PARTITIONS, q-SERIES and MODULAR FORMS CONFERENCE

March 12 – 16, 2008

University of Florida, Gainesville, FL 32611

ABSTRACTS

Scott Ahlgren, University of Illinois
3:30PM - 3:50PM, SATURDAY, MARCH 15

Vanishing of modular forms at infinity
A natural question is to ask for an upper bound on the order of vanishing at infinity of a non-zero element of a given space of modular or cusp forms. A well known upper bound is provided by the valence formula. Here we use p-adic techniques to provide improved bounds, which are sharp in many cases. (This is joint work with N. Masri and J. Rouse).

⋆ ⋆ ⋆

George Andrews, Pennsylvania State University
9:00AM - 9:50AM, THURSDAY, MARCH 13

Symmetry in q-Series
Recent work on partitions especially the k-marked Durfee symbols suggests the importance of symmetry in the transformations of q-series. In this talk we shall begin by discussing the symmetry work initiated by L.J. Rogers and recently greatly extended by D. Bowman. We shall then examine other routes to symmetry and what there is to be gained from various symmetric expansions.

⋆ ⋆ ⋆

Alex Berkovich, University of Florida
11:20AM - 11:40AM, FRIDAY, MARCH 14

Nonsymmetrical extension of the Boulet-Pak rank identities
In their recent paper Boulet and Pak introduced a new generalization of Dyson's rank. They named this statistic the $(2, m)$-rank. This rank is defined for partitions with at least two successive Durfee rectangles $[x, x + m]$ and $[y, y + m]$. In general, this rank does not enjoy an analogue of the conjugation symmetry of Dyson's rank. In my talk I will provide a q-hypergeometric "explanation" and a generalization of the Boulet-Pak identities. In particular, I will discuss certain new generating functions with a positive $(2, m)$-rank.

⋆ ⋆ ⋆

Bruce C. Berndt, University of Illinois
2:10PM - 3:00PM, WEDNESDAY, MARCH 12

Ramanujan's series for $1/\pi$
Beginning with Ramanujan's epic paper, Modular Equations and Approximations to π, we describe Ramanujan's series for $1/\pi$ and later attempts to prove them. Ramanujan's derivations employ Eisenstein series, and we show how his ideas lead to many new series for $1/\pi$ as well. Generalizations, analogues, and consequences of Ramanujan's series are discussed. This talk is based on joint work with Nayandeep Deka Baruah and Heng Huat Chan.

⋆ ⋆ ⋆

Cilanne Boulet, Cornell University
10:20AM - 10:40AM, WEDNESDAY, MARCH 12

Symmetries of k-marked Durfee symbols
As shown by Andrews, the generating series for k-marked Durfee symbols with respect to rank shows remarkable symmetry. We will give simple bijections on the Durfee symbols themselves to explain this symmetry and use these bijections to derive new enumerative results.

⋆ ⋆ ⋆

Matthew Boylan, University of South Carolina
4:00PM - 4:20PM, SATURDAY, MARCH 15

Integer weight mock theta analogues
In this talk, we discuss harmonic weak Maass forms whose image under the differential xi operator is a normalized eigenform with integer coefficients and integer weight on the full modular group. In particular, we will discuss the holomorphic parts of these Maass forms.

⋆ ⋆ ⋆

Kathrin Bringmann, University of Minnesota
10:50AM - 11:10AM, SATURDAY, MARCH 15

Marked Durfee symbols and quasimock theta functions
The modularity of the partition generating function has many important consequences, for example asymptotics and congruences for $p(n)$. Recently it became clear that the rank, a partition statistic introduced by Dyson, is related to weak Maass forms, a class of functions which are related to modular forms. Here we do a further step towards understanding how weak Maass forms arise from interesting partition statistics by placing certain marked Durfee symbols into the framework of weak Maass forms. To do this we construct a new class of functions which we call quasiweak Maass forms because they have quasimodular forms as components.

⋆ ⋆ ⋆

Zhu Cao, University of Illinois
5:00PM - 5:20PM, WEDNESDAY, MARCH 12

Product Identities for Theta Functions
Firstly we derive a general method for establishing q-series identities. Products of theta-functions can be written as linear combinations of other products of theta-functions using this method. Many known identities can be shown as special cases of this general formula. Several entries in Ramanujan's notebooks as well as new identities are proved as applications. Next we give several generalized forms of Schröter's formula. A general identity by W. Chu and Q.Yan and the Blecksmith-Brillhart-Gerst theorem are both special cases of our generalized Schröter formula.

⋆ ⋆ ⋆

Youn-Seo Choi, KIAS, Korea
5:00PM - 5:20PM, FRIDAY, MARCH 14

Identities for the fifth order mock theta functions and their generalization
In Ramanujan's Lost Notebook, we are able to find the identities related to the fifth order mock theta functions. In this talk, these identities are discussed and their generalization will be given.

⋆ ⋆ ⋆

Hershel Farkas, The Hebrew University of Jerusalem
3:30PM - 3:50PM, WEDNESDAY, MARCH 12

Generalizations of Hutchinson's Curve and the Thomae Formula
In this note we consider the one dimensional family of compact Riemann surfaces satisfying the algebraic equation

$$W^n = (z - \lambda_0)(z - \lambda_1)(z - \lambda)^{n-1}.$$

This is a family of hyperelliptic surfaces of genus $g = n - 1$. Hutchinson considered the case of $n = 3$. We shall show how the theta functions associated with this family satisfy analogues of Jacobi's formula for elliptic curves. While in Jacobi's case the theta functions were the classical ones with integer characteristic, here we will obtain theta functions with rational characteristic.
Alternatively our formulas can be thought of as Thomae formulae for what is referred to as singular Z_n curves.

⋆ ⋆ ⋆

Amanda Folsom, University of Wisconsin
10:20AM - 10:40AM, SATURDAY, MARCH 15

The spt-function of Andrews
Recently, Andrews introduced the function $spt(n)$ which counts the number of smallest parts among the integer partitions of n. We show that its generating function satisfies an identity analogous to Ramanujan's mock theta identities. As a consequence, we are able to completely determine the

parity of $spt(n)$. Using another type of identity, one based on Hecke operators, we obtain a complete multiplicative theory for $spt(n)$ modulo 3. These congruences confirm unpublished conjectures of Garvan and Sellers. Our methods generalize to all integral moduli. This work is joint with Ken Ono.

⋆ ⋆ ⋆

Sharon Garthwaite, Bucknell University
4:30PM - 4:50PM, SATURDAY, MARCH 15

Weakly Holormorphic Modular Forms Arising from Theta Series
In 1920 Ramanujan introduced the world to mock theta functions, q-series with strange analytic and transformation properties. These functions, for example, $f(q)$ and $\omega(q)$, naturally arise in the study of partitions, and, more recently, the study of rank moments. In 2003 S. P. Zwegers gave us the first hint to understanding the transformation properties of these functions by looking at forms "completed" with period integrals of theta series. K. Bringmann and K. Ono built upon this work to place these mock theta functions into the framework of automorphic forms, specifically harmonic weak Maass forms. Bringmann, Ono, and R. Rhoades have built infinite families of harmonic weak Maass forms involving period integrals of theta series of weight 1/2 and 3/2. In this talk we will explore the "holomorphic part" of these functions. This is joint work with David Penniston of Furman University.

⋆ ⋆ ⋆

Frank Garvan, University of Florida
2:10PM - 3:00PM, FRIDAY, MARCH 14

The Rank and Crank of Partitions - In Memory of Richard P. Lewis
In this talk we examine the problem of exact linear relations for the rank and the crank of partitions as well as the problem of congruence relations. This talk is in memory of Richard Lewis and highlights some of his work. The first linear relations were found for the rank mod 5 and 7 by Dyson (1944) although the mod 5 results are encoded in an identity in Ramanujan's Lost Notebook. The first congruence relations for the rank were found by Atkin and Hussain (1958). We also give three ranks for 2-colored partitions which were inspired by a paper of Lewis and Hammond (2004).

⋆ ⋆ ⋆

Basil Gordon, University of California - Los Angeles
3:30PM - 3:50PM, FRIDAY, MARCH 14

Arithmetic of the Rogers-Ramanujan coefficients
Congruences (mod 2) and (mod 3) for the Taylor series coefficients of the Roger-Ramanujan functions $G(x)$, $H(x)$ and the quotients $H(x)/G(x)$, $G(x)/H(x)$ are presented. The signs of the coefficients of the two quotients are determined.

Pavel Guerzhoy, University of Hawaii
10:20AM - 10:40AM, SUNDAY, MARCH 16

On weak Maass–modular grids of even integer weights
A number of examples of families of weak Maass forms and weakly holomorphic modular forms which satisfy a striking equality between their q-expansion coefficients appeared recently. One can formulate this equality by saying that these coefficients constitute a grid. We discuss the simplest possible setting of the full modular group and positive even integer weights. We show that for every such weight the grid exists and is unique.

⋆ ⋆ ⋆

Chadwick Gugg, University of Illinois
4:30PM - 4:50PM, THURSDAY, MARCH 13
(Room: LIT 125)
Two Identities for Squares of the Rogers-Ramanujan Functions and Applications
In his notebooks, Ramanujan recorded 40 beautiful modular relations for the Rogers-Ramanujan functions. He also recorded modular relations for the Rogers-Ramanujan continued fraction, $R(q)$. In particular, he defined the parameters $k := R(q)R^2(q^2)$, $\mu := R(q)R(q^4)$, and $\nu := R^2(q^{1/2})R(q)/R(q^2)$, and gave a number of elegant relations for these parameters. Starting from identities for the Rogers-Ramanujan functions, we give new proofs of some of these results.

⋆ ⋆ ⋆

Heekyoung Hahn, SUNY, Albany
3:30PM - 3:50PM, THURSDAY, MARCH 13
(Room: LIT 125)
Integrable systems and modular forms of level 2
A set of nonlinear differential equations associated with the Eisenstein series of the congruent subgroup $\Gamma_0(2)$ of the modular group $SL_2(\mathbb{Z})$ is constructed. These nonlinear equations are analogues of the well known Ramanujan equations, as well as the Chazy and Darboux-Halphen equations associated with the modular group. The general solutions of these equations can be realized in terms of the Schwarz triangle function $S(0, 0, 1/2; z)$. This is a joint work with Mark J. Ablowitz and Sarbarish Chakravarty.

⋆ ⋆ ⋆

Tim Huber, Iowa State University
11:20AM - 11:40AM, THURSDAY, MARCH 13
(Room: LIT 339)
q-Tangent Numbers from Ramanujan's Lost Notebook
The Hadamard product for a generalization of the Rogers-Ramanujan series appears on page 57 of Ramanujan's Lost Notebook. Coefficients appearing in series expansions for the zeros of Ramanujan's function have interesting analytic and combinatorial properties. This lecture will demonstrate

connections between these coefficients and a new class of q-tangent numbers associated with geometrically distributed random variables.

⋆ ⋆ ⋆

Mourad E.H. Ismail, University of Central Florida
11:20AM - 11:40AM, SATURDAY, MARCH 15

Addition Theorems Via Continued Fractions
We show connections between a special type of addition formulas and a theorem of Stieltjes and Rogers. We use different techniques to derive the desirable addition formulas. We apply our approach to derive special addition theorems for Bessel functions and confluent hypergeometric functions. We also derive several additions theorems for basic hypergeometric functions. Applications to the evaluation of Hankel determinants are also given. This work is based on a joint work with Jiang Zeng and will appear in Trans. Amer. Math. Soc.

⋆ ⋆ ⋆

Masahiko Ito, Aoyama Gakuin University
2:10PM - 3:30PM, SUNDAY, MARCH 16

On the Sears–Slater basic hypergeometric transformations
We define the Jackson integral of type BC_1 which is a q-series permitting Weyl group symmetry. Using this, we give a simple proof of transformation formulas for a very-well-poised-balanced ${}_{2r}\psi_{2r}$ hypergeometric series discovered by Sears and Slater. Moreover, we show a multiple generalization of the Sears–Slater basic hypergeometric transformations.

⋆ ⋆ ⋆

Frédéric Jouhet, University of Lyon I
4:30PM - 4:50PM, THURSDAY, MARCH 13
(Room: LIT 339)
Some arithmetical applications of a general formula of q-series
We will survey some recent arithmetical results arising from a multiple extension of the Rogers-Ramanujan identites proved by Andrews. This will include q-analogues of divisibility results due to Zudilin, Calkin, as well as irrationality results for q-analogues of some special functions.

⋆ ⋆ ⋆

Yasushi Kajihara, Osaka University
2:40PM - 3:00PM, SUNDAY, MARCH 16

On bilinear transformation formulas for basic hypergeometric series and multivariate generalization.
In this talk, I will present a class of bilinear transformation formulas for basic hypergeometric series and Milne's multivariate basic hypergeometric series associated with the root system of type A. Our construction is very similar to one of elementary proof of Sears-Whipple transformation formula for terminating balanced ${}_4\phi_3$ series while we use multiple Euler transformation formula with different dimensions which has obtained in our previous work.

⋆ ⋆ ⋆

Soon-Yi Kang, Pohang University of Science and Technology
5:00PM - 5:20PM, SATURDAY, MARCH 15

Generalizations of the Rogers-Fine identity and their applications
The Rogers-Fine identity plays important role in q-series, partitions, and modular forms. We state its generalizations and seek various applications of them.

⋆ ⋆ ⋆

Byungchan Kim, University of Illinois
4:30PM - 4:50PM, WEDNESDAY, MARCH 12

Combinatorial proofs of certain indentities invoving partial theta functions
In recent work of G.E. Andrews and S.O. Warnaar, they prove an interesting identity for the product of two partial theta functions. We will discuss combinatorial proofs of identities appearing in their work and related identities in Ramanujan's lost notebook.

⋆ ⋆ ⋆

Sun Kim, University of Illinois
4:00PM - 4:20PM, WEDNESDAY, MARCH 12

A generalization of the Farkas and Kra partition theorem.
We generalize certain partition theorems originating with modular equations and give bijective proofs for them. The Farkas and Kra partition theorem for modulus 7 can be derived from one of the generalizations.

⋆ ⋆ ⋆

Sung-Geun Lim, University of Illinois
5:00PM - 5:20PM, THURSDAY, MARCH 13
(Room: LIT 339)
Transformation formulas of non-analytic Eisenstein series and infinite series identities.
We compute transformation formulas of generalized non-analytic Eisenstein series and find a class of infinite series identities using those transformation formulas.

⋆ ⋆ ⋆

Karl Mahlburg, MIT
10:20AM - 10:40AM, FRIDAY, MARCH 14

Asymptotics for partitions without sequences
Partitions without sequences (i.e., containing no adjacent parts) were recently studied in connection to a wide variety of applications, including probability distributions and cellular automata. The main result of this talk is an asymptotic series expansion for the number of such partitions of size n. As shown by Andrews, the generating series for these partitions is the product of a theta function and one of Ramanujan's mock theta functions, and thus does not have the type of modular transformation properties that are typically used to make such estimates. In particular, the non-holomorphic error integrals that appear in the transformations are in fact part of the main term of the asymptotic expansion.

⋆ ⋆ ⋆

Olivier Mallet, Université Paris 7
3:30PM - 3:50PM, THURSDAY, MARCH 13
(Room: LIT 339)
n-Color overpartitions, lattice paths, and multiple basic hypergeometric series
We define two classes of multiple basic hypergeometric series which generalize multiple series studied by Agarwal, Andrews, and Bressoud. We show how to interpret these series as generating functions for special restricted lattice paths and for n-color overpartitions with weighted difference conditions. We also point out that some specializations of our series can be written as infinite products, which leads to combinatorial identities linking n-color overpartitions with ordinary partitions or overpartitions.

⋆ ⋆ ⋆

Richard McIntosh, University of Regina, Canada
4:00PM - 4:20PM, FRIDAY, MARCH 14

Some new relations involving a universal mock theta function
I will show that the classical mock theta functions, which all have weight 1/2, can be expressed in terms of the function $g_2(x, q)$. Some new mock theta "conjectures" for the functions of even order will be given.

James McLaughlin, West Chester University of Pennsylvania
4:00PM - 4:20PM, THURSDAY, MARCH 13
(Room: LIT 125)
Lifting Bailey Pairs to WP-Bailey Pairs
A pair of sequences $(\alpha_n(a,k,q), \beta_n(a,k,q))$ such that
$\alpha_0(a,k,q) = 1$ and

$$\beta_n(a,k,q) = \sum_{j=0}^{n} \frac{(k/a;q)_{n-j}(k;q)_{n+j}}{(q;q)_{n-j}(aq;q)_{n+j}} \alpha_j(a,k,q)$$

is termed a *WP-Bailey Pair*. Upon setting $k = 0$ in such a pair we obtain a *Bailey pair*. In the present paper we consider the problem of "lifting" a Bailey pair to a WP-Bailey pair, and use some of the new WP-Bailey pairs found in this way to derive some new identities between basic hypergeometric series and new single sum and double sum identities of the Rogers-Ramanujan-Slater type.

⋆ ⋆ ⋆

Stephen Milne, The Ohio State University
11:50AM - 12:10PM, SUNDAY, MARCH 16

A nonterminating q-Dougall summation theorem for hypergeometric series in $U(n)$
In this talk we extend important classical one-variable summations and transformations of Bailey to multiple basic hypergeometric series very-well-poised on unitary groups $U(n+1)$. In particular, we derive multivariable generalizations of Bailey's 3-term transformation formula for ${}_8\phi_7$ series, and Bailey's nonterminating q-Dougall summation formula. As pointed out by Michael Schlosser, our nonterminating $U(n+1)$ q-Dougall summation formula yields a natural multivariable extension of Jacobi's classical identity for eighth powers of theta functions. All of this work is a consequence of the nonterminating $U(n+1)$ q-Whipple transformation formula of Milne and Newcomb.

⋆ ⋆ ⋆

Élie Mosaki, University of Lyon I
4:00PM - 4:20PM, THURSDAY, MARCH 13
(Room: LIT 339)
On the arithmetical nature of a q-analog of the Riemann zeta function at odd integers
I will report on a recent joint work with Frédéric Jouhet concerning the arithmetical nature of a q-analog of the Riemann zeta function at odd integers. The main result states that for $1/q$ lying in $\mathbb{Z}\backslash\{-1,1\}$ there is at least one irrational among the numbers $\zeta_q(3)$, $\zeta_q(5)$, $\zeta_q(7)$ and $\zeta_q(9)$. This improves a recent result obtained by Krattenthaler, Rivoal and Zudilin.

⋆ ⋆ ⋆

Ken Ono, University of Wisconsin
9:00AM - 9:50AM, FRIDAY, MARCH 14
9:00AM - 9:50AM, SATURDAY, MARCH 15
9:00AM - 9:50AM, SUNDAY, MARCH 16

Lecture 1: *Dyson's challenge for the future: Ramanujan's mock theta functions*
Lecture 2: *Harmonic Maass forms and modular forms: Leveraging*
Lecture 3: *The Birch and Swinnerton-Dyer Conjecture, Heegner Points, and Maass forms*
My lectures will summarize various roles that harmonic weak Maass forms plays in various areas of number theory. The first lecture will about Ramanujan's mock theta functions and partitions. The second lecture will give an overview of the interplay between harmonic weak Maass form and classical modular forms. In particular, we shall leverage properties of two differential operators to obtain a theorem which detects the vanishing of Fourier coefficients of modular forms such as Delta. In particular, we reduce Lehmer's Conjecture on the nonvanishing of Ramanujan's tau-function to the alleged irrationality of a single simple elliptic type integral. In my third lecture I shall further develop the notion of rationality and transcendence to investigate the Birch and Swinnerton-Dyer Conjecture, the Gross-Zagier Theorem on derivatives of L-functions and heights of Heegner points.

⋆ ⋆ ⋆

Robert Osburn, University College Dublin
4:30PM - 4:50PM, FRIDAY, MARCH 14

M_2-rank differences for partitions without repeated odd parts
In 1944, Dyson initiated an important subject in the theory of partitions by discovering a simple statistic called the rank. He conjectured that the rank provided a combinatorial explanation for Ramanujan's congruences to the partition function modulo 5 and 7. In 1954, Atkin and Swinnerton-Dyer proved Dyson's conjectures by establishing generating functions for rank differences in arithmetic progressions. In this talk, we combine the general idea of Atkin and Swinnerton-Dyer with some new q-series identities to prove analogous results for the M_2-rank of partitions without repeated odd parts. This is joint work with Jeremy Lovejoy.

⋆ ⋆ ⋆

Peter Paule, RISC, J. Kepler University Linz
2:10PM - 3:00PM, THURSDAY, MARCH 13

Plane partitions: MacMahon's dream has came true.
In his famous book "Combinatory Analysis" MacMahon introduced Partition Analysis as a computational method for solving combinatorial problems in connection with systems of linear Diophantine inequalities and equations. After devoting a hundred pages to various aspects of Partition Analysis, he starts to consider plane partitions as a natural application domain for his method. After discussing some special cases of the full generating function for plane partitions with restricted number of rows and columns, MacMahon writes: "Our knowledge of the Omega operation is not sufficient to enable us to establish the final form of result." This talk reports on recent joint work with George

E. Andrews (PennState) which shows that - despite MacMahon's negative statement - Partition Analysis indeed is powerful enough to derive the full generating function.

⋆ ⋆ ⋆

Srinivasa Raghava, Annamalai University
3:10PM - 3:30PM, SUNDAY, MARCH 16

New Relations Between q-Series, Eulerian Forms & Theta Functions
In this paper we construct some new type of q-series identities, using the ratios of certain theta functions. Utilizing the results given by Srinivasa Ramanujan in his Lost Note Book, we obtain new representations to some q-series and partition functions (Eulerian Forms) in terms of false-theta functions. Also some new theta (indefinite quadratic forms) functional theorems are out lined. If time is permitted, some interesting new theorems regarding Eulerian forms and Theta series will be presented.

⋆ ⋆ ⋆

Carla Savage, North Carolina State University
10:20AM - 10:40AM, THURSDAY, MARCH 13

An Euler Theorem for a Family of Compositions Constrained by the Ratio of Consecutive Parts
We derive a sum/product identity, a special case of the q-Gauss summation, that has the following interpretation: the number of compositions of an integer N into positive parts $N = x_1 + x_2 + \cdots$ satisfying $x_i > 2x_{i+1}$ when n is even and $2x_i > x_{i+1}$ when n is odd, is equal to the number of partitions of N into parts congruent to 1,4, or 5 modulo 6. The proof combine techniques from lecture hall partitions, sequences constrained by the ratio of consecutive parts, and combinatorial reciprocity. This is joint work with Sylvie Corteel.

⋆ ⋆ ⋆

Michael Schlosser, Vienna University
10:50AM - 11:10AM, WEDNESDAY, MARCH 12

A hypergeometric derivation of the principal specialization formula for Macdonald polynomials
Using the Pieri formula for Macdonald polynomials and its inverse, a recently discovered recursion formula, we present a pure basic hypergeometric proof of the principal specialization formula for Macdonald polynomials. The analysis involves induction and some summations for A_n basic hypergeometric series by Milne.

⋆ ⋆ ⋆

Andrew Sills, Georgia Southern University
11:20AM - 11:40AM, WEDNESDAY, MARCH 12

A Partition Bijection Relating the Rogers-Selberg identities to a Special Case of Gordon's Theorem
Let $A(n)$ denote the number of partitions of n such that if $2j$ is the largest repeated even part, then all positive even integers less than $2j$ also appear at least twice, no odd part less than $2j$ appears, and no part greater than $2j$ is repeated. Let $G(n)$ denote the number of partitions of n such that 1 appears at most once, no part appears more than twice, and if j appears twice, then neither $j-1$ nor $j+1$ appear. Let $C(n)$ denote the number of partitions of n into parts not congruent to 0, 2, or 5 modulo 7. A special case of Basil Gordon's combinatorial of the Rogers-Ramanujan identities (Amer. J. Math. 83 (1961) 393–399) asserts that $G(n) = C(n)$ for all integers n. In "Partitions with initial repetitions" (preprint, 2006), Andrews interprets one of the Rogers-Selberg mod 7 identities as $A(n) = C(n)$. I will present a bijection between the partitions enumerated by $A(n)$ and those enumerated by $G(n)$. This material is discussed in my paper, "A partition bijection related to the Rogers-Selberg identities and Gordon's theorem," Journal of Combinatorial Theory, Series A 115/1 (2008) 67-83.

⋆ ⋆ ⋆

Michael Somos, Georgetown University
5:00PM - 5:20PM, THURSDAY, MARCH 13
(Room: LIT 125)
Multisection of q-series
Applying algebraic relation finding to the multisection of q-series yields some interesting results. This includes Klein's quartic, two continued fractions of Ramanujan, and some recent results of Andrews and Berndt. The Online Encyclopedia of Integer Sequences is a useful tool for identifying q-series given only its coefficients. Multisection can be used to prove q-series identities.

⋆ ⋆ ⋆

Dennis Stanton, University of Minnesota
11:50AM - 12:10PM, SATURDAY, MARCH 15

t-analogues of q-analogues
The q-binomial coefficient is either (A) the generating function of partitions inside a rectangle, (B) the Hilbert series for a ring of invariants, (C) the number of vector subspaces of a given dimension of a finite vector space. By combining these ideas using modular representation theory, a t-analogue of q-analogue is presented. Letting either t or q approach 1, the q-binomial coefficient is recaptured. Some consequences for integer partitions will be presented.

⋆ ⋆ ⋆

Sergei Suslov, Arizona State University
11:50AM - 12:10PM, WEDNESDAY, MARCH 12

On a problem of Landau and Feynman
We consider a motion of a nonrelativistic quantum particle with a spin in uniform perpendicular magnetic and electric fields. A transition amplitude between Landau levels is evaluated in terms of Charlier polynomials. The Green function (or Feynman's propagator) is also found. Thus is a joint work with Raquel Lopez, please see more details on http://arxiv.org/abs/0707.1902

⋆ ⋆ ⋆

Ole Warnaar, University of Melbourne
10:50AM - 11:40AM, SUNDAY, MARCH 16

Macdonald polynomials and basic hypergeometric series
In this talk I will show how many well known results in the theory of basic hypergeometric series can be generalised to the multivariable setting using Macdonald polynomial theory. Key tools, new to the multivariable theory, are lambda rings and the double affine Hecke algebra. No prior knowledge of these notions will be assumed in my talk.

⋆ ⋆ ⋆

Herbert Wilf, University of Pennsylvania
9:00AM - 9:50AM, WEDNESDAY, MARCH 12

Towards a 'global' theory of integer partitions
If S is a given set of positive integers, and M is a set of nonnegative integers containing 0, let $p(n, S, M)$ be the number of partitions of n whose parts all lie in S and the multiplicities of whose parts all lie in M. We will discuss the question of finding direct quantitative relationships between the defining sets S, M, on the one hand, and the properties of the resulting partition function, on the other. This is joint work with Rod Canfield.

⋆ ⋆ ⋆

Ae Ja Yee, Pennsylvannia State University
10:50AM - 11:10AM, THURSDAY, MARCH 13

Combinatorics of q-Euler numbers
The Euler number E_n counts the number of "alternating permutations" on $[n]$. It is well known that its exponential generating function equals $\tan z + \sec z$. For this reason, E_{2n} and E_{2n+1} are called secant numbers and tangent numbers, respectively. Certain polynomials arising in series expansions for zeros of generalized Rogers-Ramanujan functions provide a q-analog of the tangent numbers, which is part of a wider class of polynomials with similar combinatorial interpretations. In this talk, we will discuss various q-Euler numbers. This is joint work with Tim Huber from Iowa State.

⋆ ⋆ ⋆

Hamza Yesilyurt, Bilkent University, Turkey
10:50AM - 11:10AM, FRIDAY, MARCH 14

Equalities and inequalities for 7-cores
We employ the theory of modular equations to obtain new modular equations of degree seven. Using these identities together with the explicit formulas for the coefficients of 7-cores, we obtain new inequalities involving the coefficients of 7-cores. For example, we show that if n is not 7, than the number of representations of n by the sextenary form $x^2+y^2+z^2+7(l^2+t^2+s^2)$ is larger than the number of 7-cores of n. This is joint work with Alexander Berkovich.

Jiang Zeng, University of Lyon I
11:50AM - 12:10PM, FRIDAY, MARCH 14

Euler's q-difference table for $C_\ell \wr S_n$
The well-known counting formula for the derangements arise naturally from Euler's difference table associated with the sequence $\{n!\}$. In this talk we shall consider Euler's difference table associated with the sequence $\{\ell^n n!\}$ and a q-analogue of the latter table. The involved coefficients have combinatorial interpretations in terms of k-successions of the group $C_\ell \wr S_n$ and a new Mahonian statistic on the group $C_\ell \wr S_n$. In particular for $\ell = 1$ we recover the known results for the symmetric groups while for $\ell = 2$ we obtain the corresponding results for hyperoctahedral groups. This is a joint work with Hilarion L. M. Faliharimalala.

⋆ ⋆ ⋆

Jianqiang Zhao, Eckerd College
11:50AM - 12:10PM, THURSDAY, MARCH 13

Higher Cyclotomy Theory
In this talk I will describe the recent work on the relations of special values of multiple polylogarithms, motivic fundamental group of the projective plane punctured at 0, infinity and roots of unity, and the space of cuspidal modular forms of weight 2 over $X_1(p)$.

⋆ ⋆ ⋆

Sander Zwegers, University College Dublin
2:10PM - 3:00PM, SATURDAY, MARCH 15

Mock Modular Forms
We'll discuss some aspects of the theory of mock modular forms, including indefinite theta functions, Appell-Lerch sums, identities between mock modular forms, and higher depth mock modular forms. The motivation is coming from the study of Ramanujan's mock theta functions.

⋆ ⋆ ⋆