Topics in the representation theory of infinite-dimensional Lie algebras

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INdAM Visiting Professor

Timetable: 16 hrs. First lecture October 24, 2019, 14:00 (dates already fixed, see calendar), Torre Archimede, Room 2BC/30.

Course requirements: solid knowledge of linear algebra and knowledge of Lie theory at beginner’s level.

Examination and grading: oral examination on the topics covered during the course

SSD: MAT/02

Aim: The course aims at providing an introduction to the theory of locally finite Lie algebras and their representations. After a brief introduction into Lie algebra theory, the course will concentrate on the structure and representation theories of the three simple finitary infinite-dimensional Lie algebras $\mathfrak{sl}_\infty$, $\mathfrak{o}_\infty$, $\mathfrak{sp}_\infty$. If time permits, an application to the boson-fermion correspondence will be presented.

Course contents:
Synopsis: Finite-dimensional simple Lie algebras and their representations (3 hours), the Lie algebras $\mathfrak{sl}_\infty$, $\mathfrak{o}_\infty$, $\mathfrak{sp}_\infty$ - introduction (1 hour), Cartan, Borel and parabolic subalgebras (3 hours), weight representations (2 hours), simple modules with a highest weight and without highest weight (2 hours), bounded weight modules (1 hour), tensor modules and boson-fermion correspondence (4 hours).

References:

3. I. Dimitrov, I. Penkov, Locally semisimple and maximal subalgebras of the finitary Lie algebras $\mathfrak{gl}_\infty$, $\mathfrak{sl}_\infty$, $\mathfrak{o}_\infty$ and $\mathfrak{sp}_\infty$, Journal of Algebra 322 (2009), 2069-2081.