$ is polarized as well as Λ. This is a very crucial statement specially for some theoretical models.

4. The Single-Spin Asymmetry in Inclusive Hadron Productions

The preliminary data on the raw asymmetry in the inclusive π^o production in the collision of the unpolarized proton beam of 70 GeV and the proton polarized target were presented at this Workshop [16]. The set-up PROZA subtending the central, beam and target fragmentation regions was able to detect for the first time the essential raw asymmetry in the polarized target fragmentation region, while the single spin asymmetry was compatible with zero in the central and the unpolarized beam fragmentation region. The x_F dependence of raw asymmetry resembles the one discovered by E704 experiment at 200 GeV/c polarized proton beam fragmentation region. Such effect (assuming no energy dependence) is obvious since the initial pp state is identical and the asymmetry should be revealed only in the direction of the polarized proton. It is important to finish this analysis in order to check the above statement since if this statement is true, one gets a firm basis for the inclusive neutral pion polarimeter in the energy range of the RHIC.

5. The Spin Dependent Total Cross-Sections

The measurements of the difference of the total pp- and $\bar{p}$p-cross-sections in pure longitudinal spin states $\Delta\sigma_L$ at 200 GeV were published recently by E-704 Collaboration [17]. Previous measurements of this observable were limited by 12 GeV for pp collisions and no measurements have ever been made of $\Delta\sigma_L(\bar{p}p)$. The goal of such measurement is threefold. The first is to reconstruct directly the elastic scattering amplitudes in a forward direction. As is well known, there are three amplitudes at zero angle elastic scattering and their imaginary parts are defined by measuring the total cross-sections σ_T, $\Delta\sigma_L$ and $\Delta\sigma_T$ [18]. The real parts of these amplitudes can be determined by measuring the corresponding observables in the region of Coulomb- Nuclear Interference(CNI) or by using the dispersion relations. But such program was never realized at any high energy measurement, though 200 GeV data are more advanced in this direction. The second goal is to test the theoretical models. The third one is to get a hint to the possible contribution of spin dependent interactions to the rise of total cross-section at high Energy. There is only one theoretical estimate for $\Delta\sigma_L(\bar{p}p)$ made in [19]. Applying the simple arguments based on quark interaction additivity, SU(6), helicity conservation, and assuming that the $\Delta\sigma_L(pp)$ is small, the author predicted a sizable $\Delta\sigma_L(\bar{p}p) \simeq 2mb$ at $p_{lab} = 200\ GeV/c$. The experimental magnitude of $\Delta\sigma_L(\bar{p}p)$ is $[-254 \pm 124(stat) \pm 107(syst)]\mu$b and much less than the theoretical estimate. It means that some important ingredients were missed in the model. At the same time the $\Delta\sigma_L(pp)$ is expected to be of order of μb in the jet production model [20] which is compatible with the experimental value of $[-40 \pm 48(stat) \pm 52(syst)]\mu$b. According to [21], [22], applying the Regge cut model, one gets the following energy dependence for the $\Delta\sigma_T(pp)$ (the same is true for $\Delta\sigma_L(pp)$)

$$\Delta\sigma_T(pp) = a1 \cdot \frac{s^{3\Delta}}{(\ln s)^5}\ .$$

Here parameter Δ means the excess of the pomeron intercept over 1 at -t=0. By the way, this very parameter is responsible for the rise of the unpolarized total cross section at high energy [23]. The analysis made in [24] showed that this function described the experimental data on the $\Delta\sigma_L$ and $\Delta\sigma_T$ rather well. At the measured range of energy the spin dependent cross-sections continue to decrease from several mb around 5 GeV/c to 0.1 mb around 200 GeV/c. Such tendency might be changed in the case if the Regge cut with super pomeron plays a main role at higher energies. Then spin contribution may grow also, due to the parameter Δ. The experiments at RHIC and LHC with high precisions (the expected value of spin dependent cross section is of order $\simeq 1\mu$b) may be able to answer to question of the role of spin in the total cross section growth.

6. Future Experiments

There are several directions in which the future experiments are aligned. The first group includes the experiments aimed at measuring the gluon spin function, ΔG. The second group plans to decompose the quark flavor contribution to nucleon spin plus test the SU_f symmetry. The third group of experiments will be devoted to the study of the small x_{Bj} behaviour of the spin structure functions. They are listed below (borrowed partially from paper [25]):

- E155 at SLAC : measurement of the spin structure functions $g_1(x, Q^2)$, and $g_2(x, Q^2)$ for proton and deuteron. Initial polarized electron beam energy of 45 GeV, beam polarization, $P_B = 70\%$; polarized target: NH_3 and LiD. The experiment will test the sum rules, Q^2- dependence of spin stucture functions and the possible contribution of the twist-3 term. The proton data from additional spectrometer at 10.5^o will be furnished.

- E156 at SLAC : open charm and J/ψ photoproduction asymmetries at 10 energies in the interval 16-45 GeV will be measured. The corresponding measurable range is $0.1 < x_G < 0.4$. The decay mode $c \to \mu$, (24%) will be detected for high p_T ($p_T^\mu \geq 0.5$ GeV/c and $p_\mu > 3$ GeV/c) events. The statistical error in double spin asymmetry (for 4 months run) will be in range 0.008-0.03 depending on the initial photon energy and the reachable precision in the ΔG will be in range 0.01-0.06. The systematic errors are expected to be in total of order 6% and will come from the beam and target polarization accuracy and the precision of the dilution factor. The main backgrounds are expected from the π, K decays and Bethe-Heitler process. In theory the LO calculation is available and the NLO calculations are in progress. Time scale for the beginning of data taking is 1999-2000.
- COMPASS at CERN: the experiment will measure the open charm production asymmetry in polarized muon beam of energy between 90-200 GeV with the beam polarization of order 80% and intensity $2{\cdot}10^8$ per spill. The processes under study will be: $\mu + \vec{N} \to \mu + c\bar{c}$, where $c \to D^O \to K^-\pi^+$(4% BR), as well as $D^{*+} \to \pi^+ D^o$. Kinematical range corresponds to the quasi-real photons with $Q^2 \approx 0.35 < \nu < 85$ and $0.06 < x_G < 0.35$. The events around D^o mass will be selected. Combinatorial background from K/π presents an experimental problem giving a background to signal ratio ≈ 4. The open charm asymmetry precision for full data is expected to be 0.05 which results in the $\delta\Delta G/G = 0.10$. The systematical errors are expected mostly from beam and target polarization measurements and will be around $\pm 4\%$. At present the theoretical calculation at the LO level is available, NLO calculation is in progress. The quark mass uncertainty might be the main source of theoretical error in calculations. COMPASS is scheduled to start after the year 2000.
- Apollon HERA: this experiment will study the double spin asymmetry in the J/ψ photoproduction at $E_\gamma \leq 18$ GeV beam produced by the backscattered laser beam. The narrow region of gluon production, $0.3 < x_G < 0.5$, will be accessible. The expected statistical precision in the J/ψ asymmetry is 0.05 (for one year run), which allows one to get a precision in the gluon spin structure function $\delta(\Delta G/G) = 0.15$. There is Draft of Proposal and an experiment (if approved) will start in the year 2000.
- Polarized HERA : it is assumed that both electron and proton beams are polarized. The polarized electron beam of 27.5 GeV already exists, so the technical problem must be solved for the acceleration and storage of the polarized proton beam of 820 GeV and also for its polarimetry. There are two directions under discussion: a) a study of g_1^p(x) function in the inclusive DIS for a wide x-Q^2 range ($5.5 \cdot 10^{-5} < x < 1,\ 1.8 < Q^2 < 1.8 \cdot 10^4$). This is a direct continuation of the programs fulfilled at SLAC and CERN at lower energies and in narrower kinematical range. An attractive feature of this program is a strong theoretical justification and the availability of the two big detectors, H1 and ZEUS. The following requirements will be imposed

on the useful events: $\nu > 0.01, \Theta_{e'} > 3^o, Q^2 > 1GeV^2, E_{e'} > 5$ GeV. The expected statistical error on asymmetry is $\delta A = 10^{-3}$ to 0.1 at luminosity L=200 pb^{-1}. This gives a precision on $\Delta G/G = 25\%$; b) exclusive two jets production. This proceses is dominated by the photon-gluon fusion (80-90%). The measurable range is: 5< $Q^2 < 100$ GeV^2, $\sqrt{s_{ij}} > 10$ GeV, $0.0015 < x_G < 0.3$ (x_G is directly measurable over a wide kinematical region). For luminosity L=500 pb^{-1}, the expected precisions in asymmetry measurements are of order $0.2 - 1\%$ resulting in $\delta\Delta G/G = 0.007 - 0.1$.

- HERA-$\vec{N}$, DESY: this will be a fixed target experiment using the internal polarized jet target and a circulating polarized proton beam of 820 GeV. The preferable processes for the determination of the polarized gluon density will be: $\vec{p} + \vec{N} \rightarrow \gamma + jet$ and $\vec{p} + \vec{N} \rightarrow J/\psi$ +jet. The asymmetries will be measured in the range $2 \leq p_T \leq 8\ GeV/c$, $-1.5 \leq \eta \leq +1.5$. At luminosity L=240 pb^{-1} the accuracy $\delta A = 0.003 - 0.05$ will be reached leading to the precision $\delta\Delta G/G = 0.03 - 0.4$. The experiment needs a new HERA-B type detector. Time schedule for all HERA experiments will be beyond the year 2003.
- RHIC, BNL : this experiment has a broad spin program. We stress here the measurements with direct gammas plus jet production (STAR) allowing one to reconstruct the gluon spin distribution. A direct photon will be detected by the central electromagnetic barrel, while the jet will be identified by using information from TPC and electromagnetic calorimeter together. The measurable region is $0.03 < x < 0.4$ and expected precision will be of order $\delta\Delta G/G = 0.01 - 0.3$. Time schedule is the year 2000.

Conclusions

The experimental program on the High Energy Spin Physics makes an outstanding progress. The experiment SLD at SLC demonstrates the powerfulness of applying the polarized electron beam to a precise measurement of SM parameters. The excellent results were obtained in measuring the spin structure functions with high precisions which allowed one to make a thorough test of sum rules. The same data were used for precise determination of the running coupling constant. Though a lot of data were gathered, the problem seems to be far away from a final solution, specially as it concerns the small x_{Bj} region, the gluon and sea quark polarizations and a role played by orbital momentum. Therefore, new experiments with better precisions and in a wide kinematical region are needed on this subject. The hyperon polarization representing an important discovery in High Energy Spin Physics deserves more serious efforts in order to understand its energy, p_T, x_F and flavour dependences, as well as a spin transfer mechanism. The recent data of BNL experiment E766 on the big $\bar{\Lambda}$ polarization (of the same order as for Λ) requires analyzing attentively the previous $\bar{\Lambda}$- polarization measurements and theoretical models used for analyses of hyperon polarizations. It is good news that several spin programs were approved at SLAC, HERA, CERN, RHIC for such study. Therefore, we may conclude that the High Energy Spin Physics has a nice prospect.

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Обзор экспериментальных данных по спиновой физике высоких энергий.

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