PhD research topic proposal

BME, Doctoral School of Mathematics and Computer Science

Name and degree of supervisor :

Péter Pál Pach, PhD

Are you willing to supervise Stipendium Hungaricum applicants?

Yes

Title of the topic:

Applications of the polynomial method

Short description:

The polynomial method has a wide range of applications in combinatorics, just briefly mentioning some of these: Cauchy-Davenport theorem, Erdős-Heilbronn conjecture (Hamidoune-da Silva theorem), Erdős-Ginzburg-Ziv theorem, or as one of the most recent ones we could mention Dvir's proof for the finite field Kakeya-problem.

In 2016 with Croot and Lev we developed a new variant of the polynomial method which enabled us to prove Roth-type theorems in certain finite groups, and till then many other applications have been found. Specially, the method lead to the solution of the cap set problem (Ellenberg-Gijswijt), the Erdős-Szemerédi sunflower conjecture (the currently best bound is due to Naslund and Sawin who used this new method) and a tight bound for Green's arithmetic triangle lemma. The aim of the research is to find more generalizations and applications of this method.

Requirements:

Adequate command of English language, good problem solving skills.

Contact:

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Place of work:

BME, VIK, Department of Computer Science and Information Theory