

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Donnerstag, 12. Juni 2025, 13:15 Uhr

Ort: Seminarraum 019 & [WebEx](#)
(Fachbereich Mathematik und Informatik, Arnimallee 3, 14195 Berlin)

Disputation über die Doktorarbeit von

Sophie Rehberg

Thema der Dissertation:

Extensions of Ehrhart theory and applications to combinatorial structures

Thema der Disputation:

The Polytope of all Matroids

Die Arbeit wurde unter der Betreuung von **Prof. Dr. M. Beck** durchgeführt.

Abstract: Matroids were introduced as an abstraction of the concept of linear dependence in vector spaces. Matroids are ubiquitous throughout different areas in mathematics and enjoy numerous cryptomorphic, i.e., equivalent, descriptions. One of these descriptions is by matroid base polytopes, that is, matroids are in bijective correspondence with a subclass of polytopes. (A polytope is the convex hull of finitely many points or, equivalently, the bounded intersection of finitely many half-spaces.) Work by Derksen and Fink (2010) shows that the indicator function of a matroid base polytope can be written as a unique integral linear combination of indicator functions of a special subclass of matroids called nested matroids or Schubert matroids. It follows that valuations on matroids---roughly speaking---maps that respect the inclusion-exclusion principle on matroid base polytopes, are fully determined by their values on nested matroids or Schubert matroids. In recent work Ferroni and Fink (2025) use the above facts to define and study "the polytope of all matroids".

In this talk we will start by briefly introducing the necessary concepts, that is, the notions of polytopes, matroids, matroid base polytopes, and valuations. We then review the definition of the "polytope of all matroids", some of its properties, and discuss applications and motivations for studying this object.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Der Vorsitzende der Promotionskommission
Prof. Dr. M. Beck