

Meeting of FOR 2926

Thursday, November 9, 2023 - Saturday, November 11, 2023

DESY Program

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Thursday, November 9, 2023

Coffee - Bulding 1b, Seminar Room 4a+b (3:00 PM - 3:30 PM)

Thursday afternoon: Thursday afternoon - Bulding 1b, Seminar Room 4a+b (3:30 PM - 6:40 PM)

[9] Introduction to the Workshop (3:30 PM)

Presenter: THE ORGANIZERS

[2] Evolution kernels of twist-two operators (3:35 PM)

Presenter: MANASHOV, Alexander (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))

The evolution kernels that govern the scale dependence of the generalized parton distributions are invariant under transformations of the $SL(2,R)$ collinear subgroup of the conformal group. Beyond one loop the symmetry generators, due to quantum effects, differ from the canonical ones. We construct the transformation which brings the symmetry generators back to their canonical form and show that the eigenvalues (anomalous dimensions) of the new, canonically invariant, evolution kernel coincide with the so-called parity respecting anomalous dimensions. We develop an efficient method that allows one to restore an invariant kernel from the corresponding anomalous dimensions. As an example, the explicit expressions for NNLO invariant kernels for the twist two flavor-nonsinglet operators in QCD and for the planar part of the universal anomalous dimension in $N=4$ SYM are presented.

[1] A similarity transformation for the anomalous dimension matrix for exclusive processes (4:05 PM)

Presenter: Dr VAN THURENHOUT, Sam (Wigner RCP)

In the analysis of composite operators for the description of hard exclusive scattering processes, two types of operator basis called the derivative basis and the Gegenbauer basis are often used in the literature. In this talk we discuss the construction of the similarity transformation that can be used to rotate between these two bases. This way, one can use the properties of both bases to their advantage in the computation of the operator anomalous dimensions, which describe the scale dependence of non-perturbative non-forward parton distributions. We will discuss several applications of our transformation rule. First we present a numeric calculation for fixed moments of the two-loop anomalous dimensions in the derivative basis beyond the leading-color limit. Next, we introduce a method for verifying existing computations of the conformal anomaly based on the calculation of the leading-color anomalous dimensions in the derivative basis. Finally, we present the one-loop non-forward gluon anomalous dimension matrix, $\gamma^{\{gg\}}$, which is one of the main ingredients for the renormalization of flavor-singlet operators.

[11] FOR2926 PI's meeting (4:35 PM)

Friday, November 10, 2023

Friday morning (I): Friday morning (I) - Bulding 1b, Seminar Room 4a+b (9:00 AM - 10:30 AM)

[10] Regge pole and Regge cuts in full colour (9:00 AM)

Presenter: GARDI, Einan (The University of Edinburgh)

[18] The graphical function Yang-Mills project (10:00 AM)

Presenter: SCHNETZ, Oliver

Coffee - Bulding 1b, Seminar Room 4a+b (10:30 AM - 11:00 AM)

Friday morning (II): Friday morning (II) - Bulding 1b, Seminar Room 4a+b (11:00 AM - 12:30 PM)

[12] Towards NNLO helicity PDFs (11:00 AM)

Presenter: VOGELSANG, Werner (University of Tübingen)

[13] Progress on the transverse SSA in single-inclusive jet production at the EIC at NLO (11:30 AM)

Presenter: SCHLEGEL, Marc (University of Tuebingen)

We present a brief report on our ongoing efforts to calculate the transverse single-nucleon spin asymmetry of single-inclusive jet production in lepton-nucleon collisions at NLO accuracy within the collinear twist-3 factorization framework. This observable can very well be measured at a future Electron-Ion Collider (EIC). Such data will give new insight into both the partonic structure of the nucleon as well as the QCD dynamics inside the nucleon.

[19] Automtic computation of soft anomalous dimensions for heavy quark production (12:00 PM)

Presenter: CHARGEISHVILI, Bakar (Universität Hamburg, II Institut für Theoretische Physik)

Lunch - Bulding 1b, Seminar Room 4a+b (12:30 PM - 2:00 PM)

Friday afternoon (I): Friday afternoon (I) - Bulding 1b, Seminar Room 4a+b (2:00 PM - 3:30 PM)

[14] Computational methods for multiloop amplitudes in QCD (2:00 PM)

Presenter: VON MANTEUFFEL, Andreas (Universitaet Regensburg)

[17] Quarkonium production with NRQCD: Towards NNLO (3:00 PM)

Presenter: BUTENSCHOEN, Mathias (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))

Coffee - Bulding 1b, Seminar Room 4a+b (3:30 PM - 4:00 PM)

Friday afternoon (II): Friday afternoon (II) - Bulding 1b, Seminar Room 4a+b (4:00 PM - 5:30 PM)

[16] Progress on the TMD shape function (4:00 PM)

Presenter: MAXIA, Luca (University of Groeningen)

[15] A recent TMDPDF extraction and tuning of Pythia to TMD sensible data (4:30 PM)

Presenter: MOOS, Valentin (Universitaet Regensburg)

[6] TMD factorization @ next-to-leading power (5:00 PM)

Presenter: RODINI, Simone (T (Phenomenology))

In this talk I will review the recent progress and results concerning next-to-leading power factorization. I will mostly focus on semi-inclusive DIS process, showing the derivation of the structure functions at one-loop accuracy. I will comment on some of the specific details that emerge at next-to-leading power, such as the cancellation of special rapidity divergences and the emergence of Qiu-Sterman-like contribution in the factorization formula.

Social dinner - Bulding 1b, Seminar Room 4a+b (7:00 PM - 9:00 PM)

Saturday, November 11, 2023

Saturday morning (I): Saturday morning (I) - Bulding 1b, Seminar Room 4a+b (9:30 AM - 10:30 AM)

[4] Four loop splitting functions in QCD (9:30 AM)

Presenter: MOCH, Sven-Olaf (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))
Update on QCD splitting functions.

[5] Impact of SeaQuest data on sea-quark PDFs at large x (10:00 AM)

Presenter: GARZELLI, Maria Vittoria (None)

We discuss the impact of SeaQuest data on ratios of proton-deuteron/proton-proton Drell-Yan cross-sections on sea-quark PDFs at large x . Using as a basis for this study the ABMP16 methodology, we found that they allow to reduce the uncertainties on the $(\bar{u}-\bar{d})(x)$ isospin asymmetry and the $(\bar{d}/\bar{u})(x)$ ratio in the region $0.2 < x < 0.45$, keeping compatibility with other large x data previously included in the fit. We therefore suggest their incorporation in other PDF fits.

Coffee - Bulding 1b, Seminar Room 4a+b (10:30 AM - 11:00 AM)

Saturday morning (II): Saturday morning (II) - Bulding 1b, Seminar Room 4a+b (11:00 AM - 12:30 PM)

[3] Top-quark pole mass extraction at NNLO accuracy from LHC data (11:00 AM)

Presenter: ZENAIEV, Oleksandr (Hamburg University)

We extract the top-quark mass value in the on-shell renormalization scheme from the comparison of theoretical predictions for $\sigma(\bar{t} + X)$ at next-to-next-to-leading order (NNLO) QCD accuracy with experimental data collected by the ATLAS and CMS collaborations for absolute total, normalized single-differential and double-differential cross-sections during Run 1, Run 2 and the ongoing Run 3 at the LHC. Fit results from different sets of parton distribution functions agree among each other within 1σ uncertainty, whereas some datasets related to \bar{t} decay in different channels (dileptonic vs. semileptonic) point towards top-quark mass values in slight tension among each other, although still compatible within 2.5σ accuracy.

[20] Three-quark operators in SMOM scheme at two-loop order (11:30 AM)

Presenter: VERETIN, Oleg (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))

We consider the renormalization of the three-quark operators at NNLO in QCD perturbation theory at the symmetric subtraction point. This allows us to obtain conversion factors between the $\overline{\text{MS}}$ scheme and the regularization invariant symmetric MOM (RI/SMOM) schemes. The results are used to reduce the errors in determinations of the lowest two moments of baryonic distribution amplitudes in lattice QCD simulations.

[21] Second-order massive form factors for the MUonE experiment (12:00 PM)

Presenter: HASAN, Syed (University of Regensburg)

The recently proposed MUonE experiment at CERN aims at providing a novel determination of the leading-order hadronic contribution to the muon anomalous magnetic moment through the study of elastic muon-electron scattering at relatively small momentum transfer. The accuracy is anticipated at the order of 10ppm, which requires high-precision predictions including all the relevant radiative corrections. To aid the theoretical effort, the analytic evaluation of the second-order corrections to the massive form factors, due to two-loop vertex diagrams with a vacuum polarization insertion, with exact dependence on the external and internal fermion masses, and on the squared momentum transfer are evaluated. As an extension to the specific task, we consider vector, axial-vector, scalar and pseudoscalar interactions between the external fermion and the external field.

Lunch - Bulding 1b, Seminar Room 4a+b (12:30 PM - 1:30 PM)