Additive Combinatorics and Applications
Combinatoire additive et applications
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ERNIE CROOT, Georgia Institute of Technology

ZHENCHAO GE, University of Waterloo

MARCEL GOH, McGill University
Block complexity and idempotent Schur multipliers

We call a matrix blocky if, up to row and column permutations, it can be obtained from an identity matrix by repeatedly applying one of the following operations: duplicating a row, duplicating a column, or adding a zero row or column. Blocky matrices are precisely the boolean matrices that are contractive when considered as Schur multipliers. It is conjectured that any boolean matrix with Schur multiplier norm at most γ is expressible as a signed sum

$$A = \sum_{i=1}^{L} \pm B_i$$

for some blocky matrices B_i, where L depends only on γ. This conjecture is an analogue of Green and Sanders's quantitative version of Cohen's idempotent theorem. In this paper, we prove bounds on L that are polylogarithmic in the dimension of A. Concretely, if A is an $n \times n$ matrix, we show that one may take $L = 2^{O(\gamma^7)} \log(n)^2$.

LEO GOLDMAKHER, Williams College

DAVID GRYNKIEWICZ, University of Memphis

YIFAN JING, Ohio State University

YU-RU LIU, U. of Waterloo
Equidistribution Theorems in Additive Combinatorics

We establish a function-field analogue of Weyl's equidistribution theorem for polynomial sequences and explore its applications to problems in additive combinatorics. This is joint work with Jérémy Champagne, Thái Hoàng Lê and Trevor Wooley.

COSMIN POHOATA, Emory University

STEVEN SENGER, Missouri State University

FERNANDO XUANCHENG SHAO, University of Kentucky
Recent developments on the polynomial Szemeredi theorem

As a special case of the celebrated theorem of Bergelson and Leibman (the polynomial Szemeredi theorem), any positive density subset of the integers must contain a polynomial progression of the form $x, x+y, x+y^2$ with y nonzero. In the last five years since the pioneering work of Peluse and Prendiville, there have been numerous developments on the quantitative aspects of such results. I will give a brief overview of these recent developments, before describing a two-dimensional version and a "popular" version of the polynomial Szemeredi theorem for the pattern $x, x+y, x+y^2$. The talk includes joint works with Sarah Peluse, Sean Prendiville, and Mengdi Wang.

HUNTER SPINK, University of Toronto

JONATHAN TIDOR, Princeton University

STANLEY YAO XIAO, UNBC
Primes of the form $f(p,q)$, f quadratic, and applications

We capitalize on the breakthrough result of Green and Sawhney proving the infinitude of primes of the form p^2+nq^2, where $n \equiv 0, 4 \pmod 6$ is a fixed positive integer and p, q are prime variables to arbitrary binary quadratic forms satisfying the obvious non-degeneracy conditions. Notably, our result covers irreducible indefinite binary quadratic forms. This has applications to counting elliptic curves admitting a rational isogeny of prime degree, ordered by conductor.