19th MCnet Meeting

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CERN

Book of Abstracts

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Simulating Double Parton Scattering

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Presentation based on 1906.04669.

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W^+W^- pair production in k_t-factorisation in the SM and beyond

Author: Aidin Masouminia[1]

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In this talk, I will present a summary of our calculations for the production of W^+W^- pairs through leptonic decay channels $W^+W^- \to l^+\nu_l + l'^-\nu_{l'}$ in the framework of k_t-factorization. The calculations are performed using the TMD-PDFs of KMR, in different kinematic setups and the results are compared against their counter-part collinear predictions (from HERWIG7 event generator) as well as the existing experimental data from the ATLAS and the CMS collaborations for 8 and 13 TeV. A similar attempt has been made for the case of W-boson pair production through the $gg \to H \to W^+W^-$ channel, which is of considerable phenomenological interest at the NNLO QCD accuracy, for both the SM and BSM. We particularly target this NNLO sub-process, since its BSM sensitivity is of critical importance. It will be shown that our present SM predictions for the W^+W^- boson pair production signal would provide the necessary and reliable SM base-line for the future BSM studies.

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The helicity-flow method

Author: Andrew Lifson[1]

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It is well-known that the spinor-helicity method can significantly simplify the calculations of both Feynman diagrams and scattering amplitudes. In this work, we attempt to further simplify the Feynman-diagram calculation by converting the spinor-helicity method into a flow method, allowing a one-line journey from Feynman diagram to inner products. The cases of massless QED and QCD will be discussed.

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Equilibration in QCD with an effective kinetic theory event generator for proton-proton and heavy ion collisions

Author: Robin Törnkvist[1]

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This presentation will cover a short introduction of myself and a brief overview of the PhD project that I have recently started working on. This project consists of constructing and implementing a complete event generator for proton-proton, proton-ion and ion-ion collisions in the multi-purpose event generator SHERPA. The main part of the project is to implement an effective kinetic theory describing weakly coupled QCD plasmas in thermal field theory, which will be supplemented with suitable initial conditions and a hadronisation prescription.

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Observables and status of heavy-ion physics

Authors: Smita Chakraborty[1]; Leif Lönnblad[2]; Christian Bierlich[2]; Gosta Gustafson[1]

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We discuss observables present in the heavy-ion community today and the challenges associated with it for event generators, specifically for PYTHIA.

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Hadronic rescattering in Pythia

Authors: Marius Utheim[1]; Torbjorn Sjostrand[None]

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We have developed a framework for hadronic rescattering in Pythia. Our goal is to study how rescattering can account for QGP-like effects such as flow, jet quenching, etc. In this presentation I will outline our algorithm and present some preliminary results.

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Introducing myself to MCnet collaboration

Author: Simon Luca Villani[1]

[1] *University of Göttingen*

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I'm going to give a short presentation of my master thesis studies about threshold resummation for double differential cross sections. Afterwords the main lines of this Ph.D. project, about loop induced processes, are introduced.

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High Energy resummation for Higgs plus dijets

Author: Marian Heil[1]

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Higgs boson production in association with two jets is an interesting process to measure the Higgs to weak-boson coupling (WBF). However at the LHC the inclusive production of Hjj is dominated by the gluon fusion component, where the Higgs boson couples to the gluon via a top loop. The gluon fusion component is typically reduced by cuts requiring a large invariant dijet mass. Such mass cuts force the phase space in a region of large rapidity separations between the jets, where a logarithm $\ln(s/t)$ becomes relevant.

I will present the latest efforts of resumming even Next-to-Leading logarithmic contributions, as implemented in the generator High Energy Jets (HEJ). Since the limit of large top-mass and the high energy limit commute, the full top mass dependence can be retained in the predictions. The effect of the finite top mass is a further 10% reduction of the cross section, on top of the ~40% reduction within the WBF cuts of the results obtained with the HEJ resummation compared to the results at NLO.

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A New Biasing Method for Variance Reduction of Compton Events in GEANT4

Author: Sunil Kumar[1]

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In this talk, we present a new biasing method which is used to reduce the variance of low and high angle Compton scattered events from a pencil beam of X-rays interacting with a sample. The method is used to provide more accurate scatter kernels at lower computational cost than is achievable using standard GEANT4 biasing methods.
A scatter kernel is the point spread function described by the scattering of x-rays from a pencil beam through interaction with a sample. These kernels are used in medical image processing to provide a digital correction of scatter which has been shown to outperform traditional methods of physical scatter rejection using an anti-scatter grid (ASG).
In order to provide an accurate estimate of the scatter, low variance kernels must be generated in GEANT4. Due to the low probability of high angle scatter, the computational cost of producing such kernels is high. This new Compton biasing method has been proven to give both a reduction in variance and a lower computational cost.

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HEJ: Status Update

Author: James Black[1]

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I will present the results and new features that now exist within HEJ since the last MCnet meeting at CERN. In the past year, a new public release, HEJ2, as well as finite quark mass effects have been included.

I will also present briefly the ongoing work within the HEJ collaboration, including the steps towards NLL.

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Madgraph update

Author: Luca Mantani[1]

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I will present a new feature that is being implemented in madgraph, the possibility to generate polarised scattering events in order to perform polarisation studies and take advantage of the fact that certain physics is polarisation sensitive.

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Uncertainties in NLO Merging Schemes

Author: Leif Gellersen[1]

[1] *Lund University*

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Uncertainties in NLO calculations are often estimated by variations of the renormalization scale. The same can be done in parton showers. I talk about the consistent treatment of renormaliztion scale variations in the unitary merging of NLO matrix element calculations and parton showers. Furthermore, I discuss some freedom in reweighting NLO corrections and compare different unitary merging prescriptions.

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Recoil and Kinematics in Parton Showers

Author: Emma Simpson Dore[1]

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I will talk about kinematic mapping for dipole parton showers and recoil mechanisms comparing local and global recoil and Herwig. I will also briefly discuss the extension of this to the two emission case.

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Soft Photon Resummation in SHERPA

Authors: Alan Price[None]; Frank Martin Krauss[1]

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I will discuss the resummation of soft photon via the YFS algorithm for ISR in Sherpa

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4 lepton measurement designed for reinterpretation

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4 lepton measurement designed for reinterpretation