

One-Day Meeting in Combinatorics at AORC

**AORC Seminar Room
Sungkyunkwan University
April 8 (Mon), 2019**

Schedule

Time	Speaker	Title
9:30 - 10:00	Coffee	
10:00 - 10:50	Sergey Kitaev (U. Strathclyde)	Equidistributions on planar maps via involutions on description trees
11:00 - 11:50	Sun-mi Yun (SKKU)	The Characteristic Polynomial of the Alternating Permutation Poset
12:00 - 14:00	Lunch	
14:00 - 14:50	Travis Scrimshaw (U. Queensland)	Stump's q,t -Catalan numbers, representation theory, and beyond
15:00 - 15:50	Stephanie van Willigenburg (UBC)	The e -positivity of chromatic symmetric functions
16:00 - 16:30	Coffee	
16:30 - 17:20	Brendon Rhoades (UCSD)	Spanning configurations
17:30 -	Dinner	

The purpose of the meeting is to collaborate research and foster interaction between researchers interested in combinatorics and related topics. Hopefully, the meeting will provide a convenient platform for the exchange of research experiences and ideas from different research areas related to combinatorics. Anyone interested is welcome to attend. For any inquiries, please contact Jang Soo Kim (jangsookim@skku.edu).

Speaker: Sergey Kitaev (University of Strathclyde)

Title: Equidistributions on planar maps via involutions on description trees

Abstract: Description trees were introduced by Cori, Jacquard and Schaeffer in 1997 to give a general framework for the recursive decompositions of several families of planar maps studied by Tutte in a series of papers in the 1960s. We are interested in two classes of planar maps which can be thought of as connected planar graphs embedded in the plane or the sphere with a directed edge distinguished as the root. These classes are rooted non-separable (or, 2-connected) and bicubic planar maps, and the corresponding to them trees are called, respectively, $\beta(1,0)$ -trees and $\beta(0,1)$ -trees.

Using different ways to generate these trees we define two maps on them that turned out to be involutions. These involutions are not only interesting in their own right, in particular, from counting fixed points point of view, but also they were used to obtain non-trivial equidistribution results on planar maps, certain pattern avoiding permutations, and objects counted by the Catalan numbers.

The results to be presented in this talk are obtained in a series of papers in collaboration with several researchers.

Speaker: Sun-mi Yun (SKKU)

Title: The Characteristic Polynomial of the Alternating Permutation Poset

Abstract: For the symmetric group S_n , a permutation w can be considered as a word of simple transpositions $s_i = (i, i+1)$. We define some order of permutations with respect to the minimal length of the word expression of each permutation. Then S_n with this order is a poset. We consider the set of alternating permutations with the same order, which is also a poset. We call it the alternating permutation poset. It turns out that its characteristic polynomial has a nice form. In this talk we prove this property.

Speaker: Travis Scrimshaw (University of Queensland)

Title: Stump's q,t -Catalan numbers, representation theory, and beyond

Abstract: The Catalan numbers form one of the most famous sequences in combinatorics and are counted by over 200 objects. By summing over such an object, say Dyck paths, with a statistic such as major index, we construct a q -analog of the Catalan numbers. By further refining major index, Christian Stump introduced a q,t -analog of the Catalan numbers and has a natural specialization to the (Mahonian) q -Catalan numbers. In this talk, we will give an interpretation of Stump's q,t -Catalan numbers as a form of the character of a particular representation of the type C Lie algebra. As a consequence, the principal specialization of the character is the q -Catalan number. Then, by extending our approach to the entire rectangular lattice, we show that we obtain the q -binomial coefficients. This is joint work with Se-jin Oh.

Speaker: Stephanie van Willigenburg (UBC)

Title: The e -positivity of chromatic symmetric functions

Abstract: The chromatic polynomial was generalized to the chromatic symmetric function by Stanley in his seminal 1995 paper. This function is currently experiencing a flourishing renaissance, in particular the study of the positivity of chromatic symmetric functions when expanded into the basis of elementary symmetric functions, that is, e -positivity.

In this talk we approach the question of e -positivity from various angles. Most pertinently we resolve the 1995 statement of Stanley that no known graph exists that is not contractible to the claw, and whose chromatic symmetric function is not e -positive.

This is joint work with Soojin Cho, Samantha Dahlberg and Angele Foley, and no prior knowledge is assumed.

Speaker: Brendon Rhoades (UCSD)

Title: Spanning configurations

Abstract: A finite sequence (W_1, W_2, \dots, W_r) of subspaces of the complex vector space C^k is a spanning configuration if $W_1 + W_2 + \dots + W_r = C^k$. We present the cohomology of the moduli space of spanning configurations where the sequence of dimensions $\dim(W_1), \dim(W_2), \dots, \dim(W_r)$ is fixed. We explain connections to combinatorics and, in particular, symmetric function theory. Joint with Brendan Pawlowski and Andy Wilson.