

# Harmonic Analysis in Computer Science and Combinatorics

February 2 – March 3, 2006

## Program for February 27 – March 3

*All lectures are held in S8.*

Mon, Feb 27

9 – 12 *G. Kalai* Harmonic Analysis in Computer Science and Combinatorics  
14 – 17 Exercises

Tue, Feb 28

9 – 12 *G. Kalai* Harmonic Analysis in Computer Science and Combinatorics  
14:00 Exam

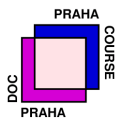
Wed, Mar 1

10:40 *A. Iosevich* Combinatorial, Analytic and Number Theoretic Aspects  
of the Erdős/Falconer Conjectures

Thu, Mar 2

10:40 *A. Iosevich* Combinatorial, Analytic and Number Theoretic Aspects  
of the Erdős/Falconer Conjectures

14:00 *A. Iosevich* Combinatorial, Analytic and Number Theoretic Aspects  
of the Erdős/Falconer Conjectures



DocCourse Prague 2006

**Harmonic Analysis in Computer Science and Combinatorics**

Programme coordinators: Jiří Matoušek and Jaroslav Nešetřil

<http://kam.mff.cuni.cz/~matousek/doccourse06.html>

## Abstracts of lectures

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*Alex Iosevich:* COMBINATORIAL, ANALYTIC AND NUMBER THEORETIC ASPECTS OF THE ERDÖS/FALCONER CONJECTURES (1/3)

Description of the Erdős/Falconer distance problems in discrete, continuous and number theoretic settings, basic definitions, counter-examples and hints at connections between the problems.

The Erdős distance problem in the Euclidean space, historical development, early results on the problem by Erdős and Moser.

*Alex Iosevich:* COMBINATORIAL, ANALYTIC AND NUMBER THEORETIC ASPECTS OF THE ERDÖS/FALCONER CONJECTURES (2/3)

The Erdős distance problem in the Euclidean space continued, Szemerédi-Trotter incidence theorem, graph theoretic techniques, the latest developments using arithmetic considerations by Solymosi/Toth and Kats/Tardos.

Some final words on the Erdős distance problem in the Euclidean space, Erdős/Falconer distance problem in vector spaces over finite fields, the result of Bourgain, Katz and Tao, Kloosterman sum approach of Iosevich and Rudnev.

## Abstracts of lectures

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*Alex Iosevich:* COMBINATORIAL, ANALYTIC AND NUMBER THEORETIC ASPECTS OF THE ERDÖS/FALCONER CONJECTURES (3/3)

Completion of the discussion of distance sets in vector spaces over finite fields, including Weil's bound for Kloosterman sums and Katz/Niederreiter asymptotic bound, beginning of the discussion of the continuous analog of the Erdős distance problem—the Falconer distance problem.

Completion of the discussion of the Falconer distance problem, synthesis and discussion of future prospects for the conjectures in question, connections with other important problems in combinatorics, number theory and harmonic analysis.

The listeners are expected to be familiar with elementary graph theory, number theory and Fourier analysis, at the level of advanced undergraduate courses. No specialized knowledge of these subjects is required.