

## MAT564: SEMINAR REPRESENTATION THEORY OF $\mathfrak{sl}_2$ – SUMMARY

### What?

Representation theory is an important and intensively studied area of modern mathematics with applications to basically all major areas of mathematics and physics.

The aim of this seminar is to learn what representation theory is all about, with the focus on the toy example of  $\mathfrak{sl}_2$  where everything can be done explicitly.

The seminar follows the book [Ma10].

### Who?

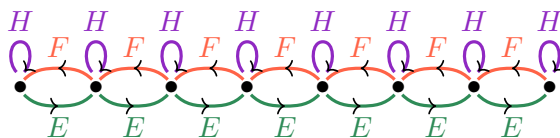
Bachelor students, Master students and upwards interested in a mixture of algebra and category theory. In particular, students following the lecture “Introduction to representation theory” by Anna Beliakova. (This seminar will start mid of March after the first concepts were introduced in the lecture “Introduction to representation theory”.)

### Where and when?

- ▶ Time and date.
  - Every Monday from 10:15–12:00.
  - Room Y27H28, University Zurich, Institute of Mathematics.
  - First meeting: Monday 18.Mar.2019.
- ▶ Preliminary meeting: Friday 01.Feb.2019, 10:15–12:00, room Y27H28.
- ▶ Website <http://www.dtubbenhauer.com/seminar-sl2-2019.html>

### Preliminary Schedule.

- ▷ The finite-dimensional case I – the simples. (18.Mar.2019)
- ▷ The finite-dimensional case II – semisimplicity. (25.Mar.2019)
- ▷ The finite-dimensional case III – unitarizability. (01.Apr.2019)
- ▷ Universal enveloping algebra I – the PBW theorem. (08.Apr.2019)
- ▷ Universal enveloping algebra II – the Cartan subalgebra. (15.Apr.2019)
- ▷ Universal enveloping algebra III – the Harish-Chandra homomorphism. (29.Apr.2019)
- ▷ Weight modules I – weight, Verma and dense modules. (06.May.2019)
- ▷ Weight modules II – the simples. (13.May.2019)
- ▷ Weight modules III – categorical considerations. (20.May.2019)
- ▷ Outlook – category  $\mathcal{O}$ . (27.May.2019)



### REFERENCES

[Ma10] V. Mazorchuk. *Lectures on  $\mathfrak{sl}_2(\mathbb{C})$ -modules*. Imperial College Press, London, 2010. x+263 pp.

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