Bernoullis Tafelrunde

Graduate Student Seminar

Monday, 20th March 2023, 12:15-13:00
Seminarraum 05.002, Spiegelgasse 5

Dominik Nowak

University Basel

Reconstructing the KdV Model from the Toda Chain by Inverse Scattering Transform

Abstract

Finding exact solutions to physical systems has been crucial since the development of kinematics. Unfortunately, it is not always possible to formulate exact solutions to classical dynamical systems with the established mathematical functions. An important milestone in understanding a system's equation of motion was achieved by Joseph Liouville by introducing the notion of *integrability*. As one example of classical integrable chain models, the infinite Toda chain will be introduced and discussed. Contrastingly, the Korteweg-de-Vries (KdV) equation will be investigated as an example of integrable Hamiltonian field theories. We will derive explicit solutions of both models by means of the *inverse scattering transform*, which is a method to solve non-linear partial differential equations.

The talk will be concluded with illustrating similarities between the Toda chain and the KdV equation.