

APPLIED MATHEMATICS COLLOQUIUM

THE SUM-PRODUCT THEOREM AND ITS APPLICATIONS

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ABSTRACT:

How “orthogonal” are the basic field operations “+” and “x”? A few years ago Bourgain, Katz and Tao proved the following theorem (stated very informally). In every finite field, a set which does not grow much when we *add* all pairs of elements, and when we *multiply* all pairs of elements, must be very close to a subfield. In particular, prime fields have no such subsets!

This theorem revealed its fundamental nature quickly. Shortly afterwards it has found many diverse applications, including in Number Theory, Group Theory, Combinatorial Geometry, and the explicit construction of Randomness Extractors and Ramsey Graphs.

In this talk I plan to explain some of the applications, stressing the last group of “pseudorandom” constructions. I will also as to sketch the main ideas of the proof of the sum-product theorem.

MONDAY, SEPTEMBER 10, 2007

4:30 PM

Building 4, Room 270

*Reception at 4:00 PM in Building 4, Room174
(Math Majors Lounge)*

Applied Math Colloquium: <http://www-math.mit.edu/amc/fall07>
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