

CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES
COLLOQUIUM

Friday, March 13
2:00 – 3:00 PM
Maria Sanford, Room 101

**SUM-PRODUCT ESTIMATES
AND THE DISCRETE FOURIER TRANSFORM**

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Abstract: *Arithmetic Combinatorics* is the simultaneous study of additive and multiplicative operations on sets. Let A and B be finite, nonempty subsets of a ring, then the *sum set* is defined as $A + B := \{a + b : a \in A, b \in B\}$ and the *product set* is $A \cdot B := \{a \cdot b : a \in A, b \in B\}$. The type of questions that arise concern the relationships between the relative sizes of the sets A , B , $A + B$, $A \cdot B$, etc. In this colloquium I will begin with the classical Erdős-Szemerédi sum-product problem, followed by an explanation of the *sum-product phenomenon* and its applications, elaborating on all the progress that has been achieved during the years by mathematician such as T. Tao, A. Green, J. Bourgain, H. Helfgott and many others. At the conclusion, I will give the audience an idea on how I and Jeremy Chapman were able to get a product estimate in $SL_2(\mathbb{Z} / p^l\mathbb{Z})$ by using the discrete Fourier Transform.

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