组合数学与图论研讨会

华东师范大学 数学科学学院

2021 年 4 月 22 日至 24 日

会议日程

2021 年 4 月 22 日 周四全天： 注册	
报告地点：华东师范大学逸夫楼三楼多功能厅	
2021 年 4 月 23 日 周五	
8:30-8:40	开幕
上午第一节（主持人：杜若霞）	
8:40-9:25	杨立波 Kazhdan-Lusztig polynomials of uniform matroids
9:25-10:10	严慧芳 On the enumeration of simultaneous core partitions with restrictions
10:10-10:30	茶歇
上午第二节（主持人：严慧芳）	
10:30-11:15	林志聪 A decomposition of ballot permutations, pattern avoidance and Gessel walks
11:15-12:00	傅士硕 Two bijections on weakly increasing trees
午餐 时间：12:00	
下午第一节（主持人：郭军伟）	
14:00-14:45	谷珊珊 On some new mock theta functions
14:45-15:30	郭龙 The many facets of Schubert polynomials
15:30-15:40	拍照
15:40-16:00	茶歇
下午第二节（主持人：杨立波）	
16:00-16:45	赵彤远 Reverse gamma-expansion for Eulerian polynomials
16:45-17:30	付梅 On second-order Eulerian numbers
晚餐 时间：18:00	
2021 年 4 月 24 日 周六	
上午第一节（主持人：谷珊珊）	
8:40-9:25	郭军伟 Some q-analogues of supercongruences for truncated ${}_3F_2$ hypergeometric series
9:25-10:10	史永堂 Anti-Ramsey numbers for graphs and hypergraphs
10:10-10:30	茶歇
上午第二节（主持人：史永堂）	
10:30-11:15	孙慧 Orthogonal polynomials and Ramanujan’s theta functions
11:15-12:00	夏先伟 New truncated versions for three classic theta function identities
午餐 时间：12:00	
14:00-17:00	自由讨论 地点：文附楼 207
晚餐 时间：18:00	

On second-order Eulerian numbers

付梅 上海财经大学

Two bijections on weakly increasing trees

傅士硕 重庆大学

Weakly increasing tree is a new kind of multiset-labeled tree introduced in a recent work of Lin-Ma-Ma-Zhou, which naturally unifies the classical concepts of plane trees and increasing trees on the set 0,1,...,n. In this talk, we introduce two bijections defined on weakly increasing trees. The first map has its roots in a bijection on plane trees due to Deutsch. The second map is a closely related variant and turns out to be an involution. This involution amounts to give a combinatorial proof of certain equidistribution result for a quadruple of tree statistics over weakly increasing trees defined on any multiset M, extending a previous result of Lin-Ma-Ma-Zhou. This is joint work with Xiang Chen.

On some new mock theta functions

谷珊珊 南开大学

Mock theta functions were first introduced by Ramanujan in his last letter to Hardy. He found that these functions have certain asymptotic properties as q approaches a root of unity, which are similar to theta functions, but they are not really theta functions. Historically, mock theta functions can be represented by Eulerian forms, Hecke-type double sums, Appell–Lerch sums, and Fourier coefficients of meromorphic Jocobi forms. By studying Hecke-type double sums and Appell–Lerch sums, we find some new mock theta functions, and establish the relations between these functions and some classical mock theta functions.

Some q-analogues of supercongruences for truncated ${}_3F_2$ hypergeometric series

郭军伟 淮阴师范学院

In 2003, Rodriguez-Villegas found four supercongruences modulo p^2 (p is an odd prime) for truncated ${}_3F_2$ hypergeometric series related to Calabi–Yau manifolds of dimension $d = 3$. One of them was already proved by Van Hamme in 1997. A

q-analogue of Van Hamme's supercongruence was given by the author and Zeng, and the author and Zudilin. In this talk, we give q-analogues of the other three supercongruences of Rodriguez-Villegas. As a conclusion, we also generalize half of Rodriguez-Villegas's supercongruences to the modulus p^3 case.

The many facets of Schubert polynomials

郭龙 南开大学

In this talk, we will give an overview of the combinatorial, algebraic, geometric and topological aspects of Schubert polynomials. We will also talk about some conjectures and open problems concerning Schubert polynomials.

A decomposition of ballot permutations, pattern avoidance and Gessel walks

林志聪 山东大学

A permutation whose any prefix has no more descents than ascents is called a ballot permutation. In this talk, we present a decomposition of ballot permutations that enables us to construct a bijection between ballot permutations and odd order permutations, which proves a set-valued extension of a conjecture due to Spiro using the statistic of peak values. This bijection also preserves the neighbors of the largest letter in permutations and thus resolves a refinement of Spiro's conjecture proposed by Wang and Zhang. Our decomposition can be extended to well-labelled positive paths, a class of generalized ballot permutations arising from polytope theory, that were enumerated by Bernardi, Duplantier and Nadeau.

We will also investigate the enumerative aspect of ballot permutations avoiding a single pattern of length 3 and establish a connection between 213-avoiding ballot permutations and Gessel walks.

Orthogonal polynomials and Ramanujan's theta functions

孙慧 南开大学

Orthogonal polynomials play an important role in algebraic combinatorics, q-series, special functions, representation theory and so on. In the Lost Notebooks, Ramanujan stated numerous identities for functions that closely related to theta functions. In this talk, we will introduce the relations between q-orthogonal polynomials

and the partial theta function identities. Moreover, we also discuss the applications of the classic orthogonal polynomials in the studying of Ramanujan's theta function identities.

Anti-Ramsey numbers for graphs and hypergraphs

史永堂 南开大学

Motivated by anti-Ramsey numbers introduced by Erdős, Simonovits and Sós in 1975, we study the anti-Ramsey problem when host graphs are plane triangulations and hypergraphs.

In this talk, we will survey some results on planar anti-Ramsey numbers of paths and matchings, and anti-Ramsey numbers of paths in hypergraphs. Joint work with Ran Gu, Yongxin Lan, Jiaao Li, Zhongmei Qin, Zi-Xia Song, Jun Yue.

New truncated versions for three classic theta function identities

夏先伟 江苏大学

In 2012, Andrews and Merca derived a truncated version of Euler's pentagonal number theory and their work inspired several mathematicians to work on truncated theta series. Motivated by Andrews and Merca's work, Guo and Zeng established truncated versions of two other classic theta function identities due to Gauss. In this paper, we deduce new truncated forms for these three classic theta function identities and provide partition-theoretic interpretations of those truncated identities. We present two different proofs of our results: analytic and combinatorial. As corollaries of our results, we obtain infinite families of linear inequalities for ordinary partition function, overpartition function and pod function. Those inequalities imply Andrews-Merca's positive result on ordinary partition function and a conjecture on overpartition given by Guo and Zeng and proved by Wang and Yee.

On the enumeration of simultaneous core partitions with restrictions

严慧芳 浙江师范大学

For a positive integer t, a partition is said to be a *t-core partition*, or simply a *t-core*, if it contains no box whose hook length is a multiple of t. The theory of t-core partitions lies at the intersection of a surprising number of fields, including number

theory, combinatorics, and representation theory. Simultaneous core partitions have been extensively exploited after Anderson's work on the enumeration of (s,t)-core partitions. In this talk, we will present some results concerning the enumeration of simultaneous core partitions with restrictions.

Kazhdan-Lusztig polynomials of uniform matroids

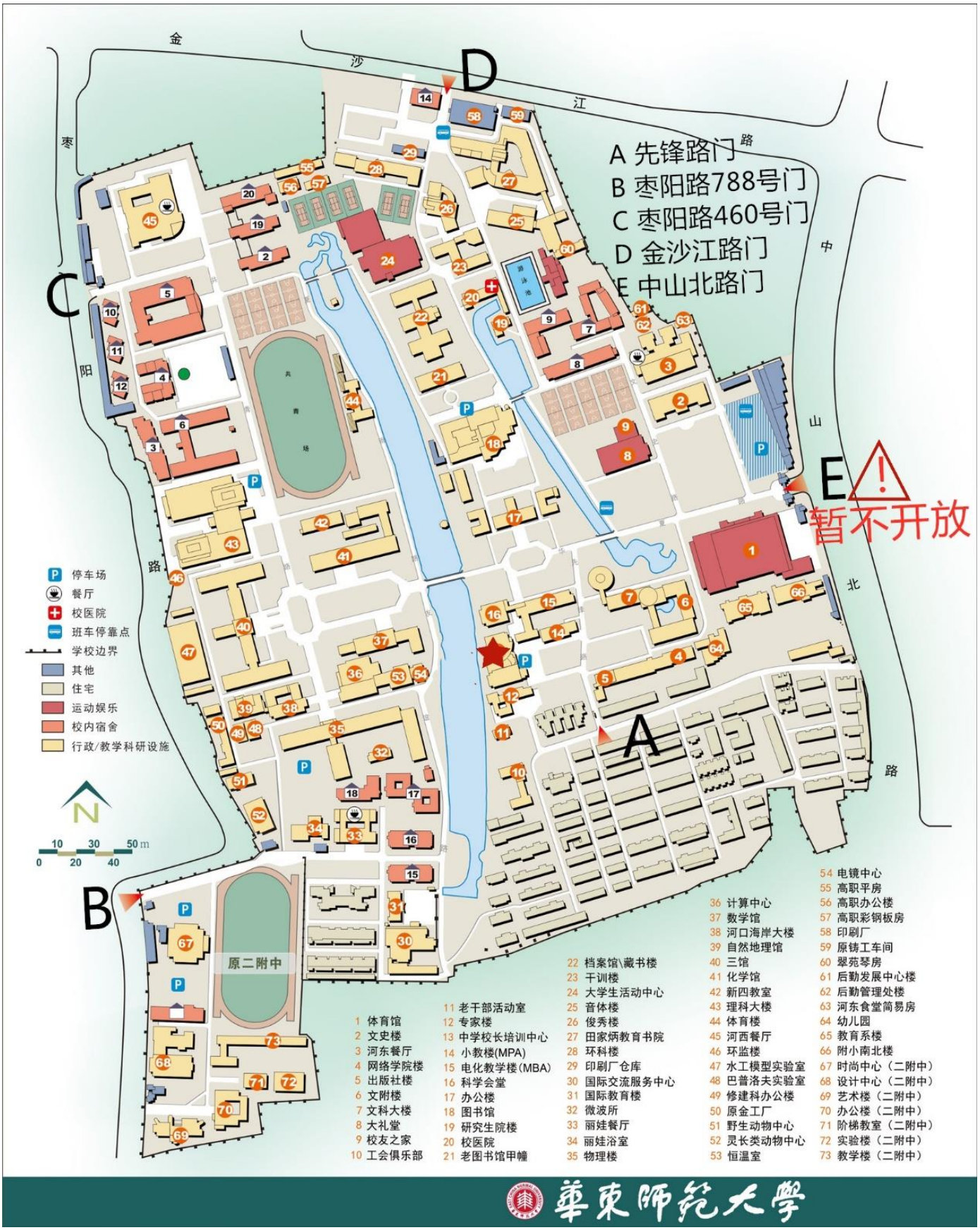
杨立波 南开大学

The Kazhdan-Lusztig polynomial of a matroid was introduced by Elias, Proudfoot and Wakefield, whose properties need to be further explored. In this talk we will survey some recent progress on the real-rootedness conjecture of Kazhdan-Lusztig polynomials of uniform matroids.

Reverse gamma-expansion for Eulerian polynomials

赵彤远 中国石油大学（北京）

经典的 Eulerian 多项式 $A_n(t)$ 在对称基底 $t^k(1+t)^{n-1-2k}$ 下的展开系数非负，这是 Foata-Schzenberger1970 年证明的称为 gamma-非负性的结果。在近期工作中，我们研究反向 gamma-展开，即将 $(1+t)^n$ 用对称 Eulerian 多项式基底 $t^k A_{n-1-2k}(t)$ 来展开的系数是非负的。此外，我们还证明了 $(1+t)^n$ 对 Narayana 多项式等几个著名多项式序列的反向 gamma 分解中系数的交错正性。对这些系数寻求组合阐释是有趣的公开问题。



注： ★ 为会议地点，即逸夫楼（学术交流中心）

校门	开放时间	开放通道
金沙江路门(D)	24 小时	行人、非机动车道、机动车
枣阳路门(B、C)	6: 00-23: 00	行人、非机动车道、机动车
先锋路门(A)	6: 00-22: 00	行人、非机动车
中山北路门(E)	暂不开放	