O P-S F N E T – Volume 33, Number 1 – January 15, 2026

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

http://math.nist.gov/opsf

OP-SF Net is distributed to OPSF Activity Group members and non-members alike through the OP-SF Talk listserv.

If you are interested in subscribing to the Newsletter and/or OP-SF Talk, or if you would like to submit a topic to the Newsletter or a contribution to OP-SF Talk, please send an email to the OP-SF Net Editors.

Editors:
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Topics:

Calendar of Events:

January 19-23, 2026

Biennial Meeting of Real Sociedad Matemática Española (RSME),
Universidad de Alicante, San Vicente del Raspeig, Spain
https://2026.bienalrsme.com

Special Session related to SIAG/OPSF:

January 19-20: **Special Session on Orthogonal Polynomials and Special Functions. Theory and Applications**
Organizers: Francisco Marcellán (Universidad Carlos III de Madrid)
and Juan José Moreno Balcázar (Universidad de Almería)

February 12–13, 2026
Workshop on Special Functions and PDEs: Algorithms and Software Development,
Istituto per le Applicazioni del Calcolo "Mario Picone" (IAC), CNR, Rome, Italy
https://sites.google.com/uninettunouniversity.net/workshopgncs/home

March 18–22, 2026
International Number Theory Conference in honor of Krishna Alladi's 70th birthday,
University of Florida, Gainesville, Florida, USA
Opening Conference Lecture: Peter Sarnak, Institute for Advanced Study, Princeton
Erdős Memorial Lecture: Andrew Granville, University of Montréal
Straus Memorial Lecture: Carl Pomerance, Dartmouth College
Ramanujan Colloquium: Maksym Radziwill, Northwestern University
Alladi Ramakirshnan Memorial Lecture: Sergei Suslov, Arizona State University
https://qseries.org/alladi70/

April 9–10, 2026
Fourth Meeting Gruppo di Attività ANA&A – SIMAI,
Department of Mathematics "Giuseppe Peano", University of Turin, Torino, Italy
https://fourthmeetinganaa.uninettunouniversity.net/index.html

April 9–10, 2026
Spectral Theory by the Lakes,
Lancaster University, Lancaster, UK,
https://benjamineichinger.eu/ST2026/

May 26–29, 2026
International Conference on Mathematics, Numerics and Applications (MNA2026),
Budva, Montenegro,
https://mat.mas.bg.ac.rs/mna2026

June 1–5, 2026
Alps Approximation School and Meeting (AASM 2026),
Villaggio Olimpico Bardonecchia, Bardonecchia, Italy
https://aasm2026.uninettunouniversity.net

June 8–12, 2026
Quantum Symmetric Pairs, Hecke Algebras, and Representations: Exploring Spherical Functions (Q-SPHERE 2026),
Radboud University, Nijmegen, The Netherlands
https://indico.imapp.ru.nl/event/345/

June 15–19, 2026
Orthogonal Polynomials, Special Functions and their Applications Summer School (OPSF-S11),
Universidad de Alcalá, Alcalá, Spain,
https://opsfa2026.web.uah.es

June 22–26, 2026
OPERA 2026 – Orthogonal Polynomials, Exponential Analysis, Rational Approximation, with Applications,
University of Stirling, Scotland, UK
https://www.opera2026.uk/

July 6– 10, 2026
2026 SIAM Annual Meeting (AN26), Cleveland, Ohio, USA,
https://www.siam.org/conferences-events/siam-conferences/an26/

July 8–18, 2026

Foundations of Computational Mathematics (FoCM 2026), University of Vienna, Vienna, Austria
https://focm2026.univie.ac.at/

Workshop related to SIAG/OPSF:

July 9–11: **Special Functions and Orthogonal Polynomials**
Organizers: Daan Huybrechs (KU Leuven), Erik Koelink (Radboud Universiteit) and Teresa Pérez (Universidad de Granada)

August 17–21, 2026

18th International Symposium on Orthogonal Polynomials, Special Functions and Applications
Muromachi Campus, Doshisha University, Kyoto, Japan
https://opsfa18.com/

Topic #1 ——— OP – SF Net 33.1 ——— January 15, 2026

From: Howard Cohl (howard.cohl@nist.gov)
Subject: Message from the Chair

As of January 1st , 2026, it's been a year since the elections were held for SIAM SIAG/OPSF and the elected officers are: Chair: Howard Cohl (NIST); Program Director: Kerstin Jordaan (University of South Africa); and Secretary: Tom Trogdon (University of Washington). At the start of the year according to SIAM records, there were 103 members of the SIAM Activity Group on Orthogonal Polynomials and Special Functions (SIAG/OPSF). After working hard to increase membership, the size of the SIAG/OPSF membership has been increased to 135! At the start of the year, the Newsletter was distributed to 607 active subscribers. Currently it's distributed to 646 active subscribers.

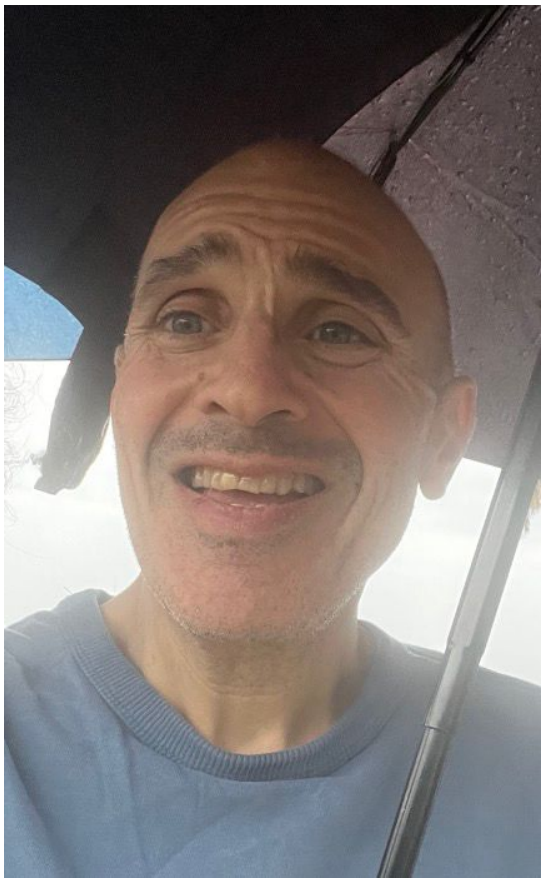

Figure 1: Howard Cohl.

Over the past year Sarah Post and I published six new editions of OP-SF NET, namely 32.1–32.6. These editions covered Reports on OPSF conferences, special sessions and minisymposia for: (1) the AMS/NZMS/AustMS meeting in Auckland, New Zealand; (2) the ORTHONET Winter 2024 meeting in Madrid, Spain; (3) TerwilligerFest in Kransjska Gora, Slovenia; (4) 2025 Shanks Conference in Honor of Ed Saff's 80th birthday at Vanderbilt University, Nashville, Tennessee, USA; (5) the SIAM Annual Meeting AN25 in Montréal, Canada; and (6) The AMS Fall Southeastern Sectional Meeting at Tulane University, New Orleans, Louisiana, USA.

The Newsletter also included reports of online OPSF seminar series such as the online Seminars: (1) "Topics in Special Functions and Number Theory" organized by Bhatnagar, Dixit and Rajkumar and (2) "Fall Virtual Analysis Seminar" by Ismail and Wang (https://ul-lafayette.zoom.us/j/2022002220); Note that there is another nice weekly online seminar series: (3) William J. Keith of Michigan Tech hosts "Seminar in Partition Theory, q-Series and Related Topics" which

runs on Thursdays from 2pm – 3pm US Eastern Standard Time (GMT −5) (https://pages.mtu.edu/∼wjkeith/PartitionsSpecialtySeminar/).

The 2025 Newsletters also included beautiful remembrances of our recently passed colleagues: **Ruiming Zhang** (1964–2024) by Zhi-Guo Liu, Xinrong Ma, Gang Li and Mourad E. H. Ismail; **Masatoshi Noumi** (1955–2024) by Katsuhisa Mimachi, Sergei Suslov, Edwin Langmann, Junichi Shiraishi, Jasper Stokman and Tom Koornwinder; and **Harry Coonce** (1938–2025) by Mitch Keller. We were also happy to include detailed lists of arXiv preprints. We also considered Thoughts of the Month by Richard Askey, Masatoshi Noumi, Dunham Jackson, the country of Haiti, Larry Andrews, and Maryna Viazovska. We also announced several postdoctoral fellowships and hosted an interesting essay by Turbiner and Znojil.

In 2025, we were excited to make announcements regarding:

• The Constructive Functions 2025 conference held May 19–22, 2025 at Vanderbilt University, Nashville, Tennessee, USA;

• Request for Minisymposia at the Third Joint SIAM/CAIMS Meeting (AN25) held July 28–August 1, 2025 in Montreal, Canada;

• The 2nd International Conference on Mathematical Analysis and Applications (MAA 2025) held August 6–7, 2025 in NIT Jamshedpur, India;

• International Conference on "Extremal Polynomials and Dynamical Systems" which was held August 19–22, 2025 in Copenhagen, Denmark;

• The OPSF-S11 Summer School held June 15–19, 2026 at Universidad de Alcalá, Alcalá, Spain;

• The OPERA 2026 Conference held June 22–26, 2026 in Stirling, Scotland;

• Request for OPSF Minisymposia at the SIAM Annual Meeting AN26 held to be held July 6–10, 2026, in Cleveland, Ohio, USA;

• FoCM 2026 Conference held July 8–18, 2026 in Vienna, Austria;

• OPSFA-18 to be held August 17–21, 2026, at Doshisha University, Kyoto, Japan and the corresponding awarding of the 2026 Gábor Szegő Prize.

This year SIAG/OPSF will be hosting a *track* with a minimum of 6 minisymposia at the SIAM Annual Meeting AN26 to be held July 6–10, 2026 in Cleveland, Ohio. Along with this I am on the organizing committee of AN26 and we succeeded in securing two OPSF plenary speakers: Nalini Joshi and Ken Ono.

We look forward to a renewed and stimulating collaboration of the community of Orthogonal Polynomials and Special Functions with SIAM.

Topic #2 ——— OP – SF Net 33.1 ——— January 15, 2026

From: OP-SF Net Editors
Subject: Announcement: *The Birth and Early Developments of OP by* **Brezinski and Redivo-Zaglia**

The SIAM book entitled "The Birth and Early Developments of Orthogonal Polynomials: A Chronological History" by Claude Brezinski and Michela Redivo-Zaglia (2026) has now been published by SIAM.

Website: https://epubs.siam.org/doi/book/10.1137/1.9781611978513

Description: The shape of the Earth was a significant scientific question in the eighteenth century. When it was discovered that the Earth was flattened at the poles, scientists sought to understand the cause, leading to the study of the gravitational attraction of celestial spheroids. The solution drew upon Newton's law of universal gravitation, which used the distance between two bodies based on the law of cosines. Expanding the inverse of this distance into a power series naturally leads to a class of orthogonal polynomials. These were introduced by Legendre and, a little bit later, by Laplace. Legendre was the

first to prove their orthogonality. Thirty years later, Gauss, approaching the problem from the perspective of numerical quadrature, independently arrived at the same polynomials. Over time, as concern for the gravitational problem of spheroids waned, the intrinsic mathematical interest in orthogonal polynomials took precedence.

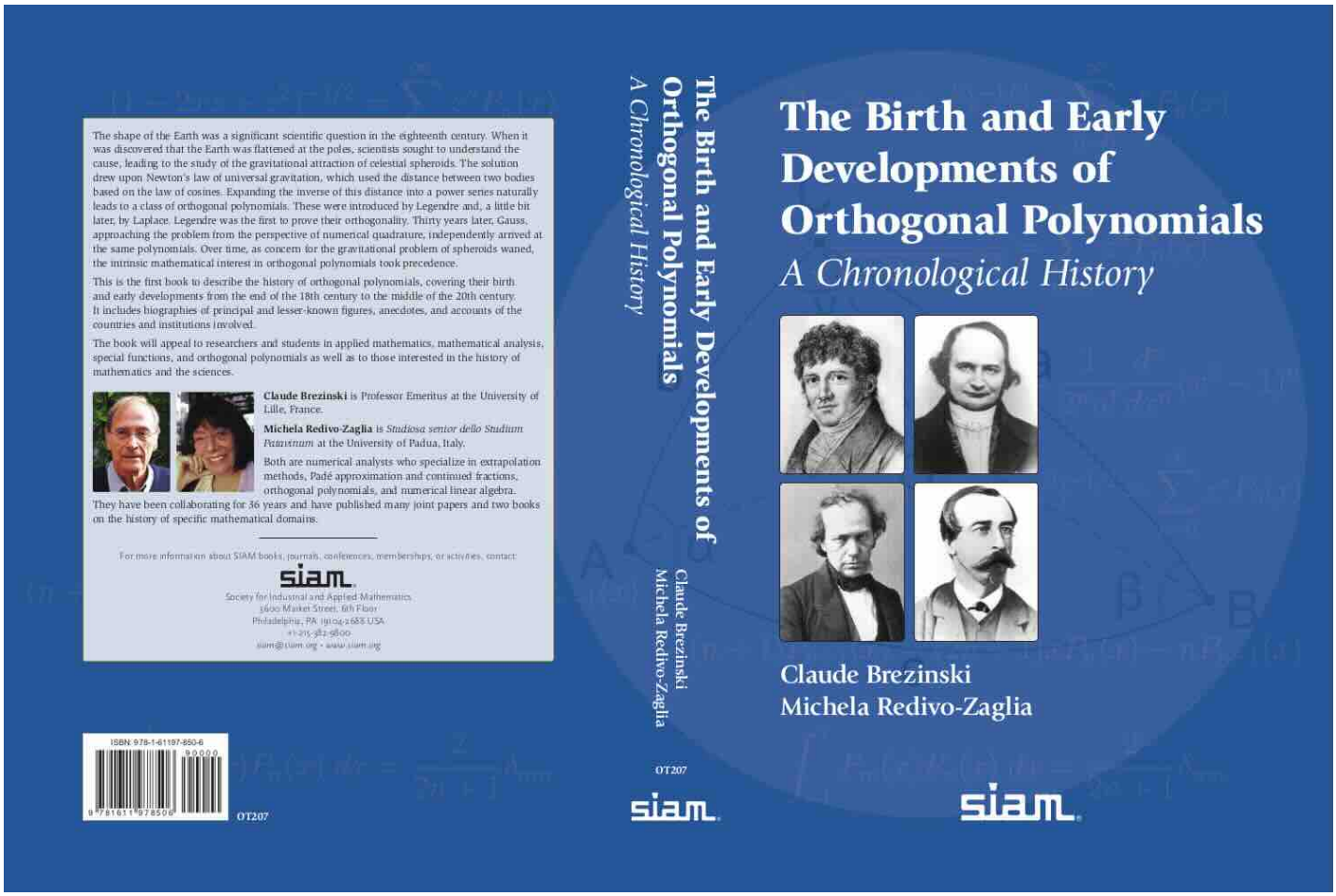

Figure 2: Back and Front Cover of Claude Brezinski and Michela Redivo-Zaglia (2026) "The Birth and Early Developments of Orthogonal Polynomials: a Chronological History".

This is the first book to describe the history of orthogonal polynomials, covering their birth and early developments from the end of the 18th century to the middle of the 20th century. It includes biographies of principal and lesser-known figures, anecdotes, and accounts of the countries and institutions involved.

Table of Contents:

This book is dedicated to Pascal Maroni (1933–2024), a good friend and colleague of the authors, and a recognized specialist of orthogonal polynomials. Unfortunately he passed away before the book was completed. However, from the beginning of the project, the authors discussed with him and incorporate into the book his ideas and his relevant suggestions.

Figure 3: The 90th birthday's dinner for Pascal Maroni (January 2023) in a restaurant in Paris. From the left Pascal, Michela and Claude. Photo taken by Gerard Meurant.

From: Manuel Domínguez de la Iglesia (anuel.dominguezi@uah.es),
Manuel Mañas Baena (mmanasba@ucm.es), Edmundo J. Huertas Cejudo (edmundo.huertas@uah.es),
Ana Foulquié Moreno (foulquie@ua.pt), Amílcar Branquinho (ajplb@mat.uc.pt),
Alberto Lastra Sedano (alberto.lastra@uah.es)
Subject: Announcement: OPSF-S11 Summer School in Alcalá, Spain, Registration Open!

OPSF-S11: **Orthogonal Polynomials, Special Functions and their Applications 2026**

Dates: June 15th -June 19th 2026
Venue: Universidad de Alcalá, Spain
Website: https://opsfa2026.web.uah.es/
Contact: opsf.s11@uah.es
Mode of Study: On campus.
Course fee: €250 (includes accommodation and meals).

The goal of the OPSFA Summer School (OPSF-S11) is to equip participants with foundational knowledge, modern methods, and practical tools in the field of orthogonal polynomials and special functions, as well as their diverse applications. The 2026 edition continues the tradition of the OPSFA Summer School series. While classical aspects of orthogonal polynomials and special functions will be covered, the program also includes more advanced and contemporary topics. These include asymptotic methods for orthogonal polynomials, Padé approximants, connections between orthogonal polynomials and areas such as sparse interpolation, exponential analysis, Gaussian integration, random tilings, multivariate orthogonal polynomials, and diagrammatic and harmonic analysis techniques.

The school is designed to engage interaction and collaboration. Lectures will be complemented by tutorials, problem sessions, and opportunities for participants to present their own research. Ample time is set aside for discussion with invited speakers and organizers—leading specialists who actively shape current research directions. The program welcomes Master's and PhD students as well as postdoctoral researchers, creating a dynamic environment that bridges different stages of academic development. The themes of OPSF-S11 are closely tied to core areas of mathematics, physics, and engineering, including differential equations, linear algebra, complex and functional analysis, group and operator theory, numerical computation, and approximation theory. A working knowledge of these subjects is expected.

Orthogonal Polynomials, Special Functions, and Applications (OPSF) has not only been shaped by the biennial OPSFA conferences, but also by a series of Summer Schools created to train and connect young researchers. These schools offer compact lecture courses, problem sessions, and mentoring in an immersive setting, and many editions have produced curated lecture notes. Since the first edition in 2000, hosting duties have rotated across institutions and countries, broadening participation and strengthening the community. As with many scientific activities, the cadence has varied over time, but the series continues to thrive and to complement the OPSFA meetings.

Registration

Admission requirements: Participants should possess a strong foundation in core areas of mathematics, particularly in mathematical analysis and approximation theory. In addition, they are expected to have a solid understanding of topics such as ordinary and partial differential equations, complex analysis or linear algebra. Familiarity with the fundamentals of special functions and orthogonal polynomials is also essential.

Application deadline: May 15th, 2026 (April 15th, 2026 if you are applying for a scholarship).

Scholarships: A number of scholarships will be available to attend the school for PhD students or young researchers who do not have their own funding or are not part of any research project.

Registration is Now Open: If you are interested in participating in the school, please complete the downloadable form linked here and submit it as soon as possible to opsf.s11@uah.es along with a brief CV and a recommendation letter from your advisor, if applicable.

Lecturers:

Course 1: "Asymptotic methods for Orthogonal Polynomials and more general Padé approximants".
Marco Bertola (Concordia University, Montreal, Canada).

Course 2: "Connections between Orthogonal Polynomials, Sparse Interpolation, Exponential Analysis, Padé Approximation and Gaussian Integration".
Annie Cuyt (Universiteit Antwerpen, Belgium).

Course 3: "From Jacobi polynomials to random tilings".
Arno Kuijlaars (Katholieke Universiteit Leuven, Belgium).

Course 4: "Multivariate orthogonal polynomials and applications".
Lidia Fernández (Universidad de Granada, Spain).

Course 5: "Diagrammatic and harmonic analysis methods for orthogonal polynomials".
Luis Velázquez (Universidad de Zaragoza, Spain).

Topic #4 ——— OP - SF Net 33.1 ——— January 15, 2026

From: Benjamin Eichinger (b.eichinger@lancaster.ac.uk) and Daniel Elton (d.m.elton@lancaster.ac.uk)
Subject: Announcement: Spectral Theory by the Lakes Workshop in Lancaster, UK

Spectral Theory by the Lakes

Venue: Lancaster University, Lancaster, UK
Dates: 9–10 April 2026
Conference webpage: https://benjamineichinger.eu/ST2026/

We are pleased to announce the workshop Spectral Theory by the Lakes. This workshop will bring together established researchers and early-career mathematicians working on different aspects of spectral theory. Nine invited lectures will be complemented by a small number of contributed talks, with priority given to PhD students and early-career researchers.

Invited Speakers:

- Catherine Drysdale
- Yan-Long Fang
- Noema Nicolussi
- Leonid Parnovski
- Leonid Pastur
- Alexander Pushnitski
- Jakob Reiffenstein
- Mira Shamis
- Eugene Shargorodsky

We are very much looking forward to seeing you in Lancaster.

Best wishes, Benjamin Eichinger and Daniel Elton

From: Erik Koelink (e.koelink@math.ru.nl) and Maarten van Pruijssen (m.vanpruijssen@math.ru.nl)
Subject: Announcement: Q-SPHERE Workshop at Radboud University, Nijmegen, The Netherlands

Dear all,

We are organizing the workshop "Quantum Symmetric Pairs, Hecke Algebras, and Representations: Exploring Spherical Functions (Q-SPHERE 2026)", June 8-12, 2026 at Radboud University, Nijmegen.

Workshop Website: https://indico.imapp.ru.nl/event/345/.

Q-SPHERE is a focused workshop bringing together researchers working at the intersection of representation theory, symmetric pairs, quantum symmetric pairs, and Hecke algebras. A central theme is the rich theory of spherical functions, both classical and quantum, and their deep connections with special functions, orthogonal polynomials, and their vector- and matrix-valued generalizations with applications in mathematical physics.

Participation is free of charge, but registration is mandatory. The registration deadline is April 1, 2026.

Confirmed Speakers:

- Andrea Appel (U. Parma)
- Kenny De Commer (VUB, Brussels)
- Jort de Groot (U. Amsterdam)
- Robin van Haastrecht (U. Gothenburg)
- Max van Horssen (U. Leuven)
- Mikhail Isachenkov (U. Amsterdam)
- Toshiyuki Kobayashi (U. Tokyo)
- Stefan Kolb (U. Newcastle)
- Tom Koornwinder (U. Amsterdam)
- Quentin Labriet (U. Montreal)
- Jules Lamers (U. Glasgow)
- Marcelo de Martino (Forward College, Lisbon)
- Marta Mazzocco (Polytechnical U. of Catalonia, Barcelona)
- Stein Meereboer (Radboud U., Nijmegen)
- Eric Opdam (U. Amsterdam)
- Michael Pevzner (U. Tokyo and U. Reims Champagne-Ardenne)
- Nobakazu Shimeno (Kwansei Gakuin U.)
- Philip Schlösser (Radboud U., Nijmegen)
- Jinfeng Song (Hong Kong U. of Science and Technology)
- Jasper Stokman (U. Amsterdam)
- Bart Vlaar (BIMSA, Beijing)
- Liao Wang (U. Bonn)
- Hideya Watanabe (Rikkyo U., Tokyo)

Please forward this announcement to interested people.

Best regards,

Erik Koelink and Maarten van Pruijssen.

Topic #6 ——— OP - SF Net 33.1 ——— January 15, 2026

From: Gaurav Bhatnagar (bhatnagarg@gmail.com), Atul Dixit (adixit@iitgn.ac.in)
and Krishnan Rajkumar (krishnan.rjkmr@gmail.com)
Subject: 2025 Report: "Topics in Special Functions & Number Theory" by **Bhatnagar**, **Dixit** & **Rajkumar**

About the seminar: This is a report on the seminar on "Topics in Special Functions and Number Theory", organized by Gaurav Bhatnagar (RamanujanExplained.org), Atul Dixit (IIT, Gandhinagar) and Krishnan Rajkumar (JNU). We meet approximately once every other week. The current timing is Thursdays, 4:00 - 5:00 PM (IST). We deviate on occasion as per the speaker's convenience, especially for speakers from the US. In case you wish to be informed of future talks, please drop a line to the organizers at sfandnt@gmail.com. The talks in the year 2025 (listed below) are all available on our website https://www.sfnt.org.

We welcome suggestions for talks.

The first talk of the year (on Thursday, January 22, 2026) is a "Ramanujan Special".
This year's speaker is Dennis Stanton.

Talk Announcement: Ramanujan Special 2026

Speaker: Dennis Stanton (University of Minnesota, USA)

Title: *Some open problems*

When: Thursday January 22, 2026, 7:30 PM- 8:30 PM IST (8 AM CST) (Note special time)

Where: Zoom: Please write to sfandnt@gmail.com for the link

Abstract: I will discuss some open problems in q-series, partitions, orthogonal polynomials, basic hypergeometric functions, and combinatorics, including the Rogers-Ramanujan identities.

Talks in 2025: The following talks were presented in the Seminar in 2025. All the talks are available on https://www.sfnt.org.

Ramanujan Special 2025. Krishnaswami Alladi (University of Florida, USA):
Duality between prime factors and primes in arithmetic progressions

In addition, the following speakers gave talks. These are (in alphabetic order by last name):

1. Abdulhafeez Abdulsalam (University of Ibadan, Nigeria and ICTP, Italy): Fourier sine and cosine transforms of expressions with nested square roots.
2. Aritram Dhar (University of Florida): Extension of Bressoud's generalization of Borwein's conjecture, some exact results, and applications.
3. Atul Dixit (IIT, Gandhinagar): The Rogers-Ramanujan dissection of a theta function.
4. Jehanne Dousse (University of Geneva): Andrews-Gordon-Bressoud type identities and particle motion.
5. Archna Kumari (IIT, Delhi): Some results in weighted and elliptic enumeration.
6. Hussein Mourtada (Université de Paris (Campus Paris-Diderot)): Integer partitions, (hyper)graphs and monomial ideals.
7. Ritwik Pal (IIIT, Delhi): On shifted convolution sum of Fourier coefficients of SL(3,Z) Hecke-Maass forms.
8. Krishnan Rajkumar (JNU, Delhi): Telescoping continued fractions for several of Ramanujan's entries.
9. James Sellers (University of Minnesota, Duluth, USA): Partitions into Odd Parts with Designated Summands.
10. Michael Schlosser (University of Vienna): Asymptotic formulas for the Fourier coefficients of infinite q-products.
11. Pranjal Talukdar (Tezpur University): On the least r-gaps in partitions and identities for the Rogers-Ramanujan Continued fraction.

Ramanujan Explained: We have launched a course under the title of Ramanujan Explained. There is a series of lectures, given by Gaurav Bhatnagar, with an accompanying textbook, containing notes and exercises. The goal is to organize (a large number of) Ramanujan's identities by technique. The course is at an undergraduate or beginning graduate level. Please share this announcement with students who may be interested in Ramanujan and his mathematics, or are required to learn the techniques to manipulate q-series. The can be accessed from https://ramanujanexplained.org/. Your advice, comments and encouragement will be greatly appreciated.

The first draft of Part I of the book is complete. It consists of a short introduction to basic hypergeometric series (and hypergeometric series). At present it contains 111 entries of Ramanujan. The book is available at https://ramanujanexplained.org/lecture-notes/.

The chapters on Ramanujan are interlaced with notes on the poetry of Kabir, the famous fifteenth century Indian poet and mystic. Kabir's ideas have been used to interpret Indian philosophical traditions, but we interpret them in the context of doing mathematics.

Here is a list of chapters in Part I of Ramanujan Explained (the book).

1. How to discover the Rogers–Ramanujan identities
2. Ramanujan's proof of the q-binomial theorem
3. Ramanujan and Heine's method
4. Ramanujan's useful transformation formula: Entry III.16.8
5. The q-Gamma function
6. Ramanujan's ${}_1\psi_1$ sum
7. Euler's Telescoping Lemma
8. Matrix Inversion and Inverse Relations
9. The Bailey Lemma
10. Ramanujan's q-continued fractions

Topic #7 ——— OP - SF Net 33.1 ——— January 15, 2026

From: Mourad E. H. Ismail (mourad.eh.ismail@gmail.com) and
Xiang-Sheng Wang (xiangsheng.wang@louisiana.edu)
Subject: Report: "Fall Virtual Analysis Seminar" by **Ismail** and **Wang**

Mourad Ismail and Xiang-Sheng Wang organize a weekly Analysis Seminar via zoom. The zoom link is: https://ullafayette.zoom.us/j/2022002220 (Meeting ID: 2022002220). The seminar meets on Fridays at 11:00 am, Louisiana time.

Last semester there were talks by

- Alexey Kuznetsov, York University, Canada
- Abdulaziz Alhaidari, Saudi Center for Theoretical Physics, Jeddah, Saudi Arabia
- Ling Long, Louisiana State University
- Abey López-García, University of Central Florida
- Xin Li, University of Central Florida
- Robert Gaunt, University of Manchester

- Zeinab Mansour, Cairo University, Egypt
- Jinho Baik, University of Michigan
- Pablo Roman, CONICET–Universidad Nacional de Córdoba, Argentina
- Seok-Young Chung, Michigan State University

So far the following people have agreed to talk in 2026: Karl Dilcher, Erik Koelink, Jeremy Lovejoy, Christian Berg, Ae Ja Yee, Tom Koornwinder, Dimitar Dimitrov, Howard Cohl and Saralees Nadarajah.

The first lecture is on Friday January 16th . Please feel free to attend.

Topic #8 ——— OP – SF Net 33.1 ——— January 15, 2026

From: OP–SF Net Editors
Subject: Essays related to the 100th birthday of Quantum Mechanics

Essays related to the 100th birthday of Quantum Mechanics

Below are two essays on the subject by:

Sergei Suslov and **Andreas Ruffing**

⋆ ⋆ ⋆

100th Birthday of Schrödinger's Wave Mechanics

Sergei Suslov (sergei@asu.edu)

How did Schrödinger derive his celebrated wave equation one hundred years ago and subsequently apply it to the hydrogen atom? According to his own testimony [1, 26, 3] and [18, 030† pp. 141–143], de Broglie's seminal work on the wave theory of matter (1923–24) and Einstein's studies on ideal Bose gases (1924–25) laid the foundation for the discovery of wave mechanics (see also [5] and [2]).

In his letter to Einstein dated November 3, 1925, Schrödinger writes: "*A few days ago, I read with great interest the ingenious theses of Louis de Broglie, which I finally got hold of ... .*"

Timetable: The exact dates of Schrödinger's foundational discoveries, leading to his first publications [1, 7], are not precisely recorded [8, 9, 10] and [5, pp. 459–465]. However, one can estimate the timeline based on his letter to Einstein [18, 030† pp. 141–143], dated November 3, 1925; Bloch's recollection of two colloquia in Zürich [11], presumably held in late November and/or early December 1925 [5, pp. 419–423]; a letter to Wien [18, 037† pp. 162–165] from Arosa on December 27, 1925; and a letter to Sommerfeld [18, 041† pp. 170–172] from Zürich on January 29, 1926. This yields a reasonable estimate spanning from early November 1925 to the end of January 1926.

Schrödinger in his letter to Sommerfeld dated January 29, 1926 [5, p. 462]; see also [18, 041† pp. 170–172]; writes: "*... Finally, I still wish to add that the discovery of the whole connection* [*between the wave equation and the quantization of the hydrogen atom*] *goes back to your beautiful quantization method for evaluating the radial quantum integral. It was the characteristic* $-\frac{B}{\sqrt{A}}+\sqrt{C'}$*, which suddenly shone out from the exponents* α_1 *and* α_2 *like a Holy Grail.*"

In this letter, Schrödinger reported for the first time the success of the wave theory in solving the quantum oscillator, rotator, the non-relativistic (and partially relativistic) hydrogen atom (Kepler problems), and the free motion of a point mass in infinite space and in a box, prior to the formal publications [1, 7].

Figure 4: The Villa Frisia of Dr. Herwig's sanatorium, Arosa (right), where it is believed wave mechanics was discovered during the Christmas holidays 1925–26 [15].

He also formulated a program for future research. For the reader's benefit, the complete letter has been translated from German to English in Appendix D of our forthcoming publication [12].

In a letter dated February 3, 1926 [18, 042† pp. 173–175], Sommerfeld responded enthusiastically: "*What you write, in your essay and letter, is terribly interesting. My personal opinion on the mysticism of integers must remain silent, as must my personal convenience ... My impression is this: Your method is a substitute for the new quantum mechanics of Heisenberg, Born, Dirac ... Because your results are completely consistent with theirs...*"

This marked the beginning of the triumph of Schrödinger's wave mechanics [5, pp. 617–636] (see also [13] and [14]).

Place of discovery: Arosa, an Alpine Kurort at about 1800 m altitude, not far from ski-resort Davos, and overlooked by the great peak of the Weisshorn. For a related video, see: https://www.news.uzh.ch/en/articles/2017/Schroedinger.html.

Here, among other things, a female physicist, Professor Laura Badis, meets the grandson of Dr. Herwig and he shows her the entry of the payment in a guest book, done by Schrödinger.

The author was able to visit Arosa on December 28–29, exactly on the 100th anniversary of the birth of wave mechanics. My personal impressions are as follows: the sanatorium/resort has long ceased to exist due to the development of modern tuberculosis treatments. All that remains is a large "ski resort" with a huge number of vacationers during the Christmas season, and many families with children of all ages. (They say that you must try hard to get on the ski lift! – The train in the mountain, from Chur to Arosa, was very crowded as well.) The building itself, Villa Frisia, has remained virtually unchanged from old photographs. Although there are many new buildings in the area, a large modern hotel has been built just down the mountainside. Some photographs are included. The mountains are truly magnificent! The linked video makes a good impression.

Figure 5: A postcard with the view of the Villa Frisia (right), where Schrödinger stayed, and the house of Dr. Otto Herwig (left).

Indeed, Villa Frisia is presented here in its current form (please see my photos). Although there are no horses anymore to serve as an "old taxi", like in the video. There are modern cars all around, mostly small cars because the mountain roads are icy and narrow. The locals and tourists are very friendly, helpful and trying to explain (mostly in German) about the area; nonetheless, no one seemed to be aware about the connection with Schrödinger. Everyone is busy with their own affairs – "thus the glory of the world passes away"! (Sic transit gloria mundi).

P.S. Please see also Chemical Landmark 2026 of the SCNAT honors Arosa and Erwin Schrödinger. The Chemistry Platform of the Swiss Academy of Sciences has established the "Chemical Landmark" program to identify and highlight scientific and technological heritage in the field of chemistry within Switzerland. A celebration was held on January 11, 2026 to honor this anniversary.

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Figure 6: The pine trees and mountains of Arosa.

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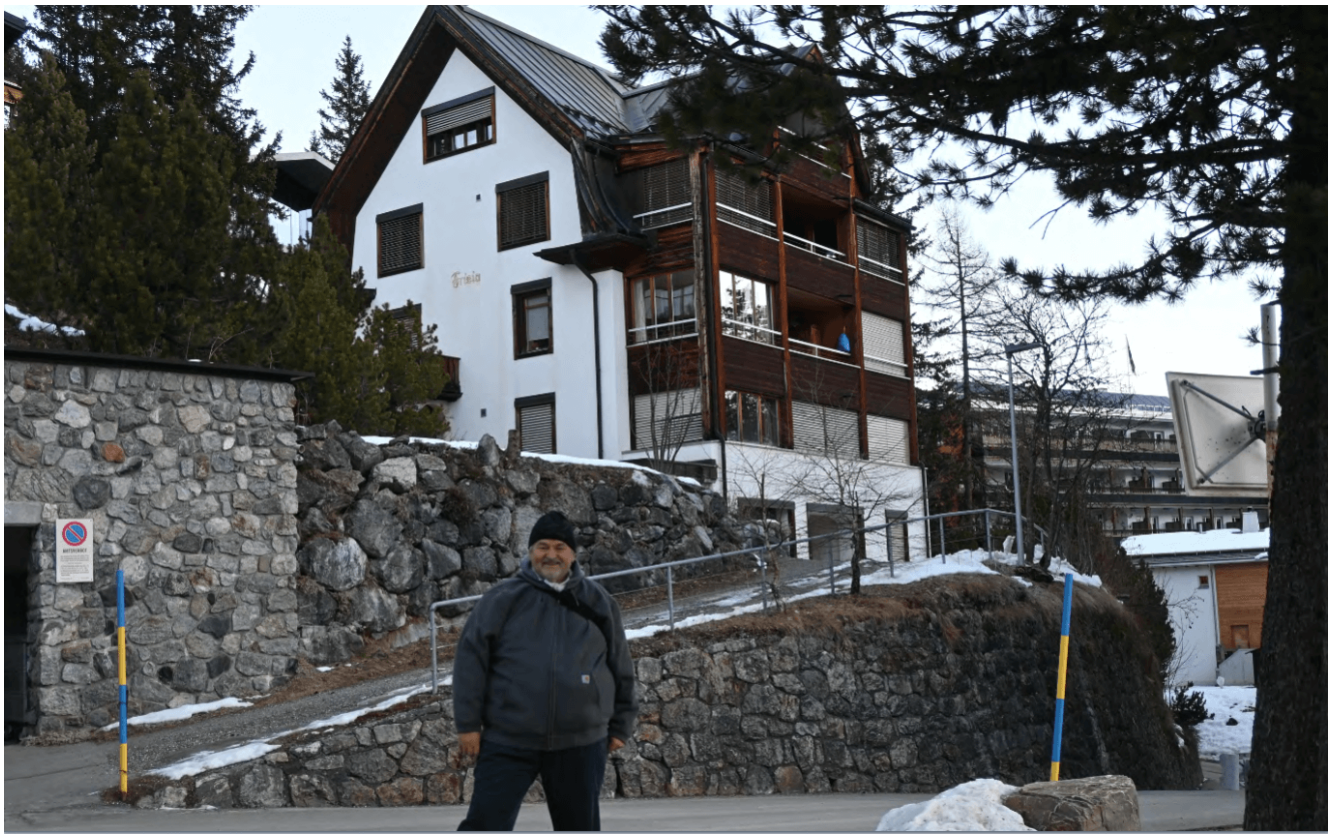

Figure 7: Sergei Suslov at Arosa, December 2025.

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⋆ ⋆ ⋆

Remarkable Times 1926–2026: On a century of the discovery of wave mechanics

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1. Historical Embedding

In an interview, Arthur Jaffe has recently pointed out that new discoveries in physics have often influenced the development of mathematics. Let us, at the beginning, elucidate this wonderful aspect of scientific reality and perception, by citing a prominent example, namely in a mathematical approach within non-commutative geometry. As it was stated by Alain Connes, one can derive the quantization of Hall conductivity. Moreover the existence of plateaus is shown while varying the Fermi energy in a region of so-called localized states. The physical discovery of Hall effect and Fermi energies helped finally creating and developing a new mathematical discipline, namely non-commutative geometry.

In plenty of situations, there happens also another, different scenario. Especially in applied mathematics, the modeling aspect may lead in a first step to the mathematical analysis which establishes existence and uniqueness of solutions. Then, a numerical solution is prepared and the model is finally tested by the

verification or validation of solving the stated problem within the chosen model. An example for this is the application of Landau-Ginzburg theory to the understanding of the shape-memory alloys and smart materials.

In the two so-far described approaches, physics always is preceding the associated mathematics. But it is also possible that an even more complex and completely unexpected and different way of scientific perception is opened. This happens for instance in context of quantum mechanics, and we will refer to it in the sequel.

Let us – for the sake of experiencing the main roads – look at the following historical context.

It is well known that in France, there existed all over the country an established famous mathematical school on special functions. The mathematicians Legendre, Hermite, Laguerre belonged to it. When they developed their celebrated special function systems of orthogonal polynomials, these were major contributions to a modern perception, so to say a root, some kind of common origin, on which later on for instance basic ideas of functional analysis partly originated. But is was not clear during the life periods of Legendre, Hermite and Laguerre whether these function systems would serve to a particular understanding of a concrete physical situation.

This changed drastically, when Erwin Schrödinger had stated his famous wave equation. Suddenly, it became apparent that these function systems are deeply associated with the quantum understanding of physics.

Suppose we had asked Hermite during his lifetime whether he was aware of the fact that his Hermite polynomials are closely related to the understanding of molecular oscillations, and also, later on, related to the celebrated advanced Schrödinger's correspondence principle (not the older version by Bohr). What kind of answer would Charles Hermite have given to this question?

Suppose we had asked Laguerre during his lifetime whether he was aware of the fact that his Laguerre polynomials are closely related to the understanding of the hydrogen energy spectrum. What kind of answer would Edmond Laguerre have given to this question?

And suppose we had asked Legendre during his lifetime whether he was aware of the fact that his Legendre polynomials are closely related to the understanding of the angular momentum and spin behavior of the hydrogen atom and other atomic systems. What kind of answer would Adrien-Marie Legendre have given to this question?

The reader of this communication recognizes already the meaning of this question technique, namely, when physicists started finding solutions to the Schrödinger equation, it was as if they just had to put up the orthogonal functions systems like pieces of a puzzle, to put them together, and to see that quantum physics looks like a concrete implementation of mathematics, in nature.

In a similar way, the described perception is crucial when looking at the development of general relativity: The interpretation of gravity as a curved structure within spacetime is strictly based on Riemannian geometry. There even exists a complete identification of gravitation (physics) as an object of mathematics (curved space time), the so-called geometrization of gravity, being an important and central ingredient within Albert Einstein's Theory of General Relativity. Moreover, the described structures within general relativity state a complete equivalence between an object of our physical perception and an object of our logical, mathematical thinking.

In general relativity as well as in quantum mechanics, we observe that mathematics – in contrast to the above examples at the beginning of this communication – is preceding, and physics – in some sense – is following the scientific perceptions of mathematics.

2. The Separation Ansatz of the Schrödinger Equation and the Modern Theory of Special Functions

It is well known that the Schrödinger equation is a special partial differential equation with a poten-

tial, where in the equation, the time variable resp. time derivative appear and where there is at least one spatial variable resp. spatial derivative. The crucial physical aspect is the use of a particular time-dependent or even stationary potential function within the Schrödinger equation, together with the following: L^2-integrability of the solutions is required along the real axis of space (resp. the various spatial variables).

In many textbooks all over physics, the following is done to find physically acceptable solutions of the Schrödinger equation: At least in the stationary case, there exists a special decomposition of a solution into a product of a function with merely spatial variables and a suitable function with only time dependence. Then, what remains, is to consider an eigenvalue problem, more generally a spectral-theoretical problem, to get insight into the energy levels of the quantum system under consideration.

These are some kind of standard methods which are transferred from generation to generation of physicists and mathematicians.

Was Schrödinger aware of that? — He used separation of variables from a university course on classical electrodynamics, but... In his letter to Wilhelm Wien from Arosa ([18], pp. 162–165), Schrödinger admits that working on "a new atomic theory" he has "... to learn mathematics to handle the vibration problem ..." (see also [15], p. 775). In the first 'quantization' article [23], the Laplace method based on complex integration was utilized to solve the radial equation (for a nonrelativistic hydrogen atom). At that time, Schrödinger refers to book [22], well-known to him from his student days, and acknowledges some guidance from Hermann Weyl. Nowadays, we may say that the corresponding quantization rule for those complex integrals is not that straightforward and a bit complicated — it has hardly ever been utilized in the aforementioned form after that and now is completely forgotten ([2], Appendix C).

Later on, Schrödinger always uses (and develops) methods from the 'magnificent classical mathematics' book [6] (in Erwin's own words [17], pp. 582–583) first published in 1924. It's almost certain that this book was not available to him in Arosa. Only in the second article on wave mechanics, Schrödinger thanks his assistant E. Fues for pointing out a connection with the Hermite polynomials for the harmonic oscillator problem and acknowledges the relation of his wave function in the 'Kepler problem' with the 'polynomials of Laguerre' [24].

Another example: the Clebsch–Gordon coefficients of the Quantum Theory of Angular Momenta are related to the so-called Hahn polynomials that *de facto* were discovered by Pafnuty Lvovich Chebyshev in 1875 [33, 34, 35]. https://en.wikipedia.org/wiki/Pafnuty_Chebyshev

As a result of a century quantum mechanics development in physics, modern texts in wave mechanics, orthogonal polynomials and special functions are available nowadays to the reader. Among them: [1, 6, 8, 11, 19, 20, 29, 32]. But only elementary functions were needed in 'old' quantum mechanics of Bohr and Sommerfeld: [3, 30]

A comment on Computer algebra methods:

Computer algebra systems such as Maple and Mathematica are valuable tools for teaching and learning quantum mechanics, particularly for beginners. These systems can handle complex mathematical calculations, allowing students to focus on understanding the underlying concepts and problem-solving strategies rather than getting bogged down in tedious computations. One should admit nonetheless that each of the quantum mechanical problems under consideration, with exception of a few trivial ones, usually requires a separate analysis with lots of specific details that are far away from a formal application of a given computer algebra system, as it might be thought of at the first glance (see, for example, [7, 9]).

3. Inspiration by Richard Askey

Richard Askey supported in an enormous way many researchers and educational programs like SUMS=Straitening Understanding of Mathematics and Science created by Joaquín Bustoz at Arizona State University. His pedagogical ethos on these programs was very special and it induced not only undergraduate research

in programs like SUMS, but it motivated also young researchers to start into future, into unexpected directions. Most important is also that he was able to show respect to colleagues, true respect. Only some kind of superficial respect – this was not what Dick wanted. His aim was true respect. Note that respect does not necessarily mean to like somebody. Dick saw this border clearly. (See [4, 5] about his legacy).

The author of this essay thinks that these important points are in a brilliant correlation with the well-known fact: *Dick Askey always believed that the development of special functions should be connected to applications, as understanding these functions and their properties is essential for addressing problems in various scientific and engineering domains.*

Some of those who knew Richard Askey may have made the following observation: On the one hand, Dick was able to dive deeply into theory – but at the same time, and this was a fascinating fact too, he was also very proud when he heard that structures he has experienced might also serve to applications – like e.g., basic quantum oscillators, or basic Fourier theory. Surely partial differential equations and ordinary differential equations are research fields in which special functions appear in a natural way as suitable solutions for the differential operator problems under consideration.

According to Lanfear and Suslov [12] : *"Sometimes, just a casual interaction with Askey could spark an important result. This is one of those stories. On one occasion, Dick had to correct a mathematics education colleague who mistakenly claimed at a joint MAA-AMS meeting that a simple Riccati equation (...) could not be explicitly solved, despite an extensive bibliography on the topic."*

Indeed, those who knew Dick, can imagine his grief-filled, but perhaps also angry or frustrated, face that he had when the mathematics education colleague reported in a wrong way on a well-known fact. At this moment, Dick may have strengthened his voice, sounding to some extent like a speaking raven bird (if one is allowed to say so and to use this picture), being so excited (certainly not in a positive way) about the colleague's mistake.

For a person outside of the community, it may have been assumable that under such an anger and such a negative situation – and Dick was able to express it really energetically – no creativity was possible for the rest of the day, or even perhaps for the rest of the week. But the opposite was the case. The tension Richard Askey conveyed over the colleagues in the audience generated some kind of lightening flash – sparking an important result to finally come out [12]: *"This "sad story" was our original motivation, in the late 2000s, to explore the complete integrability of the corresponding parametric harmonic oscillator problems in quantum mechanics..."*

As regards the results, Richard Askey surely would have liked the application to quantum physics, fulfilling his wish that mathematical structures finally might materialize in good applications.

4. Beyond the Separation Ansatz of the Schrödinger Equation. Construction of Green's Functions

[Check it out! https://www.nature.com/articles/nphys411]

In order to solve the time-dependent Schrödinger equations for a parametrized quantum oscillator, the particular Ansatz is provided in [9] (see also references therein and [31]). Hereby, a very elegant method is elucidated which Sergei Suslov and his former students have applied also in a series of articles (see [9] and the references therein). An unusual example/application: The mighty instrument of Airy functions enters the calculations and is highlighted in [12] in a special way.

This method beyond the separation ansatz provides completely new aspects of solutions to the Schrödinger model which is investigated. And indeed, as stated in their article [12], the authors arrive here at an amazing result, which they comment in a completely correct way: *"Here, we have discussed an unusual application of solutions to Airy's equation in quantum mechanics — an insight that would never have been found without Dick's influence."*

Mathematicians would rather use here results on weak solutions of PDE, and on distributions resp. distributional solutions to the model. But not necessarily they would obtain a closed, integrable solution,

i.e., a solution which can be written down in a specific notation, namely by a closed formula containing special functions.

With the intuition of physicists, modern mathematicians elucidate the main idea in a logical accurate way and finally arrive at results which are very useful for quantum physics, leading to solutions in terms of special functions. Among those are: "Missing" solutions of the simple harmonic oscillator problem in quantum mechanics and the minimum uncertainty squeezed states [10, 13].

It would be interesting to know, in particular, Schrödinger's reaction on this extension of his classical coherent states, when one can go under the so-called Heisenberg limit... Science never sleeps...

Happy 100th anniversary to Schrödinger's wave mechanics!

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Topic #9 ——— OP – SF Net 33.1 ——— January 15, 2026

From: OP-SF Net Editors
Subject: Preprints in arXiv.org

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 November and December 2026. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

http://arxiv.org/abs/2511.00045
Transient waves in linear dispersive media with dissipation: an approach based on the steepest descent path
Francesco Mainardi, Andrea Mentrelli, Juan Luis Gonza'les Santander

http://arxiv.org/abs/2511.00713
Lexical tableaux and quasisymmetric functions
John M. Campbell, Spencer Daugherty

http://arxiv.org/abs/2511.02628
Hermite–Jensen limits and d log-concavity of q-multinomials
Ken Ono

http://arxiv.org/abs/2511.02758
Finite free probability and S transforms of Jacobi processes
Nizar Demni, Nicolas Gilliers, Tarek Hamdi

http://arxiv.org/abs/2511.03030
Carl Størmer and his Numbers
Matthew Kroesche, Lance L. Littlejohn, Graeme Reinhart

http://arxiv.org/abs/2511.03979
On Euler's Theorem
George E. Andrews, Rahul Kumar, Ae Ja Yee

http://arxiv.org/abs/2511.05718
Atkin and Swinnerton-Dyer congruences for meromorphic modular forms
Michael Allen, Ling Long, Hasan Saad

http://arxiv.org/abs/2511.07444
Complete Monotonicity of the function involving derivatives of Barnes G-function
Deepshikha Mishra, A. Swaminathan

http://arxiv.org/abs/2511.07452
Real and complex spherical designs and their Gramian
Shayne Waldron

http://arxiv.org/abs/2511.07972
Generalized Probability Density Approach to Histopolation Schemes of Arbitrary Order
Gradimir V. Milovanovic, Federico Nudo

http://arxiv.org/abs/2511.09452
Multiple Rogers-Ramanujan type identities for inert quadratic orders
Shane Chern, Yifeng Huang

http://arxiv.org/abs/2511.11559
Two Useful Facts About Generating Functions
Alex Kasman, Robert Milson

http://arxiv.org/abs/2511.12684
On the entropy for indeterminate moment problems
Christian Berg

http://arxiv.org/abs/2511.15519
On Schultz's generalization of Borweins' cubic identity
Heng Huat Chan, Song Heng Chan, Zhi-Guo Liu, Wadim Zudilin

http://arxiv.org/abs/2511.16396
Generalized rank deviations for overpartitions
Kevin Allen, Robert Osburn, Matthias Storzer

http://arxiv.org/abs/2511.17034
Affine Jacobi-Trudi formulas and q,t-Rogers-Ramanujan identities
S. Ole Warnaar

http://arxiv.org/abs/2511.18118
Asymptotic analysis of a Family of Painlevé Functions with Applications to CUE Derivative Moments
Thomas Bothner, Fei Wei

http://arxiv.org/abs/2511.20824
Truncated kernel windowed Fourier projection: a fast algorithm for the 3D free-space wave equation
Nour G. Al Hassanieh, Alex H. Barnett, Leslie Greengard

http://arxiv.org/abs/2511.21433
Polynomials of the Askey scheme as Clebsch-Gordan coefficients
Nicolas Crampe, Loic Poulain d'Andecy, Luc Vinet

http://arxiv.org/abs/2511.21496
Optimal local central limit theorems on Wiener chaos
Masahisa Ebina, Ivan Nourdin, Giovanni Peccati

http://arxiv.org/abs/2511.22507
Ratio asymptotics and zero density for orthogonal polynomials with varying Verblunsky coefficients
Rostyslav Kozhan, František Štampach

http://arxiv.org/abs/2511.23362
On Fredholm Pfaffians and Riemann-Hilbert problems
Thomas Bothner, Amari Jaconelli

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Giulio Bonelli, Anton Shchechkin, Alessandro Tanzini

Topic #10 ——— OP - SF Net 33.1 ——— January 15, 2026

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 33.2 should be sent by March 1, 2026.

OP-SF NET is the electronic newsletter of the SIAM Activity Group on Special Functions and Orthogonal Polynomials (SIAG/OPSF). 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 OP-SF Talk which is currently managed and moderated by Howard Cohl (howard.cohl@nist.gov). Anyone wishing to be included in the mailing list (SIAG/OPSF members and non-members alike) should send an email expressing interest to him. Bonita Saunders also posts the Newsletter through SIAM Engage (SIAG/OPSF) which is received by all SIAG/OPSF members.

OP-SF Talk is a listserv associated with SIAG/OPSF which facilitates communication among members, non-members and friends of the Activity Group. To post an item to the listserv,
send e-mail to howard.cohl@nist.gov.

WWW home page of this Activity Group:
http://math.nist.gov/opsf
Information on joining SIAM and this activity group: service@siam.org

The elected Officers of the Activity Group (2025-2027) are:
Howard Cohl, Chair
Kerstin Jordaan, Program Director
Tom Trogdon, Secretary

The appointed officers are:

Howard Cohl, OP-SF NET co-editor
Sarah Post, OP-SF NET co-editor
Bonita Saunders, Webmaster and SIAM Engage (SIAG/OPSF) moderator

Topic #11 ——— OP - SF Net 33.1 ——— January 15, 2026

From: OP-SF Net Editors
Subject: Thought of the Month by **Paul Lockhart**

"When I am daydreaming about math, I am giving my brain its favorite drug in its purest form. Mathematics is a means of constantly evolving and changing myself — becoming reborn as a person who sees in a new way and cannot unsee. I feel so grateful! I get to have this amazing playground in my head, and so do you."

Paul Lockhart, The Mending of Broken Bones. A Modern Guide to Classical Algebra. The Belknap Press of Harvard University Press, Cambridge, 2025, Chapter on *Algebraic Geometry*, p. 371.