PhD research topic proposal
BME, Doctoral School of Mathematics and Computer Science

Name of supervisor :

Sándor Kiss

Degree:

PhD

Title of the topic:

Sumsets and difference sets

Short description:

The investigation of the sumsets and difference sets is a very important topic in Additive Number Theory. Among the plenty of beautiful and interesting results in this topic one of the oldest is the famous theorem of Cauchy and Davenport. There is some unsolved problems in this field as well.

An immediate question arises when the size of the sumset and difference set is small: what can one say about the size of the original set? Another classical problem is to estimate the cardinality of a subset of the finite field of p elements with the property that the difference of any two elements from the subset is a quadratic residue modulo p. To handle these problems and similar questions there are new and exciting methods developed by outstanding research mathematicians recently. The task of the PhD student is to learn and improve the known methods and try to solve some problems in this field. The student have to publish his results in high quality journals.

Requirements:

Advanced knowledge of abstract Algebra, Fourier Analysis and Combinatorics are needed. The PhD student should like to read and learn new tools from several fields of mathematics.

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Place of work:

Mathematical Institute of Budapest University of Technology and Economics, Department of Algebra.

Statement : *The conditions of the research above are satisfied, the theme is confirmed by the head of the Department of Algebra.*