

Coxeter Groups & Lie Algebras

Course details:

- x WS 20/21
- x Tue & Thu, 14:15-15:45
- x Studienleistung:
 - Attend classes
 - Present solution to exercises (2x)
- x Prüfungsleistung:
 - Oral exam

math.commelin.net/2020/coxeterlie

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Goal of this course

The classification of
finite-dimensional
semisimple Lie algebras
and their fin. dim.
representations

(all over alg. closed fields
of characteristic 0).

Along the way

x Coxeter groups and

reflection groups

x Root systems

x What happens if
we drop some of
the adjectives
in the goal?

3 ways to motivate Lie algebras

Geometry: from Lie groups to Lie algebras

(also the historical path)

Algebra: the study of commutators

Combinatorial: the classification shows up in other parts of maths

What's next

- Rough structure of Lie algebras
(including definition of semisimplicity)
- Classical examples, coming from linear algebra / matrices
- Root systems, Weyl groups, reflection groups
- Representation theory in low dimensions
- Generate a Lie algebra from a Dynkin diagram
- The classification