The 99 KPPY Combinatorics Seminar

Organized by S. Bang, J. Park, and M. Siggers

Oct 05 2024

Yeungnam University

Science Building 1 (F21), Room 205

Program

11:30 - 12:10 **Richard Stanley** MIT
Some combinatorial aspects of cyclotomic polynomials

12:10 **Lunch**

1:30 - 2:10 **Jang Soo Kim** SKKU
Lecture hall graphs and the Askey scheme

2:20 - 3:00 **Hongjun Ge** University of Science and Technology of China
A Bose-Laskar-Hoffman theory for μ-bounded graphs with fixed smallest eigenvalue

3:20 - 4:00 **Hyungtae Baek** Kyungpook National University
The Anderson rings over a von Neumann regular ring

4:10 - 4:50 **Mathias Schacht** University of Hamburg
TBA

5:00 **Banquet**

Abstracts

Richard Stanley
Some combinatorial aspects of cyclotomic polynomials

Euler showed that the number of partitions of n into distinct parts is equal to the number of partitions of n into odd parts. MacMahon showed that the number of partitions of n for which no part occurs exactly once is equal to the number of partitions of n into parts divisible by 2 or 3. Both these results are instances of a general phenomenon based on the fact that certain polynomials are the product of cyclotomic polynomials. After discussing this assertion, we explain how it can be extended to such topics as counting certain polynomials over finite fields and obtaining Dirichlet series generating functions for certain classes of integers.

Jang Soo Kim
Lecture hall graphs and the Askey scheme

We establish, for every family of orthogonal polynomials in the Askey scheme and the q-Askey scheme, a combinatorial model for mixed moments and coefficients in terms of paths on the lecture hall lattice. This generalizes to all families of orthogonal polynomials in the Askey scheme previous results of Corteel and Kim for the little q-Jacobi polynomials. This is joint work with Sylvie Corteel, Bhargavi Jonnadula, and Jon Keating.

Hongjun Ge
A Bose-Laskar-Hoffman theory for μ-bounded graphs with fixed smallest eigenvalue

In 2018, by using Ramsey and Hoffman theory, Koolen, Yang, and Yang gave a structural result on graphs with smallest eigenvalue at least -3 and large minimum degree. Without using Ramsey theory, we combine Bose-Laskar type argument and Hoffman theory to show some structural results about

μ-bounded graphs with fixed smallest eigenvalue. A consequence is that we have a reasonable bound for the minimum degree. Note that local graphs of distance-regular graphs is μ-bounded. We apply these results to describe the structure for any local graph of a distance-regular graph with classical parameters (D, b, α, β). As a consequence, we give a bound on α in terms of b. In particular, we show that $\alpha \leq 2$ if $b = 2$ and $D \geq 12$. This is joint work with J. Koolen, C. Lv, and Q. Yang.

Hyungtae Baek
The Anderson rings over a von Neumann regular ring

Many ring theorists researched various properties of Nagata rings and Serre's conjecture rings. In this talk, we introduce a subring (refer to the Anderson ring) of both the Nagata ring and the Serre's conjecture ring (up to isomorphism), and investigate properties of the Anderson rings. Additionally, we compare the properties of the Anderson rings with those of Nagata rings and Serre's conjecture rings. More precisely, we examine the following questions:

- When is the Anderson ring a principal ideal ring?

- When is the Anderson ring a Prüfer-like ring?

Mathias Schacht
TBA