Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Fakultät für
Mathematik, Informatik
und Naturwissenschaften

Kolloquium über Reine Mathematik

Einladung zu einem Vortrag

Dienstag, 04.11.2025

17 Uhr, Geom H4

Prof. Linda Kleist
(Universität Hamburg)

A solution to Ringel's circle problem

Abstract:

In 1959, Ringel asked for the chromatic number of tangency graphs of a collection of circles in the plane in which no three circles have the same tangent point. Particularly, he wondered whether a finite number of colors always suffices. For the special case when the circles are not allowed to overlap, the four color theorem (in combination with Koebe's disk packing theorem) asserts that four colors are always sufficient.
When allowing overlaps, Ringel provided an example that 5 colors may be needed. For a long time, this was the best known lower bound.
In this talk, we construct families of circles in the plane such that their tangency graphs have arbitrarily large girth and chromatic number. Hence, we provide a strong negative answer to Ringel's circle problem. The proof relies on a (multidimensional) version of Gallai's theorem with polynomial constraints.
The talk is based on joint work with James Davies, Chaya Keller, Shakhar Smorodinsky, and Bartosz Walczak.

Vor dem Vortrag (ab 16.30 Uhr) stehen im Foyer vor Hörsaal H4 Kaffee und Tee bereit.