Lubotzky in 2016 by showing that 2-dimensional skeleta of 3-dimensional Ramanujan complexes have the topological overlap property, but it was unclear how to carry this over to higher dimensions. Very recently, Shai joined forces with Tali Kaufmann and spectacularly solved this problem by showing that $d$-dimensional skeleta of $(d + 1)$-dimensional Ramanujan complexes have the topological overlap property, and thus resolved Gromov's problem in all dimensions. This seminal paper, which makes use of the work of Lafforgue on the Generalized Ramanujan Conjectures, is to appear in the Journal of the AMS. It is expected that the ideas developed in this paper will find many other important applications. Higher dimensional expansion is related to questions in the broader field of quantitative geometry and topology, as well as in coding theory and theoretical computer science (quantum error correcting codes).

“Another major work of Evra (jointly with Ori Parzanchevski) concerns construction of ‘Golden Gates’ for three-dimensional unitary groups. The classic work of Lubotzky, Phillips, and Sarnak (1987, 1988), provides topological generators for the orthogonal group $SO(3)$ such that for each $\ell$, the set of $\ell$-wise products of generators is distributed in an almost optimal manner on the two-dimensional and three-dimensional spheres. Among other things, their proof makes use of the full strength of the Ramanujan Conjecture for $GL(2)$ as proved by Deligne. Recently this problem has received renewed interest due to its importance and relevance for quantum computing. The 3-sphere is isomorphic to $SU(2)$, with the group of logical gates acting on a single qubit. Considered as elements of $SU(2)$, the generators provided by Lubotzky–Phillips–Sarnak were given the name ‘Golden Gates’ because the circuits constructed from these gates approximate any gate in an optimal manner. Ori Parzanchevski and Sarnak found Golden Gates for $PU(2)$, but whether one could achieve such miracles for higher dimensions was far from clear. In a recent impressive paper, Evra and Parzanchevski show that this is possible for $PU(3)$ with some striking examples, but this is demonstrated with very delicate analysis. They employ deep results of Ragowski and James Arthur (which had important consequences on the Generalized Ramanujan Conjectures) to show that the optimal covering features are still valid. The Golden Gates for $PU(2)$ and $PU(3)$ are basic building blocks for the construction

Shai Evra of Princeton University and the Hebrew University of Jerusalem has been selected the recipient of the 2020 SASTRA Ramanujan Prize, awarded for outstanding contributions by individuals not exceeding the age of thirty-two in areas of mathematics influenced by Ramanujan.

The prize citation reads: “Shai Evra is an extraordinarily gifted mathematician whose research concerns locally symmetric spaces of arithmetic groups and their combinatoric, geometric, and topological structure. He employs deep results from representation theory and number theory pertaining to the Ramanujan and Langlands conjectures to establish expander-like properties. “Expander graphs are remarkable objects with connections to many parts of mathematics and computer science. Expanders are graphs which are highly connected; to separate them into disconnected pieces, one must remove a large number of edges. In the last decade, mathematicians have formulated the notion of expansion to higher dimensional complexes. 2009 Abel Laureate Mikhail Gromov had introduced the notion of ‘geometric expansion’ in terms of an affine overlapping property for simplicial complexes. He showed that complete complexes are such expanders and that a much stronger topological overlap property holds for them. He constructed several examples of higher dimensional expanders with unbounded degree and raised the question in a very influential 2010 paper in GAFA, whether bounded degree higher dimensional expanders exist. In a fundamental paper, ‘Finite Quotients of Bruhat–Tits Buildings’ that appeared in the Journal of Topology and Analysis in 2015, Evra extended both the combinatorics and automorphic form theory (specifically the Generalized Ramanujan Conjectures) and generalized the construction of Gromov to other Bruhat–Tits buildings. However, the bounded degree problem of Gromov still remained unresolved. In the case of dimension 2, Gromov’s question was answered in the affirmative by Kaufman, Kazhdan, and
of universal gate sets in quantum computation (much like ‘not’ and ‘and’ are universal one-bit and two-bit gates for building the classical logical circuits). It is to be noted that the Ramanujan Conjectures and their generalizations are a central piece of the outstanding work of Evra.”

Shai Evra was born in Be’er Yaakov, Israel. He received his PhD from the Hebrew University of Jerusalem in 2019 under Alexander Lubotzky. He has been a postdoctoral researcher at the Institute for Advanced Study (2018–2020) and is an instructor at Princeton University for 2020–2021. He will take up a permanent position at Hebrew University in 2021. His recognitions include the 2015 Perlman Prize and the 2020 Nessyahu Prize.

The 2020 SASTRA Ramanujan Prize Committee consisted of Krishnaswami Alladi, Chair, University of Florida; William Duke, University of California, Los Angeles; Kevin Ford, University of Illinois, Urbana-Champaign; Anne Schilling, University of California, Davis; Robert Tijdeman, Leiden University; Maryna Viazovska, École Polytechnique, Lausanne; and Shouwu Zhang, Princeton University.

The previous recipients of the SASTRA Ramanujan Prize are:
- Manjul Bhargava and Kannan Soundararajan (two full prizes), 2005
- Terence Tao, 2006
- Ben Green, 2007
- Akshay Venkatesh, 2008
- Kathrin Bringmann, 2009
- Wei Zhang, 2010
- Roman Holowinsky, 2011
- Zhiwei Yun, 2012
- Peter Scholze, 2013
- James Maynard, 2014
- Jacob Tsimerman, 2015
- Kaisa Matomaki and Maksym Radziwill (shared), 2016
- Maryna Viazovska, 2017
- Yifeng Lui and Jack Thorne, 2018
- Adam Harper, 2019

—Krishnaswami Alladi, University of Florida

Rojo Receives SACNAS Award

Javier Rojo of Oregon State University has been honored with the 2020 SACNAS Distinguished Scientist Award from the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS). His work involves survival analysis, partial orders of distribution functions and related inference problems, extreme value theory and tail-heaviness of distributions, nonparametric applications, in particular obtaining a characterization of projective spaces and hyperquadrics; for her work in the study and classification of Fano varieties; and her study of algebraic foliations. Araujo has also played a key role in promoting women in mathematics and in the organization of important mathematical activities.”

Araujo specializes in algebraic geometry, including birational geometry and foliations. She obtained her PhD from Princeton University in 2004 under the supervision of János Kollár. She has been a Simons Associate with ICTP since 2015 and is the vice president of the Committee for Women in Mathematics at the International Mathematical Union. She was both an organizer and an invited speaker at the 2018 International Congress of Mathematicians. Araujo tells the Notices: “I am mother of four-year-old Iago, we love being in nature, and alternate between our residence in Rio de Janeiro and our cottage in the countryside, where we have spent most of our time during the COVID-19 pandemic, enjoying the company of our pets, growing bananas and vegetables.”

The selection committee consisted of Alicia Dickenstein (University of Buenos Aires), Lothar Goettsche (ICTP, chair), Kapil Hari Paranjape (Indian Institute of Science Education and Research [IISER], Mohali), Philibert Nang (Ecole Normale Supérieure Libreville, Gabon), and Van Vu (Yale University). The prize is awarded to a researcher from a developing country who is under forty-five years of age on December 31 of the year of the award and who has conducted outstanding research in a developing country. It is administered by the Abdus Salam International Center for Theoretical Physics (ICTP), the Department of Science and Technology (DST, Government of India), and the International Mathematical Union (IMU).

—From an ICTP-IMU announcement

Araujo Awarded ICTP-IMU Ramanujan Prize

Carolina Araujo of the Institute for Pure and Applied Mathematics (IMPA) in Rio de Janeiro, Brazil, has been awarded the 2020 ICTP-IMU Ramanujan Prize for Young Mathematicians from Developing Countries. She was awarded the prize “in recognition of her outstanding work in algebraic geometry, in particular in birational geometry and the theory of extremal rays, of which she gave important...
function estimation, statistical decision theory, random matrices, and dimension reduction techniques.

Rojo is currently the Korvis Professor of Statistics at OSU. He received his PhD in statistics from the University of California, Berkeley, under the direction of Erich L. Lehman. He previously progressed from assistant to full professor (1990–2000) of statistics at the University of Texas at El Paso, where he founded the BioStatistical Laboratory. He then moved to Rice University, where he created the Research Experience for Undergraduates in Statistics (RUSIS), which received the 2014 AMS Programs That Make a Difference Award. He has held the Seneca C. and Mary B. Weeks endowed Chair of Statistics and Chair of Mathematics and Statistics at the University of Nevada at Reno, where he led successful efforts to create two new PhD programs. He is also an adjunct professor at the MD Anderson Cancer Center and the Civil Engineering Department at Rice. He has held positions at Sandia Labs, the Rand Corporation, Pacific Gas and Electric, and El Paso Natural Gas Company. He is a Fellow of the American Statistical Association, the Institute of Mathematical Statistics, the Royal Statistical Society, and the American Association for the Advancement of Science and is an elected member of the International Statistical Institute. He received the Etta Z. Falconer Award for Mentoring and Commitment to Diversity in 2018. Rojo currently serves on SAMSI’s Scientific Advisory Committee, ICERM’s Education Advisory Board, and on several editorial boards and committees for various scientific societies. He has collaborated with faculty at the Center of Mathematical Research in Guanajuato and has organized several international conferences in Mexico.

Rojo tells the Notices: “One of my hobbies is listening to classical music and music from the 60s, 70s, and 80s. My father was a band director in the years of the big band era. Another of my hobbies was sports. Growing up in Ciudad Juárez, Mexico, I dreamt of succeeding Mickey Mantle in center field for the New York Yankees. I played semi-pro baseball in Mexico and later played NCAA baseball for UT El Paso. Although I was selected to play in the Pan-American games representing Mexico, an injury dashed all hopes of becoming a professional player. I now enjoy jogging and hiking in the beautiful Pacific Northwest and the ever-expanding family get-togethers (my wife of forty-four years, Maria Luisa, five children and their families or friends, and seven wonderful grandchildren).”

—From a SACNAS announcement

<image>

**Packard Fellowships Awarded**

The David and Lucile Packard Foundation has announced its class of Fellows in Science and Engineering for 2020. Following are the names of the new Fellows whose work involves the mathematical sciences.

**Lorin Crawford** of Brown University works in biostatistics and was selected for his work in developing “scalable machine learning algorithms that uncover how genomic features affect the architecture of complex traits and contribute to disease etiology.”

**Yin Tat Lee** of the University of Washington is a computer/informational scientist whose research “combines ideas from continuous and discrete mathematics to develop faster optimization algorithms for basic optimization problems, such as the maximum flow problem and linear programming.”

**Aviad Rubinstein** of Stanford University works in computer/information sciences. His research “focuses on a core question in theoretical computer science: What can be computed efficiently? This is important for designing better algorithms, and also for understanding processes in economics, biology, and physics that implicitly carry out complex computations.”

Packard Fellows receive US$875,000 over five years to pursue their research. The Fellowships are designed to allow maximum flexibility in how the funding is used.

—From a Packard Foundation announcement

**Credits**

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Photo of Lorin Crawford is courtesy of Elizabeth Burgi.
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