Bibliography

[1] Halzen, F. & Martin, A. D. *Quarks and Leptons: An Introductory Course in Modern Particle Physics*, John Wiley and Sons, New York, 1984;
Rolnick, W. B. *Remnants of the Fall*, World Scientific, Singapore, 2003;
Veltman, M. J. G. *Facts and Mysteries in Elementary particle Physics*, World Scientific, Singapore, 2003;
Wolfenstein, L. & Silva, P. J. *Exploring Fundamental Particles*, Taylor & Francis, USA, 2011;
Levy, M. I. *The Britanica Guide to Particle Physics*, Britannica Educational Publishing, New York, 2011;
Rigden, J. S & Bagger, J. & Stuewer, R. H. *Building Blocks of Matter*, Macmillan Reference, USA, 2003.

[2] Hakim, J. *The Story of Science: Aristotle Leads the Way*, Smithsonian Books, Washington, 2004.

[3] Rutherford, E. The scattering of α and β particles by matter and the structure of the atom, *Phil. Mag.* **21**(125), 669-688, 1911;
Rutherford, E. Collision of α particles with light atoms IV: an anomalous effect in Nitrogen, *Phil. Mag.* **37**(222), 581-587, 1919.

[4] Thompson, J. J. On the masses of ions in gases at low pressures, *Phil. Mag.* **48**(295), 547-567, 1899;
Kelvin, *Phil. Mag.* Aepinus atomized, **3**(15), 257-283, 1902;
Thompson, J. J. The magnetic properties of systems of corpuscles describing circular orbits, *Phil. Mag.* **6**, 673-693, 1903;
Thompson, J. J. On the positive electrification of α rays, and the emission of slowly moving cathod rays by radio active substances, *Proc. Cambr. Phil. Soc.* **13**, 49-54, 1904.

[5] J. Chadwick, Possible Existence of a Neutron, *Nature* **129**, 312, 1932.

[6] Bloom, E. D., et al. High-energy inelastic e-p scattering at 6-Degrees and 10-Degrees, *Phys. Rev. Lett.* **23**(16), 930-934, 1969;
Breidenbach, M., et al. Observed behavior of highly inelastic electron-proton scattering *Phys. Rev. Lett.* **23**(16), 935-939, 1969.

[7] Devenish, R., & Cooper-Sarkar, A. *Deep Inelastic Scattering*, Oxford University Press, Ork, 2004;
Badelek, B., et. al. Small-x physics in deep-inelastic lepton-hadron scattering, *Rev. Mod. Phys.* **64**(4), 927-960, 1992;
Sterman, G., et al., Handbook of perturbative QCD, *Rev. Mod. Phys.* **67**(1), 157-248, 1995;
Blumlein, J. The Theory of deeply inelastic scattering, *Prog. Part. Nucl. Phys.* **69**, 28-84, 2013

[8] Bjorken, J. D. Asymptotic sum rules at infinite momentum, *Phys. Rev.* **179**(5), 1547-1553, 1969.

[9] Brandt, R. A. & Preparata, G. Operator product expansions near the light cone, *Nucl. Phys. B* **27**(3), 541-567, 1971;
Frishman, Y. Operator products at almost light like distances, *Ann. Phys. (NY)* **66**(1), 373-389, 1971.

[10] Feynman, R. P. Very high-energy collisions of hadrons *Phys. Rev. Lett.* **23**(24), 1415-1417, 1969;
Drell, S. D. & Yan, T. M. Partons and their applications at high energies, *Ann. Phys. (NY)* **66**(2), 578-623, 1971.

[11] Sakurai, J. J. Vector-Meson dominance and high-energy electron-proton inelastic scattering, *Phys. Rev. Lett.* **22**(18), 981-984, 1969;
Cho, C. F. & Sakurai, J. J. Domain of validity of vector-meson dominance in inelastic electron- proton scattering, *Phys. Lett. B***31**(1), 22-25, 1970.

[12] Harari, H. Inelastic electron-nucleon scattering and the pomeranchuk singularity: asymptotic properties of electroproduction structure functions, *Phys. Rev. Lett.* **22**(20), 1078-1081, 1969;

Abarbanel, H. D. I., et al. Asymptotic properties of electroproduction structure functions *Phys. Rev. Lett.* **22**(10), 500-502, 1969.

[13] Collins, P. D. B. *An introduction to Regge theory and high energy Physics*, Cambridge University Press, Cambridge, 1977.

[14] Nielsen, H. B., et al. A parton theory based on the dual resonance model, *Nucl. Phys. B* **28**(1), 34-50, 1971.

[15] Callan, C. G. and Gross, D. High-energy electroproduction and the constitution of the electric current *Phys. Rev. Lett.* **22**(4), 156-159, 1969.

[16] Jaffe, R. L. G(2): The Nucleon's other spin dependent structure function, *Comments Nucl. Part. Phys.* **19**, 239-250, 1990.

[17] Beringer, J., et al. Review of particle physics (RPP), *Phys.Rev. D* **86**(1), 010001(1-1528), 2012.

[18] Donnachie, A. & Landshoff, P. p p and anti-p p elastic scattering, *Nucl.Phys. B* **231**(2), 189-204, 1984.

[19] Kaidalov, A. & Simonov, Y. Glueball masses and Pomeron trajectory in nonperturbative QCD approach *Phys.Lett. B* **477**(1), 163-170, 2000.

[20] Altarelli, G. Partons in Quantum Chromodynamics *Phys. Rep.* **81**(1), 1-129, 1982.

[21] Reya, E. Perturbative Quantum Chromodynamics *Phys. Rep.* **69**(3), 195-333, 1981.

[22] particle data group listing 2005.

[23] Chetyrkin, K. G., et al. Strong coupling constant with flavor thresholds at four loops in the MS scheme, *Phys. Rev. Lett.* **79**(12), 2184-2187, 1997;
Shaikhatdenov, B. G., et al. QCD coupling constant at NNLO from DIS data, *Phys. Rev. D* **81**(3), 034008(1-15), 2010.

[24] Gribov, V. N. & Lipatov, L. N. Deep inelastic ep scattering in perturbation theory, *Sov. J. of Nucl. Phys.* **15**, 438-450, 1972;
Lipatov, L. N.The parton model and perturbation theory *Sov. J. of Nucl. Phys.*

20, 94-102, 1975;

Dokshitzer, Y. L., Calculation of the structure functions for deep inelastic scattering and e+ e annihilation by perturbation theory in Quantum Chromodynamics *Sov. Phys. JETP* **46**, 641-653, 1977;

Altarelli, G. & Parisi, G. Asymptotic freedom in parton language, *Nucl. Phys. B* **126**(2), 298-318, 1977.

[25] Kuraev, E. A., et al. Multi-Reggeon processes in the Yang-Mills theory, *Sov. Phys. JETP.* **44**(), 443-450, 1976;

Kuraev, E, A., et al. The Pomeranchuk singularity in nonabelian gauge theories, *Sov. Phys. JETP.* **45**, 199-204, 1977;

Balitski, Y. Y. & Lipatov, L. N. The Pomeranchuk singularity in quantum chromodynamics, *Sov. J. Nucl. Phys.* **28**, 822-829, 1978.

[26] Gribov, L. V., et al. Singlet structure function at small x: unitarization of gluon ladders, *Nucl Phys B* **188**(3), 555-576, 1981;

Gribov, L. V., et al. Growth of the structure functions of deep inelastic scattering as the energy increases up to the unitarity limit, *Sov. Phys. JETP* **53**, 1113-1121, 1981;

Gribov, L. V., et al. Semihard processes in QCD, *Phys Rep* **1009**(1-2), 1-150, 1983.

[27] Ciafaloni, M. Coherenc effects in initial jets at small-Q^2's, *Nucl Phys B* **296**(1), 49-74, 1988;

Catani, S., et al. QCD coherence in initial state radiation, *Phys Lett B* **234**(3), 339-345, 1990;

Catani, S., et al. Small-x behaviour of initial state radiation inperturbative QCD, *Nucl Phys B* **336**(1), 18-85, 1990;

Marchesini, G. QCD coherence in the structure function and associated distributions at small x, *Nucl Phys B* **445**(1), 49-78, 1995.

[28] Mueller, A. H. & Qiu, J. Gluon recombination and shadowing at small values of x, *Nucl Phys B* **268**(2), 427-452, 1986;

Qiu, J. Nuclear shadowing at small values of x, *Nucl Phys B* **291**, 746-764, 1987;

Miyama, M. and Kumano, S. Numerical solution of Q^2 evolution equations in a brute force method, *Comput. Phys. Commun.* **94**(2-3), 185-215, 1996;

Zhu, W. A new approach to parton recombination in the QCD evolution equations, *Nucl Phys B* **551**(1-2), 245-274, 1999;

Zhu, W. and Ruan, J. A new modified Altarelli-Parisi evolution equation with parton recombination in proton, *Nucl Phys B* **559**(1-2), 378-392, 1999.

[29] Balitsky, I. I. Factorization for high energy scattering, *Phys Rev Lett* **81**(10), 2024-2027, 1998;

Balitsky, I. I. Factorization and high energy effective action, *Phys Rev D* **60**(1), 014020(1-17), 1999;

Kovchegov, Y. V. Small-x F_2 structure function of a nucleus including multipole pomeron exchanges, *Phys Rev D* **60**(3), 034008(1-8), 1999.

[30] Marian, J. J., et al. Wilson renormalization group for low x physics: Gluon evolution at finite parton density, *Phys Rev D* **59**(1), 014015(1-24), 1999;

Weigert, H. Unitarity at small bjorken x *Nucl Phys A* **703**(3-4), 823-860, 2002;

Balitsky, I. I. Operator expansion for high-energy scattering, *Nucl Phys B* **463**(1), 99-157, 1996.

[31] Moch, S., et al. The Three loop splitting functions in QCD: The Nonsinglet case, *Nucl. Phys. B* **688**(1), 101-134, 2004;

Herrrod, R. T. & Wada, S. Altarelli-parisi Equation in the Next-to-leading Order *Phys. Lett. B* **96**, 195-207, 1980.

[32] Altarelli, G. et al. Determination of the Bjorken sum and strong coupling from polarized structure functions, *Nucl. Phys. B* **496**(1-2) 337-357, 1997;

S. Moch, J.A.M. Vermaseren, A. Vogt, ; The Three-Loop Splitting Functions in QCD: The Helicity-Dependent Case,*Nucl. Phys. B* **889**, 351-400, 2014;

R. Mertig, W. L. van Neerven,; The Calculation of the two loop spin splitting functions P(ij)(1)(x), *Z. Phys. C* **70**(4), 637-654, 1996;

W. Vogelsang, ; A Rederivation of the spin dependent next-to-leading order splitting functions, *Phys. Rev. D* **54**(3), 2023-2029, 1996.

[33] Hinchliffe, I. & Kwiatkowski, A. Parton model sum rules, *Annu. Rev. Nucl. Part. Sci.* **46**, 609-645, 1996.

[34] Gottfried, K. Sum rule for high-energy electron - proton scattering, *Phys. Rev. Lett.* **18**(25), 1174-1177, 1967;

J. A. M. Vermaseren, A. Vogt and S. Moch, The third-order QCD corrections to deep-inelastic scattering by photon exchange, *Nucl. Phys. B* **724**(1-2), 3-182, 2005.

[35] Kataev, A. L. & Parente,G. Order O(α_s^2) perturbative QCD corrections to the Gottfried sum rule, *Phys. Lett. B* **566**(1-2), 120-124, 2003.

[36] Adler, S. L., Sum rules giving tests of local current commutation relations in high-energy neutrino reactions, *Phys. Rev.* **143**(4), 1144-1155, 1966.

[37] Allasia, D., et al. Q^2 Dependence of the Proton and Neutron Structure Functions from Neutrino and anti-neutrinos Scattering in Deuterium, *Z. Phys C* **28**(3), 321-333, 1985.

[38] Gross, D. J. & Llewellyn-Smith, D. J. High-energy neutrino - nucleon scattering, current algebra and partons , *Nucl. Phys. B* **14**(2), 337-347, 1969.

[39] Larin, S. A. & Vermaseren, J. A. M. The α_s^3 corrections to the Bjorken sum rule for polarized electroproduction and to the Gross-Llewellyn Smith sum rule, *Phys. Lett B* **259**(3), 345-352, 1991;
Baikov,P. A., et al. Adler Function, Sum Rules and Crewther Relation of Order : the Singlet Case, *Phys. Lett. B* **714**(1), 62-65, 2012.

[40] Bjorken, J. D. Inequality for Backward electron-Nucleon and Muon-Nucleon Scattering at High Momentum Transfer, *Phys. Rev.* **163**(5), 1767-1769, 1967.

[41] Larin, S. A., et al. The α_s^3 correction to the Bjorken sum rule, *Phys. Rev. Lett.* **66**(7), 862-863, 1991.

[42] Bjorken, J. D. Inelastic Scattering of Polarized Leptons from Polarized Nucleons, *Phys. Rev. D* **1**(5), 1376-1379, 1970.

[43] Larin, S. A. & Vermaseren, J. A. M. The α_s^3 corrections to the Bjorken sum rule for polarized electroproduction and to the Gross-Llewellyn Smith sum rule, *Phys. Lett B* **259**(3), 345-352, 1991;
BaikoV, P. A., et al. Adler Function, Bjorken Sum Rule, and the Crewther Relation to Order alpha$_s^4$ in a General Gauge Theory *Phys. Rev. Lett.* **104**(13), 132004(1-4), 2010.

[44] Gerasimov, S. B.A Sum rule for magnetic moments and the damping of the nucleon magnetic moment in nuclei *Sov. J. Nucl. Phys.* **2**, 430-433, 1966; Drell, S. D. & Hearn, A. C. Exact Sum Rule for Nucleon Magnetic Moments *Phys. Rev. Lett.* **16**(20), 908-911, 1966.

[45] Burkhardt, H. & Cottingham, Sum rules for forward virtual Compton scattering W. N. *Annals Phys.* **56**(2) 453-463, 1970.

[46] Efremov, A. V., et al. An Exact sum rule for transversely polarized DIS, *Phys. Rev. D* **55**(7), 4307-4314, 1997.

[47] Ellis, J. R. & Jaffe, R. L. Sum Rule for Deep Inelastic Electroproduction from Polarized Protons, *Phys. Rev. D* **9**(5), 1444-1446, 1974.

[48] Georgi, H. & Politzer, H. D. Freedom at Moderate Energies: Masses in Color, *Phys.Rev. D* **14**(7), 1829-1848, 1976.

[49] Kretzer, S. & Reno, H. Target mass corrections to electroweak structure functions and perturbative neutrino cross-sections *Phys. Rev. D* **69**(3), 034002(1-14), 2002.

[50] Blumlein, J., et al. NonSinglet QCD Analysis of Deep InelasticWorld Data at $O(\alpha_s^3)$, *Nucl.Phys. B* **774**(1-3), 182-207, 2007.

[51] Wilson, K.G. Non-lagrangian models of current algebra *Phys. Rev.* **179**(5), 1499-1512, 1969; Shuryak, E.V. & Vainshtein, A. I. Theory of Power Corrections to Deep Inelastic Scattering in Quantum Chromodynamics. $1/Q^2$ Effects *Nucl. Phys. B* **199**(3), 451-481, 1982.

[52] Aubert, J. J., et al. The ratio of the nucleon structure functions F2n for iron and deuterium [European Muon Collaboration], *Phys. Lett. B* **123**(3-4), 275-278, 1983.

[53] Geesaman, D. F. et al. The nuclear EMC effect, *Ann. Rev. Nucl. Part. Sci.* **45**, 337-390, 1995.

[54] Arneodo, M. Nuclear effects in structure functions, *Phys. Rept.* **240**(5-6), 301-393, 1994.

[55] Piller, G. & Weise, W. Nuclear deep-inelastic lepton scattering and coherence phenomena *Phys. Rep.* **330**(1), 1-94, 2000.

[56] Kulagin, S. A. & Petti, R., Global study of nuclear structure functions, *Nuclear Physics A* **765**(), (2006) 126187

[57] J. W. Qiu and I. Vitev, Nuclear shadowing in neutrino nucleus deeply inelastic scattering *Phys. Lett. B* **587**(1-2), 52-61, 2004.

[58] Tzanov, M., et al. Precise measurement of neutrino and anti-neutrino differential cross sections (NuTeV Collaboration), *Phys. Rev. D* **74**(1), 012008(1-16), 2006.

[59] Cooper-Sarkar, A. M., et al. Structure functions of the nucleon and their interpretation *Int. J. Mod. Phys. A* **13**(20), 3385-3586, 1998;

[60] Perez, E. & Rizvi, E. The Quark and Gluon Structure of the Proton, Rep. Prog. Phys. **76**(4), 046201(1-58), 2013;
Gehrmann, T., et al. A compilation of structure functions in deep inelastic scattering, *J. Phys. G: Nucl. Part. Phys.* **25**(12A), A1-a157, 1999.

[61] Janet M. C., et al. Precision measurements with high-energy neutrino beams, *Rev. Mod. Phys.* **70**(4), 1341-1392, 1998.

[62] Aidala, C. A., et al. The Spin Structure of the Nucleon, *Rev. Mod. Phys.* **85**(2), 655-691, 2013.

[63] Arneodo, M., et al. Measurement of the proton and deuteron structure functions, $F_2(p)$ and $F_2(d)$, and of the ratio σ_L/σ_T *Nucl. Phys. B* **483**(1-2), 3-43, 1997. [arXiv:hepph/ 9610231].

[64] Amaudruz, P., et al. The Gottfried sum from the ratio F2(n) / F2(p), *Phys. Rev. Lett.* **66**(21), 2712-2715, 1991.

[65] Arneodo, M., et al. A Reevaluation of the Gottfried sum, *Phys. Rev. D* **50** 1-3, 1994.

[66] Seligman, W. G., et al. Improved determination of from neutrino-nucleon scattering, *Phys. Rev. Lett.* **79**(7), 1213-1216, 1997.

[67] Leung, W. C., et al. A Measurement of the Gross-Llewellyn-Smith sum rule from the CCFR x(F3) structure function *Phys. Lett. B* **317**(), 655-659, 1993.

[68] Tzanov, M., et al. Precise measurement of neutrino and antineutrino differential cross section *Phys. Rev. D* **74**(1), 012008(1-16) 2006.

[69] P. Berge et al., A measurement of differential cross-sections and nucleon structure functions in charged-current neutrino interactions on iron, *Z. Phys. C* **49**(2), 187-224, 1991.

[70] Onengut, G., et al., Measurement of nucleon structure functions in neutrino scattering, *Phys. Lett. B* **632**(1), 65-75, 2006.

[71] Alekseev, M. G. The Spin-dependent Structure Function of the Proton g_1^p and a Test of the Bjorken Sum Rule, *Phys. Lett. B* **690**(5), 466-472, 2010;
Alekseev, M. G. The Polarised Valence Quark Distribution from semi-inclusive DIS, *Phys. Lett. B* **660**(5), 458-465, 2008;
Alekseev, V. Y. et al. Flavour Separation of Helicity Distributions from Deep Inelastic Muon-Deuteron Scattering, *Phys. Lett. B* **680**(3), 217-224, 2009.

[72] Camacho, C. M., et al. Scaling test of cross section for deeply virtual compton scattering, *Phys. Rev. Lett.* **97**(26), 262002(1-5), (2006)

[73] Ackerstaff, K., et al. Measurement of the neutron spin structure function g_1^p with a polarized He-3 internal target, *Phys. Lett. B* **404**(3-4), 383-389, 1997;
Ackerstaff, K., et al. Determination of the deep inelastic contribution to the generalized Gerasimov-Drell-Hearn integral for the proton and neutron, *Phys. Lett. B* **444**(3-4), 531-538, 1998;
Airapetian, A., et al. Measurement of the proton spin structure function g_1^p with a pure hydrogen target, *Phys. Lett. B* **442**(1-4), 484-492, 1998;
Airapetian, A., et al. Evidence for quark hadron duality in the proton spin asymmetry A_1, *Phys. Rev. Lett.* **90**(9), 092002(1-5), 2003;
Airapetian, A., et al. The Q^2 dependence of the generalized Gerasimov-Drell-Hearn integral for the deuteron, proton and neutron, *Eur. Phys. J. C* **26**(), 527-538, 2003;
Airapetian, A., et al. Precise determination of the spin structure function g(1) of the proton, deuteron and neutron, *Phys. Rev. D* **75**(1), 012007(1-48), 2007.

[74] Adeva, B. et al. Spin asymmetries A_1 and structure functions g1 of the proton and the deuteron from polarized high-energy muon scattering, *Phys. Rev. D* **58**(11),

112001(1-17), 1998;

Adeva, B., et al. (SMC Collaboration),Spin asymmetries A_1 of the proton and the deuteron in the low x and low Q^2 region from polarized high-energy muon scattering, *Phys. Rev. D* **60**(7), 072004(1-9), 1999.

[75] Abe, K., et al. Precision measurement of the proton spin structure function g_1^p, *Phys. Rev. Lett.* **74**(3), 346-350, 1995;
Abe, K., et al. Precision measurement of the deuteron spin structure function g_1^d, *Phys. Rev. Lett.* **75**(1), 25-28, 1995;
Abe, K., et al. Measurements of the proton and deuteron spin structure function g_2 and asymmetry A_2, *Phys. Rev. Lett.* **76**(4), 587-591, 1996;
Abe, K., et al. Measurements of the Q^2 dependence of the proton and deuteron spin structure functions g_1^p and g_1^d, *Phys. Lett. B* **364**(1), 61-68, 1995;
Abe, K., et al. Measurements of the proton and deuteron spin structure functions g_1 and g_2, *Phys. Rev. D* **58**(11), 112003(1-54), 1998.

[76] Deur, A. et al. Experimental determination of the evolution of the Bjorken integral at low Q^2 *Phys. Rev. Lett.* **93**(21), 212001(1-4), 2004.

[77] Dharmawardane, K.V., et al. Measurement of the x- and Q^2-dependence of the asymmetry A_1 on the nucleon, *Phys. Lett. B* **641**(1), 11-17, 2006;
Bosted, P.E., et al. Quark-hadron duality in spin structure functions g_1^p and g_1^d *Phys. Rev. C* **75**(3), 35203(1-7), 2007;
Prok, Y., et al. Moments of the Spin Structure Functions g_1^p) and g_1^d for $0.05 < Q^2 < 3.0 - GeV^2$ *Phys. Lett. B* **672**(1), 12-16, 2009.

[78] Amarian, M., et al. The Q^2 evolution of the generalized Gerasimov-Drell-Hearn integral for the neutron using a He-3 target, *Phys. Rev. Lett.* **89**(24), 242301(1-6), 2002;
Fatemi, R., et al. Measurement of the proton spin structure function $g_1(x, Q^2)$ for Q^2 from 0.15 to 1.6 GeV^2 with CLAS, *Phys. Rev. Lett.* **91**(22), 222002(1-6), 2003;
Amarian, M., et al. Q^2 evolution of the neutron spin structure moments using a He-3 target, *Phys. Rev. Lett.* **92**(02), 022301-22301, 2004.

[79] Amaudruz, P., et al. The ratio F_2^n/F_2^p in deep inelastic muon scattering, *Nucl. Phys. B* **371**(1-2), 3-31, 1992.

[80] Khorramian, A. N. & Tehrani, S. A. Next-to-next-to-leading order QCD contributions to the flavor non-singlet sector of $F_2(x, Q^2)$, *Phys. Rev. D* **78**(7), 074019(1-13), 2008

[81] Harris, D. A., et al., Precision calibration of the NuTeV calorimeter, *Nucl. Instrum. Meth. A* **447**(3), 377-415, 2000;
Tzanov, M. Review of Neutrino Deep Inelastic Scattering Results, *AIP Conf. Proc.* **1222**, 243-247, 2010

[82] Eskut, E., et al. The CHORUS experiment to search for $\mu_\nu \to \tau_\nu$ oscillation, *Nucl. Instrum. Meth. A* **401**(1), 7-44, 1997.

[83] Kayis-Topaksu, A., et al. Measurement of the Z/A dependence of neutrino charged-current total cross-sections, *Eur. Phys. J. C* **30**(2), 159-167, 2003.

[84] Acquistapace, G., et al. The West area neutrino facility for CHORUS and NOMAD experiments: 1994-1997 operation, CERN-ECP 95-14, 1995.

[85] Holder, M., et al. Performance of a Magnetized Total Absorption Calorimeter Between 15-GeV and 140-GeV, *Nucll. Instr. Meth.* **151**(1-2), 69-80, 1978;
Holder, M., et al. A Detector for High-Energy Neutrino Interactions, *Nucl. Instrum. Methods* **148**, 235-249, 1978;
Riiden, W. V., et al., A Detector For High-energy Neutrino Interactions *IEEE Trans. Nncl. Sci. NS* **29**, 360-362, 1982;
Abramowicz, H., et al., Neutrino and anti-neutrinos Charged Current Inclusive Scattering in Iron in the Energy Range $20 GeV < Neutrino Energy < 300 GeV$ *Z. Phys. C* **17**(4), 283-307, 1983.

[86] Abromowicz, H., et al. The Response and Resolution of an Iron Scintillator Calorimeter for Hadronic and Electromagnetic Showers Between 10-GeV and 140-GeV *Nucl. Instrum. Methods* **180**(2-3), 429-439, 1981.

[87] Adeva, B., et al. Spin structure of the proton from polarized inclusive deep inelastic muon - proton scattering, *Phys. Rev. D* **56**(9), 5330-5358, 1997.

[88] Allkofer, O. C., et al. A Large Magnetic Spectrometer System for High-Energy Muon Physics, *Nucl. Instrum. Methods* **179**(3) 445-466, 1981.

[89] Adeva, B., et al. CERN-EP/99-31.

[90] CERN/SPSLC 96-14, SPSC/P 297, CERN/SPSLC 96-30.

[91] Ackerstaff, K., et al., The HERMES spectrometer, *Nucl. Instr. Meth. A* **417**(2-3), 230-265, 1998.

[92] Leemann, C., et al. The Continuous Electron Beam Accelerator Facility: CEBAF at the Jefferson Laboratory *Ann. Rev. Nucl. Part. Sci.* **51**, 413-450, 2001.

[93] Sinclair, C., et al. Development of a high average current polarized electron source with long cathode operational lifetime *Phys. Rev. ST Accel. Beams* **10**(2), 023501(1-21), 2007;
Stutzman, M., et al. Characterization of the CEBAF 100-kV DC GaAs photoelectron gun vacuum system *Nucl. Instrum. Meth. A* **574**, 213-220, 2007.

[94] Kazimi, R., et al. J. Grames, et al. 2004.Kazimi, R., K. Beard, J. F. Benesch, A. Freyberger, J. Grames, et al. (2004).

[95] Keith, C., et al. A polarized target for the CLAS detector, *Nucl.Instrum.Meth. A* **501**(2-3), 327-339, 2003.

[96] Romalis, M. V., et al. Toward precision polarimetry of dense polarized ^{3}He targets, *Nucl. Instrum. Meth. A* **402**(2-3), 260-267, 1998.

[97] Alcorn, J., et al. Basic instrumentation for Hall A at Jefferson Lab, *Nucl. Instrum. Meth. A* **522**(3), 294-346, 2004.

[98] Lai, H. L., et al. The strange parton distribution of the nucleon: global analysis and applications, *JHEP* **2007**(4), 089(1-18), 2007;
Nadolsky, P. M., et al. Implication of CTEQ global analysis for collider observables, *Phys. Rev. D* **78**(1), 013004(1-21), 2008;
Pumplin, J., et al. Charm production content of the nucleon, *Phys. Rev. D* **75**(5), 054029(1-8), 2007;
Pumplin, J., et al. Uncertainties of predictions from parton distribution functions. 2. The Hessian method, *Phys. Rev. D* **65**(1), 014013(1-17), 2001;
Pumplin, J., et al. New generation of parton distributions with uncertainties from global QCD analysis, *JHEP* **2002**(07), 012(1-46), 2002;
Stump, D., et al. Inclusive jet production, parton distributions, and the search for new physics, *JHEP* **2003**(10), 046(1-35), 2003.

[99] Gluck, M., et al. Parton distributions for high energy collisions, *Z. Phys. C* **53**(1), 127-134, 1992;
Gluck, M., E. et al. Comparing radiatively generated parton distributions with recent measurements of F2(x, Q2) in the small-x region, *Phys. Lett. B* **306**(3-4), 391-394, 1993;
Gluck, M., et al. Dynamical parton distributions of the proton and small-x physics, *Z. Phys. C* **67**(3), 433-447, 1995.

[100] Gluck, M., et al. Dynamical parton distributions revisited, *Eur. Phys. J. C* **5**(3), 461-470, 1998.

[101] Forte, S., et al. Neural network parametrization of deep inelastic structure functions, *JHEP* **2002**(05), 062(1-43), 2002.

[102] Ball, R. D., et al. A first unbiased global NLO determination of parton distributions and their uncertainties, *Nucl. Phys. B* **838**(1-2), 136-206, 2010.

[103] Ball, R. D., et al., Impact of heavy quark masses on parton distributions and LHC phenomenology, *Nucl. Phys. B* **849**(2), 296-363, 2011.

[104] Martin, A. D., et al. MRST2001: partons and S from precise deep inelastic scattering and Tevatron jet data, *Eur. Phys. J. C* **23**(1), 73-87, 2002;
Martin, A. D., et al. Uncertainties of predictions from parton distributions. 1: Experimental errors, *Eur. Phys. J. C* **28**, 455-473, 2003.

[105] Martin, A. D., et al. Uncertainties of predictions from parton distributions II: theoretical errors, *Eur. Phys. J. C* **35**, 325-348, 2004.

[106] Martin, A. D., et al. Physical gluons and high-ET jets, *Phys. Lett. B* **604**(1-2), 61-68, 2004.

[107] Martin, A. D., et al. Parton distributions for the LHC Eur. *Phys. J. C* **63**, 189-285, 2009.

[108] M. Botje, QCDNUM, http://www.nikhef.nl/ h24/qcdnum/

[109] Schoeffel, L. An Elegant and fast method to solve QCD evolution equations, application to the determination of the gluon content of the pomeron, *Nucl. Instrum. Meth. A* **423**(2-3), 439-445, 1999.

[110] Vogt, A. Efficient evolution of unpolarized and polarized parton distributions with QCD-PEGASUS, *Comput. Phys. Commun.* **170**(1), 65-92, 2005.

[111] Pascaud, C. & Zomer, F. A fast and precise method to solve the Altarelli-Parisi equations in x space arXiv:hep-ph/0104013.

[112] Weinzierl, S. Fast evolution of parton distributions, *Comput. Phys. Commun.* **148**(3), 314-326 2002;
Roth, M. & Weinzierl, S. QED corrections to the evolution of parton distributions, *Phys. Lett. B* **590**(3-4), 190-198, 2004.

[113] Cafarella, A. & Coriano, C. Direct solution of renormalization group equations of QCD in x space: NLO implementations at leading twist, *Comput. Phys. Commun.* **160**(3), 213-242, 2004;
Cafarella, A., et al. Nnlo logarithmic expansions and exact solutions of the DGLAP equations from x-space: New algorithms for precision studies at the lhc, *Nucl. Phys. B* **748**(1-2), 253-308, 2006.

[114] Salam, G.P. & Rojo, J. A Higher Order Perturbative Parton Evolution Toolkit (HOPPET) *Comput. Phys. Commun.* **180**(1), 120-156, 2009.

[115] N. Cabibbo, R. Petronzio, Two-stage model of hadron structure: Parton distributions and their Q^2 dependence, *Nucl. Phys. B* **137**(4) 395-412, 1978;
Gluck, M., et al. Radiatively generated parton distributions for high energy collisions, *Z. Phys. C* **48**(3), 471-482, 1990;
Devee, M. et al. Evolution of singlet structure functions from DGLAP equation at next-to-next-to-leading order at small-x, *Euro. Phys. J. C* **72** 2036(1-11) 2012;
Baishya, R., et al. Evolution of spin-dependent structure functions from DGLAP equations in leading order and next to leading order, *Phys. Rev. D* **79**(3) 0340(1-6), 2009;
Baishya, R. & Sarma, J. K. Method of characteristics and solution of DGLAP evolution equation in leading and next to leading order at small x *Phys. Rev. D* **74**(10), 107702(1-3), 2006;
Baishya, R. & Sarma, J. K. Semi numerical solution of non-singlet DokshitzerGribovLipatovAltarelliParisi evolution equation up to next-to-next-to-leading order at small x *Euro. Phys. J. C* **60**, 585-591, 2009;

Cooper-Sarkar, A. M., et al. Structure functions of the nucleon and their interpretation *Int. J. Mod. Phys. A* **13**(20), 3385-3586, 1998.

[116] Toldra, R. A C++ code to solve the DGLAP equations applied to Ultra High Energy Cosmic Rays *Comput. Phys. Commun.* **143**(3), 287-304 2002.

[117] Furmanski, W. & Petronzio, R. A method of analysing the scalling violation of inclussive spectra in hard processes, *Nucl. Phys. B* **195**(2), 237-261, 1982;
Ramsey, G. P. J. *Comput. Phys.* 60 1985 97;
Blumlein, J., et al. Testing QCD scaling violations in the HERA energy range, *Z. Phys. C* **45**(3), 501-513, 1990;
Kumano, S. & Londergan, J. T. A FORTRAN program for numerical solution of the Altarelli-Parisi equations by the Laguerre method, *Comput. Phys. Commun.* **69**(2-3), 373-396, 1992 ;
Kobayashi, R. et al. FORTRAN program for a numerical solution of the nonsinglet Altarelli-Parisi equation *Comput. Phys. Commun.* **86**(3), 264-278, 1995.

[118] M. Gluck, E. Reya, and A. Vogt, Radiatively generated parton distributions for high-energy collisions,*Z. Phys. C* **48**(3), 471-482, 1990;
Graudenz, D., et al. The Mellin transform technique for the extraction of the gluon density, *Z. Phys. C* **70**(1), 77-82, 1996;
Blumlein, J. & Vogt, A. The Evolution of unpolarized singlet structure functions at small x, *Phys. Rev. D* **58**(1), 014020(1-26), 1998 014020;
Blumlein, J. Analytic continuation of Mellin transforms up to two loop order,*Comput. Phys. Commun.* **133**(1), 76-104, 2000;
Stratmann, M. & Vogelsang, W. Towards a global analysis of polarized parton distributions, *Phys. Rev. D* **64**(11), 114007(1-10), 2001.

[119] Gluck, M. et al. Models for the polarized parton distributions of the nucleon *Phys. Rev. D* **63**(9), 094005(1-12), 2001;
Blumlein, J. & Bottcher, H., QCD analysis of polarized deep-inelastic scattering data and parton distributions, *Nucl. Phys. B* **636**(1-2), 225-263, 2002.

[120] Hirai, M., et al. Determination of polarized parton distribution functions and their uncertainties, *Phys. Rev. D* **69**(5), 054021(1-10), 2004.

[121] Kumano, S. & Nagaia, T. H., Comparison of numerical solutions for Q^2 evolution equations, *J. Comput. Phys.* **201**, 651-664, 2004 .

[122] Miyama, M. & Kumano, S. Numerical solution of Q^2 evolution equations in a brute force method, *Comput. Phys. Commun.* **94**(2-3), 185-215, 1996; Hirai, M., et al. Numerical solution of Q^2 evolution equations for polarized structure functions, *Comput. Phys. Commun.* **108**(1), 38-55, 1998.

[123] Cabibbo, N. & and Petronzio, R. Two stage model of hadron structure: parton distributions and theirQ^2dependence, *Nucl. Phys. B* **137**(4), 395-412, 1978;

[124] Mueller, A. H. & Qiu, J. Gluon recombination and shadowing at small values of x*Nucl. Phys. B* **268**(2), 427-455, 1986.

[125] Abe, K., et al. Precision measurement of the proton spin structure function g_1^p, *Phys. Rev. Lett.* **74**(3), 346-350, 1995; Abe, K., et al. Measurements of the proton and deuteron spin structure functions g_1 and g_2, *Phys. Rev. D* **58**(11), 112003(1-54), 1998.

[126] Abe, K., et al. Precision determination of the neutron spin structure function g_1^n, *Phys. Rev. Lett.* **79**(1), 26-30, 1997.

[127] BISHARI, M. Perturbative Field Theory Effects And Regge Pole Representation, *Phys. Lett.* **90 B**(1-2), 147-150, 1980.

[128] Kwiecinski, J. Perturbative QCD predictions for the small x behavior of unpolarized and polarized deep inelastic scattering structure functions, *Acta Phys.Polon. B* **27**, 893-910, 1996.

[129] Forshaw, J. R. & Ross, D. A. *Quantum Chromodynamics and the Pomeron*, Cambridge University Press, 1997

[130] Ellis, R. K., et al. *QCD and Collider Physics* Cambridge University Press, 1996

[131] Taghavi-Shahri, F. & Arash, F. Non-singlet spin structure function in the valon model and low x scaling behavior of g_1^{NS} and g_1^p *Phys. Rev. C* **82**(3), 035205(1-7), 2010.

[132] Ermolaev, B. I., et al. Overview of the spin structure function g_1 at arbitrary x and Q^2, *Riv. Nuovo Cim.* **33**(2), 57-122, 2010.

[133] Knauf, A., et al. Estimating the small x exponent of the structure function g_1^{NS} from the Bjorken sum rule, *Phys. Lett. B* **549**(1-2), 109-114, 2002;

Kwiecinski, J. Spin dependent structure function g_1 at low x, *Acta. Phys. Pol. B* **29**, 1201-1216, 1998;

Kwiecinski, J.Perturbative QCD predictions for the small x behavior of unpolarized and polarized deep inelastic scattering structure functions, *Acta Phys. Pol. B* **27**, 893-910, 1996;

Bartels, J., et al. Nonsinglet contributions to the structure function g_1 at small x, *Z. Phys. C* **70**, 273-280, 1996;

Bartels, J., et al. Flavor singlet contribution to the structure function G_1 at small x, *Z. Phys. C* **72**(4), 627-635, 1996.

[134] Adloff, C., et al. Deep inelastic inclusive e p scattering at low x and a determination of alpha(s), *Euro. Phys. J. C* **21**(1), 33-61, 2001.

[135] Adloff, C., et al. On the rise of the proton structure function F(2) towards low x , *Phys. Lett. B* **520**(3-4), 183-190, 2001.

[136] Kotikov, A. V. & Peshekhonov, D. V. The Q^2 dependence of the measured asymmetry A1 from the similarity of the $g_1(x, Q^2)$ and $F_3(x, Q^2)$ structure functions, *Eur. Phys. J. C* **9**, 55, 1999;
J. Kwiecinski, B. Ziaja, QCD expectations for the spin structure function g_1 in the low x region, *Phys. Rev. D* **60**(5), 05004(1-12), 1999.

[137] Abbott L. F. et al. A QCD Analysis of e N Deep Inelastic Scattering Data, *Phys. Rev. D* **22**(3), 582-593, (1980) ;
Abbott L. F. & Barnett, R. M. The Effect of $1/Q^2$ and α_s Corrections on Tests of QCD, *Annals Phys.* **125**(2), 276-308, 1980.

[138] Martin, A. D., et al. Parton distributions: a new global analysis, *Eur. Phys. J. C* **4**(3) 463-496, 1998.

[139] Lai, H. L., et al., *Phys. Rev. D* **55**(3), 1280-1296, 1997.

[140] Kataev, A. L., et al. Higher twists and alpha(s)(M(Z)) extractions from the NNLO QCD analysis of the CCFR data for the xF_3 structure function, *Nucl. Phys. B* **573**(1-2), 405-433, 2000.

[141] Burkardt, M., et al. Spin-polarized high-energy scattering of charged leptons on nucleons, *Rept. Prog. Phys.* **73**, 016201(1-54), 2010.

[142] Kuhn, S. E., et al. Spin Structure of the Nucleon - Status and Recent Results, *Prog. Part. Nucl. Phys.* **63**(1), 1-50, 2009.

[143] Chen, J. P. Moments of Spin Structure Functions: Sum Rules and Polarizabilities, *Int. J. Mod. Phys. E* **19**(10), 1893-1921, 2010.

[144] Badelek, B. Spin dependent structure function $g_1(x, Q^2)$ at low x and low Q^2, *Acta Phys. Polo. B* **34**, 2943-2962, 2003.

[145] Lampe, B. & Reya, E. Spin physics and polarized structure functions, *Phys. Rept.* **332**(1-2), 1-163, 2000.

[146] Anselmino, M., et al. The Theory and phenomenology of polarized deep inelastic scattering, *Phys. Rept.* **261**(1-2), 1-124, 1995.

[147] Bernard, V. Chiral Perturbation Theory and Baryon Properties, *Prog. Part. Nucl. Phys.* **60**(1), 82-160, 2008.

[148] Gockeler, M. et al. Nucleon form-factors: Probing the chiral limit, *PoS* **LAT2006**, 120-126, 2006.

[149] Polchinski, J. & Strassler, M. J. Hard scattering and gauge / string duality, *Phys. Rev. Lett.* **88**(3), 031601(1-4), 2002; ibid. Brodsky, S. J. & de Teramond, G. F. Hadronic spectra and light-front wavefunctions in holographic QCD, *Phys. Rev. Lett.* **96**(20), 201601(1-4), 2006; **94**(20), 201601(1-4), 2005.

[150] Ball, R. D., et al. Parton distributions with QED corrections, *Nucl. Phys. B* **877**(2), 290-320, 2013.

[151] Jimenez-Delgado, P., et al. Impact of hadronic and nuclear corrections on global analysis of spin-dependent parton distributions, *Phys. Rev. D* **89**(3), 034025(1-19), 2014.

[152] Leader, E., et al. Determination of Polarized PDFs from a QCD Analysis of Inclusive and Semi-inclusive Deep Inelastic Scattering Data, *Phys. Rev. D* **82**(11), 114018(1-12), 2010.

[153] Florian, D. de, et al. Global Analysis of Helicity Parton Densities and Their Uncertainties, *Phys. Rev. Lett.* **101**(7), 072001(1-4), 2008;
Florian, D. de, et al. Extraction of Spin-Dependent Parton Densities and Their Uncertainties, *Phys. Rev. D* **80**(3), 034030(1-26), 2009.

[154] Blumlein, J. & Bottcher, H. QCD Analysis of Polarized Deep Inelastic Scattering Data, *Nucl. Phys. B* **841**(1-2), 205-230, 2010.

[155] Hirai, M. & Kumano, S. Determination of gluon polarization from deep inelastic scattering and collider data, *Nucl. Phys. B* **813**(1-2), 106-122, 2009.

[156] Bourrely, C., et al. A Statistical approach for polarized parton distributions, *Eur. Phys. J. C* **23**(3), 487-501, 2002.

[157] Khorramian, A. N., et al. Polarized Deeply Inelastic Scattering (DIS) Structure Functions for Nucleons and Nuclei, *Phys. Rev. D* **83**(5), 054017(1-11), 2011.

[158] Arbabifar, F., et al. QCD analysis of polarized DIS and the SIDIS asymmetry world data and light sea-quark decomposition, *Phys. Rev. D* **89**(3), 034006(1-20), 2014.

[159] Altarelli, G., et al. Determination of the Bjorken sum and strong coupling from polarized structure functions, *Nucl.Phys. B* **496**(1-2), 337-357, 1997.

[160] Goto, Y. et al. Polarized parton distribution functions in the nucleon, *Phys. Rev. D* **62**(3), 034017(1-18), 2000;
Goto, Y., et al. Determination of polarized parton distribution functions and their uncertainties, *Phys. Rev. D* **69**(5), 054021(1-10), 2004.

[161] Blumlein, J. & Bottcher, H. QCD analysis of polarized deep inelastic data and parton distributions, *Nucl. Phys. B* **636**(1-2), 225-263, 2002.

[162] Gluck, M., et al. Models for the polarized parton distributions of the nucleon, *Phys. Rev. D* **63**(9), 094005(1-12), 2001.

[163] Pasechnik, R. S., et al. Bjorken Sum Rule and pQCD frontier on the move, *Phys. Rev. D* **78**(07), 071902(1-5), 2008.

[164] Pasechnik, R. S., et al. Nucleon spin structure and pQCD frontier on the move, *Phys. Rev. D* **81**(1), 016010(1-13), 2010.

[165] Kataev, A. L. & Sidorov, A. V. Next-to-next-to-leading order QCD analysis of the Gross-LLewellyn-Smith sum rule and the higher twist effects, *Phys. Lett. B* **297**(3-4), 385-397, 1992.

[166] Leung, W. C., et al. A Measurement of the Gross-Llewellyn-Smith sum rule from the CCFR xF_3 structure function, *Phys. Lett. B* **317**(4), 655-659, 1993.

[167] Kataev, A. L. & Sidorov, A. V. The Jacobi polynomials QCD analysis of the CCFR data for xF_3 and the Q^2 dependence of the Gross-Llewellyn-Smith sum rule, *Phys. Lett. B* **331**(1-2), 179-186, 1994.

[168] Braun, V. M. & Kolesnichenko, A. V. Power corrections to Bjorken and Gross-llewellyn smith sum rules in QCD, *Nucl. Phys. B* **283**, 723-748, 1987.

[169] Fajfer, S. & Oakes, R. J. Nonperturbative QCD Corrections to the Bjorken and Gross-Llewellyn Smith Sum Rules, *Phys. Lett. B* **163**(5-6), 385-388, 1985.

[170] Kim, J. H., et al. Power corrections and renormalons in deep inelastic structure functions, *Phys. Rev. Lett.* **81**(17), 3595-3598, 1998.

[171] Dasgupta, M. & Webber, B. R.Power corrections and renormalons in deep inelastic scattering, *Phys. Lett. B* **382**(3), 273-261, 1996.

[172] Gross, D. J., et al. Mass Corrections in Deep Inelastic Scattering, *Phys. Rev. D* **15**(9), 2486-2494, 1977.

[173] Londergan, J. T. & Thomas, A. W. Additional Corrections to the Gross-Llewellyn Smith Sum Rule, *Phys. Rev. D* **82**(11), 113001(1-12), 2010.

[174] Baikov, P. A., et al. Adler Function, Bjorken Sum Rule, and the Crewther Relation to Order α_s^4 in a General Gauge Theory, *Phys. Rev. Lett.* **104**(13), 132004(1-4), 2010.

[175] Baikov, P. A., et al. Order α_s^4 QCD Corrections to Z and τ Decays, *Phys. Rev. Lett.* **101**(1), 012002(1-4), 2008.

[176] Burkert, V. D. & Ioffe, B. L. On the Q^2 variation of spin dependent deep inelastic electron-proton scattering, *Phys. Lett. B* **296**(1-2), 223-226, 1992;
Burkert, V. D. & Ioffe, B. L. Polarized structure functions of proton and neutron and the Gerasimov-Drell-Hearn and Bjorken sum rules, *J. Exp. Theor. Phys.* **78**, 619-622, 1994.

[177] Soffer, J. & Teryaev, O. V. Bjorken sum rule at low Q^2, *Phys. Lett. B* **545**(3-4), 323-328, 2002;

Soffer, J. & Teryaev, O. V. QCD radiative and power corrections and generalized Gerasimov-Drell-Hearn sum rules, *Phys. Rev. D* **70**(11), 116004(1-5), 2004.

[178] Khandramai, V. L., et al. Four-loop QCD analysis of the Bjorken sum rule vs data, *Phys. Lett. B* **706**(4-5), 340-344, 2012.

[179] Kotikov, A.V. & Shaikhatdenov, B. G. Q2-evolution of parton densities at small x values. Combined H1 and ZEUS F2 data, *Phys. Part. Nucl.* **44**(3), 543-546, 2013;
Kotikov, A.V. & Shaikhatdenov, B. G. Perturbative QCD analysis of the Bjorken sum rule, *Phys. Part. Nucl.* **45**(1), 26-29, 2014.

[180] Arneodo, M., et al. New Muon Collaboration, Accurate measurement of F_2^d/F_2^p and $R^d - R^p$, *Nucl. Phys. B* **487**(1-2), 3-26, 1997.

[181] Arneodo, M., et al. The Structure Function ratios F_2^{li}/F_2^D and F_2^C/F_2^D at small x. *Nucl. Phys. B* **441**(1-2), 12-30, (1995).

[182] Amaudruz, P., et al. A re-evaluation of the nuclear structure function ratios for D, He, ^{6}Li, C and Ca, *Nucl. Phys. B* **441**(1-2), 3-11, (1995).

[183] Arneodo, M., et al. The A dependence of the nuclear structure function ratios, *Nucl. Phys. B* **481**(1-2), 3-22, 1996.

[184] Arneodo, M., et al. The Q^2 dependence of the structure function ratio F_2^{Sn}/F_2^C and the difference $R^{Sn} - R^C$ in deep inelastic muon scattering, *Nucl. Phys. B* **481**(1-2), 23-39, 1996.

[185] Ashman, J., et al. A Measurement of the ratio of the nucleon structure function in copper and deuterium, *Z. Phys. C* **57**(2), 211-218, 1993.

[186] Bari, G., et al. A Measurement of nuclear effects in deep inelastic muon scattering on deuterium, nitrogen and iron targets, *Phys. Lett. B* **163**(1-4), 282-286, 1985.

[187] Dasu, S., et al. Measurement of the Difference in $R = \sigma_L/\sigma_t$ and σ^A/σ^D in deep inelastic e-D, e-Fe and e-Au Scattering, *Phys. Rev. Lett.* **60**(25), 2591-2594, 1988.

[188] Gomez, J. et al. Measurement of the A-dependence of deep inelastic electron scattering, *Phys. Rev. D* **49**(9), 4348-4372, 1994.

[189] Ackerstaff, K., et al. Nuclear effects on $R = \sigma_L/\sigma_T$ in deep inelastic scattering, *Phys. Lett. B* **475**(3-4), 386-394, 2000.

[190] Adams, M. R., et al. Extraction of the ratio $F2_n/F2_p$ from muon - deuteron and muon-proton scattering at small x and Q^2, *Phys. Rev. Lett.* **75**(8), 1466-1470, 1995.

[191] Adams, M. R., et al. Shadowing in inelastic scattering of muons on carbon, calcium and lead at low x_{Bj} , *Z. Phys. C* **67**(3), 403-410, 1995.

[192] Arrington, J., et al. Low-Q scaling, duality, and the EMC effect, *Phys.Rev. C* **73**(3), 035205(1-6), 2006.

[193] Jefferson Laboratory, Newport News, USA, URL: http://www.jlab.org/.

[194] Alde, D. M., et al. Nuclear dependence of dimuon production at 800 GeV, *Phys. Rev. Lett.* **64**(21), 2479-2482, 1990;
Vasilev, M. A. et al. Parton energy loss limits and shadowing in drell-yan dimuon production, *Phys. Rev. Lett.* **83**(12), 2304-2307, 1999;
Moreno, G. et al. Dimuon production in proton-copper collisions at $\sqrt{s} = 38.8 - GeV$ *Phys. Rev. D* **43**(9), 2815-2835, 1991.

[195] Kahn, Y., et al. New method for extracting neutron structure functions from nuclear data, *Phys. Rev. C* **79**(3), 035205(1-11), 2009.

[196] Alekhin, S., et al. Strange and Anti-strange Sea Distributions from Neutrino-Nucleon Deep Inelastic Scattering, arXiv:0910.3762.

[197] Alekhin, S., et al. Modeling lepton-nucleon inelastic scattering from high to low momentum transfer, *AIP Conf. Proc.* **967**, 215-224, 2007.

[198] Alekhin, S., et al. Determination of Strange Sea Distributions from Neutrino-Nucleon Deep Inelastic Scattering, *Phys. Lett. B* **675**(5), 433-440, 2009.

[199] Miller, G. A. & Thomas, A. W. Shadowing corrections and the precise determination of electroweak parameters in neutrino-nucleon scattering, *Int.J.Mod.Phys. A* **20**(1), 95-98, 2005;

Kovalenko, S., et al. Nuclear effects on the extraction of $sin^2\theta_W$, *Phys. Lett. B* **546**(1-2), 68-77, 2002;

Kumano, S. Modified Paschos-Wolfenstein relation and extraction of weak mixing angle $sin^2\theta_W$, *Phys. Rev. D* **66**(11), 111301(1-5), 2002;

Kulagin, S. A. Paschos-Wolfenstein relationship for nuclei and the NuTeV $sin^2\theta_W$ measurement, *Phys. Rev. D* **67**(9), 091301(1-4), 2003;

Kumano, S. Nuclear modification of structure functions in lepton scattering, hep-ph/0307105;

Kulagin, S. A. On the Paschos-Wolfenstein relationship for nuclei, hep-ph/0406220;

Kulagin, S. A. Relations between NC and CC neutrino structure functions for nucleons and nuclei, *Nucl. Phys. B. (Proc. Suppl.)* **139**, 213-218, 2005;

Brodsky, S. J., et al. Nuclear antishadowing in neutrino deep inelastic scattering, *Phys. Rev. D* **70**(11), 116003(1-15), 2004.

[200] Zeller, G.P., et al. A Precise determination of electroweak parameters in neutrino nucleon scattering, *Phys. Rev. Lett.* **88**(9), 091802(1-4), (2002).

[201] Bartoszek, L., et al. FLARE, Fermilab liquid argon experiments, hep-ex/0408121; Drakoulakos, D., et al. Proposal to perform a high statistics neutrino scattering experiment using a fine-grained detector in the NuMI beam, hep-ex/0405002.

[202] Japan Proton Accelerator Research Complex, Tokai, Japan, URL: http://jkj.tokai.jaeri.go.jp/.

[203] Mangano, M. L., et al. Physics at the front end of a neutrino factory: A Quantitative appraisal, hep-ph/0105155;
Alsharoa, M. M., et al. Recent progresses in neutrino factory and muon collider research within the muon collaboration, *Phys. Rev. ST Accel. Beams* **6**(08), 081001(1-52), 2003.

[204] Brodsky, S. J., et al. Phenomenology of photon processes, vector dominance and crucial tests for parton models, *Phys. Rev. D* **6**(1), 177-190, 1972;
Brodsky, S. J. & Liu, H. J. Shadowing and antishadowing of nuclear structure functions, *Phys. Rev. Lett* **64**(12), 1342-1346, 1990;

[205] Nikolaev, N. N. & Zakharov, B. G. Color transparency and scaling properties of nuclear shadowing in deep inelastic scattering, *Z Phys C* **49**(4), 607-618, 1991.

[206] Barone, V., et al. Structure functions of bound nucleons: From the EMC effect to nuclear shadowing, *Z Phys C* **58**(4), 541-558, 1993.

[207] Kopeliovich, B. Z. & Povh, B. Scaling variable for nuclear shadowing in deep inelastic scattering, *Phys. Lett. B.* **367**(1-4), 329-334, 1996.

[208] Armesto, N. & Braun, M. A. The EMC effect at low x in perturbative QCD, *Z Phys. C* **76**(1), 81-90, 1997.

[209] Armesto, N. A Simple model for nuclear structure functions at small x in the dipole picture, *Eur. Phys. C* **26**(1), 35-43, 2002.

[210] Kopeliovich, B. Z., et al. J Raufeisen, A V Tarasov, Nuclear shadowing and coherence length for longitudinal and transverse photons, *Phys. Rev C* **62**(3), 035204(1-13), 2000.;
Nemchik, J. Nuclear shadowing in deep inelastic scattering: Numerical solution of evolution equation for the green function, *Phys.Rev. C* **68**(3), 035206(1-13), 2003.

[211] Capella, A., et al. Structure functions of nuclei at small x and diffraction at HERA, *Euro. Phys. J. C* **5**(1), 111-117, 1998.

[212] Frankfurt, L., et al. Nuclear shadowing in deep inelastic scattering on nuclei: Leading twist versus eikonal approaches, *JHEP* **2002**, 027(1-42), 2002.;
Frankfurt, L., et al. Leading twist nuclear shadowing: Uncertainties, comparison to experiments, and higher twist effects, *Phys.Rev. D* **71**(5), 054001(1-18), 2005.

[213] Gribov, L. V., et al. Semihard Processes in QCD, *Phys. Rept.* **100**(1-2), 1-150, 1983.

[214] Mueller, A. H. & Qiu, J.-W. Gluon recombination and shadowing at Small Values of x, *Nucl. Phys. B* **268**(2), 427-452, 1986;
Qiu, J.-W. Nuclear shadowing at small values of x, *Nucl. Phys. B* **291**, 746-764, 1987.

[215] McLerran, L. D. & Venugopalan, R. Computing quark and gluon distribution functions for very large nuclei, *Phys. Rev. D* **49**(5), 2233-2241, 1994;

McLerran, L. D. & Venugopalan, R. Green's functions in the color field of a large nucleus *Phys. Rev. D* **50**(3), 2225-2233, 1994.

[216] Mueller, A. H. QCD in nuclear collisions, *Nucl.Phys. A* **715**, 20c-34c, 2003.

[217] Venugopalan, R. Classical methods in DIS and nuclear scattering at small x, *Acta Phys. Polon. B* **30**, 3731-3761, 1999.

[218] Hirai, M., et al. Nuclear parton distribution functions and their uncertainties, *Phys.Rev. C* **70**(4), 044905(1-10), 2004.

[219] Florian, D. de & Sassot, R. Nuclear parton distributions at next to leading order, *Phys. Rev. D* **69**(7), 074028(1-9), 2004.

[220] Hirai, M., et al. Determination of nuclear parton distribution functions and their uncertainties in next-to-leading order, *Phys. Rev. C* **76**(6), 065207(1-16), 2007.

[221] Schienbein, I., et al. Nuclear parton distribution functions from neutrino deep inelastic scattering, *Phys. Rev. D* **77**(5), 054013(1-14), 2008.

[222] Eskola, K. J., et al. EPS09: A New generation of NLO and LO nuclear parton distribution functions, *JHEP* **2009**(04), 065(1-34), 2009.

[223] Kulagin, S. A. & Petti, R. Neutrino inclusive inelastic scattering off nuclei, *Phys. Rev. D* **76**(9), 094023(1-24), 2007.

[224] Hirai, M., et al. Determination of nuclear parton distributions, *Phys.Rev.D* **64**(3), 034003(1-15), 2001.

[225] Eskola, K.J., et al. The Scale dependent nuclear effects in parton distributions for practical applications, *Eur.Phys.J.C* **9**(1), 61-68, 1999;
Eskola, K.J., et al. Scale evolution of nuclear parton distributions, *Nucl.Phys.B* **535**(1-2), 351-371, 1998.

[226] Adle, D. M., et al. Nuclear dependence of dimuon production at 800-GeV. FNAL-772 experiment, *Phys.Rev.Lett.* **64**(21), 2479-2482, 1990.

[227] Kulagin, S. A. & Petti, R., Global study of nuclear structure functions, *Nuclear Physics A* **765**(1-2), 126187, 2006.

[228] Guzey, V. & Strikman, M. Nuclear effects in $g_{1A}(x, Q^2)$ at small x in deep inelastic scattering on ^{7}Li and ^{3}He, *Phys. Rev. C* **61**(1), 014002(1-15), 1999.

[229] Cooper, A. M., et al. An Investigation of the Emc Effect Using Anti-neutrinos Interactions in Deuterium and Neon, *Phys. Lett. B* **141**(1-2), 133-139, 1984.

[230] Abramowicz, H., et al. Measurement of neutrino and and antineutrino structure functions in hydrogen and iron, *Z.Phys.C* **25**(1), 29-43, 1984.

[231] Hanlon, J., et al. A Comparison of Cross-Sections from Deep Inelastic Neutrino Scattering on Neon and Deuterium, *Phys.Rev.D* **32**(9), 2441-2444, 1985.

[232] Fleming, B.T., et al. A First measurement of low x - low Q^2 structure functions in neutrino scattering, *Phys.Rev.Lett.* **86**(24), 5430-5433, 2001.

[233] Qiu, J. W. & Vitev, I. Nuclear shadowing in neutrino nucleus deeply inelastic scattering, *Phys. Lett. B* **587**(1-2), 52-61, 2004.

[234] Badelek, B. & Kwiecinski, J. Shadowing in inelastic lepton - deuteron scattering, *Nucl. Phys. B* **370**(2), 278-298, 1992.

[235] Zoller, V. R. The Nucleon structure functions in deep inelastic scattering off deuterium: Nuclear shadowing and Gottfried sum rule, *Z. Phys. C* **54**(3), 425-429, 1992;
Zoller, V. R. Nuclear shadowing in deuteron and the Gottfried sum rule, *Phys. Lett. B* **279**(1-2), 145-148, 1992;
Nikolaev, N. N. & Zoller, V.R. Photon - deuteron diffractive scattering, *Z. Phys. C* **56**(4), 623-628, 1992.

[236] Kaptari, L. P. & Umnikov, A. Y. The Goffried sum rule and mesonic exchanges in deuteron, *Phys. Lett. B* **272**(3-4), 359-362, 1991.

[237] Epele, L. N., et al. Nuclear effects in deuteron and the Gottfried sum rule, *Phys. Lett. B* **275**(1-2), 155-160, 1992;
Epele, L. N., et al. Nuclear pions and the Gottfried and Bjorken sum rules, *Z. Phys. C* **64**(2), 285-290, (1994).

[238] Barone, V., et al. Structure functions of bound nucleons: From the EMC effect to nuclear shadowing, *Z. Phys. C* **58**(4), 541-558, 1993; Shadowing in deuterium

and the small x limit of F_2^n/F_2^p and $F_2^p - F_2^n$, *Phys. Lett. B* **321**(1-2), 137-139, 1994.

[239] Melnitchouk, W. & Thomas, A. W. Shadowing in deuterium, *Phys. Rev. D* **47**(9), 3783-3793, 1993; W. Melnitchouk, A. W. Schreiber, A. W. Thomas, Relativistic deuteron structure function, *Phys. Lett. B* **335**(1), 11-16, 1994.

[240] Piller, G., et al. Phenomenology of nuclear shadowing in deep inelastic scattering, *Z. Phys. A* **352**(4), 427-439, 1995.

[241] Kulagin, S. A. & Petti, R. Nuclear effects in the F_3 structure function for finite and asymptotic Q^2, *nucl. phys. A* **640**, 435-456, 1998.

[242] Close, F. E., et al. Factorization Scale Independence, the Connection Between Alternative Explanations of the Emc Effect and QCD Predictions for Nuclear Properties, *Nucl.Phys. B* **296**(3), 582-610, 1988.

[243] Kaptari, L. P., & Umnikov, A. Yu. Bjorken Sum Rule and Deep Inelastic Scattering on Polarized Nuclei, *Phys.Lett. B* **240**(1-2), 203-208, 1990.

[244] Ciofi degli Atti, C. et al. Nuclear effects in deep inelastic scattering of polarized electrons off polarized He-3 and the neutron spin structure functions, *Phys.Rev. C* **48**(3), 968-972, 1993.

[245] Schultze, R. W. & Sauer, P. U. Inelastic electron scattering from the three-nucleon bound states with polarization, *Phys.Rev. C* **48**(1), 38-63, 1993.

[246] Budick, B., et al. Halflife of molecular tritium and the axial vector interaction in tritium beta decay, *Phys.Rev.Lett.* **67**(19), 2630-2633, 1991.

[247] Abbott L. F. & Barnett, R. M. The Effect of $1/Q^2$ and α_s Corrections on Tests of QCD, *Annals Phys.* **125**(2), 276-308, 1980;
Abbott L. F. et al. A QCD Analysis of e N Deep Inelastic Scattering Data, *Phys. Rev. D* **22**(3), 582-593, 1980 ;
Barnett, R. M. Possible Evidence for Substantial Nonperturbative Quantum Chromodynamic Effects, *Phys. Rev. Lett.* **48**(24), 1657-1659, 1982.

[248] Rujula, A. De, et al. Demythification of Electroproduction, Local Duality and Precocious Scaling, *Ann. Phys,.* **103**(2), 315-353, 1977.

[249] Miramontes, J. L., et al. Evidence for higher twist From $R = \sigma_l/\sigma_t$ data in deep inelastic electron scattering, *Phys. Rev. D* **40**(7), 2184-2187, 1989.

[250] Whitlow, L. W. et al. A Precise extraction of $R = \sigma_L/\sigma_T$ from a global analysis of the SLAC deep inelastic *ep* and *ed* scattering cross-sections *Phys. Lett. B* **250**(1-2), 193-198, 1990.

[251] Virchaux, M. & Milsztajn, A. A. Measurement of α_s and higher twists from a QCD analysis of high statistics F_2 data on hydrogen and deuterium targets, *Phys. Lett. B* **274**(2), 221-229, 1992.

[252] Yang, U. K. & Bodek, A. Studies of higher twist and higher order effects in NLO and NNLO QCD analysis of lepton nucleon scattering data on F_2 and $R = \sigma_L/\sigma_T$, *Eur. Phys. J. C* **13**(2), 241-245, 2000.

[253] Alekhin, S. I. Parton distributions from deep inelastic scattering data, *Phys. Rev. D* **68**(1), 014002(1-11), 2003.

[254] Broadhurst, D. J. & Kataev, A. L. Connections between deep inelastic and annihilation processes at next to next-to-leading order and beyond, *Phys. Lett. B* **315**(1-3), 179-187, 1993 ;
Ji, X.-D. Infrared renormalons and power corrections in deep inelastic sum rules, *Nucl. Phys. B* **448**(1-2), 51-66, 1995 ;
Lovett-Turner, C.N. & Maxwell, C. J. All orders renormalon resummations for some QCD observables, *Nucl.Phys. B* **452**(1-2), 188-212, 1995 ;
Stein, E., et al. IR Renormalon contribution to the longitudinal structure function F(L), *Phys.Lett. B* **376**(1-3),177-185, 1996.
Dokshitzer, Yu. L., et al. Dispersive approach to power behaved contributions in QCD hard processes, *Nucl.Phys. B* **469**(1-2), 93-142, 1996.

[255] Dasgupta, M. & Webber, B.R., Power corrections and renormalons in deep inelastic structure functions, *Phys.Lett. B* **382**(3), 273-281, 1996.

[256] Zakharov, V. I. QCD perturbative expansions in large orders, *Nucl. Phys. B* **385**(3), 452-480, 1992.

[257] Virchaux, M. & Milsztajn, A. A Measurement of alpha-s and higher twists from a QCD analysis of high statistics F_2 data on hydrogen and deuterium targets, *Phys. Lett. B* **274**(2), 221-229, 1992.

[258] Barker, I. S., et al. QCD Analysis of Nonsinglet Neutrino Structure Functions, *Z. Phys. C* **19**(2), 147-153, 1983
Barker, I. S. & Martin, B. R. QCD Analysis of Nonsinglet Electromagnetic Structure Functions, *Z. Phys. C* **24**(3), 255-259, 1984.

[259] Blumlein, J. & Bottcher, H. Higher twist contributions to the structure functions $F_2^p(x, Q^2)$ and $F_2^d(x, Q^2)$ at large x at higher orders, *Phys. Lett. B* **662**(4), 336-340, 2008.

[260] Chyla, J. & Kataev, A. L. Next-to-next-to-leading order QCD analysis of the Gross-Llewellyn Smith sum rule and the higher twist effects, *Phys. Lett. B* **297**(3-4), 385-397, 1992.

[261] A. Kataev, L. et al. Next-to-next-to-leading order QCD analysis of the revised CCFR data for xF_3 structure function and the higher twist contributions *Phys. Lett. B* **417**(3-4), 374-384, 1998.

[262] Alekhin, S. I. & Kataev, A. L. The NLO DGLAP extraction of α_s and higher twist terms from xF_3 and F_2 structure functions data for νN DIS, *Phys. Lett. B* **452**(3-4), 402-408, 1999.

[263] Kataev, A. L., et al. The NNLO QCD analysis of the CCFR data for xF_3: is there still the rooms for twist-4 terms?, *Nucl. Phys. Proc. Suppl.* **79**(1-3), 93-95, 1999.

[264] Blumlein J. & Bottcher, H. QCD analysis of polarised deep-inelastic scattering data and parton distributions, *Nucl. Phys. B* **636**(1-2), 225-263, 2002.

[265] Leader, E., et al. Longitudinal polarized parton densities updated, *Phys. Rev. D* **73**(3), 034023(1-5), 2006.

[266] Pumplin, J., et al. New generation of parton distributions with uncertainties from global QCD analysis, *JHEP* **2002**(07), 012(1-46), 2002.

[267] Alekhin, S. Parton distributions from deep inelastic scattering data, *Phys. Rev. D* **68**(1), 014002(1-11), 2003.

[268] Martin, A. D. et al. Uncertainties of predictions from parton distributions II: theoretical errors, *Eur. Phys. J. C* **35**(3), 325-348, 2004.

[269] Virchaux, M. & Milsztajn, A. A Measurement of alpha-s and higher twists from a QCD analysis of high statistics F-2 data on hydrogen and deuterium targets, *Phys. Lett. B* **274**(2), 221-229, 1992.

[270] Martin, A. D., et al. Scheme dependence, leading order and higher twist studies of MRST partons, *Phys. Lett. B* **443**(1-4), 301-307, 1998.

[271] Blumlein, J. & Bottcher, H. Higher twist contributions to the structure functions $F_2^p(x, Q^2)$ and $F_2^d(x, Q^2)$ at large x and higher orders, *Phys. Lett. B* **662**(4), 336-340, 2008.

[272] Accardi, A. & Qiu, J. W. Collinear factorization for deep inelastic scattering structure functions at large Bjorken x(B), *JHEP* **2008**(07), 090(1-33), 2008.

[273] Schaefer, S., et al. Impact of higher order and soft gluon corrections on the extraction of higher twist effects in DIS, *Phys. Lett. B* **514**(3-4), 284-292, 2001.

[274] Alekhin, S. The QCD renormalization scale stability of high twists and alpha(s) in deep inelastic scattering, *Phys. Lett. B* **488**(2), 187-193, 2000.

□□