List of talks

- **J.-L. Agram**

  Title: QCD and diffraction results from D0 run II.

  Abstract:

- **F. Arash**

  Title: Hadronic Structure from perturbative dressing.

  Abstract: The structure of both polarized and unpolarized constituent quark is calculated in QCD. It is shown that this structure is universal, independent of its hosting hadron. The result is applied to determine the structure of nucleon and pion. The finding of the model is in good agreement with experimental data and furthermore, it shows that there are simple relationships between the nucleon and pion structure functions. We will also discuss the polarized nucleon structure function and the role of the orbital angular momentum, within the model.

- **R. Ball**

  Title: Progress in Small x Resummation

  Abstract: I summarize recent results on the small x resummation of the singlet anomalous dimension. In particular I recall the main features of the duality approach, and briefly describe some work in progress on the inclusion of subleading corrections to it.

- **A. Bravar**

  Title: Spin dependence in polarized elastic pC $\to$ pC and pp $\to$ pp scattering at very low momentum transfer t.

  Abstract:

- **A. Bruni**

  Title: Diffraction at HERA

  Abstract: Recent experimental results in ep interactions at HERA are presented. The dynamical picture of hard diffraction emerging in perturbative QCD is highlighted.

- **M. Capua**

  Title: ZEUS results on inclusive diffraction.

  Abstract: ZEUS recent results on the measurement of inclusive diffractive cross sections and their QCD interpretation will be presented.

- **I. Cherednikov**

  Title: QCD Instantons in high energy diffractive scattering.

  Abstract: The role of the instantons in high energy diffractive quark-quark scattering, in particular, in formation of the soft Pomeron, is studied within the path-ordered world-line approach. We show that within the Instanton Liquid Model, the C-odd diffractive amplitude is suppressed as $1/s$ compared to the C-even one. The further applications of the developed approach in studying the nonperturbative effects in high energy hadronic processes are briefly discussed.

- **M. Ciafaloni**

  Title: Small-x QCD behaviour with renormalization group improvements.

  Abstract: After a brief introduction to low-x QCD and to resummation approaches, I illustrate the predictions for the gluon density and splitting function of a recent renormalization-group improved small-x resummation scheme. The perturbative high-energy exponents are are predicted in a phenomenologically interesting range, and significant preasymptotic effects are found, in particular a dip of the splitting function in the moderate-x region.

- **R. Ciesielski**

  Title: Recent ZEUS results on Vector Mesons

  Abstract: The recent results on the vector meson production processes measured with the ZEUS detector are presented.

- **H. De Vega**

  Title: Reggeon Dynamics at non-zero temperature.

  Abstract: The generalization of Reggeon Dynamics to non-zero temperature is presented through the BFKL Pomeron in the leading logarithmic approximation at a non-zero temperature T in the t-channel. The Pomeron wave function for arbitrary T is calculated using an integral of motion. In multi-colour QCD, the holomorphic Hamiltonian for n-Reggeized gluons at temperature T is shown to coincide with the local Hamiltonian of an integrable Heisenberg model and can be obtained from the $T = 0$ Hamiltonian by an unitary transformation. The connection with quantum fields in accelerated frames and in black hole backgrounds as well as with the Balitsky-Kovchegov equation is presented.

- **A. Dorokhov**

  Title: Instanton effects in quark form factor and quark-quark scattering at high energy.

Abstract: The nonperturbative effects in the high-energy processes involving strongly interacting particles are studied within the instanton liquid model of the QCD vacuum (ILM) by using the Wilson integral framework. The detailed analysis of the nonperturbative contributions to the electromagnetic quark form factor is presented considering the structure of the instanton induced effects in the evolution equation describing the high energy behaviour of the form factor. It is shown that in high energy limit the instantons contribute the logarithmic corrections to the amplitudes that are exponentiated in small instanton density parameter. We show explicitly that the all-order multi-instanton contribution is well approximated by the weak field limit result. The role of the instantons in high energy diffractive quark-quark scattering, in particular, in formation of the soft Pomeron, is also considered. We show that within the ILM the C-odd diffractive amplitude is suppressed as $1/s$ comparing with the C-even one.

- **V. Fadin**

  Title: Gluon Reggeization in QCD.

  Abstract: The Reggeization hypothesis can be proved using the "bootstrap" relations, required by the compatibility of the gluon Reggeization with the s-channel unitarity. It is extremely nontrivial, that an infinite number of the bootstrap relations for the multi-particle production amplitudes can be fulfilled if the Reggeon vertices and trajectory satisfy several bootstrap conditions. All these conditions are derived and all but one are proved to be satisfied. Status of the last condition is discussed.

- **M.A. Faridi**

  Title: Odderon Picture - an update

  Abstract: The Odderon, as well as the Pomeron, are objects that were originated in Regge theory. The Odderon has been proved an important piece in the recent theoretical understanding of Diffractive Physics. It is the aim of this talk to look at the present status of the Odderon from a theoretical as well as from a phenomenological perspective and to probe its existence in the light of recent experiments.

- **F. Ferro**

  Title: TOTEM physics

  Abstract: The talk is an overview of the TOTEM experiment at the LHC. The main goals of the experiment are the measurement of the total pp cross-section with an error of 1% and the measurement of the elastic scattering. The measurement of the total cross-section is made with the luminosity independent method, measuring separately the elastic and inelastic rate. Two telescopes will be used to measure the inelastic rate, tracking the charged particles in the pseudo-rapidity range between 3.1 and 6.6. The elastic rate will be measured with silicon detectors installed in the machine. The measurements will be done using special LHC runs with high-beta optics (β^*=1540 m). TOTEM will also be able to study the main diffractive processes (single, double, central).

- **K. Goulianos**

  Title: Diffraction in a Nutshell.

  Abstract: A simple phenomenological model is presented, in which soft and hard diffractive processes are mediated by the exchange of low-x partons subject to color constraints. In a nutshell, diffractive cross sections are derived from the underlying inclusive parton distribution functions of the diffracted hadron. The model is tested on Tevatron and HERA results and is used to make predictions for diffraction at the LHC.

- **O. Grebenyuk**

  Title: Exclusive electroproduction of pions and vector mesons at HERMES.

  Abstract: The results on the exclusive electroproduction of pions and vector mesons obtained by the collaboration HERMES are presented.

- **M. Greco**

  Title: Structure Functions at small x.

  Abstract: The running of the QCD coupling is incorporated into the infrared evolution equations for the polarized singlet and non-singlet structure functions g_1. The explicit expressions for g_1 are obtained, after including the resummation of the double-log contributions and accounting for the running coupling. We predict that asymptotically $g_1 \sim x^{-D}$, were the intercepts D_s and D_{ns} are predicted, in agreement with the experimental observation.

- **W. Guryn**

  Title: Preliminary Results from pp2pp Experiment at RHIC.

  Abstract: We shall present the preliminary result of the measurement of single spin analyzing power A_N and of the forward slope parameter B, in elastic scattering of polarized protons at RHIC at $\sqrt{s}$ =200 GeV in the four momentum transferred range $-t$ (0.01-0.02) (GeV/c)^2. The scattered protons, having small scattering angles, travel inside the beam pipe and their trajectories are measured with silicon strip detectors placed in Roman pots.

- **K. Hiller**

  Title: High $|t|$ diffraction and DVCS from H1.

  Abstract: High-$|t|$ diffractive photo-production of J/Psi and single photons was measured by the H1 experiment at HERA. The presence of large $|t|$ as a hard scale allows to compare the data with pQCD calculations as the BFKL LL approximation and colour dipole models. In DVCS processes a single high-Q^2 photon is produced. For sufficient statistics such data allow the extraction of generalized parton density functions which describe the correlation of partons inside the proton.

- **A. Illarionov**

  Title: Small x behavior of parton distributions in the generalized doubled asymptotic scaling approximation.

  Abstract:

- **D. Ivanov**

  Title: Hard vector meson production at next-to-leading order.

  Abstract: The process of a hard exclusive vector meson production is studied in the framework of QCD factorization. We derive a complete set of hard-scattering amplitudes at next-to-leading order and discuss phenomenology of heavy vector meson photo and light vector meson electroproduction.

- **I. Ivanov**

  Title: Reggeization of the positive-signature octet channel.

  Abstract: We study the Reggeization of the positive-signature octet channel in NLA of the BFKL.

- **L. Jenkovszky**

  Title: General Parton Distributions, Analyticity and Crossing.

  Abstract: General Parton Distributions (GPD) unify the concepts of parton distributions and hadronic form factors. Depending on the momentum fraction variable x and the skewedness $\xi \sim x_B/2 \sim 1/s$ as well as on the invariant momentum transfer t, GPDs thus contain information on how the transverse distribution of partons is correlated with their longitudinal momentum fraction, the former being connected to t and the later to s (Mandelstam variables). GPDs cannot be measured directly instead in the leading order of α in QCD they appear in convolution integrals of so-called handbag diagram. This diagram should be appended by a crossing symmetric one, corresponding to the exchange of the photon's momenta, or to the substitution $s \to u$. These convolution integrals cannot be easily converted, but instead GPDs can be "extracted" from the data by writing a model ansatz with various free parameters. A plausible ansatz for GPD at low $-t$ is a Regge form. Following our earlier ideas, based on dual models, we suggest a natural generalization of the above Regge ansatz to all values of the kinematical variables.

- **A. Kaidalov**

  Title: Diffractive processes and the problem of "saturation".

  Abstract: It is emphasized that the problem of "saturation" of parton densities at very small x is closely related to behavior of diffractive production. Effects of saturation for structure functions and for particle production in heavy ion collisions are calculated and are compared with existing experimental data.

- **B. Kopeliovich**

  Title: Hard reactions at large Feynman x: Breakdown of QCD factorization.

  Abstract:

- **A. Kotikov**

  Title: The longitudinal structure function F_L: pQCD and k_t-factorization versus experimental data at fixed W.

  Abstract:

- **A. Kyrieleis**

  Title: The NLO photon impact factor: First numerical results for the real corrections.

  Abstract: The last step in the calculation of the NLO corrections to the photon impact factor are the phase space integrations. In the real corrections and for longitudinal photon polarisation, we analytically perform the transverse momentum integrations and carry out numerically the remaining integrations. The analytical results are discussed and first numerical studies are presented particularly addressing the dependence of the NLO photon impact factor upon the energy scale.

- **O. Lengyel**

  Title: Phenomenology on the QCD dipole picture revisited.

  Abstract: We perform an adjust to the most recent structure function data, considering the QCD dipole picture applied to ep scattering. The structure function F_2 at small x and intermediate Q^2 can be described by the model containing an economical number of free-parameters, which encodes the hard Pomeron physics. The longitudinal structure function and the gluon distribution are predicted without further adjustments.

- **A. Levy**

  Title: Overview talk of the experimental presentations.

  Abstract:

- **L. Lipatov (1)**

  Title: Moebius representation for the reggeized gluon interactions and Balitsky-Kovchegov equation.

  Abstract: We impose on the wave functions of the BFKL Pomeron and and other composite states of Reggeized gluons the constraint of vanishing at small relative coordinates. It leads to a significant simplification of the linear and non-linear equations for the wave functions. In particular the Balitsky-Kovchegov equation in 2+1 QCD turns out to be exactly solvable.

- **L. Lipatov (2)**

  Title: DGLAP and BFKL evolution equations in supersymmetric gauge theories.

  Abstract:

- **R. Longacre**

  Title: Ultra-peripheral Au-Au physics at STAR.

  Abstract: We present results from ultra-peripheral collisions taken at the STAR detector. Photons from the Au nuclei interact coherently in very peripheral collisions. We show results for $e^+ \, e^-$ pairs, pion pairs and two pion pairs.

- **A.R. Malecki**

  Title: Inclusive inelastic cross-sections of high energy hadron diffraction.

  Abstract: In the classical description the inelastic diffraction originates from the diversity of elastic scattering amplitudes in the initial and final states. We consider a multichannel correction, accounting for intermediate transitions inside an equivalence class of diffractive states. For high energy (53-546 GeV) collisions of protons and antiprotons we show that the angular distributions of the inclusive inelastic diffraction at small momentum transfers are determined by elastic scattering in the transition region between the forward peak and the diffractive minimum.

- **U. Maor**

  Title: Hard LRG as a probe of soft s-channel unitarity.

  Abstract: The dependence of hard LRG survival probability on soft s-channel unitarity is discussed. Implications for LHC Higgs production are explored. Predictions for total, elastic and diffractive cross sections in the exceedingly high energy limit are presented.

- **E. Martynov**

  Title: Direct extraction of hadronic form factors from elastic scattering data.

  Abstract: Taking a general form of Regge-pole contributions to the amplitudes, we analyze all available data on elastic small-t scattering for $p(\bar{p})$, $\pi^{\pm}$ and $K^{\pm}$ on protons. A new method is used to extract the trajectories and residues (i.e. hadronic form factors) as function of transferred momenta from the data. Some new features of the t-dependence of trajectories and residues are found.

- **E. Meggiolaro**

  Title: On the loop-loop scattering amplitudes in Abelian and non-Abelian gauge theories.

  Abstract: The high-energy scattering amplitude of two colour-singlet quark-antiquark pairs is governed by the correlation function of two Wilson loops, which follow the classical straight lines for quark (antiquark) trajectories. This quantity is expected to be free of IR divergences, differently from what happens for the parton-parton scattering amplitude, described, in the high-energy limit, by the expectation value of two Wilson lines. We shall explicitly test this IR finiteness by a direct non-perturbative computation of the loop-loop scattering amplitudes in the (pedagogic, but surely physically interesting) case of quenched QED. The results obtained for the Abelian case will be generalized to the case of a non-Abelian gauge theory with N_c colours, but stopping to the fourth order in perturbation theory. In connection with the above-mentioned IR finiteness, we shall also discuss some analytic properties of the loop-loop scattering amplitudes in both Abelian and non-Abelian gauge theories, when going from Minkowskian to Euclidean theory, which can be relevant to the still unsolved problem of the s-dependence of hadron-hadron total cross-sections.

- **C. Mesropian**

  Title: Diffraction at CDF in Run II

  Abstract: We present results on diffraction obtained by CDF collaboration in proton-antiproton collisions at the Fermilab Tevatron.

- **G. Musulmanbekov**

  Title: Dynamical quark model of hadrons and diffractive processes.

  Abstract: Interplay between soft and hard processes is described in the framework of the semiclassical model of strongly correlated quarks, SCQM, which demonstrates interconnection between constituent and current quark states inside hadrons. The SCQM leads to the representation of constituent quarks as solitons. Derived interquark potential explicitly demonstrates that relativistic (current) quark configurations are located at the origin of oscillation and constituent(nonrelativistic) quarks are at maximal distances, respectively. In the intermediate region there is a transition from current to constituent quarks with the constituent mass generation. This transition is connected with chiral symmetry breaking. The proposed dynamical picture meets local gauge invariance principle. Inclusion of the spin brings to spinning quarks-solitons or extended vortex representation of constituent quarks. It is shown that the dominating contribution to the proton spin comes from orbital angular momentum of gluons and sea quarks circulating around the oscillating valence quarks. The proposed model has some important consequences. Inside hadrons quarks and accompanying them gluons, as well, are strongly correlated. These correlations in three quark systems (nucleons)can be compared with three-body forces in QFT. Calculated valence quark structure functions are in a good agreement with experimental data. Explicit manifestation of correlated motion of quarks is single diffractive dissociation in proton - proton and antiproton - proton collisions. The model gives predictions for energetic behavior of total and single diffractive cross sections in lepton - and hadron-proton interactions.

- **N. Nikolaev**

  Title: Nonlinear k-factorization in DIS in the saturation regime: diffraction, shadowing, final states and all that.

  Abstract: The familiar k-factorization for DIS observables fails in the saturation regime. I review the recent progress with the nonlinear k-factorization which can consistently be formulated with the due account for unitarity constraints. Nonlinear generalizations of the BFKL equation for diffractive structure functions, nuclear shadowing, one-jet and dijet inclusive cross sections will be reviewed.

- **G. Pancheri**

  Title: Total cross-sections and Bloch-Nordsieck Summation.

  Abstract: Existing data on total cross-sections are reviewed and compared to a QCD model for inelastic collisions which incorporates hard parton parton scattering as well as

soft gluon effects described through the Bloch-Nordsieck resummation process. The effects of running α_s and its infrared behaviour on the energy dependence of total cross-sections is examined.

- **A. Papa**

  Title: The virtual photon to light vector meson impact factor in the next-to-leading order.

  Abstract: The forward impact factor for the virtual photon to light vector meson transition is evaluated in the next-to-leading approximation for the case of longitudinal polarization. It is shown that in the hard kinematic domain, both in the leading and in the next-to-leading approximation, the impact factor factorizes, up to power suppressed corrections, into the convolution of a perturbatively calculable hard-scattering amplitude and a meson twist-2 distribution amplitude.

- **V. Pozdniakov**

  Title: Study of double-tagged gamma-gamma interactions.

  Abstract: Interactions of the photons with virtualities Q^2 between 10 GeV^2 and 200 GeV^2 are studied with the DELPHI detector. The cross-section of the reaction gg $\rightarrow$ hadrons is measured and compared to the LO and NLO BFKL predictions.

- **A. Prokudin**

  Title: Coulomb Interference in High-energy pp and $\bar{p}p$ scattering.

  Abstract: An analysis of the Coulombic amplitude and its interference with the nuclear amplitude which is driven by the three-component Pomeron is presented. It is shown that different approaches towards the Coulomb phase evaluation give approximately uniform result at all energies and the difference is negligible at RHIC and LHC energies. We show that the use of the amplitude which was fitted to accommodate nucleon data only (in the region $0.01 \leq |t| \leq 14.5$ GeV^2) combined with the Coulomb amplitude, reproduces the existing data in the Coulomb interference domain quite accurately without any adjustment of the parameters. As a consequence, we predict the differential cross section in the region of the Coulomb nucleon interference for both RHIC and LHC energies.

- **G. Rakness**

  Title: Forward Pion Production in Hadron Collisions at STAR.

  Abstract: The region of low Bjorken-x in nucleons and nuclei has been under intense experimental and theoretical scrutiny for many years. Simulations show that pion production in hadron-hadron collisions at forward pseudorapidities ($3.3 < \eta < 4.0$) predominantly comes from collisions between high Bjorken-x quarks and low Bjorken-x gluons, which allows this kinematic region to be studied with high precision in a hadron collider. Recent results on forward hadron production in proton-proton and deuteron-Au collisions at $\sqrt{s}$=200 GeV from experiments at RHIC have stimulated much activity towards understanding the data. Measurements of the inclusive cross section for forward pion production have been reported to be in agreement with fixed-order perturbative QCD expectations. In addition, large single-spin asymmetries have been observed in polarized proton collisions at these large pseudorapidities. Correlations of forward pions with midrapidity hadrons may lead to further insight into the production mechanism in proton and nuclear collisions. The status of the analysis of STAR data on forward neutral pion production from p+p and d+Au collisions will be presented.

- **J. Rautenberg**

  Title: Diffractive charged current

  Abstract: Events with a large rapidity gap have been observed in e^+p charged current DIS at HERA. The data collected with the ZEUS detector in the running periods 1999 and 2000 correspond to an integrated luminosity of 61 pb$^-$1. The excess in the yield of such events over the standard DIS expectation has been compared to models of diffractive scattering in the electroweak regime. The diffractive charged current cross section for the kinematic range $Q^2 > 200$ GeV^2 and $x_{pom} < 0.05$ as well as its ratio to the inclusive charged current cross section have been determined.

- **R. Renner**

  Title: ZEUS results on diffractive dijets

  Abstract: Diffractive dijet production has been studied using 77.6 pb^{-1} of data taken by the ZEUS detector at HERA. The measurements have been made in the range $x_{Pom} < 0.035$, where x_{Pom} is the fraction of the proton momentum taken by the diffractive exchange. Differential cross sections have been measured and are confronted with the predictions from leading order Monte Carlo models and next-to-leading order QCD calculations. Such measurements provide an important means of testing the validity of QCD factorisation in diffraction.

- **C. Royon**

  Title: Diffractive Higgs production at the LHC: results and open questions.

  Abstract:

- **A. Sandacz**

  Title: Diffractive ρ^0 production at COMPASS experiment.

  Abstract: Diffractive muoproduction of ρ^0 mesons at COMPASS is discussed. The large statistics data cover a wide range of Q^2, $0.01 < Q^2 < 10$ GeV^2, at $< W >= 10$ GeV. Preliminary results on several spin density matrix elements and $R = \sigma_L/\sigma_T$ for incoherent exclusive ρ^0 production from COMPASS 2002 data are presented and compared to other high energy experiments and theoretical predictions.

- **W. Schäfer**

  Title: K_t factorisation for hard processes on nuclei in the saturation regime.

  Abstract:

- **S. Schätzel**

  Title: Measurements of the diffractive cross section and their QCD interpretation (H1).

  Abstract:

- **D. Schildknecht**

  Title: Saturation in DIS at low x.

  Abstract: I present a phenomenological analysis of the approach to saturation and theoretical results on the energy dependence of the saturation scale.

- **B. Seitz**

  Title: Measurement of Deeply Virtual Compton Scattering at HERMES.

  Abstract:

- **O. Selyugin**

  Title: Unitarity and saturation effects in diffractive scattering.

  Abstract: The saturation bounds from unitarity in the impact parameter representation are examined in different approaches. The energy and momentum transfer dependence of the total and differential cross sections and ratio of the real to imaginary parts of the scattering amplitude are obtained in a model that includes soft and hard Pomeron contribution, coupled to hadron via the electromagnetic form factor. It is shown that the hard Pomeron may significantly contribute to soft physics at the LHC. A similar conclusion can also be reached in the framework of non-linear approaches, using the BFKL Pomeron.

- **G. Shaw**

  Title: Colour Dipole Phenomenology.

  Abstract: We review the phenomenological status of colour dipole models, with and without low-x saturation. The characteristic features of the two component model of Forshaw et al., the saturation model of Golec-Biernat and Wustoff and the colour glass condensate model of Iancu et al will be summarized, and their predictions for DIS, DDIS, DVCS and vector meson production will be compared to HERA data, including a number of new and unpublished results.

- **G.P. Vacca**

  Title: Small x evolution: BFKL vs Dipole Picture.

  Abstract: The relation between the two approaches is discussed both in the linear and non linear regime.

- **S. Vinokurova**

  Title: The diffractive production of charm and jets.

  Abstract:

- **G. Watt**

  Title: Simultaneous QCD analysis of diffractive and inclusive DIS data.

  Abstract: We present a novel analysis of diffractive DIS data, in which the input parton distributions of the Pomeron are parameterised using the perturbative QCD expressions. In addition to the usual two-gluon model for the perturbative Pomeron, we allow for the possibility that it may be made from two sea quarks. In particular, we treat individually the components of the Pomeron of different size. This property allows the absorptive corrections to the inclusive DIS structure function F_2 to be calculated using the AGK cutting rules. The absorptive effects are found to enhance the size of the gluon distribution of the proton at small-x.

- **S. White**

  Title: Recent results on inelastic diffraction scattering of pp, d-Au, Au-Au beams at RHIC

  Abstract: The PHENIX Experiment has instrumentated the very forward region with a unique suite of detectors (Zero Degree Calorimeter, Shower Maximum and Forward Proton Calorimeter). These are used to study small momentum transfer processes in all 3 RHIC beam configurations. I present selected results and implications for the LHC.

- **B. Zakharov**

  Title: Light-cone path integral approach to the induced radiation in QED and QCD: basic concepts and recent applications.

  Abstract: We discuss basic ideas and recent applications of the light-cone path integral approach to the induced radiation in QED and QCD.

- **V. Zoller**

  Title: Triple-Pomeron Dynamics of DIS: Valence vs. Glue.

  Abstract: We present a new mechanism of diffraction excitation of high-mass hadronic states in deep inelastic scattering. In the framework of the color dipole approach to the QCD Pomeron we analyze the diffractive structure function $F_2^D(3)(x_{Pom}, \beta, Q^2)$ in the triple Pomeron region of DIS.

- **N. Zotov**

  Title: Heavy quark production at LHC as a test of the k_t-factorization approach.

  Abstract: We present a calculation of the charm and beauty production at Tevatron and LHC within the framework of k_t-factorization. We use different unintegrated gluon distributions. The analysis covers the azimuthal correlations between b and $\bar{b}$ quarks (or muons from their decay) which are a powerful test for the different unintegrated gluon distributions. We compare the theoretical results on b-flavored meson production with experimental data taken by D0 and CDF at the Tevatron and give the prediction at LHC energies.