

# 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

**Dienstag, 31.10.2023, 11:00 Uhr**

**Ort: Seminarraum**

**(Fachbereich Mathematik und Informatik, Arnimallee 2, 14195 Berlin)**

**Disputation über die Doktorarbeit von**

**Herrn David Joel Fabian**

**Thema der Dissertation:**

**Graph bootstrap percolation and additive combinatorial constructions**

**Thema der Disputation:**

**Densities of sets without three-term arithmetic progressions -- The upper bounds of Kelley and Meka**

Die Arbeit wurde unter der Betreuung von **Prof. T. Szabó, PhD** durchgeführt.

Abstract: Roth's theorem from 1952 on three-term arithmetic progressions (3-APs) states that the largest density of a subset of the first  $n$  positive integers that is free of non-trivial 3-APs tends to zero (as a function of  $n$ ) as  $n$  grows.

A corresponding lower bound is given by the Behrend construction from 1946, which provides an infinite family of 3-AP-free sets whose reciprocal densities are quasi-polynomial in  $n$ .

To this day the quasi-polynomial behaviour of that construction still constitutes the best-known lower bound.

Over the decades several incremental quantitative improvements over Roth's upper bound have been established in the pursuit of determining the asymptotic growth of the maximum density.

In February of this year, in a breakthrough result, Kelley and Meka established the first upper bound on the density of 3-AP-free sets of integers the reciprocal of which is quasi-polynomial, thereby moving the best-known upper bound much closer to the lower bound provided by Behrend.

In this talk I will present the exposition by Bloom and Sisask of the above results of Kelley and Meka.

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. T. Szabó, PhD