FAKULTÄT FÜR MATHEMATIK
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Einladung zur öffentlichen Defensio von

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Thema der Dissertation:

Infinitely presented graphical small cancellation groups

Abstract:
Graphical small cancellation theory was introduced by Gromov as a tool for constructing finitely generated groups with prescribed subgraphs embedded in their Cayley graphs. It has provided the only known counterexamples to the Baum-Connes conjecture with coefficients and the only known finitely generated non-coarsely amenable groups. In this thesis, we study graphical small cancellation groups, concentrating on the generalizations to graphical small cancellation theory of the classical $C(6)$, $C(7)$, and $C'(\frac{1}{6})$ small cancellation conditions, both over free groups and over free products.
We first extend fundamental methods and results of classical small cancellation theory to graphical small cancellation theory, proving results about van Kampen diagrams, Dehn functions and asphericity. We then focus on properties of infinitely presented graphical small cancellation groups. We show that the graphical $Gr(6)$-condition provides infinitely presented groups with coarsely embedded prescribed infinite sequences of finite graphs, and we prove that many infinitely presented graphical $Gr(7)$-groups and $Gr'(\frac{1}{6})$-groups are lacunary hyperbolic. We also show that all infinitely presented graphical $Gr(7)$-groups contain non-abelian free subgroups and, more strongly, are acylindrically hyperbolic. Moreover, we prove that all infinitely presented classical $C(6)$-groups are SQ-universal.
We apply our methods of graphical small cancellation theory to construct groups with previously unknown properties. We provide the first groups whose divergence functions lie in the gap between polynomial and exponential functions. For every k, we produce a torsion-free Gromov hyperbolic group all of whose subgroups up to index k do not have the unique product property. By showing that all cyclic subgroups in graphical $Gr'(\frac{1}{6})$-groups are undistorted, we provide the first examples of classical $C(7)$-groups that do not admit any graphical $Gr'(\frac{1}{6})$-presentations.

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