Kolleg Mathematik Physik Berlin

Interdisciplinary Center for Research in Mathematical Physics

KMPB – Day

Monday September 27th 2021, 12:30-16:00

Zoom 682 4108 8364 Password 881180

12:30 Graphical functions in even dimensions

Michael Borinsky*, *ETH Zürich

Graphical functions are a powerful tool to perform exact analytic Feynman period computations. I will review the technology which was originally introduced by Oliver Schnetz and report on recent advances of the method that allowed the extension of graphical functions from four dimensions to arbitrary even dimensions. This extension of the technology brings gauge theories within reach of the graphical function method. Moreover, it allowed the graphical functions method to be applied to graph cohomology computations in the context of work of Francis Brown.
Based on https://arxiv.org/abs/2105.05015 (work with Oliver Schnetz)

13:45 Dyson Schwinger Equations in minimal subtraction

Paul-Hermann Balduf*, *HU Berlin

The Hopf-algebra formulation of perturbative quantum field theory has, amongst other things, led to a novel systematic approach to Dyson Schwinger Equations (DSEs). The framework is based entirely on kinematic renormalization conditions. Recently, the results were even extended to a full, non-perturbative solution of the DSE.
On the other hand, most perturbative QFT calculations rely on minimal subtraction (MS) renormalization conditions. These conditions produce the same physical Green function, but with a shifted renormalization point compared to kinematic renormalization. The shift is a new, unknown function, for non-linear DSEs given by a factorially divergent power series similar to the anomalous dimension. In my talk, I discuss the position of the shifted renormalization point for various 1-scale DSEs.

15:00 Algebraic cut structures on Feynman graphs

Karen Yeats*, *U. Waterloo

I will talk about recent joint work with Dirk Kreimer, where we consider how cut structures on Feynman graphs interact with the algebraic structure of renormalization and what this means combinatorially, with a few brief digressions into enumeration and algebraic graph theory.

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