

A U S H A N G

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Montag, 18. Dezember 2023, 12:30 Uhr

Ort: Seminarraum 053

(Fachbereich Mathematik und Informatik, Takustr.9, 14195 Berlin)

Disputation über die Doktorarbeit von

Van Vuong Bui

Thema der Dissertation:

Growth of Bilinear Maps

Thema der Disputation:

Growth of polyominoes

Die Arbeit wurde unter der Betreuung von **Prof. Dr. G. Rote** durchgeführt.

Abstract: A polyomino is an edge-connected set of cells in the square lattice. Although the notion is simple and natural, many problems related to polyominoes are open, namely computing efficiently the number of polyominoes $A(n)$ with n cells and estimating its exponential growth constant $\lambda = \lim_{n \rightarrow \infty} A(n)^{1/n}$, which is known as Klarner's constant. The best algorithm for the former problem still suffers the exponential time complexity, whose base can be decreased usually by using more space. It follows that the natural way to bound λ from below by $A(n)^{1/n}$ asks for a lot of computation. The best approach for a bound so far is by considering twisted cylinders, a model that is similar to polyominoes but a bit simpler to compute. This allows the lower bound to just exceed 4 by Barequet, Rote, and Shalah in 2016, which is close to the believed value $\lambda \approx 4.06$.

The known upper bounds are however not so good: the bound 4.65 has existed since 1973 by Klarner and Rivest, and only very recently got improved to 4.53 in 2022 by Barequet and Shalah, which actually asks for a good deal of computation. Related aspects and new approaches will be also discussed.

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. G. Rote