



MAY 21–26, 2023

2023 Program for Women and Mathematics

PATTERNS IN INTEGERS: DYNAMICAL AND NUMBER THEORETIC APPROACHES

TERNG LECTURE: THE CIRCLE METHOD

Lillian Pierce, Duke University

This series will invite participants into the beautiful world of the circle method. This method, which combines both arithmetic and analytic insights, originated 100 years ago in work of Hardy and Ramanujan, in their study of the partition function. It was then more fully developed by Hardy and Littlewood in the study of Waring’s problem, which asks how many ways a given integer may be expressed as a sum of s perfect k -th powers. We will introduce the mechanics of the circle method in the setting of Waring’s problem. Then we will explore the relationship to Ergodic Ramsey Theory by applying the circle method to address questions like the following: must every set of integers with positive density contain a 3-term arithmetic progression? The series will conclude by giving a “world tour” of mathematicians currently investigating problems via the circle method.

UHLENBECK LECTURE: ERGODIC RAMSEY THEORY

Tamar Ziegler, IAS/Einstein Institute of Mathematics, Hebrew University

A famous theorem of Szemerédi from 1975 states that any subset of positive density in the integers contains arbitrarily long arithmetic progressions. In 1977 Furstenberg gave an ergodic theoretic proof of Szemerédi’s theorem. Furstenberg observed that combinatorial statements about patterns in the integers correspond to multiple recurrence questions in ergodic theory. This gave rise to the field of Ergodic Ramsey Theory, which centers around proving Ramsey-type results using ergodic theoretic techniques (some such results have no alternative proof to this day). The course will introduce the participant to some ideas in Ergodic Ramsey Theory and also to connections with other approaches to Ramsey type problems including the circle method, which will be introduced in the other course.

ORGANIZERS

Wei Ho

IAS/Princeton/Michigan

Michelle Huguenin

Institute for Advanced Study

Dusa McDuff

Columbia University

Lillian Pierce

Duke University

APPLICATION DEADLINE: FEBRUARY 16, 2023

For more information visit:

www.ias.edu/math/wam/events/2023-program-women-and-mathematics

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PREREQUISITES

Terng Lecture: At least one course in real or complex analysis and at least one course in algebra or number theory

Uhlenbeck Lecture: Measure theory and functional analysis



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Program for Women and Mathematics
Institute for Advanced Study
1 Einstein Drive
Princeton, NJ 08540
(609) 734-8115
womensprogram@ias.edu

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