Graduate Seminar on Representation Theory

Introduction to Lie groups and their representations

Summer term 2022

DR. THORSTEN HEIDERSDORF

This seminar gives an introduction to Lie groups with an emphasis on representation theoretic aspects. In order to get anywhere, we will focus on Matrix Lie groups which helps to get rid of some lengthy technical preliminaries that are necessary for general Lie groups.
The seminar is meant to complement the lecture course of Professor Stroppel on Lie algebras in the summer term. It can however be taken independently since no substantial knowledge of Lie algebras is required.

Some topics:
Basics on Lie groups
Matrix Lie groups
Matrix exponentials and the Baker-Campbell-Hausdorff formula
The correspondence between Lie groups and Lie algebras
Coverings and Fundamental groups
Representation theory for compact groups
The Peter-Weyl theorem
Analytic proofs of the Weyl character formula and complete reducibility

Date and time of the seminar: Tuesdays 4-6pm.

Prerequisites: Linear Algebra, some basic background on algebras. Integration on manifolds, some topology (connectedness, simply connected, fundamental groups).

Organizational meeting: Wednesday, Feb 9, 4.15pm via Zoom (see the link on the homepage)

Literature: Hall: *Lie Groups, Lie Algebras, and Representations*, Bump: *Lie groups* and selected other texts.

Contact: thorsten@math.uni-bonn.de