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The Electronic News Net of the
SIAM Activity Group on Orthogonal Polynomials and Special Functions

http://math.nist.gov/opsf

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Topics:

Calendar of Events:

November 21-22, 2019
Two Days on Orthogonal Polynomials and Special Functions
University of Almería, Almería, Spain
https://w3.ual.es/GruposInv/Tapo/CA2019/OPSF2019.html

December 18–20, 2019
Matrix Valued Special Functions and Integrability
Radboud University, Nijmegen, The Netherlands
https://www.ru.nl/math/vm/events/@1238175/matrix-valued-special-functions-and-integrability/

April 27–May 20, 2020
Workshop on Integrable Systems and Orthogonal Polynomials—Numerical
and Analytical Perspectives
AIMS South Africa, Muizenberg, Cape Town, South Africa
https://aims.ac.za/2019/10/23/workshop-integrable-systems-and-orthogonal-polynomials-numerical-and-analytical-perspectives/

May 11–15, 2020
LMS–CMI Research School: *Methods for Random Matrix Theory and Applications*
University of Reading, Reading, UK
https://janivirtanen.wordpress.com/research-school-2020

July 5–11, 2020
8th European Congress of Mathematics (8ECM)
Mini-symposium on Orthogonal Polynomials and Special Functions
Organized by Paco Marcellán, Juan J. Moreno-Balcázar and Galina Filipuk,
Portorož, Slovenia
https://www.8ecm.si/minisymposia

July 6–10, 2020
SIAM Annual Meeting, held jointly with CAIMS
(Canadian Applied and Industrial Mathematics Society)
Sheraton Centre Toronto Hotel, Toronto, Ontario, Canada
https://www.siam.org/Conferences/CM/Main/an20

July 7–10, 2020
Functional Analysis, Approximation Theory and Numerical Analysis (FAATNA)
Matera, Italy
http://web.unibas.it/faatna20/

July 13–17, 2020
33rd International Colloquium on Group Theoretical Methods in Physics (Group33)
Cotonou, Benin
http://www.cipma.net/group33-cotonou-benin

July 13–18, 2020
Combinatorics around the q-Onsager algebra, celebrating the 65th birthday of Paul Terwilliger
Satellite event of the 8th European Congress of Mathematics
which will be held the prior week in Portorož, Slovenia,
Kranjska Gora, Slovenia
https://conferences.famnit.upr.si/indico/event/15/overview

August 10–14, 2020
OPSFA Summer School 2020
Radboud University, Nijmegen, The Netherlands
https://www.ru.nl/radboudsummerschool/courses/2020/opsfa-summer-school-2020

Topic #1 ——— OP – SF Net 26.6 ——— November 15, 2019

From: Walter Van Assche (walter.vanassche@kuleuven.be)
Subject: Message from the Chair

This is my last message as a chair of the activity group "Orthogonal Polynomials and Special Functions". You should have received a message with subject "Election is now open for SIAG OPSF" and I hope you already have voted. If not, then look up this mail in your mailbox and cast your vote. It has been my pleasure to serve the activity group the past six years and I am confident that my successor will do a good job in continuing this service.

It is very sad that 2019 turned out to be a year where we lost some good friends and colleagues. This newsletter contains obituaries of four respected members of our activity group: Richard Askey, Martin Muldoon, Erik van Doorn and Mark Coffey. They were all four regular attendees of our meetings, workshops and symposia and probably we would not have this Newsletter or activity group without the effort and support they have always given. Some more background information about their work will appear in forthcoming issues of this Newsletter.

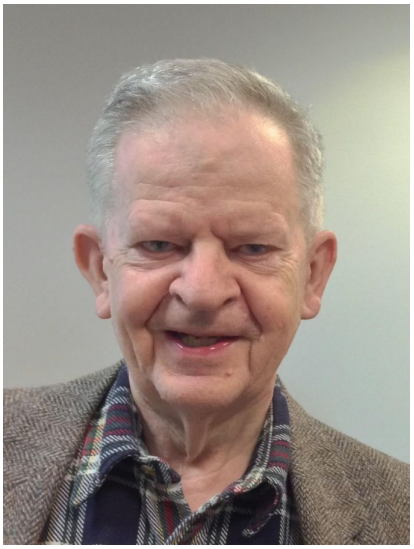
Walter Van Assche (November 2019)

Topic #2 ——— OP – SF Net 26.6 ——— November 15, 2019

From: Suzanne Askey (askey@chorus.net)
Subject: Obituary for **Richard Allen "Dick" Askey** (1933–2019)

Richard Allen "Dick" Askey, June 4, 1933—October 9, 2019

Richard Allen "Dick" Askey, of Madison, Wisconsin, passed away on October 9, 2019, at the age of 86. He was born to Philip E. Askey and Bessie May Askey on June 4, 1933, in St. Louis, Missouri.



Dick Askey

Dick devoted his life's work to mathematics and math education. He received his Ph.D. from Princeton University in 1961 under the direction of Salomon Bochner, then became an instructor at the University of Chicago before joining the faculty in the Department of Mathematics at the University of Wisconsin–Madison in 1963 as an Assistant Professor. Dick retired as the John Bascom Professor of Mathematics in 2003. Dick generously used his time to help many mathematicians around the world with their careers. He was a man of integrity and lived his life to help others and share knowledge.

Dick was a Guggenheim Fellow in 1969–1970, and spent the academic year at the Mathematisch Centrum in Amsterdam, The Netherlands and brought his family with him. He gave an invited address at the International Congress of Mathematicians in 1983. He was elected as a Fellow of the American Academy of Arts and Sciences in 1993, a Fellow of the Society for Industrial and Applied Mathematics in 2009, a Fellow of the American Mathematical Society (AMS) in 2012 and was also an Honorary Fellow of the Indian Mathematical Society. He was very active in AMS governance and served as Vice President of the Society from 1986 to 1987. Dick traveled the world giving talks on mathematics and sharing the genius of the mathematician Srinivasa Ramanujan. Professor Askey was presented a Lifetime

Achievement Award in Recognition and Appreciation for his Outstanding Work and Leadership in the Field of Special Functions, at the International Symposium on Orthogonal Polynomials, Special Functions and Applications in Hagenberg, Austria on July 24, 2019.

Dick was the world's foremost authority on Special Functions and a world leader in the area of orthogonal polynomials. His favorite special function was Jacobi polynomials. An inequality for Jacobi polynomials of his, the Askey-Gasper inequality, was essential in de Brange's famous proof of the Bieberbach conjecture. Dick was instrumental in the construction of the hugely important, Askey and q-Askey schemes which are hierarchical organizations of generalized and basic hypergeometric orthogonal polynomials. He introduced the Askey-Wilson polynomials in 1984 (together with James A. Wilson), which are on the top level of the q-Askey scheme.

Some of his most well-known publications include "Orthogonal Polynomials and Special Functions" (Society for Industrial and Applied Mathematics, Philadephia, 1975), "Special Functions" (Cambridge University Press, Cambridge, 1999), co-authored with George Andrews and Ranjan Roy, and an essay "Good Intentions are not Enough" (Chapter 8 in The Great Curriculum Debate: How Should We Teach Reading and Math?, Brookings Institution Press, Washington D.C., 2001). Early in his career Dick made a commitment to improving K-12 math education. He opposed "new math" in the 1960's and helped point out deficiencies in more recent changes to math education.

Dick was a loving husband and father. Dick and Liz's devotion to one another has been an inspiration to those who know them. During his last years, he faithfully cared for Liz during her Alzheimer's journey. They raised their children with a love of books, curiosity about the world, and with great kindness. Dick baked cookies and popovers with his children, read them countless books, and supported and encouraged their education of all types, from college to other classes like photography, dance, puppetry, ceramics, and swimming. Together, Dick and Liz supported the Arts, literacy programs, education, and a homeless program for women and children at the YWCA.

Dick is survived by his wife of 61 years, Elizabeth Hill Askey, his son, James R. Zurlo (Kathryn Zurlo), daughter, Suzanne E. Askey (David Foss); his three siblings: Ruth Gilmore, Carol Wisler, and Phil Askey; grandchildren Rebecca Zurlo, Ben Hinkel and Sarah Askey-Foss, and a great granddaughter Aisa Hinkel.

In lieu of flowers, the family would appreciate donations made in his name to:
YWCA Madison or the American Players Theatre.

Topic #3 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Kathy Driver (kathy.driver@uct.ac.za), Mourad Ismail (mourad.eh.ismail@gmail.com),
and Chandler Davis (davis@math.toronto.edu)
Subject: Obituary for **Martin Eugeen Muldoon** (1939–2019)

Martin E. Muldoon, February 28, 1939—August 1, 2019

Martin Muldoon was born on February 28, 1939 in County Mayo, Ireland. He studied at the National University of Ireland, obtaining a B.Sc. in 1959 and an M.Sc. in 1960. In 1961 he went to the University of Alberta, Edmonton, Canada, to pursue his graduate studies and obtained his Ph.D. in 1966. After graduation, he went to York University, Toronto, Canada, as an assistant professor and advanced through the ranks where he became a professor in 1978. He retired in 2004 but remained very active in mathematics. Martin provided valuable service to the SIAM Activity Group

on Orthogonal Polynomials and Special Functions for many years. He was SIAG/OPSF program director from 1993–95, and edited or co-edited the activity group's Newsletter from 1996–2015.

Martin Muldoon

Martin met Mourad Ismail in the early 1970's. Their first paper was on a problem proposed by Thomas Nagylaki to determine the dependence of the smallest eigenvalue of a boundary value problem on real n-dimensional space ["Monotonicity of the zeros of a cross-product of Bessel functions", SIAM Journal on Mathematical Analysis, **9**:4, 1978]. This amounted to showing that the roots of a transcendental equation are monotone in the dimension n. Martin and Mourad found different solutions using distinct methods. In the late 1970's, Mourad and Martin continued their collaboration and addressed questions relating to the complete monotonicity of quotients of special functions and their relation to infinitely divisible distributions. Many years of fruitful collaboration on a variety of problems ensued. Martin also worked extensively with his doctoral supervisor (and later his great friend and colleague) Lee Lorch at York University. During the later years of his research career, Martin worked with Kathy Driver and they wrote several papers on the properties of zeros of ultraspherical, Laguerre and Jacobi polynomials. Martin's in-depth knowledge of zeros of Bessel functions led to the proofs of necessary and sufficient conditions on the parameter t to ensure interlacing of zeros of two Laguerre polynomials of the same degree, and of different degrees, corresponding to different parameters α and $\alpha + t$.

Martin also worked on the gamma and q-gamma functions and found certain characterizations of the gamma function. Another question he worked on was to characterize certain special functions by nonlinear equations satisfied by their zeros. This is a question originating in physics and was first addressed by researchers from the Calogero team in Rome, Italy.

Martin was a collaborator of Lee Lorch in peace work as well as in mathematics. It was natural that when Lee died in 2014, Martin wrote a widely read obituary mentioning his work for peace and civil liberties. He also led in founding a fund at York University in honor of Lee, dedicated to these goals.

Both Lee and Martin were active over the years in Science for Peace, an activist organization since 1981—headquartered in Toronto—primarily composed of university people. Martin served on the Executive Committee for many years. He was one of the most reliable and unfailingly cheerful characters in a sometimes fractious lot. His fairness and even temper became especially important in a period of dissension within the organization over several years; when the dust settled, the leaders again were willing to work together, but some of the older group failed to put in the effort needed to restore constructive activity. Martin as Treasurer, was one of a small nucleus that filled the gap and enabled Science for Peace to move forward. His death will be mourned by all, but his legacy will be a harmonious, competent peace group, well able to carry on his spirit. He, and his wife Jay, held generous, inclusive views of the world and were always wonderful to interact with socially.

Martin will be greatly missed by our community of mathematicians. A more detailed obituary will appear in the Journal of Approximation Theory.

From: Lance Littlejohn (Lance_Littlejohn@baylor.edu)
Subject: Obituary for **Erik van Doorn** (1949–2019)

Erik van Doorn, August 12, 1949—November 1, 2019

Erik van Doorn

On November 1, 2019, Erik van Doorn tragically passed away, after being in a traffic accident two days earlier while riding his bicycle in Germany near his home in Enschede, The Netherlands. Erik and his wife, Janny, were well known and admired by the community of researchers in orthogonal polynomials, approximation theory and stochastic processes. From the University of Twente's website, "Erik was an internationally renowned scientist, highly respected for his research, and a welcome speaker at many conferences". Indeed, the lectures that Erik gave at conferences were always immaculately prepared and wonderfully presented. Erik will be greatly missed by his many mathematical, and non-mathematical, friends.

Erik was born on August 12, 1949, in Zeist, The Netherlands to parents Frans and Truus van Doorn. Erik had a younger sister Karin (currently living in Leiden), and two younger brothers, Michael (who passed away earlier) and Jurry (currently living in Romania). Erik and Janny were married on January 22, 1978. They have one son, Tim, who runs a recording studio and lives in Antwerp, Belgium, with his long-time girlfriend, Wendy.

(L–R) Janny, Erik, Frank Coden, Pauline Coolen-Schrijner

Erik received his Ph.D. in mathematics from the Technische Hogeschool Twente (as the University of Twente was called then), in December 1979 under the supervision of Prof. J. H. A. (Jos) de Smit. The title of his Ph.D. thesis was *Stochastic Monotonicity of Birth-Death Processes*. After working elsewhere for a few years, Erik returned to the (renamed) University of Twente as a faculty member in 1985 and remained at Twente until his retirement in 2014 but Erik continued his research after retirement. He supervised three Ph.D. students, Bart van Arem (1990), Pauline Schrijner (later Coolen-Schrijner (1995, d. 2008) and Werner Scheinhardt (1998).

Erik's mathematical research centered around birth-death processes and random walks, applying orthogonal polynomials, and also involved many other areas of stochastic processes, including his fundamental work in quasi-stationary distributions, convergence of Markov chains and stochastic fluid queues.

Outside of mathematics, Erik and Janny enjoyed traveling together. They both had fond memories of their visits to the United States, Greece, Spain and Australia. Erik had a life-long passion for history and he loved to visit old castles as well as local historical sites around Enschede.

Erik had signed papers to be an organ donor in case that he died unexpectedly. There is comfort in knowing that Erik's sudden and tragic passing gave life to others in need.

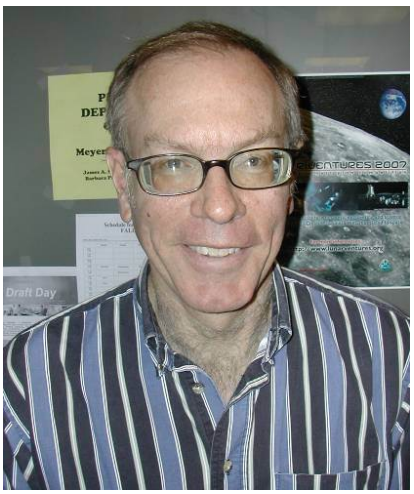
In the next issue of this Newsletter, there will be written remembrances of Erik and his mathematical research given by his colleagues (and friends) Ted Chihara, Werner Scheinhardt, Frank Coolen, Lance Littlejohn and possibly others.

Topic #5 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Victor Moll (vhm@tulane.edu)
Subject: Obituary for **Mark William Coffey** (1957–2019)

Mark William Coffey, October 24, 1957—October 17, 2019

Mark W. Coffey died October 17, 2019, short of his 62nd birthday. He was born in Lincoln, Nebraska on October 24, 1957. Mark attended the University of Iowa for his undergraduate eduction. I met Mark as first year graduate students at the Courant Institute, New York University in the Fall of 1980. He was a student of Malvin Kalos with a thesis on discretization algorithms for partial differential equations. Mark graduated with a PhD in Applied Mathematics in 1983. He then worked for IBM in Poughkeepsie, New York, performing mathematical and numerical modeling (1983–1988). He then held postdoctoral fellowships working on high T_c and Type II superconductors at Iowa State University (1989–1992) and then as a NRC postdoctoral research fellow in the Electromagnetic Technology Division at the National Institute of Standards and Technology in Boulder, Colorado (1992–1994). Mark always had an interest in Mathematical Physics, so he returned to graduate school and obtained a second PhD in Physics from Iowa State University. He then held academic positions at the University of Colorado and the Colorado School of Mines.


Mark Coffey

I saw Mark again at a Joint Mathematical Meetings and immediately we realized that we had developed similar interests. Mark was then working on problems in Special Functions, mostly in connection with the Riemann zeta function. He was particularly fond of the evaluation of integrals containing logarithmic terms in the integrand. These type of problems usually produce analytic results with a number theoretical flavor. He was particularly interested in Stieltjes constants $\gamma_n(a)$, appearing in the Laurent expansion of the Hurwitz zeta function $\zeta(s,a)$ around the pole at $s=1$. He produced from his work on these constants, some remarkable integral evaluations such as

$$\int_0^1 \frac{\ln(-\ln x)\,dx}{1-x+x^2} = -(\gamma+\ln 6)+\tfrac{1}{6}\left[\gamma_1\left(\frac{2}{3}\right)-\gamma_1\left(\frac{1}{3}\right)+\gamma_1\left(\frac{5}{6}\right)-\gamma_1\left(\frac{1}{6}\right)\right],$$

where γ is Euler's constant ["Functional equations for the Stieltjes Constants", The Ramanujan Journal, **39**:3, 2016].

From my scientific conversations with Mark it was clear to me that he was a classical mathematician with a solid knowledge of Physics, or vice-versa. On both sides, he had impeccable taste. He will be sorely missed.

Topic #6 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Christoph Koutschan (christoph.koutschan@ricam.oeaw.ac.at)
Subject: Announcement: OPSFA 2019 Proceedings in *Integral Transforms and Special Functions*

As announced during the conference, we have organized a special issue for the post-proceedings of OPSFA-15. Here is some information for submissions:

The journal is *Integral Transforms and Special Functions*, and the guest editors are:

- Galina Filipuk, Faculty of Mathematics, University of Warsaw, Warsaw, Poland.
- Christoph Koutschan, Johann Radon Institute for Computational and Applied Mathematics, Austrian Academy of Sciences, Linz, Austria.
- Francisco Marcellán, Universidad Carlos III de Madrid, Departamento de Matemáticas, Leganés, Madrid, Spain.
- Walter Van Assche, Department of Mathematics, Katholieke Universiteit Leuven, Leuven, Belgium.

Online submissions are through:
https://www.tandfonline.com/action/authorSubmission?journalCode=gitr20

Choose "OPSFA15" when the system asks for the special issue.

A typical paper for this journal should be no more than 30 pages.

Deadline: March 31, 2020.

We are looking forward to your many interesting contributions!

Best wishes,
Galina Filipuk, Christoph Koutschan, Francisco Marcellan, and Walter Van Assche

Topic #7 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Juan J. Moreno Balcázar (balcazar@ual.es)
Subject: Announcement: Two Days on Orthogonal Polynomials & Special Functions, Almería, Spain

To celebrate the 25th Anniversary of the University of Almería research group, *Teoría de aproximación y polinomios ortogonales* (TAPO—Approximation Theory and Orthogonal Polynomials), we are holding a scientific workshop. The workshop, with topics including orthogonal polynomials and special functions, will be held from November 21–22, 2019. By continuity with the previous workshop held last year in Granada, we are calling this workshop, *Dos Días de Polinomios Ortogonales y Funciones Especiales* (Two Days on Orthogonal Polynomials and Special Functions).

There is no registration fee. However, the registration deadline is October 25, 2019. The workshop will be held in Spanish. You can find all the information about this event on the conference website:

https://w3.ual.es/GruposInv/Tapo/CA2019/OPSF2019.html.

Topic #8 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Walter Van Assche (walter.vanassche@kuleuven.be) and Erik Koelink (e.koelink@math.ru.nl)
Subject: Announcement: Matrix Valued Special Functions & Integrability, Nijmegen, The Netherlands

We are organising a workshop entitled *Matrix valued special functions and integrability*.

Date: December 18–20, 2019 (starts Wednesday afternoon, ends Friday at lunchtime).
Location: Huygensbuilding, Radboud Universiteit, Nijmegen, the Netherlands.

Speakers:

- W. Riley Casper, Louisiana State University, Baton Rouge, Louisiana.
- Mirta Castro, Universidad de Sevilla, Sevilla, Spain.
- Alfredo Deaño, University of Kent, Canterbury, United Kingdom.
- Maurice Duits, KTH Royal Institute of Technology, Stockholm, Sweden.
- Bruno Eijsvoogel, Radboud University, Nijmegen, The Netherlands.
- Ana Foulquié Moreno, Universidade de Aveiro, Aveiro, Portugal.
- Maria Ángeles García-Ferrero, Max Planck Institute Leipzig, Leipzig, Germany.
- David Gómez-Ullate, Universidad de Cádiz, Cádiz, Spain.
- Wolter Groenevelt, Delft University of Technology, Delft, The Netherlands.
- Jasper Stokman, University of Amsterdam, Amsterdam, The Netherlands.

Everybody is welcome to attend and please forward this announcement.

There is no registration fee but please register at the following link so that we are prepared for the number of lunches, etc.

With kind regards,
Walter Van Assche and Erik Koelink

Topic #9 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Kerstin Jordaan (jordakh@unisa.ac.za) and Peter Clarkson (P.A.Clarkson@kent.ac.uk)
Subject: Announcement: Integrable Systems and Orthogonal Polynomials, Cape Town, South Africa

Workshop on Integrable Systems and Orthogonal Polynomials:
Numerical and Analytical Perspectives,
April 27 to May 1, 2020
African Institute for Mathematical Sciences (AIMS), Muizenberg, Cape Town, South Africa.

This workshop will focus on the relationship between integrable systems, in particular the Painlevé equations and discrete Painlevé equations, and orthogonal polynomials from both numerical and analytical perspectives. The Painlevé equations, continuous and discrete, are nonlinear analogs of the classical special functions and form the core of modern special function theory. In recent years various interesting connections between Painlevé equations and orthogonal polynomials

Muizenberg, South Africa

have been studied. For example, rational solutions and special function solutions of Painlevé equations have a close relationship with orthogonal polynomials. From a numerical perspective, reliable and efficient evaluation of solutions of Painlevé equations poses significant challenges, and several approaches have been proposed in the literature, including initial value and boundary value methods in the complex plane and numerical calculation based on the Riemann-Hilbert formulation. Presentations will include survey type lectures on important developments in the area as well as lectures on recent results and open problems.

Target Audience: Researchers, Postdoctoral Fellows, PhD and Master's students.

Organisers: Kerstin Jordaan (University of South Africa) and Peter Clarkson (University of Kent)

For more information and to register please visit the following link.

Registration and logistics: workshops@aims.ac.za.

Academic enquiries: Kerstin Jordaan (jordakh@unisa.ac.za).

Closing date for applications: **December 6, 2019**.

Topic #10 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Paco Marcellán (pacomarc@ing.uc3m.es), Juan Moreno-Balcázar (balcazar@ual.es) and Galina Filipuk (G.Filipuk@mimuw.edu.pl)
Subject: Announcement: Orthogonal Polynomials and Special Functions, Portorož, Slovenia

Mini-symposium: "Orthogonal Polynomials and Special Functions"
Organized by: Paco Marcellán, Juan J. Moreno-Balcázar and Galina Filipuk
Eighth European Congress of Mathematics (8ECM) to be held in Portorož, Slovenia
Dates: July 5-11, 2020.

Description:

Since the classical text written by Szegő in 1939, which set the foundations for the theory for orthogonal polynomials on the real line and on the unit circle, great advances both in the general theory and in the interaction with other areas of mathematics have taken place. Among them, we highlight here the links with numerical analysis (via classical Gaussian integration and its extensions as well as spectral methods for boundary value problems), approximation theory, spectral theory of differential operators, or potential theory in the complex plane.

In the last few years, a very fruitful area of research for the mathematical community working in orthogonal polynomials is related to the theory of random matrices, determinantal random processes and integrable systems. Structural properties of polynomials in the framework of standard L^2 orthogonality with respect to a Borel measure (or a weight function) have been deeply studied for other patterns of orthogonality like multiple orthogonal polynomials, orthogonal polynomials in several variables or Sobolev orthogonal polynomials.

The aim of this mini-symposium is to bring together international experts in different aspects of the theory of orthogonal polynomials, from analytic to numerical aspects with a special emphasis on their applications, and to give the community more visibility in an international meeting that has a larger scope than the regular conferences on the topic.

Webpage for mini-symposia: https://www.8ecm.si/minisymposia.

Webpage for the Congress: https://www.8ecm.si/.

The registration is open and it is possible to participate in this Mini-symposium with a short talk (20 minutes) or a poster.

Topic #11 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Bonita Saunders (Bonita.Saunders@nist.gov)
Subject: Announcement: Postdoctoral Position in Validated Computation of Special Functions at NIST

A two-year postdoctoral research opportunity in validated computation of special functions is available at the National Institute of Standards and Technology in Gaithersburg, MD through the US National Research Council (NRC) Associateship Program. Applicants must be US citizens. The application deadline date is February 1, 2020.

NIST's Applied and Computational Mathematics Division (ACMD) is developing an online system for generating validated tables of special function values with an error certification computed to user- specified precision. A typical user might be a researcher or software developer testing his own code or confirming the accuracy of results obtained from a commercial or publicly available package. The goal is to create a standalone system, but also link to and from the NIST Digital Library of Mathematical Functions.

The project, DLMF Standard Reference Tables on Demand (DLMF Tables), is a collaborative effort with the University of Antwerp Computational Mathematics Research Group (CMA) led by Annie Cuyt. A beta site based on CMA's Mpleee , a multiprecision IEEE 754/854 compliant C++ floating point arithmetic library, is already available at http://dlmftables.uantwerpen.be/. The successful candidate will have the opportunity to advance our current efforts in the field of validated computing through the continued research and development of multiple precision function software providing guaranteed error bounds at arbitrary precision. The associate will also help expand

DLMF Tables into a full-fledged site, as well as investigate the enhancement of existing multi-precision libraries for possible inclusion in DLMF Tables.

Before formally applying, candidates should contact Bonita Saunders to discuss this appointment. For additional information on NIST ACMD postdoc opportunities see:
https://www.nist.gov/itl/math/postdoctoral-opportunities

Topic #12 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Howard Cohl (howard.cohl@nist.gov)
Subject: Report by **Cohl**: Special Session on OPSF at the 2nd International Conference on Symmetry

A special Session on "Special Functions and Orthogonal Polynomials" was held at the 2nd International Conference on Symmetry in Benasque, Spain on Monday September 2, 2019. The organizers were Howard Cohl and Roberto S. Costas-Santos.

The conference was held in the Centro de Ciencias de Benasque Pedro Pascual, which organizes many conferences throughout the year. The Centro was a great venue and was accessible 24 hours per day. There were many rooms which one could use hold separate conversations.

Benasque is right in the heart of the Pyrenees mountain range, very close to the border of Spain and France. Benasque center is located in the Benasque *Hidden Valley*, which is surrounded by the highest peaks of the Pyrenees. So daily views were spectacular. The altitude was 3734 feet (1138 meters) and the climate was extremely comfortable. The locals were extremely accomodating and were eager to share their Aragonese culture with all visitors. There were many restaurants and Spanish cuisine was bountiful. The conference banquet was really enjoyable and it was held at the La Llardana Restaurant.

A list of speakers, the titles of their talks, and affiliations of the Special Session is given below.

- *More Precise Symmetric Descriptions for Properties of the Askey-Wilson Polynomials and their Symmetric Sub-Families*
  Howard S. Cohl, Applied & Computational Mathematics Division, Mission Viejo, CA, USA.
- *Classical Orthogonal Polynomials. Orthogonality and Duality*
  Roberto S. Costas-Santos, Departamento de Física y Matemáticas, Universidad de Alcalá, Alcalá de Henares, Spain.
- *Enabling Semantics in Digital Mathematical Libraries*
  Moritz Schubotz, FIZ Karlsruhe—Leibniz Institute for Information Infrastructure, Franklinstrasse 11, 10587 Berlin, Germany.
- *Asymptotic approximations of the hyperbolic umbilic diffraction catastrophe*
  Ester Pérez Sinusía, Departamento de Matemática Aplicada, Universidad Zaragoza, Zaragoza, Spain.
- *Uniform Convergent expansion of the Appell F_1 function*
  Pablo Palacios Herrero, Departamento de Estadística, Informática y Matemáticas, Universidad Pública de Navarra, Pamplona, Spain.
- *Christoffel deformations of discrete ensembles*
  Pierre Lazag, Département de Mathématiques, Université d'Aix-Marseille, Marseille, France.
- *Equilibrium measures under weakly admissible external fields*
  Joaquín Sánchez-Lara, Department of Applied Mathematics, University of Granada, Granada, Spain.

Topic #13 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Paul Terwilliger (terwilli@math.wisc.edu)
Subject: Report by **Terwilliger**: Special session at AMS Fall Central Sectional Meeting

A special session on "Special Functions and Orthogonal Polynomials" was held at the AMS meeting in Madison on Sept 14–15, 2019. The organizers were Sarah Post and Paul Terwilliger

The speakers included the well known experts: Howard Cohl, Diego Dominici, Mourad Ismail, Dennis Stanton, and Hans Volkmer, along with some young rising stars: Hanmeng Zhan, Anthony Walter, O'Neill Kingston, Sarah Bockting-Conrad, Julien Gaboriaud, Edward Hanson, and Jae-ho Lee.

Concerning the topics, in addition to classical orthogonal polynomials, there were talks on Zeta functions for graphs (Iwan Duursma), quantum walks on association schemes (Ada Chan), diagram algebras (Anne Schilling), Schur-Weyl duality (Peter Tingley), and regular tournaments (Allen Herman).

In spite of the variety of topics covered, after every talk Dennis Stanton had an insightful comment or question, and these encouraged others to ask questions as well; thank you Dennis!

On a somber note, during the AMS meeting Professor Emeritus Dick Askey lay critically ill with cancer at a hospice outside of Madison. On Sunday afternoon when the talks were over, Howard Cohl, Diego Dominici, and Mourad Ismail lead a group of participants to visit Dick and present him with a "friendship book" that they had edited with contributions from many dozen friends around the world. It took considerable effort to create that friendship book, and the editors deserve our profound thanks. Thank you Howard, Diego, and Mourad!

Topic #14 ——— OP - SF Net 26.6 ——— November 15, 2019

From: Frank Garvan (terwilli@math.wisc.edu)
Subject: Report by **Garvan**: Special Session at AMS Fall Southeastern Sectional Meeting

Report on the AMS Special Session on Partitions and Related Topics,
Fall Southeastern Sectional Meeting, held on November 2–3, 2019,
University of Florida, Gainesville.

Organizers:

- Dennis Eichhorn, University of California, Irvine (deichhor@math.uci.edu)
- Frank Garvan, University of Florida (fgarvan@ufl.edu),
- Brandt Kronholm, University of Texas, Rio Grande Valley (brandt.kronholm@utrgv.edu)

There are many aspects of the Theory of Partitions: algebraic, analytic and combinatorial. In addition, it has connections with many areas of mathematics: additive number theory, modular forms, statistical mechanics, algebraic combinatorics, combinatorial identities, representation theory and special functions. All these connections and aspects were represented at this Special Session.

A list of speakers, the titles of their talks, and affiliations is given below.

- *A partition generalization of Brun's identity and inequality*
  Krishnaswami Alladi, University of Florida, Gainesville, Florida, USA

- *Incongruences for modular forms and applications to partition functions*
  Marie Jameson, University of Tennessee, Knoxville, Tenessee, USA
- *Congruences for powers of* $p(n)$
  Madeline Locus Dawsey, University of Texas at Tyler, Tyler, Texas, USA
- *Maass forms and the mock theta function* $f(q)$
  Alexander J. Dunn, University of Illinois at Urbana Champaign, Champaign, Illinois, USA
- *Properties of the Appell-Lerch function*
  Jonathan Gabriel Bradley-Thrush, University of Florida, Gainesville, Florida, USA
- *On the Behavior of Integer Partitions and Carry Sequences*
  Philip de Castro, Clemson University, Clemson, South Carolina, USA
- *Statistics for unimodal sequences of integers*
  Karl Mahlburg, Louisiana State University, Baton Rouge, Louisiana, USA
- *On a Minimal Excludant Theorem and its Generalization*
  Cristina Ballantine, College of the Holy Cross, worcester, Massachusetts, USA
- *Schur functions and the distribution of the major index for tableaux of given shape and descent number*
  William J. Keith, Michigan Technological University, Houghto, Michigan, USA
- *New Infinite* q*-Product Expansions with Vanishing Coefficients*
  James G. Mc Laughlin, West Chester University, West Chester, Pennsylvania, USA
- *From partition identities to a combinatorial approach to explicit Satake inversion*
  Heekyoung Hahn, Duke University, Durham, North Carolina, USA
- *Garden of Eden Partitions for Bulgarian and Austrian Solitaire*
  James A. Sellers, University of Minnesota Duluth, Duluth, Minnesota, USA
- *Some New Positive Observations*
  Alexander Berkovich, University of Florida, Gainesville, Florida, USA
- *Interpolated sequences and critical* L*-values of modular forms*
  Armin Straub, University of South Alabama, Mobile, Alabama, USA
- *Partitions and a conjecture of John Thompson*
  Ian Wagner, Vanderbilt University, Nashville, Tennessee, USA
- *Andrews-Bressoud Series and Wronskians*
  Maggie Wieczorek, University of Tennessee, Knoxville, Tennessee, USA
- *Existence of* η*-quotients of squarefree levels*
  Michael Allen, Oregon State University, Corvallis, Oregon, USA
- *Creating Several Infinite Classes of Mock and Quantum Modular Forms*
  Allison Arnold-Roksandich, Boise State University, Boise, Idaho, USA
- *MacMahon Partial Fractions and Partition Zeta Functions*
  Andrew V. Sills, Georgia Southern University, Statesboro, Georgia, USA
- *Systematic counting of pattern-avoiding partitions*
  Mingjia Yang, Rutgers University, New Brunswick, New Jersey, USA
- *Coaugmented Partitions and a Generalization of Partitions with Parts Separated by Parity*
  Hannah E. Burson, University of Illinois at Urbana-Champaign, Champaign, Illinois, USA

- *The method of weighted words re-revisited*
  Ali K. Uncu, Austrian Academy of Sciences OEAW RICAM / Johannes Kepler University RISC, Linz, Austria
- *Linked partition ideals, directed graphs and q-multi-summations*
  Shane Chern, Penn State University, State College, Pennsylvania, USA
- *Modular Equations for McKay-Thompson Series*
  Timothy Huber, University of Texas Rio Grande Valley, Edinburg, Texas, USA

Links to abstracts and more details including co-authors can be found at the following link:

https://www.ams.org/meetings/sectional/2264_program_ss22.html.

Topic #15 ——— OP - SF Net 26.6 ——— November 15, 2019

From: OP-SF Net Editors
Subject: Review by **Filipuk**: *Orthogonal polynomials and Painlevé equations* by **Van Assche**

This is a review of the book *Orthogonal Polynomials and Painlevé Equations* by Walter Van Assche, Katholieke Universiteit Leuven, Belgium. It was published by Cambridge University Press, Cambridge in 2017.

This book review by Galina Filipuk was originally published by the American Mathematical Society (AMS) as the review MR3729446 in *Mathematical Reviews/MathSciNet*. It is reprinted here by permission of the AMS.

⋆ ⋆ ⋆

This book is devoted to the study of connections between recurrence coefficients of semi-classical orthogonal polynomials and (classical) solutions of the Painlevé equations. Both discrete and continuous Painlevé equations appear in this context. Some integrable systems (e.g., the Toda lattice) also appear in a natural way in the theory of orthogonal polynomials. Moreover, the Painlevé transcendents are used for the local analysis near critical points in the study of the asymptotic behavior of orthogonal polynomials.

The book consists of seven chapters. There are numerous exercises throughout the text and their solutions are presented in Appendix. An extensive bibliography and an index are included in the book.

The first chapter is devoted to the introduction to the theory of orthogonal polynomials on the real line, including a definition of semi-classical orthogonal polynomials. A family of orthonormal polynomials on the real line $\{p_n(x)\}$, $n \geq 0$, always satisfies a three-term recurrence relation of the form

$$xp_n(x) = a_{n+1}p_{n+1}(x) + b_n p_n(x) + a_n p_{n-1}(x), \quad n \geq 0,\ p_{-1} = 0.$$

The coefficients a_n and b_n are usually called the recurrence coefficients. A brief introduction to the theory of the Painlevé equations (both discrete and continuous) is also given in the first chapter.

The second chapter is devoted to the explanation of how the discrete Painlevé I equation (dPI) appears in the study of polynomials orthogonal with respect to the Freud weight $w(x) = e^{-x^4+tx^2}$. The asymptotic behavior of the recurrence coefficients is given and the unicity of the positive solution of (dPI) with a certain initial condition is discussed. It is also shown that the recurrence coefficients of the orthogonal polynomials with respect to the weight $w(x) = e^{-x^4+tx^2}$ satisfy one

of the Painlevé differential equations in the variable t, namely, the fourth Painlevé equation.

The third chapter is devoted to the discrete Painlevé II equation (dPII). Orthogonal polynomials on the unit circle with respect to a certain weight are discussed and the connection of their Verblunsky coefficients to the third and the fifth Painlevé equations is presented. The discrete Painlevé II equation and the third and the fifth Painlevé equations also appear in the context of discrete orthogonal polynomials, namely the generalized Charlier polynomials. The unicity of solutions of (dPII) is also discussed.

The fourth chapter is devoted to the explanation of ladder operators (for orthogonal polynomials with exponential weights and for orthogonal polynomials on the linear and q-lattices) and their use for finding the recurrence coefficients of orthogonal polynomials. Ladder operators increase (decrease) the degree of the orthogonal polynomials by one and are sometimes called the raising (lowering) operators. The technique of the Riemann-Hilbert problem for orthogonal polynomials is discussed and ladder operators are derived. The technique of ladder operators is demonstrated for the modified Laguerre polynomials.

The fifth chapter is devoted to various examples of semi-classical orthogonal polynomials and their connections to the Painlevé equations.

The sixth chapter is devoted to the discussion of special solutions of the Painlevé equations (both rational and special function solutions) which are related to the orthogonal polynomials.

Finally, the seventh chapter is devoted to the study of the asymptotic behavior of orthogonal polynomials near critical points and how the Painlevé equations (PI)-(PVI) are used in this context.

Reviewed by Galina V. Filipuk.

Topic #16 ——— OP - SF Net 26.6 ——— November 15, 2019

From: OP-SF Net Editors
Subject: Review by **Marcellán**: *Orthogonal polynomials and Painlevé equations* by **Van Assche**

This is a review of the book *Orthogonal Polynomials and Painlevé Equations* by Walter Van Assche, Katholieke Universiteit Leuven, Belgium. It was published by Cambridge University Press, Cambridge in 2017.

This book review by Paco Marcellán was originally published by zbMATH (formerly Zentralblatt MATH), as the review Zbl 1387.33001. It is reprinted here by permission of zbMATH.

⋆ ⋆ ⋆

At the end of the 19$^{\text{th}}$ century some relevant mathematicians like Poincaré, Fuchs, Picard, Painlevé, among others, were interested to find those nonlinear ordinary differential equations (ODE) such that their general solutions are free from movable branch points (Painlevé property). The locations of possible branch points and critical essential singularities of solutions can be independent on the initial values. In the case of first order differential equations the Painlevé property only gives linear differential equations, the Riccati differential equation and the equation associated with the Weierstrass elliptic function. For second order differential equations, Picard raised the description of those nonlinear differential equations $y''(x) = R(x, y, y')$, where R is a rational function, such that the Painlevé property holds. Paul Painlevé found that, up to some simple transformations, there are 50 canonical forms for such ODEs. 44 of them can be reduced to linear ODEs, Riccati equation or Weierstrass case. The remaining six equations of such a list are called Painlevé ODEs and their solutions are known as Painlevé transcendents. For them, the

only movable singularities are poles (no essential singularities). A remarkable overview on these topics is presented in [*P. A. Clarkson*, Lect. Notes Math. 1883, 331–411 (2006; Zbl 1100.33006)].

On the other hand, discrete Painlevé equations are nonlinear recurrence relations for which the continuous limit is one of the Painlevé ODE. A classification of discrete Painlevé equations based on rational surfaces associated with affine root systems was suggested by *H. Sakai* [Commun. Math. Phys. 220, No. 1, 165–229 (2001; Zbl 1010.34083)].

The book under review is focused on the relationship between Painlevé equations and orthogonal polynomials. The basic fact is that the coefficients of the three term recurrence relations (TTRR) the sequences of polynomials with respect to measures supported on the real line together with some differential properties of the measure (Pearson equation) yield discrete Painlevé equations. Moreover, if the measure depends on some time parameter, then one can deduce Painlevé ODE for the coefficients of the recurrence relation. This fact is connected with some integrable systems (Toda, Langmuir, among others).

Two blocks constitute the skeleton of this book. In the first one (five chapters) the author deals with the Painlevé equations associated with the coefficients of the TTRR that some families of orthogonal polynomials satisfy. In the second one (two chapters), the attention is focussed on rational solutions of Painlevé ODE which appear for some choices of the parameters involved in ODEs. Furthermore, the asymptotic behavior of orthogonal polynomials near critical points is presented by using the Riemann–Hilbert approach.

Chapter 1 provides a basic background about orthogonal polynomials with a special emphasis on those associated with the so–called semiclassical weights. Next, the description of the continuous and discrete Painlevé equations is presented.

In Chapter 2, some examples of Freud weights are studied. First, in the case $w(x) = \exp(-x^4+tx^2)$ a d–$\mathrm{P_I}$ equation appears for the coefficients of the TTRR. The unicity of the positivity solution of such an equation with an initial condition $x_0 = 0$ is analyzed and, consequently, the value of x_1 is determined. On the other hand, a differential–difference equation for the coefficients of the TTRR is deduced and, by using the above equations, a Painlevé IV equation for such coefficients is obtained.

Chapter 3 deals with orthogonal polynomials associated with the measure $w(z) = \exp((z+\frac{1}{z})t/2)$ supported on the unit circle. Now, the parameters of the recurrence relation that the corresponding orthogonal polynomials satisfy (the so–called Verblunsky coefficients) are related to a d–$\mathrm{P_{II}}$ equation. They also satisfy a Painlevé V equation, that can be reduced to a Painlevé III. Examples of discrete orthogonal polynomials (generalized Charlier) are also analyzed and the corresponding Painlevé equations for some choices of the parameters are obtained. The unicity of solutions of d–$\mathrm{P_{II}}$ and its positivity according to some initial conditions is proved.

By using the formulation of the Riemann–Hilbert problem for orthogonal polynomials a new proof of a classical result about ladder operators for exponential weights (see [*Y. Chen* and *M. E. H. Ismail*, J. Phys. A, Math. Gen. 30, No. 22, 7817–7829 (1997; Zbl 0927.33011)]) is given. This approach is very useful in order to analyze Painlevé equations for different families of semiclassical weights in continuous and discrete cases as done in Chapters 4 and 5.

In Chapter 6 the author focuses the attention on those Painlevé equations such that, for some choices of the parameters, either rational or special function solutions appear. For the Painlevé II and III they are given in terms of the logarithmic derivative of two consecutive Yablonskii–Vorobiev polynomials and Umemura polynomials, respectively. In other cases they can expressed as Wronskians of classical orthogonal polynomials. The Painlevé equations II–VI also have solutions which can be expressed in terms of classical special functions (Airy, Bessel, parabolic cylinder, Kummer and Gauss functions, respectively).

Finally, in Chapter 7 the connection between the density of zeros of orthogonal polynomials associated to weight functions with singularities, the construction of a local parametrix at certain critical points in the asymptotic behavior of orthogonal polynomials and random matrices is stated for Painlevé I, II, IV and V.

The presentation of this book is very friendly for a general audience interested in the theory of orthogonal polynomials, nonlinear ODE and integrable systems. The contents of the chapters are very pleasant taking into account the main results and their proofs are given with a smart distribution. Many of the results described in the first block are based on the contributions by the author and co-workers.

The book is based on lecture notes of courses and seminars in several higher education institutions. A list of 16 exercises with their solutions allows a dynamical approach to the techniques described therein. Finally, an updated list of 156 references invites the reader to advance in the learning of many questions contained in this nice book.

Reviewed by Francisco (Paco) Marcellán, Leganes, Spain.

Topic #17 ——— OP - SF Net 26.6 ——— November 15, 2019

From: OP-SF Net Editors
Subject: Preprints in arXiv.org from September & October, 2019

The following preprints related to the fields of orthogonal polynomials and special functions were posted or cross-listed to one of the subcategories of arXiv.org during September and October 2019. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

http://arxiv.org/abs/1909.00058
Can Umbral and q-calculus be merged?
G. Dattoli, B. Germano, K. Górska, M. R. Martinelli

http://arxiv.org/abs/1909.00071
Singular Nonsymmetric Macdonald Polynomials and Quasistaircases
Laura Colmenarejo, Charles F. Dunkl

http://arxiv.org/abs/1909.00103
Painlevé VI, Painlevé III and the Hankel Determinant Associated with a Degenerate Jacobi Unitary Ensemble
Chao Min, Yang Chen

http://arxiv.org/abs/1909.00147
Degree bipartite Ramsey numbers
Ye Wang, Yusheng Li, Yan Li

http://arxiv.org/abs/1909.00963
A Riemann-Hilbert approach to asymptotic analysis of Toeplitz+Hankel determinants
Roozbeh Gharakhloo, Alexander Its

http://arxiv.org/abs/1909.01448
Reflective prolate-spheroidal operators and the KP/KdV equations
W. Riley Casper, F. Alberto Grünbaum, Milen Yakimov, Ignacio Zurrian

http://arxiv.org/abs/1909.01485
Romik's Conjecture for the Jacobi Theta Function
Tanay Wakhare

http://arxiv.org/abs/1909.01508
Taylor coefficients of the Jacobi $\theta_3(q)$ function
Tanay Wakhare, Christophe Vignat

http://arxiv.org/abs/1909.01550
Counting acyclic and strong digraphs by descents
Kassie Archer, Ira M. Gessel, Christina Graves, Xuming Liang

http://arxiv.org/abs/1909.03874
Coefficients of Wronskian Hermite polynomials
Niels Bonneux, Clare Dunning, Marco Stevens

http://arxiv.org/abs/1909.05209
Class Numbers and Self-Conjugate 7-Cores
Ken Ono, Wissam Raji

http://arxiv.org/abs/1909.06334
Characteristic polynomials of complex random matrices and Painlevé transcendents
Alfredo Deaño, Nick Simm

http://arxiv.org/abs/1909.07045
q-rious and q-riouser
S. Ole Warnaar, Wadim Zudilin

http://arxiv.org/abs/1909.07634
Applications in random matrix theory of a PIII′ τ-function sequence from Okamoto's Hamiltonian formulation
Dan Dai, Peter J. Forrester, Shuai-Xia Xu

http://arxiv.org/abs/1909.07796
Darboux transformations from the Appell-Lauricella operator
Antonia M. Delgado, Lidia Fernández, Plamen Iliev

http://arxiv.org/abs/1909.08654
A new approach to analysis of 2D higher order quantum superintegrable systems
Bjorn K. Berntson, Ian Marquette, Willard Miller Jr

http://arxiv.org/abs/1909.08870
Diagonalization of the finite Hilbert transform on two adjacent intervals: the Riemann-Hilbert approach
Marco Bertola, Elliot Blackstone, Alexander Katsevich, Alexander Tovbis

http://arxiv.org/abs/1909.09046
On the Wasserstein Distance between Classical Sequences and the Lebesgue Measure
Louis Brown, Stefan Steinerberger

http://arxiv.org/abs/1909.09107
Asymptotic behaviour of Christoffel–Darboux kernel via three-term recurrence relation I
Grzegorz Świderski, Bartosz Trojan

http://arxiv.org/abs/1909.09354
Multi-Macdonald polynomials
Camilo González, Luc Lapointe

http://arxiv.org/abs/1909.09805
Asymptotic expansion of Mathieu–Bessel series. II
R. B. Paris

http://arxiv.org/abs/1909.09958
On the orthogonality and convolution orthogonality via the Kontorovich–Lebedev transform
Semyon Yakubovich

http://arxiv.org/abs/1909.10294
A family of q-hypergeometric congruences modulo the fourth power of a cyclotomic polynomial
Victor J.W. Guo, Michael J. Schlosser

http://arxiv.org/abs/1909.12062
An electrostatic interpretation of the zeros of sieved ultraspherical polynomials
K. Castillo, M. N. de Jesus, J. Petronilho

http://arxiv.org/abs/1909.12527
A note on orthogonal polynomials described by Chebyshev polynomials
K. Castillo, M. N. de Jesus, J. Petronilho

http://arxiv.org/abs/1909.12643
Racah problems for the oscillator algebra, the Lie algebra $\mathfrak{sl}_n$, and multivariate Krawtchouk polynomials
Nicolas Crampé, Wouter van de Vijver, Luc Vinet

http://arxiv.org/abs/1909.13415
Simplified error bounds for turning point expansions
T. M. Dunster, A. Gil, J. Segura

http://arxiv.org/abs/1909.13752
On classical orthogonal polynomials related to Hahn's operator
R. Álvarez-Nodarse, K. Castillo, D. Mbouna, J. Petronilho

http://arxiv.org/abs/1910.00880
A proof of a conjecture about a symmetric system of orthogonal polynomials
K. Castillo, M. N. de Jesus, J. Petronilho

http://arxiv.org/abs/1910.01227
Jensen Polynomials for the Riemann Xi Function
Michael Griffin, Ken Ono, Larry Rolen, Jesse Thorner, Zachary Tripp, Ian Wagner

http://arxiv.org/abs/1910.01747
The γ-coefficients of Branden's (p,q)-Eulerian polynomials and André permutations
Qiong Qiong Pan, Jiang Zeng

http://arxiv.org/abs/1910.02493
A Riemann-Hilbert approach to the lower tail of the KPZ equation
Mattia Cafasso, Tom Claeys

http://arxiv.org/abs/1910.03036
On a Tauberian Theorem of Ingham and Euler-Maclaurin Summation
Kathrin Bringmann, Chris Jennings-Shaffer, Karl Mahlburg

http://arxiv.org/abs/1910.03105
Potential kernels for radial Dunkl Laplacians
Piotr Graczyk, Tomasz Luks, Patrice Sawyer

http://arxiv.org/abs/1910.07551
q-Analogues of Dwork-type supercongruences
Victor J. W. Guo

http://arxiv.org/abs/1910.08393
q-Difference systems for the Jackson integral of symmetric Selberg type
Masahiko Ito

http://arxiv.org/abs/1910.08394
Discrete Mehler-Fock transforms
Semyon Yakubovich

http://arxiv.org/abs/1910.08548
An introduction to multiple orthogonal polynomials and Hermite-Padé approximation
G. López Lagomasino

http://arxiv.org/abs/1910.08882
Classical skew orthogonal polynomials in a two-component log-gas with charges $+1$ and $+2$
Peter J Forrester, Shi-Hao Li

http://arxiv.org/abs/1910.08957
Asymptotic expansion of the modified exponential integral involving the Mittag-Leffler function
R. B. Paris

http://arxiv.org/abs/1910.08989
Systematic Counting of Restricted Partitions
Mingjia Yang, Doron Zeilberger

http://arxiv.org/abs/1910.10243
Markov theorem for weight functions on the unit circle
K. Castillo

http://arxiv.org/abs/1910.10761
Heun functions and diagonals of rational functions (unabridged version)
Y. Abdelaziz, S. Boukraa, C. Koutschan, J-M. Maillard

http://arxiv.org/abs/1910.10790
The Asymptotic Distribution of the Rank for Unimodal Sequences
Kathrin Bringmann, Chris Jennings-Shaffer, Karl Mahlburg

http://arxiv.org/abs/1910.10932
A common q-analogue of two supercongruences
Victor J. W. Guo, Wadim Zudilin

http://arxiv.org/abs/1910.10981
Recurrence coefficients for discrete orthogonal polynomials with hypergeometric weight and discrete Painlevé equations
Anton Dzhamay, Galina Filipuk, Alexander Stokes

http://arxiv.org/abs/1910.11747
General modular quantum dilogarithm and beta intergals
Gor Sarkissian, Vyacheslav P. Spiridonov

http://arxiv.org/abs/1910.12518
Zero distribution of orthogonal polynomials on a q-lattice
Walter Van Assche, Quinten Van Baelen

http://arxiv.org/abs/1910.13244
The Rank Enumeration of Certain Parabolic Non-Crossing Partitions
Christian Krattenthaler, Henri Mühle

http://arxiv.org/abs/1910.14168
Uniqueness of polarization for the autonomous 4-dimensional Painlevé-type systems
Akane Nakamura, Eric Rains

http://arxiv.org/abs/1910.14369
Index of seaweed algebras and integer partitions
Seunghyun Seo, Ae Ja Yee

Other Relevant OP-SF E-Prints

http://arxiv.org/abs/1909.00962
Quadratic and quartic integrals using the method of brackets
B Ananthanarayan, Sumit Banik, Sudeepan Datta, Tanay Pathak

http://arxiv.org/abs/1909.01096
Principal Series Representation of $SU(2,1)$ and Its Intertwining Operator
Zhuohui Zhang

http://arxiv.org/abs/1909.01103
The extended xgamma distribution
Mahendra Saha, Abhimanyu Singh Yadav, Arvind Pandey, Shivanshi Shukla, Sudhansu S Maiti

http://arxiv.org/abs/1909.01270
Emptiness formation probability and Painlevé V equation in the XY spin chain
Filiberto Ares, Jacopo Viti

http://arxiv.org/abs/1909.01338
A zero density estimate for Dedekind zeta functions
Jesse Thorner, Asif Zaman

http://arxiv.org/abs/1909.01510
Intertwining Operator for $Sp(4,\mathbb{R})$ and Orthogonal Polynomials
Zhuohui Zhang

http://arxiv.org/abs/1909.01659
Zeta functions of graphs, their symmetries and extended Catalan numbers
Jérémy Dubout

http://arxiv.org/abs/1909.02350
Fundamental tones of clamped plates in nonpositively curved spaces
Alexandru Kristály

http://arxiv.org/abs/1909.02464
Diagonalization of the Heun–Askey–Wilson operator, Leonard pairs and the algebraic Bethe ansatz
Pascal Baseilhac, Rodrigo A. Pimenta

http://arxiv.org/abs/1909.02700
An algorithm of computing special values of Dwork's p–adic hypergeometric functions in polynomial time
Masanori Asakura

http://arxiv.org/abs/1909.02715
A view on elliptic integrals from primitive forms (Period integrals of type $\mathsf{A}_2, \mathsf{B}_2$ and G_2)
Kyoji Saito

http://arxiv.org/abs/1909.02732
An analog of the Sinc approximation for periodic functions
Hidenori Ogata

http://arxiv.org/abs/1909.02943
Alternating multiple zeta values, and explicit formulas of some Euler–Apery–type series
Weiping Wang, Ce Xu

http://arxiv.org/abs/1909.02948
Elliptic solutions of Boussinesq type lattice equations and the elliptic N^{th} root of unity
Frank W Nijhoff, Ying–ying Sun, Da–jun Zhang

http://arxiv.org/abs/1909.03435
Convergence of multiple Fourier series and Pick's theorem
Luca Brandolini, Leonardo Colzani, Sinai Robins, Giancarlo Travaglini

http://arxiv.org/abs/1909.03540
Inference In General Single–Index Models Under High–dimensional Symmetric Designs
Hamid Eftekhari, Moulinath Banerjee, Ya'acov Ritov

http://arxiv.org/abs/1909.03643
On the logarithm of the Riemann zeta–function and iterated integrals
Shōta Inoue

http://arxiv.org/abs/1909.03710
A Fast Chebyshev Spectral Method for Nonlinear Fourier Transform
Vishal Vaibhav

http://arxiv.org/abs/1909.04033
On the solutions of linear Volterra equations of the second kind with sum kernels
Pierre-Louis Giscard

http://arxiv.org/abs/1909.04233
Estimates for Pauli-type Operators and Local Well-posedness for the Reduced Hartree-Fock Equation
Xin Dong

http://arxiv.org/abs/1909.05759
Narain transform for spectral deformations of random matrix models
Maciej A. Nowak, Wojciech Tarnowski

http://arxiv.org/abs/1909.05991
An Estimation of the Values of Some Zeta Functions on the Line $\sigma = 1$
Yoshihiro Koya

http://arxiv.org/abs/1909.06084
Non-uniform hyperbolicity in polynomial skew products
Zhuchao Ji

http://arxiv.org/abs/1909.06705
On ℓ-adic Galois polylogarithms and triple ℓ-th power residue symbols
Densuke Shiraishi

http://arxiv.org/abs/1909.06941
On a series for the upper incomplete Gamma function
Mario DeFranco

http://arxiv.org/abs/1909.07026
On the Hurwitz zeta function with an application to the exponential-beta distribution
Julyan Arbel, Olivier Marchal, Bernardo Nipoti

http://arxiv.org/abs/1909.07076
Visualization of Fractional Integrals
Trienko Lups Grobler

http://arxiv.org/abs/1909.07112
Generation of off-critical zeros for hypercubic Epstein zeta-functions
Igor Travěnec, Ladislav Šamaj

http://arxiv.org/abs/1909.07303
Elliptic classes, McKay correspondence and theta identities
Malgorzata Mikosz, Andrzej Weber

http://arxiv.org/abs/1909.07350
Chudnovsky-Ramanujan Type Formulae for non-Compact arithmetic triangle groups
Imin Chen, Gleb Glebov, Ritesh Goenka

http://arxiv.org/abs/1909.07601
Interplay between symmetries of quantum $6-j$ symbols and the eigenvalue hypothesis
Victor Alekseev, Andrey Morozov, Alexey Sleptsov

http://arxiv.org/abs/1909.07794
Generalized-hypergeometric solutions of the general Fuchsian linear ODE having five regular singularities
A. Ishkhanyan, C. Cesarano

http://arxiv.org/abs/1909.08121
On the L^2-norm of Gegenbauer polynomials
Damir Ferizović

http://arxiv.org/abs/1909.08183
A local-global theorem for p-adic supercongruences
Hao Pan, Roberto Tauraso, Chen Wang

http://arxiv.org/abs/1909.08438
Asymptotic approximation of the eigenvalues and the eigenfunctions for the Orr-Sommerfeld equation on infinite intervals
Victor Nijimbere

http://arxiv.org/abs/1909.09152
On random Fourier-Hermite transform associated with stable process
Sabita Sahoo, Bharatee Mangaraj

http://arxiv.org/abs/1909.09232
The arithmetic Kuznetsov formula on $GL(3)$, II: The general case
Jack Buttcane

http://arxiv.org/abs/1909.09694
An inversion formula with hypergeometric polynomials and application to singular integral operators
R. Nasri, A. Simonian, F. Guillemin

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Low pseudomoments of the Riemann zeta function and its powers
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Kevin Ford, Sergei Konyagin

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Kira V. Khmelnytskaya, Vladislav V. Kravchenko, Sergii M. Torba

Topic #18 ——— OP - SF Net 26.6 ——— November 15, 2019

From: OP-SF Net Editors
Subject: Submitting contributions to OP-SF NET and SIAM-OPSF (OP-SF Talk)

To contribute a news item to OP-SF NET, send e-mail to one of the OP-SF Editors howard.cohl@nist.gov, or spost@hawaii.edu.

Contributions to OP-SF NET 27.1 should be sent by January 1, 2020.

OP-SF NET is an electronic newsletter of the SIAM Activity Group on Special Functions and Orthogonal Polynomials. We disseminate your contributions on anything of interest to the special functions and orthogonal polynomials community. This includes announcements of conferences, forthcoming books, new software, electronic archives, research questions, and job openings as well as news about new appointments, promotions, research visitors, awards and prizes. OP-SF Net is transmitted periodically through a post to SIAM-OPSF (OP-SF Talk).

SIAM-OPSF (OP-SF Talk) is a listserv of the SIAM Activity Group on Special Functions and Orthogonal Polynomials, which facilitates communication among members, and friends of the Activity Group. See the previous Topic. To post an item to the listserv, send e-mail to siam-opsf@siam.org.

WWW home page of this Activity Group:
http://math.nist.gov/opsf
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The elected Officers of the Activity Group (2017-2019) are:
Walter Van Assche, Chair
Andrei Martínez-Finkelshtein, Vice Chair
Sarah Post, Program Director
Yuan Xu, Secretary

The appointed officers are:
Howard Cohl, OP-SF NET co-editor
Sarah Post, OP-SF NET co-editor
Diego Dominici, OP-SF Talk moderator
Bonita Saunders, Webmaster and OP-SF Talk moderator

From: OP-SF Net Editors
Subject: Thought of the Month by **Galileo Galilei**

Philosophy [i.e., natural philosophy] is written in this grand book—I mean the Universe—which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is impossible humanly to understand a single word of it; without these, one is wandering around in a dark labyrinth.

Galileo Galilei (1564–1642), *The Assayer (Il Saggiatore)*, 1623, as translated by Stillman Drake (1957), Discoveries and Opinions of Galileo pp. 237–8.

Contributed by Michael Schlosser.

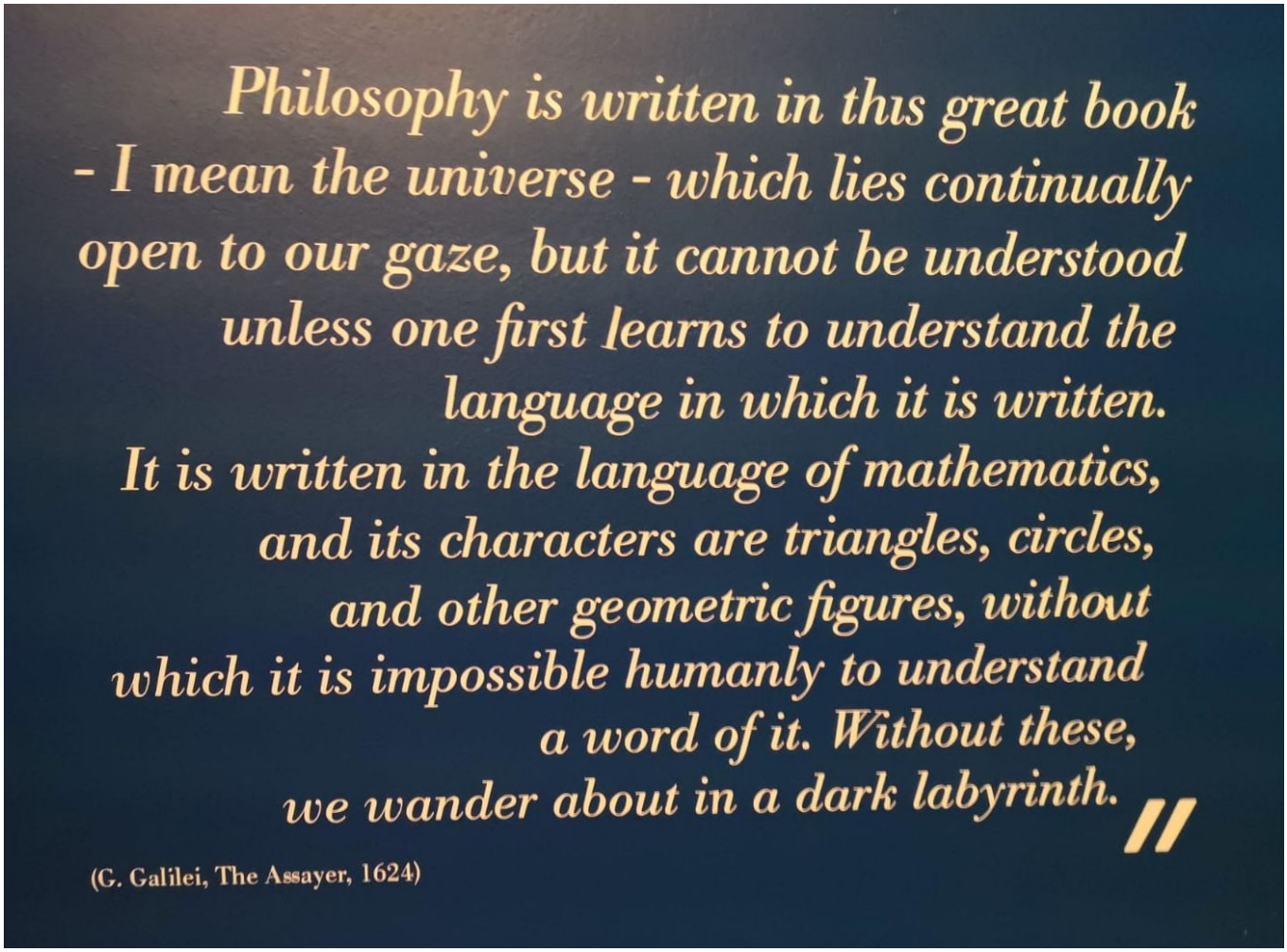

Figure 1: Photo taken by Michael Schlosser in August 2019, while visiting Museo Egizio as a tourist, in Turin, Italy.