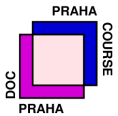

MiniDocCourse Prague & Borová Lada 2007

Ergodic Ramsey Theory:
A dynamical approach to static theorems

Programme coordinators: J. Matoušek and J. Nešetřil

We are delighted to introduce

Prof. Vitaly Bergelson

speaking on

Ergodic Ramsey Theory
A Dynamical Approach to Static Theorems

January 25 – February 3, 2007

The programme starts with the **65th Mathematical Colloquium**

`Thu, Jan 25`

14:00 *S5* Ergodic Theorems Along Polynomials:
From Combinatorial Applications to Challenges for Physicists

Various recurrence and convergence results obtained in recent years indicate that dynamical systems exhibit regular behavior along polynomial times. While these results were mainly motivated by applications to number theory and combinatorics, such as the polynomial extension of Szemeredi's theorem on arithmetic progressions, this phenomenon also deserves attention from the point of view of potential applications to physics. For example, the Poincare recurrence theorem, as well as convergence theorems of the von Neumann and Birkhoff type, hold along any sequence of the form $p(n)$, $n = 1, 2, \ldots$ where $p(n)$ is a polynomial with integer coefficients satisfying $p(0) = 0$, and it would be of interest to give a physical interpretation of these facts. After reviewing some known results, we will discuss the intriguing dichotomy between the theorems related to polynomial and exponential behavior. The last part of the talk will be devoted to open problems and conjectures.

The programme continues with the first MiniDocCourse lecture

`Fri, Jan 26`

10:40 *S5* The Early Results of Ramsey Theory and Their Modern Counterparts

We will discuss Hilbert's irreducibility theorem and the equations over finite fields, and connect these results to modern developments such as Hindman's theorem.

The rest of the course takes place in pension Kavalír in Borová Lada.

In addition to the scheduled lectures, there will be excercise sessions.

`Sun, Jan 28`

14:00 Departure to Borová Lada from Malostranské Náměstí

`Mon, Jan 29`

Three Main Principles of Ramsey Theory

Partition Ramsey Theory and Topological Dynamics

`Tue, Jan 30`

Density Ramsey Theory and Furstenberg's Correspondence Principle

Stone-Čech Compactification and Hindman's Theorem

`Wed, Jan 31`

IP Sets and Ergodic Ramsey Theory

The Nilpotent Connection

`Thu, Feb 1`

Ergodic Ramsey Theory and Amenable Groups

Progressions in Primes: Green-Tao Theorem

`Fri, Feb 2`

What Next? Open Problems and Conjectures

`Sat, Feb 3`

12:00 Bus back from Borová Lada

For registration and additional information, see

`http://kam.mff.cuni.cz/minidoc/`

Vitaly Bergelson studied in Russia and in Israel. He was awarded Landau Prize for his dissertation thesis (created under the supervision of prof. H. Furstenberg at the university in Jerusalem). Currently, he is a full professor at University of Ohio in Columbus, where he has been employed since 1984.

Prof. Bergelson is an acknowledged researcher in ergodic theory and its applications, especially in combinatorial number theory. Together with his student A. Leibman, he proved e.g. the well-known polynomial versions of Van der Waerden and Szemerédi Theorems.

Vitaly Bergelson is a renowned lecturer and a popular teacher. In 2006, he presented an invited talk at International Congress of Mathematicians in Madrid and Mordell Lecture in Cambridge.