# Parton Showers and Resummation 2025

# Report of Contributions

Contribution ID: **2**                                      Type: **not specified**

# Differential threshold resummation for hadronic and SIDIS processes

*Thursday 17 July 2025 12:40 (20 minutes)*

Using renormalization group arguments in dQCD, I derive an analytic resummation formula for the threshold resummation of differential distributions with fixed longitudinal partonic kinematics. By matching to existing fixed-order NNLO computations I obtain NLL resummation for the Drell-Yan rapidity distribution with fixed partonic rapidity and for semi-inclusive deep-inelastic scattering. For Drell-Yan I compare to previous results obtained using SCET.

**Author:**   FORTE, Stefano (Università degli Studi e INFN Milano (IT))

**Presenter:**   FORTE, Stefano (Università degli Studi e INFN Milano (IT))

Contribution ID: **3**　　　　　　　　　　　　　　　　　　　　　　　Type: **not specified**

# Towards two-loop EW corrections at NLL in OpenLoops

*Tuesday 15 July 2025 17:30 (20 minutes)*

At energies above the Electroweak (EW) scale, higher-order EW corrections exhibit a logarithmic enhancement which is driven by the ratio of the typical scattering energy to the gauge-boson mass. At next-to-leading order (NLO) these corrections lead to factors amounting to several tens of percent in tails of kinematic distributions of crucial LHC processes, and still contribute a few percent at next-to-next-to-leading order (NNLO). As such, their inclusion is essential to reduce theoretical uncertainties arising from missing higher-order corrections.

In this talk, I will review the key features of the algorithm implemented in OpenLoops (OL) for calculating one-loop EW corrections in the logarithmic Sudakov approximation, namely at next-to-leading logarithmic (NLL) accuracy, and present the status towards its extension to the two-loop level. This approximation efficiently implements the Denner-Pozzorini algorithm using an effective vertex approach, enabling to reproduce the full one- and two-loop results with percent-level accuracy while preserving tree-level computational complexity.

**Author:**　MAI, Lorenzo (University of Genova)

**Presenter:**　MAI, Lorenzo (University of Genova)

**Session Classification:**　Recent developments in Monte Carlo generators

Contribution ID: **4**             Type: **not specified**

# Factorization and Resummation in Threshold PDFs

*Tuesday 15 July 2025 16:30 (20 minutes)*

We study factorization at next-to-leading power (NLP) in deep inelastic scattering (DIS) in the endpoint region $x \rightarrow 1$ within the framework of soft-collinear effective theory (SCET). The full QCD process is matched onto two SCET currents, whose matrix elements factorize into individual component functions. By employing endpoint reshuffling theorems that relate these component functions at endpoint kinematics, we remove all endpoint divergences. We then derive the relevant renormalization-group (RG) equations and solve them at leading order in RG-improved perturbation theory, thereby resumming large logarithms to all orders. Our main finding is that, in the endpoint limit, new structures emerge for the parton distribution functions (PDFs), necessitating a modification of the standard PDF factorization scheme .

**Author:** SCHNUBEL, Marvin (BNL)

**Presenter:** SCHNUBEL, Marvin (BNL)

**Session Classification:** Parton densities and soft resummation

Contribution ID: **5**        Type: **not specified**

# Small-x Resummed Gluon Densities from HELL and Applications with JETHAD (Zoom)

*Tuesday 15 July 2025 18:00 (20 minutes)*

We review the state of the art in applying the small-$x$ resummation to parton distribution functions in the proton, with particular emphasis on the gluon content. In the first part, we briefly discuss small-$x$ resummed 1D collinear distributions, highlighting their connections with the 3D transverse-momentum dependent counterparts at both small and moderate $x$, including the effects of gluon-proton spin correlations. In the second part, we present a novel determination of unintegrated gluon densities, obtained from the small-$x$ resummation formalism as implemented in the HELL approach. Finally, we discuss applications to HERA and LHC phenomenology, leveraging the JETHAD multimodular interface.

**Authors:** BONVINI, Marco (INFN, Rome 1 Unit); Dr CELIBERTO, Francesco Giovanni (UAH Madrid)

**Presenter:** Dr CELIBERTO, Francesco Giovanni (UAH Madrid)

**Session Classification:** Parton densities and soft resummation

Contribution ID: **6**                                       Type: **not specified**

# NNLO matching in VINCIA

*Monday 14 July 2025 17:20 (20 minutes)*

Fixed-order matching of Monte Carlo showers remains a critical ingredient to push forward the precision frontier of collider phenomenology. Beyond the conceptually simple leading-order matching, the past two decades have seen multiple techniques to achieve next-to-leading order (NLO) matching which have further been fully automated and made available in public codes. This pushed the precision frontier to NNLO.

We outline a new technique to perform NNLO matching in which the shower Monte Carlo is used as the phase space generator. In the context of a simple process, Z decay to hadrons, we focus on the VINCIA sector shower which utilises the antenna formalism. In the sector approach, the phase space is partitioned into non-overlapping sectors which greatly simplifies the inclusion of 2->4 antenna functions. The matching formulae are derived by comparing the fully differential jet production cross section computed both in the shower and at fixed-order. We develop a technique to compute the complex sector integrals which control the NLO correction to the 3-jet production cross section. The latter is the only missing ingredient to achieve NNLO matching in the process Z decay to hadrons. Finally, we discuss the flowchart of the numerical implementation.

**Author:**   EL-MENOUFI, Basem

**Presenter:**   EL-MENOUFI, Basem

Contribution ID: **7**                                                    Type: **not specified**

# Vector boson+dijets at large mjj

*Thursday 17 July 2025 10:20 (20 minutes)*

We present the first calculation of high-energy corrections to the process of photon+dijet production. The high-energy corrections stabilise the fixed-order perturbative behaviour and lead to a significant improvement in the description of data.

**Author:** ANDERSEN, Jeppe (IPPP, University of Durham)

**Presenter:** ANDERSEN, Jeppe (IPPP, University of Durham)

Contribution ID: **8**                        Type: **not specified**

# Threshold resummation for VV pair production to NNLO+NNLL at the LHC (Zoom)

*Tuesday 15 July 2025 17:00 (20 minutes)*

We perform the threshold resummation for massive vector boson pair production processes ($ZZ$ and $W^+W^-$) in hadron collisions to Next to Next Leading Log accuracy. The resummed cross-sections are then matched with NNLO fixed order results, which are obtained using the MATRIX code. We present our results for the invariant mass distribution to NNLO+NNLL accuracy in QCD for the current LHC energies. The NNLL contributions enhance the cross section by a few per cent in the high invariant mass regions. In these regions, the uncertainties due to unphysical scales ($\mu_R$ and $\mu_F$) in the fixed-order results, 4.6\% for ZZ and 4.2\% for WW (at $Q = 1.3$ TeV) get reduced to 3.2\% and 3.0\%, after resummation.

**Authors:** DEY, Chinmoy (Indian Institute of Technology Guwahati); Dr MEDURI CHAKRAVAR-TULA, Kumar (IIT Guwahati); BANERJEE, Pulak (INFN Cosenza); PANDEY, Vaibhav (Indian Institute of Technology Guwahati)

**Presenter:** PANDEY, Vaibhav (Indian Institute of Technology Guwahati)

**Session Classification:** Parton densities and soft resummation

Contribution ID: **9**                                    Type: **not specified**

# Four-top production at the LHC: improving predictions with invariant-mass threshold resummation.

*Tuesday 15 July 2025 16:00 (20 minutes)*

We present new results for the invariant-mass distribution and total cross section for four-top production, incorporating the resummation of soft-gluon corrections at improved next-to-leading logarithmic accuracy, including non-logarithmic $\mathcal{O}(\alpha_s)$ terms (NLL'accuracy). After discussing the challenges of invariant-mass threshold resummation in processes with six coloured legs, we present our resummed predictions matched to fixed-order NLO calculations. Our results modify the shape of the fixed-order invariant-mass distribution and significantly reduce theoretical uncertainties.

**Authors:** VAN BEEKVELD, Melissa Corona (Nikhef National institute for subatomic physics (NL)); KULESZA, Anna (University of Muenster); LUPATTELLI, Michele (Muenster University); SARACCO, Tommaso (Nikhef)

**Presenter:** SARACCO, Tommaso (Nikhef)

**Session Classification:** Parton densities and soft resummation

Contribution ID: **10** Type: **not specified**

# The Lund b-jet plane

*Thursday 17 July 2025 15:00 (20 minutes)*

In this talk, I will present our research on the substructure of jets containing heavy flavour. Our main goal is to better understand these jets from a theoretical perspective, using resummed perturbative techniques that are specially designed for jets coming from heavy quarks. In particular, we provide analytical predictions for several key jet substructure observables, including jet angularities and the Lund plane density for $b$-jets. I will highlight the most significant differences between our results and those obtained in the massless quark approximation.

**Authors:** GHIRA, Andrea (Università degli studi di Genova); SOYEZ, Gregory (IPhT, CEA Saclay); Prof. MARZANI, Simone (Università di Genova and INFN Sezione di Genova)

**Presenter:** GHIRA, Andrea (Università degli studi di Genova)

**Session Classification:** Recent developments in jet physics

Contribution ID: **11**                                               Type: **not specified**

# LHC phenomenology with KrkNLO matching

*Monday 14 July 2025 15:00 (20 minutes)*

The systematic combination of perturbative QCD with parton-shower resummation is achieved at NLO by a small, but growing, number of 'NLO matching' methods.

Among them, the KrkNLO method is unique in exploiting a modification of the PDF factorisation scheme, from the conventional $\overline{\text{MS}}$ scheme, to a scheme (the 'Krk' scheme) in which the NLO corrections can be applied as a simple multiplicative reweight. This is positive by construction, since it does not use subtraction, and unlike other methods has no dependence on an unphysical choice of shower-scale or suppression factor.

We summarise the KrkNLO method, its recent implementation for general colour-singlet processes in Herwig 7, and present results for LHC processes involving the production of massive and massless vector bosons. We will summarise the results of a systematic comparison with MC@NLO, and also review the properties of the Krk scheme among other factorisation schemes proposed as alternatives to $\overline{\text{MS}}$, including their positivity.

**Author:**   WHITEHEAD, James Christopher

**Presenter:**   WHITEHEAD, James Christopher

Contribution ID: **12**                                                   Type: **not specified**

# Large-x Resummation for Transverse Momentum Distributions

*Tuesday 15 July 2025 17:30 (20 minutes)*

In this talk, I discuss the resummation of leading logarithmic contributions to the collinear matching coefficients of Transverse Momentum Dependent distributions (TMDs) in the large-$x$ regime. Resummation is performed directly at the level of TMDs, preserving their process-independence and, for the first time, covering distributions that match onto twist-three collinear Parton Distribution Functions (PDFs). I will present general resummation formulas valid for all leading power functions, including TMDPDFs and TMDFFs, except the pretzelosity distribution, which is associated with a twist-four operator. Additionally, I demonstrate that the resummation accuracy can reach $N^3LL$, surpassing some of the current fixed-order results for several TMDs. The application of these formulas improves perturbative convergence, helps estimate unknown higher-order terms, and constrains non-perturbative model inputs, thereby providing a robust framework for phenomenology of the different TMD processes.

**Authors:**   PROKUDIN, Alexey (PSU Berks and JLab);   VLADIMIROV, Alexey (Universidad Complutense de Madrid);   SCIMEMI, IGNAZIO (Universidad Complutense madrid);   DEL RÍO GARCÍA, Óscar (Complutense University of Madrid)

**Presenter:**   DEL RÍO GARCÍA, Óscar (Complutense University of Madrid)

**Session Classification:**   Parton densities and soft resummation

Contribution ID: **13**                                                    Type: **not specified**

# KNO scaling in quark and gluon jets at the LHC

*Friday 18 July 2025 10:20 (20 minutes)*

The Koba-Nielsen-Olesen (KNO) scaling of hadron multiplicity distributions, empirically confirmed to hold approximately in $e^+e^-$ collisions and Deep Inelastic Scattering, has been observed to be violated in hadron-hadron collisions. In this work, we show that the universality of KNO scaling can be extended to hadron-hadron collisions when restricted to QCD jets. We present a comprehensive study of KNO scaling in QCD jets produced in proton-proton collisions at the LHC. Using perturbative QCD calculations in the double logarithmic approximation and PYTHIA simulations, we find that KNO scaling approximately holds for both quark and gluon jets across a broad jet $p_T$ range, from 0.1 TeV to 2.5 TeV, at both the parton and hadron levels. Especially, we highlight characteristic differences between the KNO scaling functions of quark and gluon jets, with the quark-jet scaling function lying above that of gluon jets at both low and high multiplicities. This distinction is essential for interpreting inclusive jet data at the LHC. Furthermore, we propose direct experimental tests of KNO scaling in QCD jets at the LHC through quark-gluon discrimination using jet substructure techniques, as demonstrated by applying energy correlation functions to PYTHIA-generated data.

**Authors:** Dr CHEN, Lin (Instituto Galego de Fisica de Altas Enerxias - IGFAE); DUAN, Xiang-Pan; WU, Bin

**Co-authors:** SALGADO LOPEZ, Carlos Albert (Universidade de Santiago de Compostela (ES)); MA, Guo-Liang (Fudan University)

**Presenter:** Dr CHEN, Lin (Instituto Galego de Fisica de Altas Enerxias - IGFAE)

Contribution ID: **14**                                       Type: **not specified**

# Renomalon analysis of SCET-II observables in the large-$\beta_0$ approximation

*Thursday 17 July 2025 15:00 (20 minutes)*

We present a derivation of nonperturbative corrections to SCET-II-type observables in the large-$\beta_0$ approximation based on the bubble-sum approximation within the SCET framework. We demonstrate how to obtain the leading-power nonperturbative corrections using the collinear anomaly approach and further discuss their impact on the corresponding partonic cross sections.

**Author:**   BRUNE, Kevin

**Presenter:**   BRUNE, Kevin

**Session Classification:**   Factorisation and non-perturbative aspects

Contribution ID: **15**                                                    Type: **not specified**

# Final-state NLO matching in Alaric

*Monday 14 July 2025 17:50 (20 minutes)*

In this talk, we present steps towards automated matching of the Alaric parton shower to NLO QCD matrix elements for lepton collisions in Sherpa. We validate our implementation against jet production in $e^+e^- \to$ jets for up to five jets. We show numerical tests of the subtraction in the infrared limit, benchmarking against the Catani-Seymour subtraction. We then present first hadron-level matched results compared against LEP data.

**Authors:**   REICHELT, Daniel;   MEINZINGER, Peter (Zürich University);   HOECHE, Stefan (Fermilab)

**Presenter:**   MEINZINGER, Peter (Zürich University)

Contribution ID: **17**                                          Type: **not specified**

# A novel algorithm for spin correlations in parton evolution

*Tuesday 15 July 2025 16:30 (20 minutes)*

Spin correlations between QCD emissions have so far been neglected in most of the parton shower algorithms commonly used for LHC predictions. However, their inclusion is crucial to achieve NLL accuracy or to include NLO contributions in these algorithms.

In this talk, we present a new algorithm for incorporating spin correlations into parton shower algorithms. Instead of using spin density matrices as in the Collins-Knowles algorithm, the common choice for this task, our algorithm relies on soft currents to exchange spin information between emissions. This has the advantage of reducing the number of amplitude evaluations and, thus, improving the performance compared to the standard algorithm. During the talk I will discuss the idea of the algorithm and the results of its first implementation for final-state particles. Once fully developed, it will be the basis for the inclusion of spin correlations in the parton shower code ALARIC.

**Author:**   HOPPE, Diana Mareen (Technische Universitaet Dresden (DE))

**Co-authors:**   REICHELT, Daniel; SIEGERT, Frank (Technische Universitaet Dresden (DE)); HOECHE, Stefan (Fermilab)

**Presenter:**   HOPPE, Diana Mareen (Technische Universitaet Dresden (DE))

**Session Classification:**   Recent developments in Monte Carlo generators

Contribution ID: **18**                                            Type: **not specified**

# Three-loop jet function for boosted heavy quarks

*Thursday 17 July 2025 17:15 (20 minutes)*

Previous studies have shown that certain observables at massless $e^+e^-$ colliders producing primary top quarks can be used to measure the top quark mass with an uncertainty smaller than $\Lambda_{\mathrm{QCD}}$. The maximal sensitivity to the top mass is attained in the peak of the distribution, where Effective Field Theories (EFTs) enable the factorization of the differential cross section across different physical scales. The jet function —previously known at two loops—appears as a common ingredient in many factorization theorems, motivating the computation of this matrix element at higher perturbative orders.

In this talk, we will review the basic EFT concepts and the factorization theorem necessary to introduce the jet function. We will outline the workflow of a fixed-order calculation and present our analytic result for the three-loop jet function for boosted heavy quarks. Our result can be used to improve the calibration of the top quark mass parameter in parton-shower Monte Carlo generators and enhances the perturbative accuracy of the jet invariant mass distribution for reconstructed top quarks.

**Authors:**    MARTÍN CLAVERO, Alberto;   STAHLHOFEN, Maximilian (Albert-Ludwigs-Universität Freiburg);  BRÜSER, Robin (Albert-Ludwigs-Universität Freiburg);  MATEU BARREDA, Vicent (Universidad de Salamanca)

**Presenter:**   MARTÍN CLAVERO, Alberto

**Session Classification:**  Factorisation and non-perturbative aspects

Contribution ID: **19**          Type: **not specified**

# Super-leading logarithms and PDF factorization

*Thursday 17 July 2025 16:15 (20 minutes)*

I analyze the low-energy dynamics of gap-between-jets cross sections at hadron colliders, for which phase factors in the hard amplitudes spoil collinear cancellations and lead to double ('super-leading') logarithmic behavior. Based on a method-of-regions analysis, I identify three-loop contributions from perturbative active-active Glauber-gluon exchanges with the correct structure to render the cross section consistent with PDF factorization below the gap veto scale. From this, two important conclusions may be drawn: first, no double-logarithmic terms appear in the scale evolution below the veto scale, and second, the DGLAP evolution must be correctly matched as well.

**Authors:** SCHWIENBACHER, Dominik; NEUBERT, Matthias (Johannes Gutenberg University Mainz); HAGER, Patrick Angus; JASKIEWICZ, Sebastian Eryk (University of Bern); BECHER, Thomas Georg (Universitaet Bern (CH))

**Presenter:** SCHWIENBACHER, Dominik

**Session Classification:** Recent developments in jet physics

Contribution ID: **20**                                                         Type: **not specified**

# Super-leading logarithms from effective field theory

*Thursday 17 July 2025 12:00 (30 minutes)*

Factorization theorems for non-global observables at hadron colliders can be used to resum super-leading logarithms (SLLs) and we present a phenomenological analysis of their numerical impact in pp -> 2 jets.

SLLs are closely related to collinear factorization breaking and are driven by a double-logarithmic evolution equation in an effective field theory. The compatibility of this double-logarithmic evolution with single-logarithmic PDF evolution at low scales implies stringent consistency conditions on the low-energy matrix element of this effective theory.

We will derive these conditions in our talk; the explicit computations necessary to verify consistency at the three-loop level will be covered in a separate presentation.

**Authors:** SCHWIENBACHER, Dominik; NEUBERT, Matthias (Johannes Gutenberg University Mainz); HAGER, Patrick Angus; JASKIEWICZ, Sebastian Eryk (University of Bern); BECHER, Thomas Georg (Universitaet Bern (CH))

**Presenter:** BECHER, Thomas Georg (Universitaet Bern (CH))

Contribution ID: **21**                                            Type: **not specified**

# Partial N3LL + NNLO Resummed Predictions for the Drell-Yan Process in Rapidity Dependent Jet Veto Observables

*Thursday 17 July 2025 17:45 (20 minutes)*

Jet vetoes are important tools that can be used to separate hard processes. A commonly used variable in which jets are identified and vetoed is the transverse momentum of a jet. It can also be useful to vary the tightness of such cuts depending on the rapidity of a jet depending on the focus on central or forward jets. This naturally leads to a class of such variables related to the leading jets transverse momentum weighed by some rapidity dependent function. Here we explore various types of rapidity dependent jet veto variables.

Applying tight cuts on such variables requires resummation of large logarithms, which can cause fixed order predictions to be unphysical. Here we present cutting edge partial N3LL + NNLO results for the Drell-Yan process in 2 rapidity dependent jet veto variables. These predictions act as a test for SCET and can be used to probe into the properties of QCD radiation.

**Author:** CLARK, Thomas

**Presenter:** CLARK, Thomas

**Session Classification:** Recent developments in jet physics

Contribution ID: **22**                                                                    Type: **not specified**

# On Determining $\alpha_s(m_Z)$ from Dijets in $e^+e^-$ Thrust

*Wednesday 16 July 2025 16:25 (30 minutes)*

We update a previous N$^3$LL$'$+$calO(\alpha_s^3)$ determination of the strong coupling from a global fit to thrust data. Detailed discussions are provided concerning the stability of the results under variations of the fit range and the importance of summing up higher-order logarithmic terms for convergence and stability. We also demonstrate that a number of additional effects associated to power corrections have a small impact on this fit result, including modifications to the renormalon substraction scheme for dijet power corrections and the inclusion of three-jet power correction models.

**Authors:** HOANG, André; VITA, Gherardo; STEWART, Iain; BENITEZ, Miguel (University of Salamanca); MATEU, Vicent

**Presenter:** BENITEZ, Miguel (University of Salamanca)

Contribution ID: **23** Type: **not specified**

# Decomposition of QCD splitting functions into scalar radiators and pure remainders

*Tuesday 15 July 2025 16:00 (20 minutes)*

In this talk, I will present a new decomposition of QCD splitting functions, carried out systematically up to second order in the strong coupling. The core idea is to separate the splitting functions into two components: scalar dipole radiator functions and pure remainders. Unlike conventional approaches, our construction does not rely on any soft or collinear approximations. The splitting functions can be used to construct an overlap free subtraction, or for the construction of accurate Parton showers.

**Author:** KNOBBE, Max (University of Göttingen)

**Presenter:** KNOBBE, Max (University of Göttingen)

**Session Classification:** Recent developments in Monte Carlo generators

Contribution ID: 24                                           Type: **not specified**

# A Precise Determination of $\alpha_s$ from Heavy Jet Mass

*Wednesday 16 July 2025 17:45 (20 minutes)*

A global fit for $\alpha_s(m_Z)$ is performed on available $e^+e^-$ data for the heavy jet mass distribution. The state-of-the-art theory prediction includes $\mathcal{O}(\alpha_s^3)$ fixed-order results, N³LL′ dijet resummation, N²LL Sudakov shoulder resummation, and a first-principles treatment of power corrections in the dijet region. Theoretical correlations are incorporated through a flat random-scan covariance matrix. The global fit results in $0.1145^{+0.0021}_{-0.0019}$, compatible with similar determinations from thrust and $C$-parameter.

Dijet resummation is essential for a robust fit, as it engenders insensitivity to the fit-range lower cutoff; without resummation the fit-range sensitivity is overwhelming.

In addition, we find evidence for a negative power correction in the trijet region if and only if Sudakov shoulder resummation is included.

**Author:** BHATTACHARYA, Arindam

**Co-authors:** HOANG, Andre (Austrian Academy of Sciences (AT)); Prof. STEWART, Iain; SCHWARTZ, Matthew (Harvard University); BENITEZ, Miguel (University of Salamanca); Prof. MATEU, VICENT (University of Salamanca); ZHANG, Xiaoyuan

**Presenter:** BHATTACHARYA, Arindam

Contribution ID: **25**                                              Type: **not specified**

# The perturbative structure of jet vetoes in azimuthal gaps

*Thursday 17 July 2025 16:45 (20 minutes)*

The distribution of transverse energy flow into an azimuthal strip presents novel theoretical features and accompanying challenges in its all-order description. Its resummation structure depends non-trivially on the axis definition, with the standard thrust axis breaking naive double-logarithmic exponentiation. Moreover it receives non-global logarithmic (NGL) enhancements that start with $\mathcal{O}(\alpha_s^2 L^3)$ rather than the usual single-logarithmic NGL structure. We investigate the logarithmic structure of this observable at both lepton and hadron colliders and present resummed analytic results at the next-to-double-logarithmic order, as well as a numerical algorithm for its leading-logarithmic resummation at leading $N_C$. We find that standard widely used dipole showers fail to describe the observable beyond crude double-logarithmic estimates. This study shows that simple modifications to well-studied observables can lead to complex theoretical structures, underscoring the need for flexible numerical tools with high logarithmic precision.

**Authors:**  FRALEY, Alexander (University of Manchester);  DASGUPTA, Mrinal (The University of Manchester (GB));  MONNI, Pier Francesco (CERN)

**Presenter:**  FRALEY, Alexander (University of Manchester)

**Session Classification:**  Recent developments in jet physics

Contribution ID: **26** Type: **not specified**

# Current limitations of event generators in experimental analyses at the LHC

*Monday 14 July 2025 13:25 (45 minutes)*

**Presenter:** ROLOFF, Jennifer (Brown University (US))

Contribution ID: **27**                                          Type: **not specified**

# Theoretical understanding of QCD cascades in heavy-ion collisions

*Friday 18 July 2025 09:40 (30 minutes)*

**Presenter:**   Dr MILHANO, Guilherme (LIP-Lisbon & CERN TH)

Contribution ID: **28** Type: **not specified**

# Overview of jet physics in heavy-ion collisions

*Friday 18 July 2025 09:00 (30 minutes)*

**Presenter:** LOURENCO HENRIQUES BARATA, Joao

Contribution ID: **29**                                              Type: **not specified**

# Recent developments in the calculation of higher-order matrix-element in heavy-ion collisions

*Friday 18 July 2025 11:20 (30 minutes)*

**Presenter:** ARNOLD, Peter (University of Virginia (US))

Contribution ID: **30**                                         Type: **not specified**

# Welcome

*Monday 14 July 2025 13:15 (10 minutes)*

**Presenters:** SOTO ONTOSO, Alba (Universidad de Granada (ES)); Dr KARLBERG, Alexander (CERN); REICHELT, Daniel; BUONOCORE, Luca (CERN); MONNI, Pier Francesco (CERN)

Contribution ID: **31**                                  Type: **not specified**

# PanScales efforts towards NNLL showers

*Tuesday 15 July 2025 09:30 (30 minutes)*

**Presenter:** SOYEZ, Gregory (IPhT, CEA Saclay)

Contribution ID: **32** Type: **not specified**

# The Alaric project

*Tuesday 15 July 2025 10:10 (30 minutes)*

**Presenter:** HOECHE, Stefan (Fermilab)

Contribution ID: **33** Type: **not specified**

# Timelike Factorization in jet physics

*Wednesday 16 July 2025 09:00 (30 minutes)*

**Presenter:** MOULT, Ian

Contribution ID: **34**                                                     Type: **not specified**

# Recent developments in jet substructure calculations

*Wednesday 16 July 2025 09:40 (30 minutes)*

**Presenter:** Prof. MARZANI, Simone (Università di Genova and INFN Sezione di Genova)

Contribution ID: **35** Type: **not specified**

# Recent theoretical advancements in the description of energy correlations

*Wednesday 16 July 2025 11:20 (30 minutes)*

**Presenter:** ZHU, Huaxing (ZJU - Zhejiang University (CN))

Contribution ID: **36** Type: **not specified**

# TH colloquium: The Strong Interaction at 50 Years: less Puzzling, more Rich, and still Mysterious

*Wednesday 16 July 2025 14:00 (1 hour)*

https://indico.cern.ch/event/1513473/

**Presenter:** Prof. STEWART, Iain

Contribution ID: **37** Type: **not specified**

# Conceptual and technical challenges in the matching of parton showers to higher-order calculations

*Monday 14 July 2025 14:20 (30 minutes)*

**Presenter:** SKANDS, Peter (Monash University (AU))

Contribution ID: **38** Type: **not specified**

# Logarithmically-accurate and positive-definite NLO shower matching with ESME

*Monday 14 July 2025 16:00 (30 minutes)*

**Presenter:** Dr KARLBERG, Alexander (CERN)

Contribution ID: **39**                                         Type: **not specified**

# Current status of NNLOPS simulations at LHC

*Monday 14 July 2025 16:40 (30 minutes)*

**Presenter:** ROTTOLI, Luca (Universita & INFN, Milano-Bicocca (IT))

Contribution ID: **40** Type: **not specified**

# High-energy limit of QCD

*Thursday 17 July 2025 09:00 (30 minutes)*

**Presenter:** GARDI, Einan

Contribution ID: **41**                                        Type: **not specified**

# Reggeization in Color

*Thursday 17 July 2025 09:40 (30 minutes)*

**Presenter:**   Prof. STEWART, Iain

Contribution ID: 42                                     Type: **not specified**

# Non-perturbative corrections to the projected N-point energy correlators

*Tuesday 15 July 2025 14:10 (30 minutes)*

**Presenter:**   Dr PATHAK, Aditya (DESY)

Contribution ID: **43** Type: **not specified**

# Hadronization models with NLL-accurate showers in Herwig

*Tuesday 15 July 2025 12:00 (30 minutes)*

**Presenter:** HOANG, Andre (Austrian Academy of Sciences (AT))

Contribution ID: 44                                          Type: **not specified**

# Non-perturbative power corrections using the PanScales shower

*Tuesday 15 July 2025 14:50 (30 minutes)*

**Presenter:**   ZANOLI, Silvia (University of Oxford)

Contribution ID: 45      Type: **not specified**

# Non-perturbative power corrections to $e^+e^-$ event shapes in the three-jet region and strong coupling fits

*Wednesday 16 July 2025 17:05 (30 minutes)*

**Presenter:** NASON, Paolo

Contribution ID: 46 Type: **not specified**

# Thrust distribution in electron-positron annihilation at full NNNLL+NNLO (and beyond) in QCD

*Wednesday 16 July 2025 15:45 (30 minutes)*

**Presenter:** FERRERA, Giancarlo (Università degli Studi e INFN Milano (IT))

Contribution ID: 47 Type: **not specified**

# Automation of NNLL calculations

*Wednesday 16 July 2025 10:20 (20 minutes)*

**Presenter:** BANFI, Andrea (University of Sussex)

Contribution ID: 48                                                    Type: **not specified**

# Recent progress in subleading-colour effects and amplitude-level evolution

*Tuesday 15 July 2025 11:20 (30 minutes)*

**Presenter:**   PLATZER, Simon (University of Graz (AT))

Contribution ID: **49** Type: **not specified**

# TBD

**Presenter:** LI, Yibei

Contribution ID: **51** Type: **not specified**

# Farewell

*Friday 18 July 2025 12:00 (10 minutes)*

**Presenters:** SOTO ONTOSO, Alba (Universidad de Granada (ES)); Dr KARLBERG, Alexander (CERN); REICHELT, Daniel; BUONOCORE, Luca (CERN); MONNI, Pier Francesco (CERN)

Contribution ID: **52**                                                    Type: **not specified**

# Status of NLL-Accurate Parton Showers in Herwig

*Tuesday 15 July 2025 09:00 (20 minutes)*

**Presenter:**   SULE, Siddharth (The University of Manchester (GB))

Contribution ID: **53**　　　　　　　　　　　　　　　　　Type: **not specified**

# Towards a Quantum Information Theory of Hadronization

*Thursday 17 July 2025 14:30 (20 minutes)*

**Presenter:**　MICHEL, Johannes (Nikhef/University of Amsterdam)

**Session Classification:**　Factorisation and non-perturbative aspects

Contribution ID: **54**                                           Type: **not specified**

# Parton shower recoil with jets

*Tuesday 15 July 2025 17:00 (20 minutes)*

**Presenter:**   HELLIWELL, Jack (Monash University (AU))

**Session Classification:**   Recent developments in Monte Carlo generators

Contribution ID: **55**                                                  Type: **not specified**

# NNLO soft function for 0-jettiness in tt production

*Thursday 17 July 2025 16:45 (20 minutes)*

**Presenter:**   EDELMANN, Sebastian

**Session Classification:**   Factorisation and non-perturbative aspects

Contribution ID: **56**
Type: **not specified**

# Exponentiation of next-to-soft gluon and soft quark emissions from the replica trick

*Thursday 17 July 2025 16:15 (20 minutes)*

**Presenter:** VERNAZZA, Leonardo (INFN, Torino)

**Session Classification:** Factorisation and non-perturbative aspects

Contribution ID: **57** Type: **not specified**

# SLLs in ttbar production

*Thursday 17 July 2025 17:15 (20 minutes)*

**Presenter:** BANERJEE, UPALAPARNA (JGU Mainz)

**Session Classification:** Recent developments in jet physics

Contribution ID: **58** Type: **not specified**

# **TBD**

*Wednesday 16 July 2025 12:00 (30 minutes)*

**Presenter:** VITA, Gherardo

Contribution ID: 59                                                      Type: **not specified**

# **TBD**

*Thursday 17 July 2025 11:20 (30 minutes)*

**Presenter:**   BUONOCORE, Luca (CERN)

Contribution ID: **60** Type: **not specified**

# Soft anomalous dimensions with massive legs

*Thursday 17 July 2025 17:45 (20 minutes)*

**Presenter:** ZHU, Zehao (University of Edinburg)

**Session Classification:** Factorisation and non-perturbative aspects

Contribution ID: **61**　　　　　　　　　　　　　　　　　　　Type: **not specified**

# NNLO predictions with nonlocal subtractions and fiducial power corrections

*Thursday 17 July 2025 14:30 (20 minutes)*

**Presenter:** BROGGIO, Alessandro

**Session Classification:** Recent developments in jet physics