

Workshop on Pseudo-randomness in Mathematical Structures

Monday, June 14, 2010 (All day) - Friday, June 18, 2010 (All day)
(2009-2010)

June 14 - 18, 2010

Organizers: Jean Bourgain, Russell Impagliazzo, Peter Sarnak and Avi Wigderson

Program: <http://www.math.ias.edu/pseudo2010/program>

Video: <http://video.ias.edu/pseudo2010>

Photos: [Photos of the Workshop](#), by C. J. Mozzochi

A common theme in many seemingly disjoint mathematical areas is to quantify the extent to which natural deterministic mathematical objects have properties similar to those of random objects. For example, is the variance of the distribution of primes approximately that expected for a random set of the same density? When are multiplication and addition over fields ``uncorrelated"? When do the Cayley graphs for groups have the expansion of random graphs? How random are the orbits of natural dynamical systems?

On the other side, computer science applications often require deterministic mathematical structures with such pseudo-random properties. For example, graphs with random-like expansion are used for applications ranging from distributed protocols for leader selection to network routing to sorting. In fact, the central question of computational complexity can be viewed as deterministically constructing a function that is random-like with respect to the ability of small circuits to compute it.

This workshop will aim to highlight parallels and connections between approaches to pseudo-randomness in different areas of mathematics, and between the mathematical and computational approaches to pseudo-randomness. Invited speakers will be eminent researchers in such areas as additive number theory, algorithm design, analysis, combinatorics, computational complexity, cryptography, dynamical systems, ergodic theory, group theory, number theory, and statistical mechanics. The first two days of the workshop will be devoted to tutorials giving an overview of the role of pseudo-randomness in some of the areas mentioned. These tutorials will not require knowledge of any particular disciplines, and will be accessible to graduate students in all areas of mathematics and computer science. The subsequent three days will highlight exciting related research developments, but will also be accessible to a mixed audience of computer scientists and mathematicians. A list of confirmed speakers and a schedule may be found at <http://www.math.ias.edu/pseudo2010/program>.

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The workshop will take place at the Institute from June 14-18, 2010 in Wolfensohn Hall (www.ias.edu/files/pdfs/campusmap.pdf). Researchers in all related areas are welcome to participate. Directions, dining options, and other information may be found at "[Practical Information](#)."

The workshop is funded by the National Science Foundation grant DMS-0835373, "Pseudorandomness in mathematics and computer science" and NSF grant CCF-0832797, "Expeditions in Computing." The Workshop is co-sponsored by the Center for Computational Intractability at Princeton University.

Inquires should be addressed to: pseudo.workshop@gmail.com.

terms:

- [workshop](#)