

Verein zur Förderung der Theoretischen Physik in Österreich

# EINLADUNG

zur 2. Vorlesung im Rahmen der Erwin-Schrödinger-Gastprofessur 2024

**Matthias NEUBERT**  
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***“Factorization of non-global LHC observables  
Part 2: “The Glauber series”***

**Abstract:**

We present a systematic formalism based on a factorization theorem in Soft-Collinear Effective Theory (SCET) to describe non-global observables at hadron colliders, such as gap-between-jets cross sections. The cross sections are factorized into convolutions of hard functions, capturing the dependence on the partonic center-of-mass energy  $\sqrt{s}$ , and low-energy matrix elements, which are sensitive to the low scale  $Q_0 \ll \sqrt{s}$  characteristic of the veto imposed on energetic emissions into the gap region between the jets. The scale evolution of both objects is governed by a renormalization-group equation, whose form we derive. With the help of this equation, we develop an EFT-based approach to the resummation of so-called “non-global logarithms”, including the “super-leading logarithms” discovered by Forshaw et al. in 2006, which only appear in hadron-collider processes.

**Part 2:** The super-leading logarithms arise from two soft Glauber-gluon interactions between the two colliding partons in the scattering process. Using the same formalism, we explore the contributions of multiple Glauber interactions. The “Glauber series” simultaneously incorporates large double-logarithmic corrections together with higher-order exchanges of Glauber pairs associated with the large numerical factor  $(i\pi)^2$ . Numerical estimates for wide-angle gap-between-jet cross sections at the parton level show that, in particular for gg scattering at relatively small vetoes  $Q_0$ , the contribution involving four Glauber exchanges gives a sizable correction and should not be neglected. We develop a resummation approach for the terms in the Glauber series in renormalization-group improved perturbation theory, including the running of the strong coupling  $\alpha_s(\mu)$ . We also show that the Glauber series itself can be resummed to all orders in the large- $N_c$  limit.

**Zeit: Dienstag, 21.5.2024, 16:15h**

**Ort: Erwin-Schrödinger-Hörsaal, Boltzmannngasse 5, 5. Stock**

**Zoom Meeting:**

Meeting ID: 933 4269 3866 Passcode: 185096

<https://univienne.zoom.us/j/93342693866?pwd=aUpTR0VJNUhJY2Q0ajdaKzI1YWVlBQ09>

gez.: A. Hoang, H. Neufeld, M. Procura

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