

Feynman amplitudes and moduli spaces of graphs

Marko Berghoff (HU Berlin)

1 March, 2018

Abstract: Moduli spaces of graphs show up in various areas of mathematics, for instance in geometric group theory or tropical geometry. Moreover, recent results by Bloch and Kreimer hint at a connection between the combinatorial structure of such spaces and questions regarding the analytic structure of Feynman amplitudes, a long-standing open problem in quantum field theory. In this talk I will give a short introduction to Feynman amplitudes and show how to interpret them as integrals over “semi-discrete” volume forms on an appropriate moduli space of colored graphs. In the case relevant for physics most of these integrals are divergent and need to be renormalized to find their finite physical value. I will explain how these divergences are encoded in the structure of the moduli space and how a Borel-Serre bordification of it can be used to solve the renormalization problem. If time permits I discuss some further properties of these moduli spaces of colored graphs and how similar constructions a la Outer space could help to improve our understanding of Feynman amplitudes viewed as boundary values of complex functions.