Otto-von-Guericke-Universität Magdeburg
Fakultät für Mathematik

Auf Einladung des Institutes für Algebra und Geometrie spricht

Armin Weiß

(Universität Stuttgart)

über das Thema

The isomorphism problem for virtually free groups

Der Vortrag findet per Zoom-Meeting statt.
Zoom Meeting ID 971 4945 5855, passcode 490213

Zeit: Dienstag, 19. Juli 2022, 13.00 Uhr

Zu diesem Vortrag laden wir alle Interessierten herzlich ein.

Prof. Dr. Petra Schwer

Abstract: Testing isomorphism of infinite groups is a classical topic, but from the complexity theory viewpoint few results are known. In this talk I will present two recent advances in this area concering virtually free groups.

In the first part of the talk we will consider the following problem: given a context-free grammar for the word problem of a virtually free group G, compute a finite graph of groups with finite vertex groups and fundamental group G. We establish a non-deterministic algorithm running in doubly exponential time. It follows that the isomorphism problem of context-free groups can be solved in doubly exponential space. Moreover, if, instead of a grammar, a finite extension of a free group is given as input, the isomorphism problem in PSPACE.

In the second part of the talk we will consider the isomorphism problem for plain groups, that is, groups that are isomorphic to a free product of finitely many finite groups and finitely many copies of the infinite cyclic group. Every plain group is naturally presented via an inverse-closed finite convergent length-reducing rewriting system. We prove that the isomorphism problem for plain groups given in this form lies in the third level of the polynomial time hierarchy.

This result is achieved by combining new geometric and algebraic characterizations of groups presented by inverse-closed finite convergent length-reducing rewriting systems developed in recent work of Elder and Piggott (2021) with classical finite group isomorphism results of Babai and Szemeredi (1984).

The talk is based on joint work with Géraud Sénizergues and with Heiko Dietrich, Murray Elder, Adam Piggott, and Youming Qiao.