RESEARCH SEMINAR ON STRING MATHEMATICS
MONODROMY AND RESURGENCE
SUMMER TERM 2022

The topic of the research seminar for string mathematics for the summer term 2022 is *Monodromy and resurgence*. It is open to anyone interested in research questions around this topic. It will consist of several talks given by the participants of the seminar following some suggested literature and may include research talks given by external invited speakers.

Introduction and summary

Resurgence refers to the mathematical treatment of divergent formal power series using the Borel transform and the study of the Borel summability of the Borel transform and the associated Stokes phenomena. Divergent power series are ubiquitous in quantum mechanics, quantum field- and string theories. These are typically obtained using a perturbative formulation of the theory or of its correlation- and partition functions. The divergence of the obtained formal series in the expansion parameter signals missing contributions from non-perturbative effects which can be made precise using the methods of resurgence. Within mathematics resurgent power series are often found as solutions of differential equations near irregular singular points, the Borel transform and summation also allows here to recover analytic functions defined over larger domains from the asymptotic expansion.

The aim of this seminar is to understand the mathematical structures behind the ideas of resurgence as well as to discuss some of its applications/appearances in exact WKB, QFT and string theory.

Literature

The literature which will be followed is:

- Divergent series, summability and resurgence by Mitschi and Sauzin
- Lectures on non-perturbative effects in large N gauge theories, matrix models and strings by Marcos Marino

Logistics

The seminar is organized by Murad Alim (*murad.alim@uni-hamburg.de*). It takes place on Mondays 14:15-15:45 in Geomatikum 431, an organizational meeting takes place on April 4th, the first talk is on April 11th. Talks are given by members of the group or graduate students who are in the research phase of their masters/phd programs. If you are interested in giving a talk, please email the organizers.