

OP-SF NET – Volume 33, Number 5 – September 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.

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Calendar of Events:

September 22 – 25, 2026

Back to the Roots (of Polynomials)
Paderborn University, Paderborn, Germany
<https://spp2265.wias-berlin.de/>

December 7–11, 2026

CMFT 2026 – Computational Methods and Function Theory
IIT Madras, Chennai, India
<https://ge.iitm.ac.in/cmft-2026>

June 27–July 2, 2027

Workshop on Multivariate Orthogonal Polynomials, in Algebraic Combinatorics
and Mathematical Physics: New and Future Connections,
Banff International Research Station (BIRS), Banff, Alberta, Canada
<https://www.birs.ca/events/2027/5-day-workshops/27w5730>

Summer, 2028

19th International Symposium on Orthogonal Polynomials, Special Functions and Applications
University of Melbourne, Melbourne, Australia

Topic #1 ——— OP – SF Net 33.5 ——— September 15, 2026

From: Howard S. Cohl (howard.cohl@nist.gov), Kerstin Jordaan (jordakh@unisa.ac.za),
Tom Trogdon (trogdon@uw.edu), Ana Loureiro (A.Loureiro@kent.ac.uk),
Teresa Pérez (tperez@ugr.es), and Luc Vinet (luc.vinet@umontreal.ca)

Subject: Summary of the SIAG/OPSF and OPSFA Business Meeting at OPSFA–18 by **Howard Cohl**

Thinking back on the SIAG/OPSF and OPSFA Business Meeting held on Tuesday, August 18, 2026, in Hardy Hall at Doshisha University in Kyoto, the whole event felt like a vibrant snapshot of a community constantly in motion, with Howard S. Cohl (SIAG/OPSF Chair and OPSFA SIAG/OPSF representative) presenting and Kerstin Jordaan (SIAG/OPSF Program Director) taking minutes. This business meeting was also given on behalf of Thomas Trogdon (SIAG/OPSF Secretary), Ana Loureiro (OPSFA–14), and Teresa Pérez (OPSFA–17), and Luc Vinet (OPSFA–16) who was present at the business meeting. The meeting also provided an opportunity to recognize the wider team supporting SIAG/OPSF activities during 2025 and 2026, including elected officers Howard Cohl, Kerstin Jordaan, and Thomas Trogdon, OP–SF NET co–editor Sarah Widiasih Post, and Bonita Saunders, who maintains the SIAG/OPSF website. Tom Koornwinder’s acceptance in May of the newly created role of Archivist was also noted, acknowledging his longstanding contribution to preserving the community’s history since he founded OP–SF NET in 1993.

Looking at the broader dashboard of activities, the momentum is undeniable—an active, growing, and deeply international group pushing the frontiers of orthogonal polynomials and special functions straight into modern arenas like AI and quantum theory. It’s thrilling to realize the membership has surged by 22 percent since just January, reaching 137 members, with students making up a very healthy 29 percent of that total. And while it’s fantastic that the group spans every single continent with 79 percent rooted in academia, the demographics still leave that lingering, important thought that gender diversity is an area where the community definitely needs to do better.

This same energy clearly spilled over into the SIAM Annual Meetings, recalling the intense, five-week sprint to organize nine minisymposia at AN25 in Montréal, which seamlessly paved the way for securing an incredibly rare, dedicated eight-session track at AN26 in Cleveland. That Cleveland meeting was a

high point, especially with Nalini Joshi and Ken Ono delivering such compelling plenary talks. On the publication front, the outreach efforts are genuinely paying off; Howard's role as the SIAM News liaison has already resulted in several online articles highlighting the community's work, but the truly monumental victory is the recent update that OPSF has officially been added back into the editorial policy of the SIAM Journal on Mathematical Analysis (SIMA), ending a long period of lost representation and opening doors for new Associate Editor appointments.

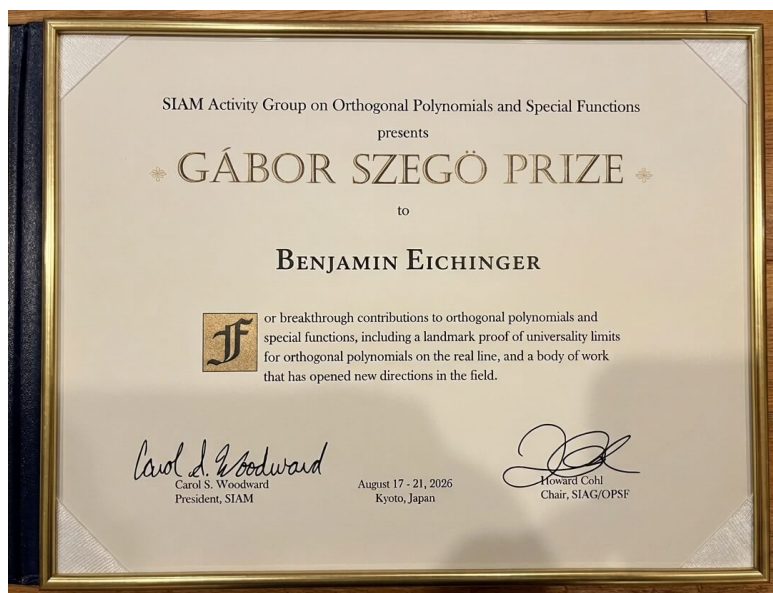


Figure 1: 2026 Gábor Szegő Prize

As the meeting wrapped up, thoughts naturally drifted toward the future, acknowledging the newly formed Nominating Committee gearing up for the Fall 2027 elections, and feeling a shared sense of pride for Benjamin Eichinger, who was set to receive the 2026 SIAM Gábor Szegő Prize and deliver his talk on universality limits. Finally, the excitement surrounding the OPSFA conferences continues to build, especially with the Steering Committee's recent decision to select the University of Melbourne as the host for OPSFA-19 in 2028. Realizing this will be the very first OPSFA meeting held in the Southern Hemisphere, complete with a preceding MATRIX research program, it just underscores how beautifully this community continues to expand its global footprint and collaborative spirit.

Topic #2 ——— OP – SF Net 33.5 ——— September 15, 2026

From: Howard S. Cohl (howard.cohl@nist.gov), Kerstin Jordaan (jordakh@unisa.ac.za),
and Tom Trogdon (trogdon@uw.edu)

Subject: Announcement: OPSF Added to the SIAM Journal on Mathematical Analysis Editorial Policy

Orthogonal Polynomials and Special Functions Added to the Editorial Policy of the SIAM Journal on Mathematical Analysis.

We are pleased to report an encouraging development for the Orthogonal Polynomials and Special Functions (OPSF) community. Following discussions between SIAG/OPSF leadership and SIAM Publications, Orthogonal Polynomials and Special Functions (OPSF) has been explicitly added to the editorial policy of the *SIAM Journal on Mathematical Analysis* (SIMA); see

<https://epubs.siam.org/journal/sima/editorial-policy>.

<https://www.siam.org/publications/siam-journals/siam-journal-on-mathematical-analysis/>.

This change is an important step toward recognizing OPSF as a core area of mathematical analysis and sends a positive signal that high-quality research in the field is welcome at SIMA.

We thank Kivmars Bowling (SIAM Publications Director), Pierre-Emmanuel Jabin (Editor-in-Chief of SIMA), and Tamara Kolda (SIAM Vice President for Publications) for their thoughtful consideration of this matter and their engagement with the OPSF community. We also note with appreciation that Professor Jabin has indicated that he will keep recommendations for additional Associate Editors with expertise in OPSF in mind as future editorial appointments are made.

At the same time, it is clear that additional progress is needed. Although OPSF is now explicitly included in the editorial policy, the journal's scope continues to emphasize applied mathematical analysis, and questions remain regarding the treatment of papers whose primary contributions are theoretical. Many of the most influential advances in orthogonal polynomials and special functions have arisen from deep theoretical developments that only later found important applications. We therefore hope that the role of OPSF within SIMA will continue to broaden and that the journal will welcome both fundamental and application-driven contributions.

An important next step is for members of the OPSF community to submit outstanding papers to SIMA. Doing so will help demonstrate the vitality of the field, provide a clearer picture of how OPSF manuscripts are handled in practice, and help identify any remaining barriers to publication.

We welcome comments from the community on this development. Continued dialogue with SIAM Publications and the SIMA editorial leadership, together with increased submissions from the OPSF community, will help ensure that orthogonal polynomials and special functions receive the visibility and representation they deserve within one of SIAM's flagship journals.

Topic #3 OP – SF Net 33.5 September 15, 2026

From: Paul Nevai (mail@nevai.us)

Subject: Announcement: Advances in Approximation Theory has arrived

You probably already know that “Journal of Approximation Theory” (JAT), as we knew it, is dead, see

<https://people.math.osu.edu/nevai.1/JAT/>.

Most of JAT's former editors joined forces to launch a new online successor of JAT that we used to love and respect (but not anymore). It is published by Stanford University Press and it is called “Advances in Approximation Theory” (AAT) with the Editors-in-Chief Martin Buhmann, Feng Dai, András Kroó, and Sergey Tikhonov, see

<https://aat.journals.sup.org/index.php/aat>

Our editors and I will be very appreciative and grateful if you helped us to make AAT viable, successful, and at least as respected as JAT used to be by submitting your papers related to Approximation Theory to AAT.

You can register as an Author, Reviewer, and Reader at

<https://aat.journals.sup.org/index.php/aat/user/register>

Please contact me atpaul@nevai.us or AAT ataat@nevai.us if you have any questions.

We look forward to hearing from you and receiving your papers at AAT.

In addition, please spread the word among your colleagues, coauthors, and friends. Please encourage them to submit papers to AAT.

Best regards, Paul

P.S. Please forgive us if you end up getting more than one email from us inviting you to contribute to AAT.

Topic #4 ——— OP – SF Net 33.5 ——— September 15, 2026

From: Tanay Wakhare (tanay@mathvision.ai)

Subject: Announcement: MathVision: AI Workspace for OPSF Research

MathVision is a free AI research workspace developed specifically for mathematicians and applied researchers. It is designed to support a mathematical project from start to finish, combining proof iteration, computation, literature search, and LaTeX writing in one environment.

One recent example is the paper *Tadpole Nahm sum as a Wronskian*, available at <https://arxiv.org/pdf/2607.22904>, by Shane Chern, Chanh Tran, and Tanay Wakhare. During the project, MathVision surfaced an overlooked connection between the tadpole Nahm sum under investigation and a series studied previously by Bartlett and Warnaar. Developing this observation led to a Wronskian formula for the tadpole Nahm sum and a proof of its modularity. Chern, whose research includes partitions and q -series, described the discovery as an example of MathVision helping uncover a connection that had been missed in the existing literature.

MathVision has also partnered with the Rogers–Ramanujan–Slater Database (RRSDB), developed by Robert Schneider, Andrew Sills, and collaborators. The RRSDB is a research resource for identities in partitions and q -series, and the collaboration is adding natural-language search and interactive tools to the database. Professor Schneider has described MathVision as a “unique and useful resource for writing and research, like Overleaf plus Mathematica,” and noted that the collaboration should make the RRSDB more useful for research and experimentation.

MathVision is led by Tanay Wakhare, an MIT Ph.D. candidate and number theorist whose work includes q -series, special functions, and combinatorics. These connections to the number theory and q -series communities have helped shape some of the platform’s earliest research applications and collaborations.

In practice, a researcher can begin with a theorem, conjecture, or manuscript and use MathVision’s chat and prebuilt AI workflows. These prebuilt workflows encompass an AI research agent, referee-style review, literature search, suggested next steps, and more. Within the same project, MathVision can also run symbolic and numerical computations with executable code, generate interactive mathematical visualizations, and use an integrated LaTeX agent to draft and revise the resulting mathematical writing.

MathVision is currently free to use, with no separate paid AI subscription or prior AI experience required. Researchers can try it on a current problem or manuscript at <https://mathvision.ai/>.

Topic #5 ——— OP – SF Net 33.5 ——— September 15, 2026

From: OP–SF Net Editors

Subject: Happy Belated 100th Birthday to **Waleed Al-Salam**

It has come to our attention that Waleed A. Al-Salam would have celebrated his 100th birthday on July 15, 2026. Waleed A. Al-Salam was born on July 15, 1926, in Iraq, and passed away on April 13, 1996, in Edmonton, Alberta, Canada.

We take this opportunity to remember and celebrate his life and his many contributions to the fields of special functions and orthogonal polynomials. Happy 100th birthday, Waleed!

In remembrance of Waleed, we attach a reproduction of Martin Muldoon’s obituary from OP–SF NET 3.3, Topic 7, May 16, 1996; and Richard Askey’s article from OP–SF NET, which appeared in OP–SF NET 3.4, Topic 14, on July 15, 1996.



Figure 2: Photograph of Waleed Al-Salam in Segovia. The photo was taken in 1986 and provided by Tom Koornwinder.

Waleed Al-Salam 1926-1996
OP-SF NET 3.3, Topic 7, May 16, 1996
by **Martin Muldoon**

Friends and colleagues are saddened by news of the passing, a few months short of his 70th birthday, of Waleed Al-Salam, Professor Emeritus of Mathematics at the University of Alberta. Born on July 15, 1926 in Baghdad, Iraq, he died on April 14, 1996 in Edmonton, Alberta, Canada.

Waleed studied at the University of California, Berkeley, earning a Bachelor's degree in Engineering Physics in 1950 and a M.A. in Mathematics in 1951. He returned to Baghdad as an Instructor at the College of Science for a few years, before enrolling for the Ph.D. at Duke University. He completed the degree in 1958 with a thesis "On the Bessel Polynomials" [3]¹ written under the supervision of Leonard Carlitz. By this time he was already a regular contributor to the periodical literature with some 20 published articles on a variety of topics in orthogonal polynomials and special functions.

After completing his Ph.D., Waleed returned to the College of Science in Baghdad as Associate Professor. Coming back to North America in 1962, he eventually (1966) took a position at the University of Alberta, where he was Professor of Mathematics from 1967 until his retirement in 1992. Waleed continued to contribute to several areas related to orthogonal polynomials; his CV lists over 80 articles. Areas covered by his work include characterization theorems (see his survey article in pp. 1-24 of P. Nevai, ed., *Orthogonal Polynomials: Theory and Practice*, Kluwer, 1990 [4], [7, pp. 1-24]), Turan expressions, generating

¹The actual title of his thesis was *The Bessel Polynomials and Some Related Functions*. See also [2, 1].

functions, summation formulas, q -analogs, and fractional operators. He and his collaborators did much work on various special and generalized systems of orthogonal polynomials. The Al-Salam-Carlitz polynomials (1965) are still frequently cited; see, e.g., the papers of R. Askey and S. K. Suslov in *Lett. Math. Phys.* 29 (1993) [6], 123–132 and *J. Phys. A* 20 (1993), L693–L698 [5]. The Al-Salam-Chihara polynomials (1976) play an important role in the Askey-Wilson scheme of basic hypergeometric orthogonal polynomials.

Waleed supervised the Ph.D work of Bill Allaway (1972) and Mourad Ismail (1974), and conducted joint work with a variety of people at Alberta and elsewhere. In later years, these included Ted Chihara, A. Verma, Mourad Ismail and Waleed's wife, Nadhla Al-Salam, also on the faculty at Alberta, and a member of this Activity Group.

On his retirement in 1992, Waleed decided to put his expertise and energy at the disposal of the orthogonal polynomials community by starting and maintaining an ftp site for papers in the area. This effort prospered and he continued to oversee it until last year when his failing health made it necessary to pass the task to Hans Haubold at the UN Office in Vienna. Waleed had been diagnosed with leukemia in 1993 and this was to reduce his active participation in conferences in subsequent years. Nevertheless, with Nadhla's constant support, he still managed to travel and old and new friends were able to benefit from his knowledge and enjoy his optimistic and humorous personality.

References:

- [1] W. A. Al-Salam. On the Bessel polynomials. Bulletin of the Italian Mathematical Union, Series III, 12:227–229, 1957.
- [2] W. A. Al-Salam. The Bessel polynomials. Duke Mathematical Journal, 24:529–545, 1957.
- [3] W. A. Al-Salam. The Bessel Polynomials and Some Related Functions. Ph.D. thesis, Duke University, Durham, North Carolina, 1958. Ph.D. Dissertation.
- [4] W. A. Al-Salam. Characterization theorems for orthogonal polynomials. In Orthogonal polynomials (Columbus, OH, 1989), volume 294 of NATO Adv. Sci. Inst. Ser. C: Math. Phys. Sci., pages 1–24. Kluwer Acad. Publ., Dordrecht, 1990.
- [5] R. Askey and S. K. Suslov. The q -harmonic oscillator and an analogue of the Charlier polynomials. J. Phys. A, 26(15):L693–L698, 1993.
- [6] R. Askey and S. K. Suslov. The q -harmonic oscillator and the Al-Salam and Carlitz polynomials. Lett. Math. Phys., 29(2):123–132, 1993.
- [7] P. Nevai, editor. Orthogonal polynomials: theory and practice. Proceedings of the NATO Advanced Study Institute on orthogonal polynomials and their applications held in Columbus, Ohio, USA, May 22–June 3, 1989. With the assistance of Mourad E. H. Ismail, volume 294 of NATO ASI Ser., Ser. C, Math. Phys. Sci. Dordrecht etc.: Kluwer Academic Publishers, 1990.

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Waleed Al-Salam
OP-SF NET 3.4, Topic 14, July 15, 1996
by **Richard A. Askey**

One of the pleasures in visiting Edmonton was being able to talk with Waleed Al-Salam. The conversations could be on mathematics, but just as frequently would be on other topics. What he did not tell me about one visit is something which shows his character.

It was a cold winter, and he met me at the downtown airport after a flight from Calgary. He never mentioned the sequel. I was wearing a fur hat bought in Moscow, and carrying a bag from the International

Congress of Mathematicians in Moscow in 1966. There was a Russian hockey team in Calgary. When this Russian looking man with a Russian hat and bag flew to the downtown airport in Edmonton without the [Royal Canadian Mounted Police] RCMP having been notified, they called to Edmonton to ask that this be checked out. I did not notice them watching, nor do I think Waleed did, but a few days later there were questions asked about him and me at the Mathematics Department. It was only many years later that someone else told me about this. Waleed did not, since he did not want me to feel bad about his being investigated. That was typical. He was a gentleman.

Waleed was also a scholar. On another trip to Edmonton, I talked about some orthogonal polynomials which had first been found by L. J. Rogers, although Rogers was not aware they were orthogonal. These polynomials had been rediscovered twice around 1940, so were known to be orthogonal. However, they were not well known. In discussion after the talk, Waleed said that these polynomials reminded him of some polynomials found by Bill Allaway in his thesis [2]. Waleed had sent me this thesis, but I had not read it carefully, so asked him to bring in a copy the next day. Sure enough, Allaway had rediscovered these polynomials once again, but had been more careful in his work than the two who had found these polynomials about 1940. There was a special case where division by zero occurred unless you were careful, and Allaway had been. These polynomials which had been missed by others are now called sieved polynomials and they have played an important role in a few developments of the general theory of orthogonal polynomials. Both of Waleed's Ph.D. students, Bill Allaway and Mourad Ismail, got a good start in mathematics from the problems which they got from him.

I handled the paper Waleed and Ted Chihara wrote on what are now called the Al-Salam-Chihara polynomials [1]. This was for SIAM Journal on Mathematical Analysis, so there should be some indication that the work would have applications to problems in science or engineering, or some other applied area. They had none, but the polynomials seemed so natural that there was no question in my mind that they would eventually have many applications. We now know where they live. They are a very important q -extension of Laguerre and Meixner polynomials. The problem Al-Salam and Chihara solved was a very natural extension of the problem solved by Meixner in the middle 1930s when he found Meixner polynomials and what I call Meixner-Pollaczek polynomials. These last arise in the representations of $SU(1,1)$, and so in theoretical physics. Now that quantum groups seem to have appeared in physics, it is very likely that these polynomials of Al-Salam and Chihara will arise in problems in physics, just as the polynomials found earlier by Al-Salam and Carlitz have arisen in the study of q -harmonic oscillators. These last polynomials are natural q -extensions of Charlier polynomials. They also extend the continuous q -Hermite polynomials of L. J. Rogers. The polynomials of Rogers have a very interesting combinatorial structure associated with them, and extensions of this to the Al-Salam-Carlitz polynomials is currently being developed.

Waleed Al-Salam had a remarkable eye for formulas, and the ability and energy to find a number of important ones. The polynomials mentioned above are very appropriately named, and these and some other results found by him will keep his name in the minds of many people who never had the joy of knowing him. Those of us who did will remember him as well as his work, and miss him the more for this.

References:

- [1] W. A. Al-Salam and T. S. Chihara. Convolutions of orthonormal polynomials. SIAM Journal on Mathematical Analysis, 7(1):16–28, 1976.
- [2] W. R. Allaway. The identification of a class of orthogonal polynomial sets. ProQuest LLC, Ann Arbor, MI, 1972. Thesis (Ph.D.)–University of Alberta (Canada).

The text of the previous OP-SF NET topics remain the same as was originally produced. However, we have made the effort to create proper bibliographies for the topics.

From: Howard S. Cohl (howard.cohl@nist.gov)

Subject: Report: The SIAG/OPSF Track at the SIAM Annual Meeting AN26 by **Howard Cohl**

Report: The SIAG/OPSF Track at the SIAM Annual Meeting AN26

The SIAG/OPSF Track at the SIAM Annual Meeting AN26

The SIAM Annual Meeting AN26, held July 6–10, 2026, in Cleveland, Ohio, provided a particularly strong opportunity for the Society for Industrial and Applied Mathematics Activity Group on Orthogonal Polynomials and Special Functions (SIAG/OPSF) to showcase the breadth and vitality of its research community. For the first time in approximately seven years, SIAG/OPSF had an organized “track” at the SIAM Annual Meeting, consisting of eight minisymposia spanning computation, hypergeometric series, modular forms, orthogonal polynomials, nonlinear special functions, asymptotic analysis, number theory and combinatorics, mathematical physics, and artificial intelligence.

The organization of this track was an important accomplishment for SIAG/OPSF. SIAM activity-group tracks are scheduled only periodically, approximately once every seven years, making AN26 a significant opportunity to present the activity group’s research as a coherent component of the broader SIAM Annual Meeting. Howard S. Cohl served on the AN26 Organizing Committee and worked with the SIAG/OPSF leadership and community to help develop the track.

The Eight Minisymposia

The SIAG/OPSF track consisted of eight minisymposia:

1. *Computation of Special Functions*, organized by Amparo Gil and Javier Segura.
2. *Hypergeometric Series and Modular Forms*, organized by Hasan Saad and Yifeng Huang.
3. *From Orthogonal Polynomials to Nonlinear Special Functions with Applications*, organized by Howard Cohl and Nasser Saad.
4. *Special Functions with Applications in Number Theory and Combinatorics*, organized by Lin Jiu.
5. *Recent Advances in Asymptotic Analysis and Special Functions*, organized by Jonathan Stanfill and Ahmad Barhoumi.
6. *AI Assistance in Special Functions and Number Theory: A New Paradigm*, organized by Tanay Wakhare.
7. *The Hypergeometric Motive: Hypergeometric Functions in Geometry and Number Theory*, organized by Ursula Whitcher, Michael Allen, and Adriana Salerno.
8. *Orthogonal Polynomials and Special Functions in Mathematical Physics*, organized by Cade Ballew, Charbel Abi Younes, and Deniz Bilman.

Scientific Breadth of the Track

The eight minisymposia collectively demonstrated the remarkable breadth of contemporary research in orthogonal polynomials and special functions, ranging from numerical computation and asymptotic analysis to hypergeometric series, modular forms, number theory, combinatorics, geometry, mathematical physics, and artificial intelligence. The individual reports below provide a more detailed account of the scientific programs, speakers, and discussions in each minisymposium. Taken together, they illustrate both the depth of the traditional foundations of OPSF and the field's continuing expansion into new mathematical and computational directions.

OPSF Representation Among the AN26 Plenary Speakers

The SIAG/OPSF presence at AN26 extended beyond the formal activity-group track. Two plenary speakers presented topics closely connected with major themes represented in the track.

Nalini Joshi of the University of Sydney presented the plenary lecture *From Polynomials to Nonlinear Special Functions*, which complemented the track's emphasis on the connections between orthogonal polynomials, special functions, nonlinear equations, and integrable systems.

Ken Ono of the University of Virginia and AXIOM Math presented the plenary lecture *Mathematics in the Age of AI: Discovery, Verification, and the Future of Proof*, providing a natural complement to the minisymposium *AI Assistance in Special Functions and Number Theory: A New Paradigm*.

The participation of Joshi and Ono at the plenary level was particularly valuable in extending the visibility of OPSF-related themes beyond the dedicated SIAG/OPSF sessions and into the broader scientific program of the Annual Meeting.

Community Building and International Participation

The AN26 track was also an important community-building activity. The eight minisymposia brought together researchers working across different areas of OPSF and reflected the increasingly international character of the activity group. By August 2026, SIAG/OPSF had 137 members, approximately 29% of whom were students, with members represented on every continent. The track therefore provided an especially valuable opportunity for researchers from different mathematical communities, generations, and geographical regions to meet and develop new connections.

Context Within SIAG/OPSF Activities

The AN26 track followed a strong recent pattern of SIAG/OPSF participation in major scientific meetings. At the SIAM Annual Meeting AN25 in Montréal, July 28–August 1, 2025, the activity group organized nine OPSF minisymposia. AN26 was distinctive, however, because the eight minisymposia were formally organized as a SIAG/OPSF track. Given the periodic nature of activity-group tracks, this provided a particularly valuable opportunity to give OPSF a concentrated and recognizable presence within the Annual Meeting.

The track also complemented other major SIAG/OPSF activities during 2026, including the continuing development of the *OP-SF NET* newsletter, the OPSFA conference series, and international workshops and schools.

Significance for SIAG/OPSF

The AN26 track substantially increased the visibility of orthogonal polynomials and special functions within the broader SIAM community. Its formal track designation brought eight related minisymposia together as a coherent scientific program while also demonstrating the breadth and interdisciplinary character of contemporary OPSF research.

Particularly noteworthy was the inclusion of artificial intelligence as an explicit component of the track, together with the participation of Nalini Joshi and Ken Ono as plenary speakers. These features highlighted

both the established importance of OPSF within analysis, mathematical physics, and number theory and its continuing engagement with emerging directions in computational and AI-assisted mathematics.

Conclusion

The SIAG/OPSF track at the SIAM Annual Meeting AN26 was a strong demonstration of the vitality, breadth, and interdisciplinary character of the orthogonal-polynomials and special-functions community. The eight minisymposia, together with the participation of two OPSF-associated plenary speakers, gave the activity group a substantial presence throughout the meeting and highlighted the field's connections to a wide range of contemporary areas of mathematics.

Because SIAM activity-group tracks occur only approximately every seven years, AN26 represented a particularly valuable opportunity to showcase OPSF research within the broader SIAM community and to strengthen connections among researchers across the field. The successful organization of the track reflected the strength and enthusiasm of the SIAG/OPSF community and demonstrated that orthogonal polynomials and special functions remain a mature field with deep historical foundations while continuing to evolve in new and forward-looking directions.

Topic #7 OP – SF Net 33.5 September 15, 2026

From: OP-SF Net Editors

Subject: Reports: SIAM AN26 SIAG/OPSF Track Minisymposia

Reports: SIAG/OPSF Track Minisymposia

Below are some reports on SIAM AN26 SIAG/OPSF Track by:

Howard Cohl and Nasser Saad; Amparo Gil and Javier Segura; Ahmad Barhoumi; Charbel Abi Younes; Yifeng Huang and Hasan Saad; Lin Jiu; Ursula Whitcher; and Tanay Wakhare.

**Report by Howard Cohl and Nasser Saad on the SIAM AN26 MS
“From Orthogonal Polynomials to Nonlinear Special Functions with Applications”**

**Organizers: Howard S. Cohl (NIST, U.S.A.) and
Nasser Saad (University of Prince Edward Island, Canada)**

Dates: Monday, July 6 and Friday, July 10, 2026

A three-part minisymposium entitled “From Orthogonal Polynomials to Nonlinear Special Functions with Applications” was organized by Howard S. Cohl and Nasser Saad as part of the SIAG/OPSF track at the 2026 SIAM Annual Meeting (AN26), held July 6–10, 2026, in Cleveland, Ohio. Parts I and II were held on Monday, July 6, and Part III on Friday, July 10.

The aim of the minisymposium was to bring together researchers working in different areas of orthogonal polynomials and special functions and to highlight their broad range of applications. The talks covered classical and basic hypergeometric functions, orthogonal polynomials, q -series, the Riemann zeta function, Painlevé equations, Riemann–Hilbert methods, and asymptotic analysis. Together, they showed the close connections between classical special-function theory and current problems in analysis and mathematical physics.

The final program consisted of the following talks.

Part I, Monday, July 6. Howard S. Cohl and Michael Schlosser, “Product Formulas for Basic Hypergeometric Series by Evaluations of Askey–Wilson Polynomials”; Luc Vinet and Alexei Zhedanov, “Eigenvalue Equations for Sieved Polynomials or Proving Askey Right Again”; and Bonita V. Saunders, “From the Riemann Hypothesis to Bose–Einstein Condensation: Mathematical and Physical Applications of the Riemann Zeta Function.”

Part II, Monday, July 6. Kenta Miyahara, “Transition Asymptotics for the Real Solutions of the Sinh–Gordon Painlevé III”; Nasser Saad, “On Hypergeometric–type Solutions of Linear Differential Equations”; and Robert Maier, “Orthogonal Polynomials and Orderings in the Heisenberg Algebra.”

Part III, Friday, July 10. Robert J. Buckingham, “Large–Order Asymptotics of Special Families of Painlevé Functions Via Riemann–Hilbert Analysis”; Lin Jiu, Shane Chern, and Karl Dilcher, “Identities Involving Central $(q-)$ binomial Coefficients Via $(q-)$ hypergeometric Series”; and Nalini Joshi and Adri B. Olde Daalhuis, “Exponentially–Improved Asymptotics for q –Difference Equations.”

Taken together, the three sessions showed the broad range of current work in orthogonal polynomials and special functions. The talks covered Askey–Wilson and sieved polynomials, hypergeometric differential equations, q –series, the Riemann zeta function, Painlevé equations, Riemann–Hilbert methods, and asymptotic analysis. The program thus connected classical topics in special functions with more recent developments and applications.

Despite the early morning schedule of Parts I and III, the sessions were well attended and led to interesting questions and discussions. They also gave participants a valuable opportunity to exchange ideas, strengthen existing research connections, and begin new collaborations.

The organizers thank all the speakers for their contributions and participation, and SIAG/OPSF and SIAM for their support of the minisymposium.

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**Report by Amparo Gil on the SIAM AN26 MS
“Computation of Special Functions”
Organizers: [Amparo Gil](#), [Javier Segura](#) (U. Cantabria, Spain)
Date: Friday, July 10, 2026**

The session brought together talks in which the computation of special functions (or related aspects) played a prominent role. After the presentations, there were questions addressed to all the speakers. The interest and participation of the audience were greatly appreciated.

In the first talk “Improving the computation of Bessel functions and their zeros”, I presented recent results obtained jointly with Nico Temme and Javier Segura concerning the computation of Bessel functions and their zeros. I placed particular emphasis on a key aspect of this subject, which is closely connected with the broader field of special function computation: the design and development of efficient, robust, and highly accurate numerical algorithms. Howard Cohl kindly chaired this talk.

The second talk “Computing Generalized Hypergeometric Functions via Rational–Algebraic Transformations”, by Richard Slevinsky (University of Manitoba) together with John Lopez, introduced a rational–algebraic transformation that provides globally convergent series representations for generalized hypergeometric functions. Unlike classical Möbius transformations, which fail to improve convergence near certain critical points, the approach achieves pointwise convergence across the entire complex plane.

The third talk “Special Functions and the Numerical Solution of Initial–Boundary Value Problems”, by Witse Waes (University of Washington) in collaboration with Thomas Trogdon, addressed the role of generalized special functions in solving initial–boundary value problems using the Unified Transform Method.

It focused on the impact of singularities in their integral representations, the computational challenges they pose, and numerical time integration methods based on their efficient evaluation. Coincidentally, the session took place during the Spain–Belgium World Cup match. At the end of the session, Wietse (who is Belgian) informed me of Spain’s victory. We exchanged congratulations and commiserations in good spirits before saying our goodbyes.

In the final talk “Algorithmic and AI-driven developments in special functions in Mathematica”, Tigran Ishkhanyan presented recent additions of special functions to Mathematica (such as Heun functions, Meijer- G functions, Appell functions and others). He also discussed new developments related, for instance, to the solution of fractional differential equations, and briefly mentioned the integration of AI into certain aspects of Mathematica’s computational capabilities.

Together, the four talks emphasized the continuing relevance of special functions in both theoretical and applied aspects of computational mathematics.

**Report by [Ahmad Barhoumi](#) on the SIAM AN26 MS
 “Recent Advances in Asymptotic Analysis and Special Functions”
 Organizers: Ahmad Barhoumi (Grinnell College, U.S.A.)
 and Jonathan Stanfill (Ohio State University, U.S.A.)
 Dates: Monday, July 6 and Tuesday, July 7, 2026**

The 2026 SIAM Annual Meeting took place at the Huntington Cleveland Convention Center in Cleveland, OH between July 6–10. The meeting featured many sessions on asymptotic analysis, orthogonal polynomials, and special functions. Here, we report on a particular session titled Recent Advances in Asymptotic Analysis and Special Functions. Talks highlighted new approaches to classical results as well as new applications to a variety of areas including random matrix theory and mathematical physics. The session was partitioned into 3 parts:

- Part I
 - Generalized DEK-Type Orthogonal Polynomials by Rachel Bailey
 - Ramanujan’s Mock Theta Functions: a Unifying Theory and New Results by Ovidiu Costin
 - Parabolic Cylinder Functions Revisited Using Borel–Laplace Techniques by Rodica Costin
- Part II
 - Orthogonal Polynomials, Matrix Models, and Map Enumeration by Nathan Hayford
 - q -Deformation of the Marchenko–Pastur Law by Guido Mazzuca
 - Asymptotic Analysis of Some Multiple Orthogonal Polynomials Arising in the Six–vertex Model by Karl Liechty
- Part III
 - Matrix Model for Mixed Multiple Orthogonal Polynomials by Maksim Kosmakov
 - Asymptotic Evidence for Ferromagnetism in Non–abelian Spin Models by Joe Webster
 - Orthogonal Polynomials and Mutually Unbiased Bases by Brian Simanek

Report by Charbel Abi Younes on the SIAM AN26 MS
“Orthogonal Polynomials and Special Functions in Mathematical Physics,”
Organizers: Charbel Abi Younes (cyounes@uw.edu), Cade Ballew (ballew@uw.edu)
and Deniz Bilman (bilman@uc.edu)
Dates: Tuesday, July 7 and Wednesday, July 8, 2026

A three-part minisymposium on “Orthogonal Polynomials and Special Functions in Mathematical Physics” was organized by Charbel Abi Younes (Washington), Cade Ballew (Washington), and Deniz Bilman (Cincinnati) at the 2026 SIAM Annual Meeting, held July 6–10, 2026, in Cleveland, Ohio. The aim of the session was to present recent work applying orthogonal polynomials and special functions to PDEs, Riemann–Hilbert problems, integrable systems, and random matrix theory.

The talks addressed two distinct themes: the asymptotic and combinatorial analysis of orthogonal polynomials and special functions (Novak, Peca–Medlin, Gharakhloo, Davis, Johnson, and Barhoumi), and the development of numerical methods based on them (Abi Younes and Ballew). The applications were equally varied, ranging from integrable probability and random matrix theory (Novak, Peca–Medlin, and Abi Younes) to the enumeration of maps on Riemann surfaces (Gharakhloo and Barhoumi), Painlevé equations (Johnson and Barhoumi), and integrable PDEs and nonlinear waves (Davis and Ballew). The speakers and talks were:

Part I

- Jonathan Novak (UC San Diego): “Random Determinants and Quasimodular Forms”
- John Peca–Medlin (UC San Diego): “Special Functions for Structured Random Permutation Statistics”
- Roozbeh Gharakhloo (UC Santa Cruz): “Combinatorics of Even Valent Graphs on Riemann Surfaces” (joint with Tomas Lasic Latimer, Sydney)

Part II

- Ethan Davis (Cincinnati): “Wave Patterns Near Rogue Waves Formed Through Breather Synchronization”
- Trevor Johnson (Cincinnati): “Large–Degree Asymptotics for Laguerre Rational Solutions of Painlevé V”

Part III

- Charbel Abi Younes (Washington): “Asymptotics of Orthogonal Polynomials with Applications to Density Estimation of Random Matrices”
- Cade Ballew (Washington): “Numerical Methods for KdV and mKdV Soliton Gases”
- Ahmad Barhoumi (Grinnell): “Orthogonal Polynomials, Painlevé Equations, and Map Enumeration”

The sessions were well attended and led to productive discussion. The organizers thank all speakers and participants.

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**Report by Yifeng Huang and Hasan Saad on the SIAM AN26 MS
“Hypergeometric Series and Modular Forms,”
Organizers: Yifeng Huang (Emory University, Atlanta, Georgia, U.S.A.),
Hasan Saad (Louisiana State University, Baton Rouge, Louisiana, U.S.A.)
Dates: Thursday, July 9 and Friday, July 10, 2026**

At the 2026 SIAM Annual Meeting, we organized the minisymposium Hypergeometric Series and Modular Forms, bringing together researchers working across several areas connected by hypergeometric series, q -series, and modular forms. The minisymposium was also part of a broader collection of minisymposia at the meeting exploring closely related themes through hypergeometric motives, special functions, number theory, and combinatorics.

One of the most enjoyable aspects of the minisymposium was seeing how naturally conversations developed among speakers, participants, and organizers coming from rather different mathematical backgrounds. The talks touched on arithmetic, computation, representation theory, partition theory, topology, knot theory, and mathematical physics, among other subjects, yet remained remarkably accessible across these boundaries.

A recurring theme was that hypergeometric and q -series often provide explicit and concrete manifestations of structures arising in many different areas. This made them an especially effective common language for the minisymposium: even when the deeper structural motivations of two talks were quite different, their q -series expressions provided connections that could be readily recognized and discussed. We were very glad that we were able to gather researchers with such varied perspectives around this shared theme, and the many lively discussions throughout the sessions made the experience particularly rewarding.

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**Report by Lin Jiu on the SIAM AN26 MS
“Special Functions with Applications in Number Theory and Combinatorics”
Organizers: Lin Jiu (Duke Kunshan University, China)
Date: Friday, July 10, 2026**

The aim of this mini-symposium entitled Special Functions with Applications in Number Theory and Combinatorics, held at the 2026 SIAM Annual Meeting, was to highlight some applications of special functions in number theory and combinatorics.

Special functions appear in various fields and take multiple forms, including series expansions, integral representations, differential or difference equations arising from certain models. Therefore, the variety of their applications naturally extends, among other fields, to physics, engineering, probability and statistics. In number theory and combinatorics, notable examples include, but are not limited to, gamma function, zeta functions, Dirichlet series and L -functions, integer partition functions, q -series, modular forms, orthogonal polynomials, etc. Besides their computational and analytical properties such as convergence and asymptotic behavior, other key properties, such as algebraic structures and combinatorial and probabilistic interpretations, make these functions essential tools in related research. This minisymposium will highlight some applications of special functions in number theory and combinatorics. Speakers will present either results on related special functions with examples of applications, or show the usage of special functions in studying the main objects under consideration.

Four talks were scheduled on July 10, 2026, in the following order:

1. Rishabh Sarma — Further Analogs of Andrews' Spt-function Identity
2. Yifeng Huang — High rank zeta functions of arithmetic orders and curve singularities
3. Brandt Kronholm — Congruences and Cranks for Partitions with Bounded Largest Part
4. Robert Schneider — Estimating the imaginary parts of the roots of $\zeta(s)$ and other partition zeta functions

The organizational work for this mini-symposium was done by Lin Jiu, Duke Kunshan University, P. R. China.

★ ★ ★

Report by [Ursula Whitcher](#) on the SIAM AN26 MS

“The Hypergeometric Motive: Hypergeometric Functions in Geometry and Number Theory”

Organizers: Michael Allen (Wesleyan University, U.S.A.), Adriana Salerno (National Science Foundation, U.S.A.), Ursula Whitcher (Mathematical Reviews, U.S.A.)

Date: Thursday, July 9, 2026

Hypergeometric functions appear with remarkable frequency in number theory and algebraic geometry. The philosophy of hypergeometric motives holds that this is no accident: we should view their various manifestations, from differential equations satisfied by periods to finite field hypergeometric functions, of a single underlying hypergeometric object. At the SIAM meeting in Cleveland this summer, the two-part SIAG/OPSF minisymposium The Hypergeometric Motive: Hypergeometric Functions in Geometry and Number Theory connected experts and early-career researchers in number theory, geometry, and physics to explore the many facets of hypergeometric motives. Adriana Salerno (National Science Foundation/American Mathematical Society), Michael Allen (Wesleyan University), and Ursula Whitcher (Mathematical Reviews–American Mathematical Society) jointly organized the event.

Adriana Salerno kicked the minisymposium off with an introduction to the philosophy of hypergeometric motives. Christine Berkesch (University of Minnesota) gave combinatorial insight into the behavior of hypergeometric PDE systems. Hassan Saad (Louisiana State University) described Sato–Tate type distributions for geometrically interesting finite field hypergeometric functions, and Brian Grove (Texas State University, San Marcos) described an explicit method for establishing the modularity of hypergeometric representations.

The second part of the minisymposium delved deeper into geometry and physics. Leah Sturman (Southern Connecticut State University) described collections of hypergeometric L -functions associated to K3 surfaces. Michael Allen discussed recent results on hypergeometric supercongruences, which should (conjecturally) be controlled by p -adic Hodge theory. The session's final two speakers, Michael Schultz (Virginia Tech) and Kamryn Spinelli (Queen's University), discussed the role of hypergeometric functions in the study of Calabi–Yau threefolds, with techniques ranging from theoretical physics to invariant theory.

Report by [Tanay Wakhare](#) on the SIAM AN26 MS

“AI Assistance in Special Functions and Number Theory: A New Paradigm,”

Organizer: Tanay Wakhare (Massachusetts Institute of Technology, MathVision AI, U.S.A.)

Date: Wednesday, July 8, 2026

Artificial intelligence is beginning to fundamentally reshape mathematical research and workflows. Reflecting this shift, the mini-symposium “AI Assistance in Special Functions and Number Theory: A New Paradigm” brought together five speakers from across academia and industry during the SIAM Annual Meeting from July 6–10. Together, the talks surveyed many of the most important topics surrounding the use of AI for mathematics. The mini-symposium was organized by Tanay Wakhare (Massachusetts Institute of Technology, MathVision AI).

Karan Srivastava (University of Wisconsin–Madison) opened by introducing AI Noether, an algebraic-geometric framework for abductive inference that identifies missing axioms needed to reconcile new hypotheses with incomplete theories. Ken Ono (Axiom) followed with examples of AI-assisted mathematical problem solving.

Tanay Wakhare (Massachusetts Institute of Technology, MathVision AI) discussed the rapid evolution of mathematical research workflows, drawing on experience developing AI assisted research systems to examine how LLM prompting and agent orchestration can be integrated into mathematical research. Henry Kvinge (Pacific Northwest National Laboratory) then presented the Algebraic Combinatorics Dataset Repository, a collection of research-level combinatorics conjectures, and discussed efforts to evaluate AI systems on mathematical conjecture generation. Ho Boon Suan (National University of Singapore) concluded the session with a survey of his extensive experience with “vibe proving” to describe how the interactions between humans, large language models, and formal verifiers look like in practice.

From: Satoshi Tsujimoto (tsujimoto.satoshi.5s@kyoto-u.ac.jp) and Hiroshi Miki (hmiki@mail.doshisha.ac.jp)
 Subject: Report: Conference Report: OPSFA-18, Kyoto, Japan, by **Satoshi Tsujimoto** and **Hiroshi Miki**

CONFERENCE REPORT: OPSFA-18

The 18th International Symposium on Orthogonal Polynomials, Special Functions and Applications
 by: **Satoshi Tsujimoto** and **Hiroshi Miki**



Figure 3: Monday afternoon plenary lecture given in Hardy Hall by Guilherme Silva entitled “Orthogonal polynomials at finite temperature”.

The 18th International Symposium on Orthogonal Polynomials, Special Functions and Applications (OPSFA-18) was held at Hardy Hall on the Muromachi Campus of Doshisha University in Kyoto, Japan, from August 17 to 21, 2026. Continuing a conference series established in 1984, OPSFA-18 convened researchers working on orthogonal polynomials, special functions, and their many connections with mathematical physics, probability, combinatorics, representation theory, integrable systems, and related areas. The symposium was organized by the Organizing Committee, chaired by Satoshi Tsujimoto of Kyoto University and co-chaired by Hiroshi Miki of Doshisha University, with the support of the Scientific Committee.



Figure 4: From left to right: Benjamin Eichinger and Howard Cohl, just prior to Eichinger’s Gábor Szegő Prize Lecture.

The conference brought together 199 participants from 28 countries and regions. The participants represented a broad spectrum of mathematical disciplines, reflecting both the continuing expansion of the field and the growing interaction between classical special-function theory and neighboring areas of mathematics and theoretical physics.

The scientific program consisted of ten plenary lectures, sixteen thematic sessions, and a poster session. The plenary speakers were Kohei Iwaki, Jan Felipe van Diejen, Makiko Sasada, Benjamin Eichinger, María Ángeles García-Ferrero, Manuela Girotti, Dan Dai, Rinat Kedem, Yasuhiko Yamada, and Guilherme Silva. Their lectures presented recent developments in areas ranging from integrable systems and random matrices to asymptotic analysis, special functions, probability, and mathematical physics.

A central component of the conference was its sixteen thematic sessions, which covered a wide variety of topics, including Painlevé equations and integrable systems; random matrices and probability; exact WKB analysis; algebraic combinatorics; quantum walks and quantum information; multiple, matrix, and exceptional orthogonal polynomials; orthogonal polynomials on the unit circle; multivariate special functions; representation theory; and asymptotic methods. The breadth of the program highlighted both the richness of the

subject and the increasingly interdisciplinary character of contemporary research on orthogonal polynomials and special functions.

A particular highlight of the conference was the presentation of the 2026 Gábor Szegő Prize, awarded by the SIAM Activity Group on Orthogonal Polynomials and Special Functions, to Benjamin Eichinger in recognition of his outstanding research contributions. The award ceremony was followed by his plenary lecture, “Universality Limits and Beyond,” which attracted a large audience and was warmly received by the participants. The recognition of Eichinger’s achievements underscored the vitality and continued development of the field.



Figure 5: The group photo for OPSFA–18.

The poster session, held during an extended lunch break, generated lively discussions and provided graduate students and early-career researchers with an excellent opportunity to present their work and interact with specialists in the field. Throughout the week, active exchanges continued both during and outside the formal sessions, creating the stimulating and collegial atmosphere that has long been a hallmark of the OPSFA series.

The social program included a Welcome Party and a conference banquet, both of which were very well attended. These events encouraged interaction across generations and research areas and further contributed to the warm atmosphere of the conference. With its rich cultural heritage and vibrant academic environment, Kyoto provided an ideal setting in which to welcome colleagues from around the world.

During the Business Meeting, the OPSFA Steering Committee announced that Melbourne, Australia, had been selected as the venue for OPSFA–19 in 2028. The participants warmly welcomed the announcement, and the meeting concluded with a strong sense of anticipation for the next gathering of the OPSFA community.

The organizers are deeply grateful to all the speakers, participants, sponsors, supporting institutions, and student volunteers whose contributions made the conference possible. Through its outstanding scientific presentations and numerous opportunities for discussion and collaboration, OPSFA–18 demonstrated the continuing strength and vitality of the international community working on orthogonal polynomials and special functions. The meeting strengthened existing collaborations and created new opportunities for future research across the international OPSFA community.

From: OP–SF Net Editors

Subject: Report: OPSFA–18 in Kyoto, Japan, A Personal Journey, by **Howard Cohl** and **Sarah Post**

OPSFA–18 in Kyoto: A Personal Journey

by: **Howard Cohl** and **Sarah Post**

OPSFA–18, the eighteenth International Symposium on Orthogonal Polynomials, Special Functions and Applications, was held August 17–21, 2026, at Doshisha University in Kyoto. For us, however, the meeting was much more than a scientific conference. It was a chance to reconnect with old friends and colleagues, meet new people, exchange ideas, explore Kyoto, and enjoy the many unexpected experiences that come with traveling halfway around the world for mathematics. What follows is our personal account of the trip and the people, conversations, food, and adventures that made it especially memorable.



Figure 6: Antonio Duran and Howard Cohl eating breakfast at the Hearton Kyoto Hotel.



Figure 7: Howard's Japanese breakfast at the Hearton Kyoto Hotel.

In some ways, many aspects of both of our trips to attend OPSFA–18 in Kyoto, Japan, overlapped. Both of us flew to Osaka, Japan, on Saturday, August 15 (Howard from LAX and Sarah from Hawaii), on flights that arrived at Kansai International Airport (KIX) at the same time on Sunday, August 16, at 6:40 p.m. This was entirely coincidental, as neither of us knew before departing that our flights would arrive at exactly the same time. Since Howard had visited Japan with his family the previous summer, he already had some familiarity with Japanese culture, but the trip was nevertheless an eye-opening and heartwarming experience. This was Sarah's first trip to Japan and she had such a wonderful time, she is already planning a family trip for the spring.

After clearing customs and arriving in the public area of the airport, we located each other by sending texts and found the JR West (West Japan Railway Company) Haruka Limited Express train, which departs Kansai International Airport (Kansai Kokusai Kūkō) in Osaka and travels to Kyoto Station (Kyōto-eki). At Kyoto Station, we found a taxi that first dropped off Sarah at her hotel and then took Howard to his hotel, the Hearton Hotel Kyoto (Hāton Hoteru Kyōto). The taxi driver was confused and drove instead to the Hilton, but after realizing that he had gone to the wrong place, he was extremely apologetic, bowing and asking for forgiveness. This was not a problem at all and was quite a nice introduction to the kindness and humility of the people of Kyoto, Japan. After arriving at the Hearton Hotel Kyoto, Howard had a small dinner at a restaurant called Yayoiken Karasuma Oike Branch, which was a short walk

from the hotel. It cost ¥1,310 (about \$8.18) for a beef short rib and beef offal set meal, which came with a large portion of barley rice. Afterward, Howard returned to the hotel, unpacked, and fell asleep. Sarah relaxed for the evening in her beautiful room in the Kaya Hotel near Nijo Castle.



Figure 8: The Doshisha University motto, “Go, go, go in peace. Be strong! A Mysterious Hand will guide you!” as displayed in the back of Hardy Hall. These words were originally delivered as a benediction by the university’s founder, Joseph Hardy Neesima (Nijima Jō), on June 12, 1879, to the 15 students of the first graduating class of the Doshisha English School.

The next day was the start of the OPSFA–18 conference, but the local organizers of the conference, Satoshi Tsujimoto and Hiroshi Miki, planned the first day so that it would be easy for travelers, with registration opening at 12:00 and the conference beginning at 14:00. Howard was able to enjoy a great Japanese breakfast at 07:00, where he got to have breakfast with Antonio J. Durán (Universidad de Sevilla, Spain), whom he hadn’t seen in ages. After breakfast, Howard decided to take a half-hour walk to Doshisha University Muromachi Campus to see where the activities of the day would take place. Even though registration had not started yet, he was able to meet the excellent and highly professional organizers, Satoshi Tsujimoto and Hiroshi Miki, who were there setting up. Howard greeted them and returned to his hotel to freshen up. Sarah also enjoyed a well-appointed hotel buffet with both Western and Japanese dishes.

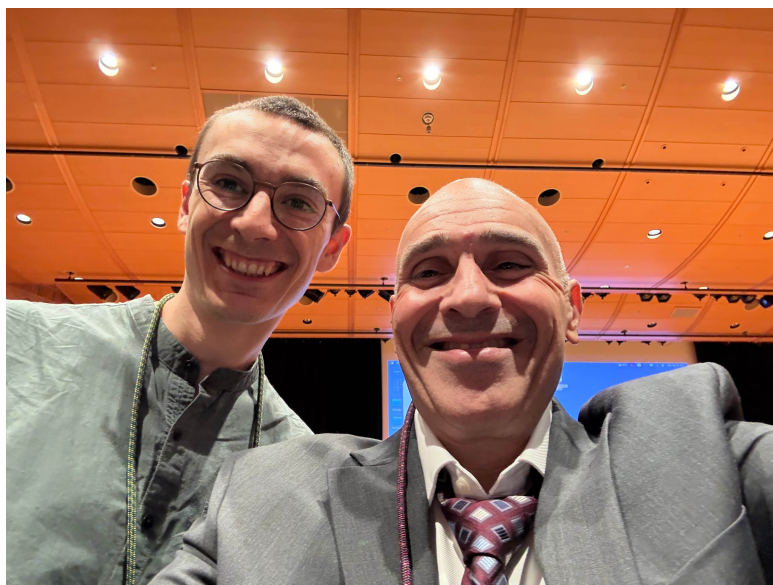


Figure 9: Benjamin Eichinger and Howard Cohl prior to Benjamin’s 2026 SIAM Gábor Szegő Prize lecture.

Registration took place in the area just adjacent to Hardy Hall (named after the founder of the university, Joseph Hardy Neesima), where all the plenary lectures took place. The registration package included a nice notebook, quality badge holders, and USB-powered fans, which turned out to be really useful for surviving the heat and humidity in Kyoto. The first plenary lecture of the conference was by Jan Felipe van Diejen at 14:30, followed by Yasuhiko Yamada and Guilherme Silva. Then there was a Welcome Party from 18:00–20:00 at a nice restaurant in the same building as Hardy Hall at Doshisha University Muromachi Campus. It was a really fun party, and Howard caught up with many friends and colleagues whom he hadn’t seen for ages, including Kerstin Jordaán, Dmitrii Karp, Andrei Martínez–Finkelshtein, Jacob Christiansen, Walter Van Assche, Dan Dai, Luc Vinet, Gergő Nemes, Arno Kuijlaars, Peter Miller, Margit Rösler, and Paul Terwilliger.

Howard also met up with Sarah, who made a point of introducing him to Giovanni Rastelli, a mathematician from Turin, Italy, whom Howard had previously expressed a strong interest in meeting. Howard was familiar with Rastelli’s work and was interested in discussing long-held research ideas on topics in which Rastelli was an expert. Rastelli is also a rice farmer, and we learned more about his rice farm in Italy.

Howard and Giovanni had an interesting discussion about research topics and decided to meet later in the conference to discuss further. After the party, Howard and Sarah walked together for most of the way back, parting ways when they reached the point where their routes to their respective hotels diverged.

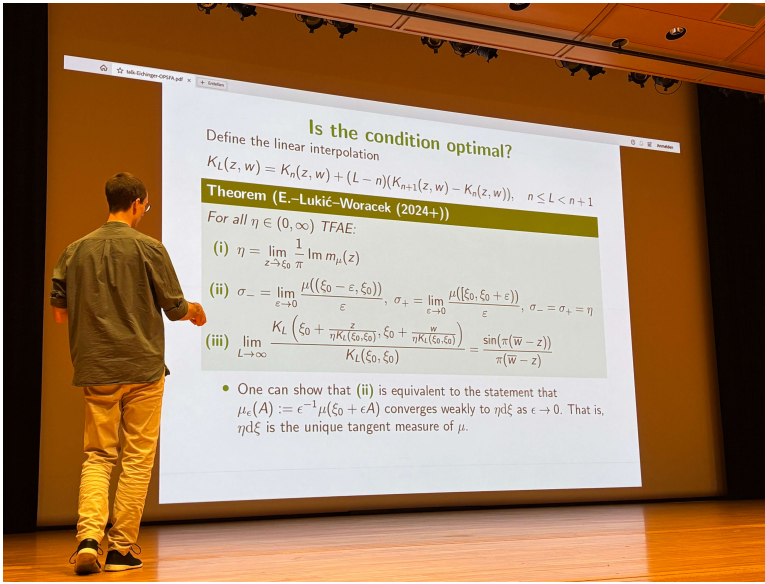


Figure 10: Benjamin Eichinger during his 2026 SIAM Gábor Szegő Prize lecture.

For Howard, on Tuesday morning (and pretty much every morning onward), he got up early and enjoyed the Hearton Kyoto Hotel's wonderful Japanese breakfast. This breakfast was nothing like a Western breakfast. There was no coffee, only tea and delicious items including dried fish, rice (often with seaweed), small pickled items, tamagoyaki (Japanese rolled omelet, often slightly sweet), miso soup, and a savory custard with meat at the bottom. Quite the way to start the morning. Sarah made use of the time zone difference to take some early morning Zoom meetings. Luckily, the hotel provided locally-roasted individual drip coffee in ingenious open bag design. She was so impressed by these single serve devices, she later bought a couple boxes to take home.



Figure 11: Single serve drip coffee.

After breakfast, Howard proceeded to the conference, which featured plenary talks by Makiko Sasada and Kohei Iwaki. In the morning and afternoon, aside from the plenary lectures, there were also interesting parallel thematic sessions. Sarah also served as coordinator of Thematic Session 4, "Orthogonal Polynomials, Mathematical Physics, and Interacting Particle Systems," which brought together talks spanning several closely connected areas of orthogonal polynomials, mathematical physics, and integrable systems. The session was particularly well aligned with Sarah's research interests and provided an opportunity to highlight the connections among these areas. The organizers provided a Japanese lunch to the attendees on Tuesday, Thursday, and Friday, as well as a varied

selection of Japanese snacks, including fresh, warm mochi on Thursday, thoughtfully procured by Miwa Tsujimoto. From 18:15–19:00, there was a SIAG/OPSF and OPSFA business meeting where Howard, as chair of SIAG/OPSF and also of the OPSFA Steering Committee, chaired the meeting, and Kerstin Jordaan took minutes. The business meeting was well attended, and Howard took the opportunity to announce the decision of the OPSFA Steering Committee that OPSFA–19 would take place in Melbourne, Australia, in 2028. It was exciting to announce the next OPSFA meeting while we were still gathered together in Kyoto. After the business meeting, Howard walked back to his hotel.

That evening, Sarah went to a dinner organized by Luc's wife Letitia Muresan at Kyoto's tofu restaurant Tousuiro. The menu was a traditional kaiseki style but with tofu in all different forms, including unlimited helpings of their specialty cold oboro tofu. Sarah particularly enjoyed the grilled course with the smoky addition of rich miso glazes.

The following morning, Wednesday, Howard woke up early, enjoyed another Japanese breakfast at the hotel, and prepared to introduce Benjamin Eichinger for his 2026 SIAM Gábor Szegő Prize lecture entitled “Universality Limits and Beyond.” The introduction went well, and Howard presented Benjamin with the Prize before Benjamin proceeded to give an excellent lecture on topics related to his 2026 paper in the *Annals of Mathematics*, “An Approach to Universality Using Weyl m -Functions.” It was particularly rewarding for Howard to be involved in recognizing Benjamin’s work and then to hear him present his research to the OPSFA community. After the lecture, a group photograph was taken, followed by parallel sessions, lunch, and a poster presentation.



Figure 12: From left to right: Miwa Tsujimoto, Luc Lapointe, Sarah Post, Letitia Muresan, Nicolas Crampé, Satoshi Tsujimoto, Hiroshi Miki and Luc Vinet.

family, as well as Rachel Bailey and her husband Sebastien Geerens. It was a great time. After the banquet, Howard returned to his hotel and took a rest.



Figure 13: From left to right: Howard Cohl, Umme Zainab, Hiroshi Miki, Rachel Bailey and her husband Sebastien Geerens.

On Wednesday evening, the conference banquet was held at Hotel Okura Kyoto. Prior to the banquet, Howard took a nap to try and catch up on his sleep and recover from jet lag before the banquet and arrived a bit late by taxi. To his surprise (it probably shouldn’t have been a surprise), he was asked by Satoshi Tsujimoto and Luc Vinet to give a short announcement thanking the organizers and informing the attendees at the banquet that the next OPSFA meeting would be in Melbourne, Australia. He was not prepared for this, but managed to wake up a bit more and offer his thanks and share the news with the attendees. He was told later that it went well, which he was really happy about. Someone tried to induce Alberto Grünbaum to say something about the history of OPSFA, but was not cajoled into a long speech and instead gave quick humorous remarks and the attendees returned to their conversations. At the banquet, Howard was able to enjoy wonderful conversation with Nicola Mastronardi and his

The next day, Thursday, there were plenary lectures by María Ángeles García-Ferrero and Manuela Girotti, as well as morning and afternoon parallel thematic sessions and a delicious Japanese lunch. On Thursday afternoon, Howard was able to enjoy a deep research conversation with Giovanni Rastelli.

Before traveling to Japan, Howard organized a dinner with previous and current OP-SF NET editors Sarah Post and Kerstin Jordaan, along with Gergő Nemes and Hiroshi Miki. We all walked to the restaurant Wagyu Yakiniku Nakayoshi, through pouring rain. Gergő, Howard, and Hiroshi had umbrellas, but Sarah and Kerstin did not, so Hiroshi kindly stopped at a convenience store and bought a couple of umbrellas for them. We then continued to a beautiful little restaurant which only had two rooms. Yakiniku

is a style of Japanese dining in which diners grill the meat themselves at the table, and the restaurant specializes in wagyu beef. Hiroshi took care of ordering for us, which was extremely helpful, and everything he selected was delicious. Our meal included several cuts of excellent wagyu beef, beef tongue, rice and vegetables, and local Kyoto sake. We had many wonderful conversations throughout the evening, reminiscing about our experiences with OP-SF NET and sharing stories about our personal lives. It was a memorable evening and a wonderful experience.



Figure 14: From left to right: Howard Cohl, Hiroshi Miki, Gergő Nemes, Sarah Post and Kerstin Jordaán.

On Friday there were plenary talks by Dan Dai and Rinat Kedem, as well as parallel sessions. Howard and Sarah also gave their contributed talks on Friday. Howard gave an overview of joint work with Roberto Costas-Santos and Xiang-Sheng Wang on orthogonality relations for the symmetric polynomials in the q^{-1} -Askey scheme, while Sarah spoke on exceptional orthogonal polynomials and their connections with exactly solvable quantum systems, including quasi-exactly solvable deformations. After the conference ended, Howard and Sarah decided to go and have a sake and a beer and started to walk back in the direction of their hotels. On the way they crossed paths with Giovanni Rastelli and invited him to join them, which he graciously accepted. They encountered a shop selling Mizu Yōkan, a delicious, smooth, chilled Japanese jellied dessert made by the historic confectioner Toraya from red or

white bean paste, agar, and sugar, and bought some for their families. Eventually, after searching Google Maps for a couple of places to rest and have a drink, they found an izakaya restaurant called Shunsai Kokoiro, 98-14 Kitakoji-cho, Ryogaemachi-dori Nijo-agaru, Nakagyo-ku, Kyoto. Kyotaro Ishikawa is the owner and chef. Sarah asked him to choose four dishes, along with sake and beer, for us to enjoy, and Kyotaro was delighted to help. He was visibly excited by the opportunity, even wringing his hands with anticipation as he considered which dishes to choose and prepare for us. This carefully chosen menu included a small flavorful broth (like an amuse bouche), a sashimi platter, a fresh salad with chicken and sesame dressing, a vegetable stew (nishime) and for the finale, cold soba noodles. After this incredible meal, Sarah parted ways with Howard and Giovanni, who met up with Kerstin Jordaán and enjoyed a very nice Japanese sushi meal with her. After they said their goodbyes, it was a wonderful Friday evening.



Figure 15: Mizu Yōkan, a chilled Japanese jellied dessert made from red or white bean paste, agar, and sugar—made by the historic confectioner Toraya.

Sarah spent her Saturday shopping. After depositing her bags in a locker at Kyoto station, the first stop was to purchase Ozora kendamas for her boys. Next she walked north towards Shijō-Kawaramachi looking for room fragrances to recreate the amazing smells from her hotel. She found many shops with similar woody fragrances to take home, as well as a beautiful hand-sewn quilt. After filling all the space in her extra carry-on, she stopped in a small, standing-only yakitori bar for some grilled chicken thighs, livers and crisp cucumber with miso. And of course, a cold beer.



Figure 16: From left to right: Howard Cohl, Owner/Chef of Shunsai Kokoiro, Kiyotaro Ishikawa (wearing the dark blue traditional chef's samue top), Sarah Post and Giovanni Rastelli at Shunsai Kokoiro, a small and amazing izakaya restaurant, on Friday evening.

JR Underground Central Gate. It only cost ¥1,000 per piece; you keep your receipt and then pick up your luggage when you are finished. He did some personal shopping for his family and then purchased a ticket from Kyoto Station to Osaka Station. One of the shops was cos:mura, an upscale Korean cosmetics shop, where he obtained some items his oldest daughter wanted. He also got some claw clips for his youngest daughter. He tried some delicious Japanese pastries with royal milk tea and maple syrup and then went to a floor near Kyoto Station that is dedicated to Japanese ramen. He ended up eating at an award-winning ramen shop called Menya-Iroha Ramen. There he had ramen with thick noodles, beer, and gyoza (Japanese fried dumplings). He had been craving ramen all week and finally had it, and it did not let him down. Afterward, he purchased a ticket and took the JR West Haruka Limited Express from Kyoto Station to Kansai International Airport (KIX).



Figure 17: Sarah's last lunch.

After a full morning and afternoon of walking and shopping, Sarah was exhausted and finally caved and figured out how to use the completely self-explanatory and simple Kyoto subway back to the main station and onward to KIX for her return flight home.

For Howard, the Saturday after the conference was another big adventure. Howard had his last hotel breakfast and soon thereafter checked out of his room, left his luggage in the hotel lobby, and took a taxi from Hearton Hotel Kyoto to Higashiyama, a beautiful historic area where there are lots of shrines and an immense Japanese cemetery. There's also an area that is more commercial, with very narrow streets and traditional Japanese shops and buildings. He started at Kiyomizu-dera and then walked through Sannenzaka and Ninenzaka. Afterward, he took an Uber back to his hotel to retrieve his luggage. Then he took a taxi to Kyoto Station and stored his large bag at Crosta Kyoto, at Kyoto Station, which is a very convenient place to store luggage while in Kyoto near the

Howard's flight did not depart until 17:45, but he wanted to purchase some items at the Studio Ghibli store in a mall adjacent to Osaka Station. Unfortunately, he had purchased a ticket directly to Kansai International Airport and had to exit Osaka Station in order to go to the mall. It was a challenge to exit Osaka Station because he had difficulty finding anyone who could communicate in English, and they kept sending him to different places. Finally, they just let him leave without having to make a payment. It was fairly difficult to find the mall, but finally he did. The Studio Ghibli shop was on the 8th floor of the mall, and because he wasn't able to find the luggage storage place, he had to cart his big luggage around with him, which actually wasn't too bad. He made it to the Studio Ghibli shop and found the exact items he had been searching for that his youngest daughter needed, as well as some other Studio Ghibli items. If you're not familiar with Studio Ghibli, the studio produces some of the most amazing and heartwarming Japanese animated films you've ever seen. It's really a phenomenon.



After getting the items, Howard returned to the station, but he had to find Track 21, which proved difficult to find. The track was supposed to be on Level B1, but the levels weren't easily marked, nor were the directions to the tracks easily marked. After trying to ask several people, he finally found two young men who also did not know where Track 21 was, but were determined to help. After locating a station attendant, who gave them instructions, there ensued about a 1-km walk through underground passages and hallways until they eventually reached Track 21. He profusely thanked the two incredibly nice young men, and then boarded his train. The train took him to Kansai International Airport (KIX) in Osaka. Once he arrived at the airport, everything was easy. He boarded his outbound flight and flew back to LAX. It was an amazing trip on so many levels.

Looking back, OPSFA-18 was much more than a successful scientific meeting. It was an opportunity to reconnect with old friends and colleagues, meet new ones, exchange ideas, and discover unexpected connections across the many areas represented at the conference. The warmth and generosity of the organizers and participants, together with the beauty, culture, food, and remarkable hospitality of Kyoto, made the experience especially memorable.

Figure 18: Higashiyama district in Kyoto, Japan.

For both of us, the conference was a wonderful reminder that the best mathematical meetings are about much more than lectures and research: they are also about friendship, conversation, collaboration, and the shared joy of discovering mathematics together.



Figure 19: Japanese cemetery in beautiful Higashiyama, Kyoto, Japan.

Topic #10 ——— OP – SF Net 33.5 ——— September 15, 2026

From: OP-SF Net Editors

Subject: Remembrances of **Craig A. Tracy** (1955–2026)

Remembrances of Craig A. Tracy (1955–2026)

Craig A. Tracy (1955–2026) made foundational contributions to mathematical physics, integrable systems, random matrix theory, and probability. He was also a valued colleague, mentor, collaborator, and friend to many in the mathematical community. The remembrances gathered here reflect several facets of his life and work: early collaborations, his leadership at the University of California, Davis, his generosity toward students and younger researchers, and the enduring reach of his mathematical legacy. Below are remembrances of Craig A. Tracy by:

Estelle Basor; John Harnad; Bruno Nachtergaele; Eunghyun Lee; Axel Saenz; Dan Romik; and Herbert Spohn.

Early Collaborations and Mathematical Beginnings

A Remembrance of Craig Tracy

by: **Estelle Basor** (ebasor@aimath.org)

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I hope in these notes to relate my own personal memories of Craig Tracy and to also show hints of his research evolution from Toeplitz determinants to random matrix theory and Tracy–Widom distributions.

In 1976 in my first quarter of teaching at Cal Poly in San Luis Obispo, I received a postcard from Craig.

Back then, without the internet, email and phone texting, you had to write to other mathematicians for copies of preprints or reprints of papers, or in this case, a thesis copy. Math departments provided the easy-to-fill-in postcards to save faculty time. This was my first ever request for anything that I had done and I was curious about the overlap in our research interests. (Notice that the salutation on the card was “Dear Sir” a fact I pointed out to Craig in later years.)

It turned out that the overlap was the asymptotics of Toeplitz determinants. Let ϕ be a function defined on the unit circle $\mathbb{T}$ with Fourier coefficients

$$\phi_k = \frac{1}{2\pi} \int_0^{2\pi} \phi(e^{i\theta}) e^{-ik\theta} d\theta,$$

and define the matrix

$$T_n(\phi) = (\phi_{j-k})_{j,k=0,\dots,n-1}.$$

We refer to ϕ as the symbol of the matrix. The asymptotics of the determinants for a particular class of singular symbols were conjectured in 1968 by Michael Fisher and Robert Hartwig.

These symbols were of the form

$$\phi(e^{i\theta}) = \phi_0(e^{i\theta}) \prod_{j=1}^R \phi_{\alpha_j, \beta_j}(e^{i(\theta-\theta_j)})$$

where

$$\phi_{\alpha, \beta}(e^{i\theta}) = (2 - 2 \cos \theta)^\alpha e^{i\beta(\theta-\pi)}, \quad 0 < \theta < 2\pi$$

and $\Re \alpha > -\frac{1}{2}$.

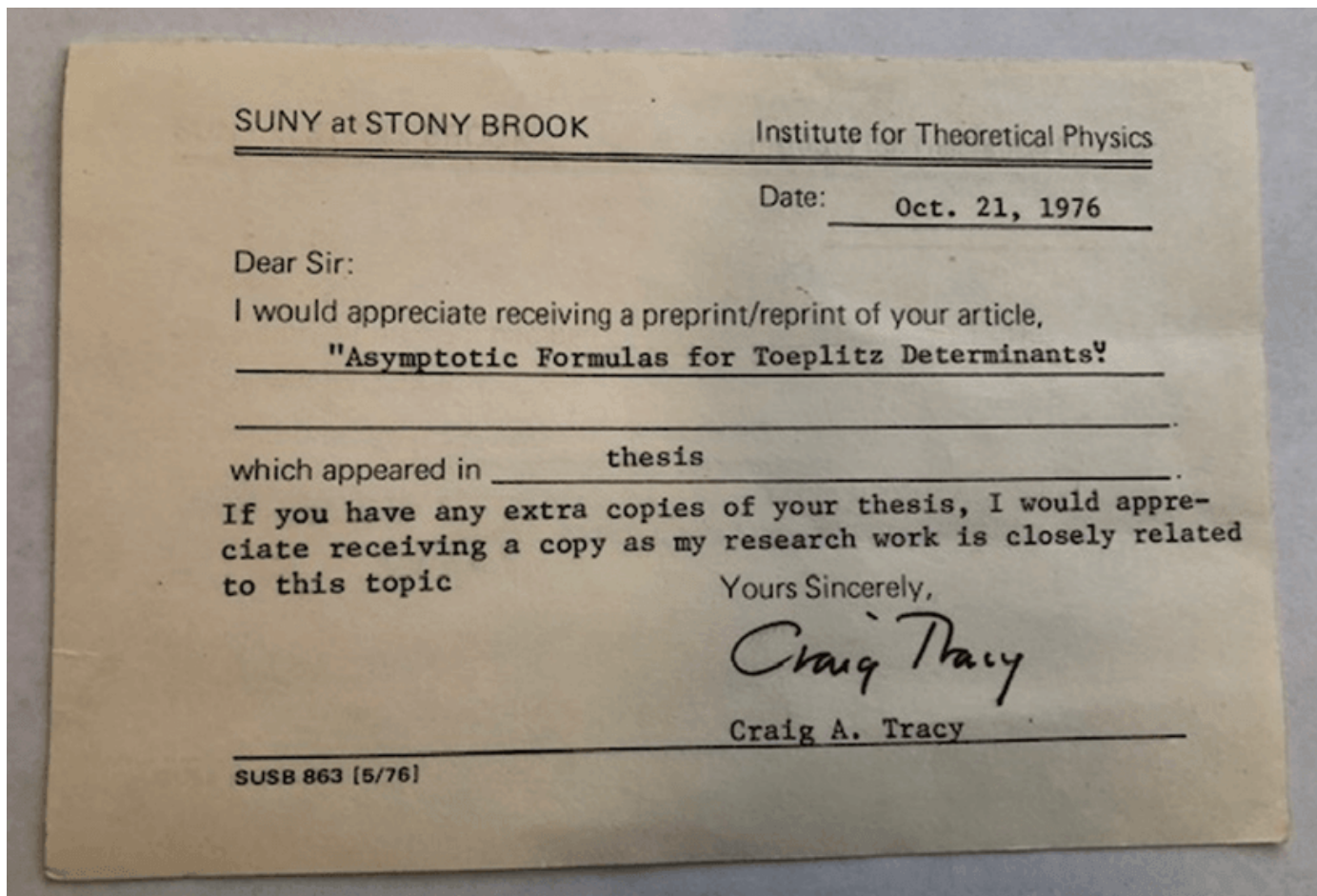


Figure 20: First correspondence with Craig.

The function ϕ is assumed to be sufficiently smooth, continuous, non-zero, and have winding number zero. The factor

$$(2 - 2 \cos \theta)^\alpha$$

may have a zero, be unbounded, or have a singularity of oscillatory type. The factor

$$e^{i\beta(\theta-\pi)}$$

has a jump if $\beta \notin \mathbb{Z}$.

Fisher and Hartwig conjectured that

$$D_n(\phi) \sim G(\phi_0)^n n^\Omega E$$

where

$$\Omega = \sum_{j=1}^R (\alpha_j^2 - \beta_j^2)$$

and E is some constant whose value they did not identify.

Craig and I continued to correspond after the 1976 postcard and we both worked on aspects of the Fisher-Hartwig conjecture. We finally met in person at a summer conference in Laramie, Wyoming in 1984 where Craig was one of the featured lecturers. Then in 1991, Craig wrote to me again to ask if we could write a survey of the status of the Fisher-Hartwig conjecture for an issue of *Physica A: Statistical Mechanics and its Applications* dedicated to Michael Fisher. As we worked on the survey, we found a

counter-example and reformulated the conjecture, and at the same time began thinking of related problems.

One related problem is finding asymptotics of Fredholm determinants for the continuous analogue of finite Toeplitz matrices. These are the truncated Wiener–Hopf operators $W_\alpha(\sigma)$ defined on $L^2(a, b)$ by

$$f(x) \rightarrow g(x) = f(x) + \int_a^b k(x-y) f(y) dy,$$

where k is given by

$$k(x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} (\sigma(\xi) - 1) e^{-ix\xi} d\xi.$$

The symbol σ is defined on the real line and it is assumed that $\sigma = 1$ in $L^1(R)$. The function $k(x-y)$ is called the kernel of the operator. If σ is given by

$$1 - \lambda \chi_{[-1,1]}$$

where $\chi_{[-1,1]}$ is the characteristic function of the interval $[-1, 1]$, we have a symbol with jump discontinuities analogous to certain Fisher–Hartwig symbols. The kernel is given by

$$k(x-y) = \lambda \frac{\sin \pi(x-y)}{\pi(x-y)}.$$

This leads us directly to Random–Matrix Theory since, for the classical Hermitian ensemble, the Fredholm determinant for $\lambda = 1$ computes the probability that there are no eigenvalues in the interval $[a, b]$.

The above kernel, called the sine kernel, can be rewritten as

$$\lambda \frac{\sin \pi x \cos \pi y - \sin \pi y \cos \pi x}{\pi(x-y)} = \frac{A(x)A'(y) - A(y)A'(x)}{x-y}$$

where $A(x) = \frac{\sqrt{\lambda}}{\pi} \sin \pi x$. It was already known that for the sine kernel there was a connection to Painlevé equations. To understand the connection, consider once again the Fredholm determinant, defined on $L^2(-s, s)$ by

$$D(\lambda) = \det(I - \lambda K_S)$$

where K_S is the integral operator defined by the sine kernel. Our goal now is to gather information about

$$\frac{d}{ds} (\log \det(I - K(s)))$$

thought of as a function of the endpoints of the interval. Whenever the derivative makes sense,

$$\frac{d}{ds} (\log (\det (I - K(s)))) = -\text{trace} \left((I - K(s))^{-1} \cdot K'(s) \right).$$

Now define $R(x, y)$ to be the resolvent kernel, that is, the kernel that corresponds to the operator

$$(I - K)^{-1} K.$$

Information about the resolvent kernel is the key. After some analysis one can show that

$$\text{trace} \left((I - K(s))^{-1} \cdot K'(s) \right) = 2 R(s, s).$$

After some additional computations we have the following. Let function $a(s) = sR(s, s)$ satisfies the differential equation:

$$s^2(a'')^2 = 4(sa' - a)(2(a')^2 + 4\pi^2(sa' - a)),$$

where $-2a(s) = s \frac{d}{ds} \log \det(I - \lambda K)$.

What Craig and Harold Widom realized was that the edge statistics could be described with a kernel of the same form, the Airy kernel, and that they could apply the same techniques as above. For this kernel the sine function is replaced by the Airy function $Ai(x)$ which satisfies the linear equation

$$y'' - xy = 0.$$

Consider the Fredholm determinant

$$\det(I - \lambda K_A)$$

where the kernel for K_A defined on $L^2(s, \infty)$ is

$$\frac{A(x)A'(y) - A(y)A'(x)}{x - y}.$$

Then we have

$$\det(I - \lambda K_A) = \exp \left(- \int_s^\infty (x - s)q(x, \lambda)^2 dx \right)$$

where q satisfies the Painlevé equation

$$q'' = sq + q^3$$

and

$$q(s, \lambda) \sim \sqrt{\lambda} Ai(s) \text{ as } s \rightarrow \infty.$$

The function

$$F_2(s) = \exp \left(- \int_s^\infty (x - s)q(x, \lambda)^2 dx \right)$$

is the Tracy-Widom distribution F_2 .

Craig was the first person to ask me for a copy of my work and also the first person I posted a paper on the arXiv with. When he was in Kyoto one summer and we were working on a τ function result, we corresponded by email, and that was the first time I used email. Working with Craig was intense. He was fearless, creative, and funny. He was artistic, a great photographer, and a warm human being. He had the instincts of a physicist and the preciseness of a mathematician. He seemed to have no reservation collaborating with me, even though I was an unknown junior faculty member at a teaching university. I treasure everything he taught me. The one thing I gave him in return was an introduction to Harold Widom. Their work was ground breaking and I am happy I played a very small part in the story.



Figure 21: Harold Widom, Craig Tracy and Estelle Basor at an AIM workshop in 2017.

Remembrance of Craig Tracy

by: [John Harnad](#)

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First meeting and early collaboration

Craig came to visit the CRM (Centre de Recherches Mathématiques) in Montreal, at the invitation of Pavel Winternitz, in the late 1980's, and gave a presentation about his early groundbreaking work on spin-spin correlation functions in the $2D$ Ising model [1, 2] (done in collaboration with Wu, McCoy and Barouch), linking it with the P_{III} transcendent, as well as subsequent related developments [3, 13, 14, 16, 17, 19]. I believe those were the earliest pioneering papers to appear linking the Painlevé equations to the computation of correlators and critical phenomena in condensed matter physics.

This led to many subsequent developments, both by Craig and his collaborators and by others, most notably, the Kyoto school [4, 5, 7, 8], on holonomic quantum fields, calculations of n -point 2D free fermion correlation functions, and the crucial introduction, by Sato, of the τ -function, both for isospectral (solitonic) systems and integrable hierarchies of the KP type [9, 11, 15] and also for general isomonodromic deformation problems of rational type. (A detailed introduction to the varied uses of Sato's τ -function is given e.g., in [44].) This was later related to the Riemann-Hilbert "dressing" method [12, 18] and applied to determining various asymptotics in integrable systems and random matrices via the Deift-Zhou

“nonlinear steepest descent” method [25].



Figure 22: May 1–6, 2000: Isomonodromic Deformations and Applications in Physics, CRM, Univ. de Montréal.

We spoke about these results at the time, and the role of Painlevé-type equations within the wider framework of integrable systems, but didn’t reach any deeper understanding of the links between such systems and inverse spectral methods, the Riemann–Hilbert approach to Zakharov–Shabat integrable hierarchies, or the R -matrix type Hamiltonian structure for integrable systems, separation of variables in spectral Darboux coordinates and resulting linearization map on complex tori, which I was working on at the time [22].

When we met again from August 16 to 21, 1992, at the Scheveningen Workshop on Methods of Algebraic Geometry in Physics, at Wassenaar, the Netherlands, we were both giving minicourses on different aspects of integrable systems. For Craig, this was focused on the latest developments of his and Harold Widom’s, linking integrable Hamiltonian systems with the asymptotic spectral theory of random matrices. Mine [22, 23] concerned the explicit Liouville–Arnold integration of systems undergoing isospectral flows in loop algebras, using “Spectral Darboux Coordinates” to obtain a complete separation of variables and integration via the Abel map to the complex tori that formed the Jacobi variety of associated invariant algebraic curves. Craig presented his and Harold’s latest results [20, 21] linking spacing distributions near the edge of the asymptotic spectrum of random matrices in the GUE (Gaussian Unitary Ensemble) with Hamiltonian dynamics and, in particular, with the Hastings–McCleod [6] solution of the Painlevé II equation, which gives rise to the now-famous “Tracy–Widom distribution”. It also included the equations satisfied, more generally, by multi-interval spacing distributions. They had found a beautiful formulation of these, involving non-autonomous Hamiltonian dynamics, expressed in terms of canonical coordinates on a Poisson phase space.

There appeared to be a remarkable similarity between the equations appearing in our separate presentations, despite the fact that they involved completely different applications, and were not equivalent



Figure 23: June 20 – July 8, 2005: Random matrices, random processes and integrable systems, CRM, Univ. de Montréal.

systems. I remember an unexpected surprise when Craig, whose talk followed mine, began by saying “I would like to thank the previous speaker for having written down all the equations I will be needing in this talk.” Although this was a rather excessively generous attribution, it turned out to really point to an intriguing coincidence, both puzzling and challenging, that begged to be understood more fully. By the end of the workshop, the relation between the two presentations became clear and, as it turned out in time, rather fundamental, with many far-reaching generalizations and applications. At the time, it led to a joint publication [24], in which some very basic connections between certain Hamiltonian systems of autonomous and non-autonomous type became clarified. This was subsequently considerably generalized [26, 45], and has reappeared, again and again, in a variety of settings.

Over the years that followed, we often crossed paths, and discussed many things of joint interest. I was privileged to also get to know Harold, his long-time collaborator and good friend (who, although we had not yet met at the time, was a coauthor on this joint paper). Our meetings were mainly at the many conferences and workshops that we attended, or organized ², which were mostly about integrable systems, their relations to the asymptotic spectral properties of random matrices, and later, more general inte-

²A sample: May 14–17, 1996, CRM Workshop on Special Functions and Painlevé Transcendents, Univ. de Montréal, Qué.; May 1–6, 2000, CRM workshop: Isomonodromic Deformations and Applications in Physics, Univ. de Montréal (organized with A. Its); Sept. 23–27, 2002: Mathematical Sciences Research Centre, Berkeley, Calif., Recent Progress in Random Matrix Theory and Its Applications; April 30 – May 14, 2005, Banff International Research Station, Random Matrices, multi-orthogonal polynomials and Riemann–Hilbert problems; June 20 – July 8, 2005, CRM Short program on: Random Matrices, Random Processes and Integrable Systems, Univ. de Montréal; Aug. 6–13, 2006, International Congress on Mathematical Physics, Rio de Janeiro, Special session on Random Matrices; Oct. 5 – 10, 2008, Banff International Research Station, Five-day workshop: Random Matrices, inverse spectral methods and asymptotics; Sept. 13–17, 2010, MSRI workshop Mathematical Sciences Research Institute, Berkeley CA, Random Matrix Theory and its Applications, Nov. 14 – Dec. 17, 2010, MSRI Berkeley, Program on: Random Matrix Theory, Interacting Particle Systems and Integrable System; Sept. 23–28, 2012, Banff International Research Station, Five-day workshop: Integrable Systems, Growth Processes and KPZ Universality, Banff International Research Station, Banff, Alberta.

grable random processes, both continuous and discrete, and found many shared themes of great interest.



Figure 24: Oct. 30 – Nov. 3, 2006, Centre International de Recherches Mathématiques (CIRM), Luminy Luminy conference on random matrices. Boat to Porquerolles 1. (Marco Bertola, J.H., Tamara Grava, Craig).

The connection: Isospectral vs. Isomonodromic

By the end of the week at Wassenaar, it became clear why the equations Craig and Harold had derived in computing the multi-interval spacing distributions for random matrices near the edge of the spectrum appeared to be so similar to the ones that I had been studying within the Hamiltonian setting of loop algebras and classical R -matrices. They were both systems of overdetermined PDE's which do, in fact, both consist of multivariable systems of compatible multi-Hamiltonian equations, generated by the same set of commuting Hamiltonians. But they were not actually the same equations, for a very basic reason.

The systems I had been studying [23] involved commuting isospectral flows of Lax matrices $L(\lambda)$ depending rationally on an auxiliary spectral parameter, or rather a loop algebra parameter λ , which was uniquely related to the eigenvalues μ by an invariant planar, complex algebraic curve, given by the characteristic equation

$$\det(L(\lambda) - \mu \mathbf{I}) = 0. \quad (1)$$

It follows from the classical R -matrix theory [10] that, choosing the Hamiltonians $\{H_i\}_{i=1,\dots,n}$ to be spectral invariants of $L(\lambda)$, these Poisson commute and satisfy compatible, autonomous systems of (isospectral) Lax equations.

$$\frac{\partial L}{\partial t_i} = [A_i, L], \quad (2)$$

where the matrices $\{A_i\}_{i=1,\dots,n}$ are obtained by taking the differentials dH_i on the symplectic leaves, giving elements of the loop algebra that commute with L , and then projecting onto the subspaces of the dual space defined by an additive Riemann-Hilbert type of splitting

$$A_i = \pm P_{\pm}(dH_i) \quad (3)$$

which are either in the $+$ or $-$ subspace of the corresponding loop algebra. (These are equivalent because the differential dH_i as an element of the loop algebra, commutes with L .)

$$[dH_i, L] = 0, \quad (4)$$

which is just the infinitesimal expression of the fact that H_i is a spectral invariant of L .

Craig and Harold's equations [20, 21] were not isospectral; when expressed in terms of rational Lax matrices and viewed as elements of a loop algebra, they involved an additional term that made them interpretable rather as compatibility conditions for deformations of a meromorphic covariant derivative operator on the punctured sphere (the punctures being at the endpoints $\{a_i\}_{i=1,\dots,n}$ of the multiple spacing intervals, and were to be understood as vanishing curvature conditions for a covariant derivative operator on the extended space with coordinates $\{\lambda, a_1, \dots, a_n\}$ obtained by regarding the deformation parameters as additional independent variables. The resulting system was Fuchsian (first-order poles only), except at ∞ (but could be generalized to include further non-Fuchsian singular points, or poles of higher degree at ∞). This was therefore to be understood as the compatibility conditions for multiparametric families of deformations of a meromorphic first-order differential operator, with matrix-valued coefficients, that preserved its monodromy (or generalized monodromy).

But how could the same set of commuting Hamiltonians generate different sets of first-order systems of PDE's? The point is that, whereas the flow parameters $\{t_i, \dots, t_n\}$ in the (isospectral) Lax equations (2) just denote the multi-time parameters corresponding to a complete set of Poisson commuting spectral invariant Hamiltonians $\{H_i\}_{i=1,\dots,n}$ and are really simply independent variables, in the Lax equations (2), for the system of Tracy and Widom, the variables $\{a_i, \dots, a_n\}$ with respect to which we differentiate are the endpoints of the intervals in the multi-interval spacing distributions and these appear explicitly in the definition of the Lax matrix as the pole loci:

$$L(\lambda) = \lambda L_\infty + C_0 + \sum_{i=2}^n \frac{L_i}{\lambda - a_i}. \quad (5)$$

Here L_∞, C_0 and $\{L_1, \dots, L_n\}$ are all traceless 2×2 matrices of a specific form, involving $2n+2$ independent variables $\{x_0, y_0, x_1, y_1, \dots, x_n, y_n\}$, which are interpreted as canonical coordinates on a reduced symplectic phase space.

Because of the explicit dependence on the parameters $\{a_1, \dots, a_n\}$, the equations (2), and the fact that these replace the time parameters $\{t_1, \dots, t_n\}$ in the derivatives in the Lax equations (2), the derivative picks up an additional term:

$$\frac{\partial L}{\partial a_i} = [A_i, L] + \frac{\partial_0 L}{\partial a_i}, \quad (6)$$

where $\frac{\partial_0 L}{\partial a_i}$ just denotes the explicit derivative with respect to the variable a_i . Remarkably, computing this explicitly, we have

$$\frac{\partial_0 L}{\partial a_i} = \frac{L_i}{(\lambda - a_i)^2} = -\frac{\partial A_i}{\partial \lambda} \quad (7)$$

making this equivalent to the vanishing commutator conditions

$$\left[\frac{\partial}{\partial a_i} - A_i, \frac{\partial}{\partial \lambda} - L(\lambda) \right] = 0, \quad i = 1, \dots, n \quad (8)$$

which, evaluating at the poles implies

$$\left[\frac{\partial}{\partial a_i} - A_i, \frac{\partial}{\partial a_j} - A_j \right] = 0, \quad i, j = 1, \dots, n. \quad (9)$$

Viewing $\{\frac{\partial}{\partial a_i} - A_i\}_{i=1,\dots,n}, \frac{\partial}{\partial \lambda} - L(\lambda)$ as covariant derivatives along the coordinate directions of the product of the punctured sphere with an affine n -dimensional space, eqs. (8, 9) are the vanishing conditions

for the curvature tensor. This implies the compatibility of the parallel transport equations along all coordinate directions:

$$\left(\frac{\partial}{\partial \lambda} - L\right) \Psi(\lambda, a_1, \dots, a_n) = 0, \quad (10)$$

$$\left(\frac{\partial}{\partial a_i} - A_i\right) \Psi(\lambda, a_1, \dots, a_n) = 0, \quad i = 1, \dots, n, \quad (11)$$

for a fundamental system Ψ which, in turn, implies the invariance of the monodromy of the operator $\frac{\partial}{\partial \lambda} - L(\lambda)$ under the deformations induced by this system.

In the nonautonomous, isomonodromic case the spectral curve is not invariant under the dynamics, and hence the interpretation of (6) as Hamiltonian equations on an extended space, that includes the $\{a_i\}_{i=1, \dots, n}$ as coordinates, involves a projection onto a quotient, which may be identified with a single symplectic leaf.

Subsequent developments

All these results turned out to have far-reaching generalizations, which were gradually clarified in subsequent years. The fact that the passage from nonautonomous to autonomous systems and vice versa works for the case of more general loop algebras, of arbitrary rank, with only first-order poles at finite points, plus possibly one with degree 2 (Poincaré rank 1) was shown in [26], as was the existence of “dual pairs” of rational isomonodromic systems that, after a further Hamiltonian quotient, were equivalent, despite having different ranks and different singular points. This notion of “isomonodromic duality” was further generalized, in [35], where the special rôle of $\lambda = \infty$ in the dualization map was removed.

The idea of passing from autonomous to nonautonomous systems, by identifying a complementary set of spectral invariant functions (like the pole loci, in the Fuchsian case) with the ones that coordinatize the symplectic leaves, was already present in the slightly more general case of a pole of higher order at ∞ , as was shown in [26]. The fact that they could be identified with Casimir elements which, in a sense, were “mirror images” of the corresponding spectral invariant “isomonodromic” Hamiltonians (with respect to the principal parts vs. the lowest order analytic terms at the poles of the meromorphic differential $\lambda d\mu$ on the spectral curve), was already explained in [32]. But a more complete account was not published until [43], with further structural details provided in [45].

In the years that followed, together with Harold and others, Craig discovered many further beautiful results, several of them, again, groundbreaking—too many to try to summarize here (although I hope, and presume, that some of the other contributors to this issue will present accounts of those results with which they are more closely familiar). Some of these [27, 28, 29, 30, 31, 33, 34] were still about the spectral theory of random matrices, and offshoots of that remarkable body of work. Others concerned various types of random processes and statistical problems that bear some relation to completely integrable systems, with very valuable contributions on the statistics of the Asymmetric Exclusion Process and variants thereof [36, 37, 38, 39, 40, 41, 42].

What distinguishes the many publications explaining these discoveries is the absolute clarity with which the results, some of them rather deep and challenging to comprehend, are always presented, rendering them maximally accessible to the rest of us, who (in my case, at least) could only follow some of them in detail, with ever-growing wonder and admiration. When presenting these results, Craig’s lectures were also always of the utmost clarity and precision.

He was a good friend and colleague, a valuable source of new ideas, a leader and creative innovator in our field, who had a unique multifaceted impact on its development. He will be sorely missed by us all.

References:

- [1] T. T. Wu, B. M. McCoy, C. A. Tracy and E. Barouch, “Spin–spin correlation functions for the two–dimensional Ising model: Exact theory in the scaling region”, Phys. Rev. B **13**, 316–374 (1976).

- [2] B. M. McCoy, C. A. Tracy, and T. T. Wu, “Painlevé functions of the third kind” J. Math. Phys. **18**, 1058–1092. (1977).
- [3] H. G. Vaidya and C. A. Tracy, “One-particle reduced density matrix of impenetrable bosons in one dimension at zero temperature”, J. Math. Phys. **20**, 2291–2313 (1979).
- [4] M. Sato, T. Miwa, and M. Jimbo, “Holonomic Quantum Fields I–V,” Publ. RIMS, Kyoto Univ. **14**, 223–267 (1977); ibid. **15**, 201–278, 577–629, 871–972 (1979); ibid. **16**, 531–584 (1980).
- [5] M. Jimbo, T. Miwa, Y. Mori, M. Sato, “Density matrix of an impenetrable Bose gas and the fifth Painlevé transcendent” Physica D **1**, 80–158, (1980).
- [6] S. P. Hastings and J.B. McLeod, “A boundary value problem associated with the second Painlevé transcendent and the Korteweg–de Vries equation”, Arch. Rat. Mech. Anal **73**, 31–51, (1980).
- [7] M. Jimbo, T. Miwa, and K. Ueno, “Monodromy preserving deformation of linear ordinary differential equations with rational coefficients: I. General theory and τ -function”, Physica D **2**, 306–352 (1981).
- [8] M. Jimbo and T. Miwa, “Monodromy preserving deformation of linear ordinary differential equations with rational coefficients. II, III” Physica D **2**, 407–448 (1981); ibid. **4**, 26–46, (1981).
- [9] M. Sato, “Soliton equations as dynamical systems on infinite dimensional Grassmann manifolds”, Kokyuroku, RIMS, Kyoto Univ., 30–46 (1981).
- [10] M. A. Semenov–Tian–Shansky, “What is a classical r -matrix”, Funct. Anal. Appl. **17**, 259–272 (1983).
- [11] E. Date, M. Jimbo, M. Kashiwara and T. Miwa, “Transformation groups for soliton equations”, In: Nonlinear integrable systems—classical theory and quantum theory, World Scientific (Singapore), eds. M. Jimbo and T. Miwa (1983).
- [12] M. Jimbo and T. Miwa, “Solitons and infinite-dimensional Lie algebras”, Publ. Res. Inst. Math. Sci., **19**, 943–1001 (1983)
- [13] J. Palmer and C. Tracy, “Two-dimensional Ising correlation functions: The SMJ analysis”, Adv. in App. Math. **4**, 46–102 (1983).
- [14] C. A. Tracy, Complete integrability in statistical mechanics and the Yang–Baxter equations, Physica D **14**, 253–264 (1984).
- [15] G. Segal and G. Wilson, “Loop groups and equations of KdV type”, Publ. Math. IHÉS **61**, 5–65 (1985).
- [16] C. A. Tracy, “ Z_n Baxter model: Critical behavior,” J. Statistical Phys. **44**, 183–191 (1986),
- [17] C. A. Tracy, “Introduction to exactly solvable models in statistical mechanics”, Proc. Symposia in Pure Math. Part I, **49**, 355–375 (1989).
- [18] A. R. Its, A. G. Izergin, V. E. Korepin, and N. A. Slavnov, “Differential equations for quantum correlation functions,” Int. J. Mod. Phys. B **4**, 1003–1037 (1990).
- [19] C. A. Tracy, “Asymptotics of a τ -function arising in the two-dimensional Ising model,” Commun. Math. Phys. **142**, 297–311 (1991).
- [20] C. A. Tracy and H. Widom, “Introduction to Random Matrices”, Chapter of: Geometric and Quantum Aspects of Integrable systems, Springer Lecture Notes in Physics **424**, ed. G. F. Helminck (Springer–Verlag, N.Y., Heidelberg, 1993).

- [21] C. A. Tracy and H. Widom, "Level-spacing distributions and the Airy kernel", Phys. Lett. B. **305**, 115–118 (1993).
- [22] M. R. Adams, J. Harnad and J. Hurtubise, "Darboux Coordinates and Liouville–Arnold integration in Loop Algebras", Commun. Math. Phys. **155**, 385–413 (1993).
- [23] J. Harnad, "Isospectral Flow and Liouville–Arnold Integration in Loop Algebras", Chapter of: Geometric and Quantum Aspects of Integrable systems, Springer Lecture Notes in Physics **424**, ed. G. F. Helminck (Springer–Verlag, N.Y., Heidelberg, 1993).
- [24] J. Harnad, C. A. Tracy, and H. Widom, "Hamiltonian structure of equations appearing in random matrices," in Low Dimensional Topology and Quantum Field Theory, ed. H. Osborn, pp. 231–245 (Plenum, New York, 1993).
- [25] P. Deift and X. Zhou, "A Steepest Descent Method for Oscillatory Riemann–Hilbert Problems. Asymptotics for the MKdV Equation". Ann. Math. **137**, No. 2, 295–368 (1993).
- [26] J. Harnad, "Dual Isomonodromic Deformations and Moment Maps into Loop Algebras", Commun. Math. Phys. **166**, 337–365 (1994).
- [27] C. A. Tracy and H. Widom, "Fredholm determinants, differential equations and matrix models", Commun. Math. Phys. **163**, 33–72 (1994).
- [28] C. A. Tracy and H. Widom, "Level-spacing distributions and the Airy kernel", Commun. Math. Phys. **159**, 151–174 (1994).
- [29] C. A. Tracy and H. Widom, "On orthogonal and symplectic matrix ensembles" , Commun. Math. Phys. **177** 727–754 (1996).
- [30] C. A. Tracy and H. Widom, "Correlation functions, cluster functions and spacing distributions for random matrices," J. Stat. Phys. **92**, 809–835 (1998).
- [31] C. A. Tracy and H. Widom, "Random unitary matrices, permutations and Painlevé," Commun. Math. Phys. **207**, 665–685 (1999).
- [32] J. Harnad, "Hamiltonian theory of the general rational isomonodromic deformation problem", Presentation at Fields Institute workshop on integrable and near-integrable Hamiltonian systems, 17–21 May 2004;
<http://www.fields.utoronto.ca/audio/03-04/integrable/harnad/>.
- [33] C. A. Tracy and H. Widom, "Matrix kernels for the Gaussian orthogonal and symplectic ensembles", Ann. Inst. Fourier, Grenoble **55**, 2197–2207 (2005).
- [34] C. A. Tracy and H. Widom, "The Pearcey process", Commun. Math. Phys. **263**, 381–400 (2006).
- [35] N. M. J. Woodhouse, "Duality for the general isomonodromy problem," J. Geom. Phys. **57**, 4, 1147–1170 (2007).
- [36] C. A. Tracy and H. Widom, "Integral formulas for the asymmetric simple exclusion process", Commun. Math. Phys. **279**, 815–844 (2008).
- [37] C. A. Tracy and H. Widom, "A Fredholm determinant representation in ASEP," J. Stat. Phys. **132**, 291–300 (2008).
- [38] C. A. Tracy and H. Widom, "Asymptotics in ASEP with step initial condition," Commun. Math. Phys. **290**, 129–154 (2009).
- [39] C. A. Tracy and H. Widom, "Total current fluctuations in the asymmetric simple exclusion process", J. Math. Phys. **50**, 095204 (2009).

- [40] C. A. Tracy and H. Widom, “Formulas for joint probabilities for the asymmetric simple exclusion process”, *J. Math. Phys.* **51**, 063302 (2010).
- [41] C. A. Tracy and H. Widom, “On the asymmetric simple exclusion process with multiple species”, *J. Stat. Phys.* **150**, 457–470 (2013).
- [42] C. A. Tracy and H. Widom, “Blocks and gaps in the asymmetric simple exclusion process: Asymptotics”, *J. Math. Phys.* **59**, 091201 (2018).
- [43] D. Yamakawa, “Tau functions and Hamiltonians of isomonodromic deformations,” *Josai Math. Monog.* **10**, 139–160 (2017).
- [44] J. Harnad and F. Balogh, *Tau Functions and their Applications*, Monographs on Mathematical Physics series, Cambridge University Press, Cambridge, UK (2021).
- [45] M. Bertola, J. Harnad and J. Hurtubise, “Hamiltonian structure of rational isomonodromic deformation systems”, *J. Math. Phys.* **64**, 083502 (2023).

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Colleagues, Community, and Mentorship

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Craig Tracy, a dear colleague and singular leader
 by: **Bruno Nachtergaele** (bnachtergaele@ucdavis.edu)

Craig Tracy was just a name to me until I was contacted by him in early 1996 about interviewing for a position at UC Davis. Craig was chairing the Department of Mathematics at the time.

My conversations with Craig during my interview and follow-up visits left a lasting impression. All department chairs I had interacted with until then were physicists, were effective, caring, and supportive, and these qualities also applied to Craig but he stood out in one way: Craig articulated a clear idea about what he wanted to accomplish as chair. The department had the opportunity to expand its faculty and Craig had a rather precise concept of what kind of people he wanted to hire. He wanted each new hire to expand the scope of research expertise in the department while growing a connected web of research interests. He wanted the best he could recruit and was specifically interested in people who had their own clear research direction and had the ability to build it out independently. Craig convinced me that Davis and I were a perfect fit. That may have been a recruitment gimmick but it worked 😊. In any case, after thirty years at UC Davis, I still believe he was right. Davis was an excellent match for me.

My colleagues all agree that Craig was a great recruiter. And, of course, he was highly respected as a mathematician and mathematical physicist. To me, he quickly became a dear friend and colleague. Soon after starting at Davis, we discovered we had a lot in common beyond science. For example, we both were subscribers to the New York Review of Books. I doubt anyone else in the department read that magazine. We discussed books regularly. I was particularly happy about that because upon my first impression, thirty years ago, I wondered whether people in California read books (it turns out, some people do!). Craig left behind an extensive library not only of math and physics books, but also a broad selection of biography and history.

To advance his vision for the department, as department chair he had to work with the university administration. Most directly, he had to work with the Dean of Mathematical and Physical Sciences at the time. At the time, that was Peter Rock. Craig and Peter were nothing alike but they knew how to work together to advance common goals. Inevitably, however, they sometimes clashed. Craig focused unerringly on

the big picture and despised the bean counting that the Dean's Office engaged in. One year, Peter Rock pointed out to Craig that the department ended the fiscal year in the red. Craig may or may not have pointed out that mathematicians 'don't do numbers'. It was not a major budget shortfall and Craig made it clear to Peter it did not bother him. Peter fumed.

As department chair, Craig was responsible for writing the department letters for merits and promotions. Nowadays, the chair is assisted in this important task by a Vice-Chair Academic Personnel but in those days the chair was burdened with this task. These letters report the department's recommendation on the case as documented by a vote. This was required from all departments on campus but apart from that, department chairs had different approaches to writing those letters. Some would ask the candidate to write the letter themselves. For Craig it was one of the most important opportunities for the chair to advance the math faculty's interests and to shape department culture. He took a personal interest in understanding the work and research projects of each of his colleagues and was able to convey the unique qualities and importance of each person's research to the campus community in these letters. When a mathematics promotion case arrived at the campus Committee on Academic Personnel for review, the committee members were offered a chance to learn something about what mathematical research is about. They came to appreciate Craig's letters and Craig was known for the succinct clarity of the explanations in his letters.

Craig gave everyone the opportunity to inform him about their work in one-on-one meetings, which were required. He met with junior faculty every year, whether they were up for promotion that year or not. These meetings were a bit intimidating, but I also remember them as the ultimate confidence builder. If Craig was interested in your work, you must be on the right track. His interests were capacious. Whether or not I followed his advice, his opinion always mattered a lot to me.

Craig looked out for junior faculty, not only during his four years as department chair, but throughout his career. His efforts to support the upcoming generation of scientists were not limited to the department. He wrote countless letters of recommendation and nominated people for awards without having been asked. He had excellent judgment. Several of the junior people who caught his attention went on to illustrious careers.

I had many conversations with Craig over the years. These became less frequent in the more recent past and regrettably came to an end much too soon, but I can easily conduct an imagined conversation with Craig in my head. His voice is still there, and his opinions continue to matter.

Remembering Craig Tracy: A Student's Gratitude

by: **Eunghyun Lee** (eunghyun.lee@nu.edu.kz)

Nazarbayev University, Kazakhstan

I was deeply saddened to learn that my Ph.D. advisor, Craig Tracy, passed away on January 29, 2026. For many in the mathematical community, Craig will be remembered as an extraordinary mathematician whose work had a profound influence on integrable systems, random matrix theory, and integrable probability. For me, however, he was also a patient and generous advisor who supported me through some of the most formative—and uncertain—years of my life.

I entered the Ph.D. program at the University of California, Davis, in September 2006 and became Craig's student in the fall of 2007. I remained at Davis until completing my degree in 2011. Throughout those years, Craig supported me in many ways. He showed remarkable patience as I learned how to approach research, how to cope with difficulties, and how to develop the persistence required to become a mathematician. He took his responsibility as an advisor very seriously. His support was never limited to suggesting problems or discussing mathematics; he cared about my progress as a whole and consistently helped me move forward.



Figure 25: Photograph of Craig Tracy with Eunghyun Lee and another student taken August 2008. This photograph was taken during an dinner invitation at his home.

What I remember most clearly is the quiet steadiness of his support. Craig was never someone who needed to make a display of his generosity. He simply remained present and dependable. When I struggled, he was patient. When I needed guidance, he gave it. When decisions had to be made about my future, he treated them with seriousness and care. At a stage of life when a young researcher often feels uncertain about both mathematics and the future, knowing that one's advisor is genuinely concerned makes an enormous difference.

Craig's concern for me did not end when I received my degree. After graduation, he continued to take an interest in my career and supported me until I was able to establish myself. Even after I obtained an academic position in Kazakhstan and began pursuing independent research, he remained interested in what I was doing. That continuing interest meant a great deal to me. It conveyed that, in his mind, advising was not a relationship that simply ended with the dissertation or the graduation ceremony.

His thoughtfulness also extended well beyond mathematics. In January 2022, when serious civil unrest broke out in Kazakhstan, where my family and I live, Craig contacted me to ask whether we were safe. At a frightening and uncertain moment, I was deeply grateful that he had remembered us and taken the time to write. This was characteristic of him: even years after I had left Davis, he continued to care about the lives of his former students.

My final exchange with Craig took place in August 2023. I wrote to tell him about my family and my

current research and asked whether I might visit him in California later that year. He replied warmly. He remarked that it was hard to believe my son was already nine years old—an indication that he had remembered my family over the years. He also told me candidly that he had been living with Parkinson’s disease for seven or eight years and that walking had become difficult. Since retiring in July 2021, he had rarely been on campus, so a visit to Davis would not be possible; instead he invited me to spend an afternoon with him at his home in Sonoma.

When I read that email, I was struck by something that may seem small. Craig’s emails had always been clear and carefully written, but in this one the typing itself had become unsteady. I could not help imagining how much effort even that short reply must have cost him. Yet he had still taken the trouble to answer me, ask about my family, explain his circumstances, and offer a way for us to meet. Reading the message then was painful; reading it now is even more so.

Unfortunately, I did not make that visit.

I was scheduled to attend a workshop at the American Institute of Mathematics in Pasadena in June 2026. In March, while planning the trip, I began thinking that after the workshop I should finally travel to Sonoma and see Craig. I intended to contact him and was determined that this time I would not miss the opportunity. It was then that I learned he had already passed away.

I wish I had visited him sooner. I wish I had been able to sit with him once more, tell him about my work and my family, and express in person how grateful I was for everything he had done for me. Like many things we assume there will still be time to do, that visit was postponed until it was no longer possible.

Although I can no longer tell him directly, I hope Craig knew how deeply I appreciated his guidance, patience, and kindness. Whatever I have accomplished as a mathematician owes much to the foundation he helped lay. His example continues to influence the way I think about my own responsibility toward students: not merely to teach them mathematics or supervise their research, but to remain patient during their difficulties, to take their futures seriously, and to care about the people they become.

I will remember Craig not only for the mathematics he created, but also for the generosity, loyalty, and quiet sense of responsibility he showed as a mentor. I feel fortunate and honored to have been his student. I will miss him greatly, and I will always remain grateful to him.

Remembrance of Craig Tracy

by: **Axel Saenz Rodriguez** (saenzroa@oregonstate.edu)

Craig Tracy was my first mentor in mathematics. Craig inspired me to set out my own path and go beyond what was expected of me, to find my own passions rather than follow the norm. I’m forever grateful to him for his immeasurable impact on my life. I write to you about my interactions with Craig — meeting him, learning life lessons, and collaborating — so that later in life I can look back to this article and remember Craig through my eyes.

I met Craig in 2011 as a first-year graduate student when I took his complex analysis course. At that point, unbeknownst to me, Craig was already a prominent and distinguished mathematician. I had no idea how much his work would shape my scientific career, as it has done for countless others. One time in class, somehow Craig asked the class how many different newspaper subscriptions we had and, after telling him that we don’t read newspapers, he went on to give us a long list of newspapers he receives each morning to read. For the next meeting of the class, the students coordinated to show up with a different newspaper. When Craig walked into class and everyone was reading a newspaper, Craig had just a hint of reaction, without much of a comment, as it took him a moment to realize the subtle prank — I always thought he thought it was funny. Craig was very serious about his work. Yet, he was very

unintimidating and welcoming.

Craig championed the scientific pursuit through unwavering support of the people behind the science. After a good performance in Craig's complex analysis course, he performed match-making and set me up with my PhD advisor, Motohico Mulase. It was then that I was first introduced to integral systems, working at the intersection of the Japanese school of integrable systems, random matrix theory, enumerative geometry, and mirror symmetry. Later, Craig told me that he decided that he wouldn't be a good PhD advisor for me. Since Craig had only received formal training as a PhD student in physics and not in math, he decided that it would be better if I received pure math training from Motohico. Craig always identified himself as a physicist despite major contributions and a life-long career in mathematics. Regardless, Craig was right in that the best choice for me was to receive pure math training from Motohico.

Craig's superpower was that he would be able to accurately identify and relentlessly pursue core ideas hidden deep behind layers of abstraction and technicalities. Craig would tell me that he understood things differently because he was a physicist and that would guide his mathematical work. Craig collaborated almost exclusively with Harold Widom for a significant part of his career. Together they established ground breaking results in random matrix theory and the Kardar-Parisi-Zhang universality class. Craig would like to tell me the story of meeting Harold in Oberwolfach and reaching the summit of a mountain on a hike despite knowing that they should have turned around before the summit because it was getting dark. They decided to go beyond the point of no return to reach the top. Craig would credit the success of his life-long collaboration with Harold to their shared sense of exploration.

In 2015, as I was entering my last year of graduate school, I went to a conference in honour of Craig at Stony Brook. At some point when speaking about Craig, someone said that there are two types of great mathematicians: (1) those who close fields by proving long outstanding problems, and (2) those who open fields by making breakthroughs in new directions. Craig was the latter. One time I read one of Craig's papers from the 70's. There was a computation that was multiple pages long. I was impressed by Craig's computational prowess. I later asked him about it. In a light-hearted tone and joking manner, he simply responded that someone else later — a year or two later — obtained the same result in less than half a page. On another occasion, I asked him about the difference between math and physics. He told me that it is easy for a mathematician to find issues and gaps in physics work, but the more meaningful and harder task is to find what is correct in the output of physicists.

In 2020, as the Covid pandemic was breaking out, I visited Craig in UC Davis to give a seminar talk but I almost didn't make it. I was flying over from England and I missed my flight because I went to the wrong airport in London; Heathrow not Gatwick. The next flight was the following day and I ended up arriving just one hour before the seminar talk. Petrified, I wrote to Craig explaining the reason for my delay as I was waiting for my new flight out of London. I didn't even try to make a good excuse; I just told him that I was not careful and went to the wrong airport. He simply responded with "I bet you won't make that mistake again." Yet, another life lesson from Craig.

I collaborated with Craig and Harold in their last publication, working on the edge fluctuations of the one-dimensional Heisenberg-Ising XXZ spin- $\frac{1}{2}$ chain. I forget how the collaboration started; it mostly happened when I was a postdoc at the University of Warwick during the pandemic. All three of us were isolated and working from home. We would frequently exchange emails discussing the problem and sharing typed up computations. I was surprised how welcoming Craig and Harold were; there were no egos or hierarchy in the collaboration. Exploring math and reaching the summit was the priority. Unfortunately, Harold passed away as we were wrapping up our project and I didn't have the opportunity to meet him in person. We ended up obtaining the Tracy-Widom distribution — or the F_2 distribution as they would call it — for the fluctuations of the edge under a specific setting, and much of my current efforts lie in extending the work started in this collaboration. It was a great privilege to have collaborated with Craig and Harold.

Craig was humble, competitive, principled, and proud. His relentless pursuit of mathematics is inspir-



Figure 26: Craig Tracy (left) and Barbara Nelson (right) outside of their home in Sonoma on Sep 2, 2021 after one of my visits to discuss math.

ing. Moreover, he actively supported the people that made science and math possible. Craig produced once-in-a-generation mathematical work that will have an everlasting impact on society at large. Craig has significantly shaped the landscape of mathematics and I will always remember him as a trail blazer.

★ ★ ★

Legacy in Probability, Mathematical Physics, and Beyond

★ ★ ★

Craig Tracy – Remembrances
by: **Dan Romik** (romik@ucdavis.edu)

There are not many people who influenced the course of my life as much as Craig did. He was not only the mathematical inspiration for much of my work on probability theory and combinatorics, but was also a large part of the reason why I ended up applying to UC Davis and moving there in 2009. At both a professional level and a personal one, I regard meeting and getting to know Craig as among the best things that ever happened to me.

Craig offered me his friendship and made me feel welcome at Davis even before I moved there. He and his wife Barbara were visiting Israel in the winter of 2009, when I was still working at the Hebrew University, and invited me to meet them for dinner in Tel Aviv. We had a lovely time, and when I arrived in

Davis a few months later they both continued to invite me to socialize with them on many occasions. I felt fortunate to count both of them among my friends in the years that followed.

Craig had an unmistakable presence in our department. He was mild-mannered and offered his opinions amicably, but you could tell they were strongly held and had real conviction behind them. When he talked, people listened, and more often than not his views about an issue carried the day.

In 2014, when I was considering whether to accept an offer to become the next department chair, Craig came to offer me advice. He said I shouldn't worry that taking this tough job would impact my research productivity; he told me he was confident I had the drive and passion to keep publishing good work, and volunteered that he made his greatest discovery, the Tracy-Widom distribution, while he himself served as department chair in the 1990s. This seemed like a good example to be inspired by. I took on the role, and indeed went on to publish some of my own best work during those years.

Craig and I never officially collaborated, but our interests were closely aligned, and we had frequent conversations about mathematical topics relating to what each of us was thinking about, with a fruitful exchange of ideas. I was inspired by his approach to research, by his ambition to attack difficult problems, by his long-running collaboration with Harold Widom, and by the depth and breadth of his knowledge of probability theory, statistical physics, random matrix theory, complex analysis, and many other topics. I would come to him for advice when I was stuck on a problem. In one case I remember, this produced a dramatic success: around 2015, I was studying a problem in asymptotic representation theory which required analyzing the asymptotics of a certain generating function analogous to the classic Euler partition function. I spent several frustrating weeks trying to do the analysis, without success. Shortly after telling Craig about the problem, I received an email from him with a short write-up showing how the asymptotics I wanted followed in a relatively straightforward manner from a complicated integral identity in a paper from 2002 by Kohji Matsumoto, a Japanese number theorist. This was just the breakthrough I needed. The paper I ended up writing on this problem opened a fascinating research thread in analytic number theory that has since been followed up on by many other mathematicians. I am indebted to Craig for the help he provided with that project.

Craig and I shared a love for the symbolic mathematics software application Mathematica, and would often discuss calculations and experiments we were doing with it. He was proud of his achievements, and I know he won many awards over his illustrious career, but I don't think I ever saw him happier than the day he told me excitedly that Wolfram had just added a `TracyWidomDistribution` command to the new version of Mathematica. One other occasion that came close was when Sasha Soshnikov, Brian Rider and I organized Craig's 70th birthday conference at the Simons Center for Geometry and Physics in Stony Brook. I felt honored to be involved in that effort, and despite Craig's generally humble demeanor, I could tell he was quite pleased with how it turned out.

Craig left a rich mathematical legacy that cannot be easily summarized. His work with Harold Widom on what we call the Tracy-Widom distributions, which are now understood to enjoy universality properties not unlike the universality of the Gaussian distribution in probability and statistics, is legendary and changed mathematics forever. (I remember attending a workshop at MSRI in Berkeley with Craig some time in the early 2010s, where one of the younger speakers expressed at the beginning of his talk how much of an honor it was to meet the famous Craig Tracy, exclaiming excitedly that it felt like meeting Gauss!) Even late in his career, Craig continued to produce impressive breakthroughs; a favorite of mine is his result with Widom from 2009 showing that the partially asymmetric simple exclusion process has fluctuations that converge in law to the Tracy-Widom distribution F_2 . This had been an open problem — a particular example of what is known as KPZ universality — and extended well-known results of Kurt Johansson from 2000 for the totally asymmetric case. Johansson's already very complicated analysis was able to exploit an integrability property relating the problem to the combinatorics of longest increasing subsequences and the Robinson-Schensted-Knuth algorithm. For the partially asymmetric case this method was not available, and settling it required great creativity and analytic insight: Craig and Harold first managed to derive a complicated Fredholm determinant formula for the probability distribution of

the position of a given particle in the process at a given point in time, then found a way to perform an ingenious analysis using the steepest descent method to obtain the Tracy–Widom asymptotics.

To my mind, the recurring thread that runs through much of Craig’s work was his ability to apply very deep knowledge of analytic techniques, particularly complex and asymptotic analysis, differential equations and special functions, to important questions in probability and statistical physics. He was also a much–admired mentor and Ph.D. advisor for his students. He was a wonderful friend and colleague and left a strong mark on our department at UC Davis and on the mathematics research community. I miss him dearly.

★ ★ ★

Remembrance of Craig Tracy
by: **Herbert Spohn** (spohn@ma.tum.de)
Technical University of Munich

In June 2007, experts in Random Matrix Theory assembled at Snowbird, Utah, for a memorable conference where I first met Craig. We had many interesting discussions. I had already met Harold Widom in Paris, and I asked Craig about their collaboration, which apparently became most intensive after Harold moved to Santa Cruz. Craig explained to me that, essentially, it was all Harold. However, when I later heard Harold’s account, the claim was reversed. Thus, I will never know the true story, except for the fact that it was a truly exceptional example of creative mathematical teamwork.

When remembering Craig, I have to mention his work, jointly with Harold, on the ASEP (asymmetric simple exclusion process). In TASEP, particles move on the one–dimensional lattice, hopping randomly to the right neighboring site, subject to the exclusion rule that at most one particle may occupy a site. For step initial conditions, Kurt Johansson proved that the integrated current across the origin is governed by the Tracy–Widom distribution. This came as a complete surprise, since at first sight there is no random matrix visible in the model.

A natural question was then to understand the partially asymmetric case. However, the determinantal structure of TASEP is lost in ASEP. With great ingenuity, Craig and Harold discovered a substitute structure with the flavor of the Bethe ansatz. In particular, their results enabled the study of the weak asymmetry scaling limit. The resulting asymptotic theory became one of the foundations of the statement that the KPZ (Kardar–Parisi–Zhang) equation belongs to the KPZ universality class. The KPZ class loosely describes a large family of stochastic particle systems that, in particular, exhibit Tracy–Widom fluctuations. Thus ASEP belongs to this universality class. The KPZ equation itself, however, is a singular stochastic partial differential equation and could, in principle, have exhibited different scaling behavior. We now know that the KPZ equation is no exception.

Craig and I participated in workshops on topics of common interest and greatly enjoyed watching the progress made by the younger generation of mathematical physicists entering our field. In the fall of 2021, I attended a large random matrix program at MSRI and had the opportunity to participate in the celebration of Craig’s 75th birthday at Davis. It was a wonderful event, with illuminating insights into the early days of random matrix theory.

I miss Craig.

Topic #11 OP – SF Net 33.5 September 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 July and August 2026. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

<http://arxiv.org/abs/2607.00231>

The $2j-k$ and $j-2k$ Bi-orthogonal Polynomials on the Unit Circle: Further Properties and Riemann-Hilbert Characterizations

Roosbeh Gharakhloo, Nicholas S. Witte

<http://arxiv.org/abs/2607.01544>

Formalized q -series: The Rogers-Ramanujan Identities and Beyond

Kenny Lau, Seewoo Lee, Ken Ono

<http://arxiv.org/abs/2607.03912>

A MacMahon Analysis View of 4 Diagonal DSPPs

Runqiao Li, Ali K. Uncu

<http://arxiv.org/abs/2607.04050>

Bergeron's conjecture & a tale of two binomial coefficients

Tewodros Amdeberhan, Matthias Beck

<http://arxiv.org/abs/2607.05466>

The lattice of normal reflection subgroups of an irreducible reflection group

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From: OP–SF Net Editors

Subject: Submitting contributions to OP–SF NET and SIAM–OPSF (OP–SF Talk)

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howard.cohl@nist.gov, or spost@hawaii.edu.

Contributions to OP–SF NET 33.6 should be sent by November 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>

Back issues of OP–SF NET can be obtained from: <https://staff.fnwi.uva.nl/t.h.koornwinder/opsfnet>

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

Tom Koornwinder, SIAG/OPSF Archivist

Topic #13 ——— OP – SF Net 33.5 ——— September 15, 2026

From: OP–SF Net Editors

Subject: Thought of the Month by **Ken Ono**

“When I finally understood that, I recognized that this is not the end of mathematics. The computer should not be replacing us as scientists, but maybe it’s replacing a large part of the heavy lift that was routine to us anyway.”

Ken Ono in Duncombe, Jenessa (2026). Q&A: Ken Ono feared AI. Now he trains it. Physics Today, April 29, 2026. [link](#).