

# IEEE Information Theory Society Newsletter



Vol. 61, No. 3, September 2011

Editor: Tracey Ho

ISSN 1045-2362

Editorial committee: Helmut Bölcskei, Giuseppe Caire, Meir Feder, Joerg Kliewer, Anand Sarwate, and Andy Singer

## Annual IT Awards Announced

Most of the principal annual awards of the Information Theory Society were announced at the 2011 ISIT in Saint Petersburg. The 2012 Shannon Award goes to Abbas El Gamal. Shlomo Shamai received the 2011 Shannon award, which was officially announced last year. At the 2011 Saint Petersburg ISIT, he gave the much-awaited Shannon Lecture, which fully lived up to the high expectations of our community (check our Society Website soon to watch the lecture if you were unable to attend), and accepted the award with some touching words in Russian and English. The 2011 Wyner Award goes to G. David Forney, Jr. The 2011 IT Paper Award is shared by the papers



Abbas El Gamal



David Forney

The 2011 Chapter of the Year Award was presented to the Spain Chapter.

The Claude E. Shannon Award, awarded for "consistent and profound contributions to the field of information theory," is the highest honor of the IT Society. Abbas El Gamal received the B.Sc. (honors) degree in electrical engineering from Cairo University in 1972 and the M.S. degree in statistics and the Ph.D. degree

in electrical engineering from Stanford University, Stanford, CA, in 1977 and 1978, respectively. From 1978 to 1980, he was an Assistant Professor of Electrical Engineering at the University of Southern California (USC), Los Angeles. He has been on the Stanford University faculty since 1981, where he is currently the Hitachi America Professor in the School of Engineering. His research interest and contributions are in the areas of network information theory, digital imaging, and integrated circuit design. He has authored or coauthored more than 200 papers and 30 patents in these areas. Abbas El Gamal is on the Board of Governors of our Society and is currently our Second Vice President elect. The topics that Abbas El Gamal and his research group span an unusually broad spectrum of theory and design. They range from his sustained and profound contributions to the challenging discipline of multi-terminal information theory, through extensions of his seminal record-setting work in fast-frame image sensors and cameras. He will give the Shannon Lecture at the 2012 ISIT in Cambridge, USA.

"Information Spectrum Approach to Second-Order Coding Rate in Channel Coding", by Masahito Hayashi, *IEEE Transactions On Information Theory*, 55 (11)

and

"Channel Coding Rate in the Finite Blocklength Regime", by Yury Polyanskiy, H. Vincent Poor, Sergio Verdú, *IEEE Transactions On Information Theory*, 56 (5).

The winners of the 2011 Joint Information Theory and Communications Society Paper Award are

"Wireless Information-Theoretic Security", by Matthieu Bloch, João Barros, Miguel R. D. Rodrigues, Steven W. McLaughlin, *IEEE Transactions On Information Theory*, 54 (6)

and

"Multiuser MIMO Achievable Rates With Downlink Training and Channel State Feedback", by Giuseppe Caire, Nihar Jindal, Mari Kobayashi, Niranjay Ravindran, *IEEE Transactions On Information Theory*, 56 (6).

The Aaron D. Wyner Distinguished Service Award recognizes an "individual who has shown outstanding leadership in, and provided long-standing exceptional service to the information theory community". G. David Forney, Jr. received the B.S.E. degree in electrical engineering from Princeton University, Princeton, NJ, in 1961, and the M.S. and Sc.D. degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge, MA, in 1963 and 1965, respectively. From 1965–99 he was with the Codex Corporation, which was acquired by Motorola, Inc. in 1977. Since 1996, he has been an Adjunct Professor at M.I.T. G. David

continued on page 4

## From the Editor

Dear IT Society members,

It was great to see many of you at ISIT in St. Petersburg, and many thanks to the organizers for a most enjoyable conference. This issue carries announcements of awards from ISIT and elsewhere—warmest congratulations to the award winners for all your achievements and contributions! Also in this issue are minutes from the Board of Governors meeting at ITA, and reports on the 2011 School of Information Theory and the 7th Asia-Europe Workshop on “Concepts in Information Theory”.

As a reminder, announcements, news and events intended for both the printed newsletter and the website, such as award

announcements, calls for nominations and upcoming conferences, can be submitted jointly at the IT Society website <http://www.itsoc.org/>, using the quick links “Share News” and “Announce an Event”. Articles and columns that do not fall into the above categories should be e-mailed to me at [tho@caltech.edu](mailto:tho@caltech.edu), with a subject line that includes the words “IT newsletter”. The deadlines for the next few issues are:

| Issue         | Deadline         |
|---------------|------------------|
| December 2011 | October 10, 2011 |
| March 2012    | January 10, 2012 |
| June 2012     | April 10, 2012   |

**Please submit ASCII, LaTeX or Word source files; do not worry about fonts or layout as this will be taken care of by IEEE layout specialists. Electronic photos and graphics should be in high resolution and sent as separate files.**

I look forward to your contributions and suggestions for future issues of the newsletter.

*Tracey Ho*

*Tracey Ho*



### IEEE Information Theory Society Newsletter

*IEEE Information Theory Society Newsletter* (USPS 360-350) is published quarterly by the Information Theory Society of the Institute of Electrical and Electronics Engineers, Inc.

Headquarters: 3 Park Avenue, 17th Floor,  
New York, NY 10016-5997.

Cost is \$1.00 per member per year (included in Society fee) for each member of the Information Theory Society. Printed in the U.S.A. Periodicals postage paid at New York, NY and at additional mailing offices.

**Postmaster:** Send address changes to IEEE Information Theory Society Newsletter, IEEE, 445 Hoes Lane, Piscataway, NJ 08854.

© 2011 IEEE. Information contained in this newsletter may be copied without permission provided that the copies are not made or distributed for direct commercial advantage, and the title of the publication and its date appear.

*IEEE prohibits discrimination, harassment, and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.*

## Table of Contents

|   |    |
|---|----|
| Annual IT Awards Announced.....   | 1  |
| From the Editor.....  | 2  |
| President’s Column.....   | 3  |
| 2011 IEEE Information Theory Society Chapter of the Year Award.....             | 6  |
| IT Society Members Honored.....   | 7  |
| The Historian’s Column.....   | 7  |
| Golomb’s Puzzle Column™ Primes and Divisibility.....                            | 9  |
| Golomb’s Puzzle Column™ Polyomino Tilings Solutions.....                        | 10 |
| IEEE Information Theory Society Board of Governors Meeting Minutes.....         | 11 |
| Report on the 7th Asia-Europe Workshop on “Concepts in Information Theory”..... | 17 |
| Report on the Fourth Annual School of Information Theory.....                   | 17 |
| Conference Calendar.....  | 19 |

## President's Column

Giuseppe Caire

I have just returned from astonishing and sumptuous Saint Petersburg, Russia, where a very successful 2011 IEEE International Symposium on Information Theory (ISIT) took place. The decision to hold ISIT in Russia was a tribute to the contributions of Russian scientists to Information Theory over the years. Particularly, I would like to thank the 2011 ISIT General Co-Chairs Tony Ephremides, Vladimir Blinovskiy and Alexander Kuleshov, for the flawless organization that we all have enjoyed, as well as the *Institute for Problems of Information Transmission* (IPPI) for providing manpower and administrative support for the organization of the Symposium. I'd like also to take the occasion to offer my best wishes to IPPI, which is celebrating its 50th anniversary. May the legacy and tradition of Dobrushin and Pinsker flourish and continue to enrich us!



Organizing a large conference such as ISIT is always a very demanding task, and in this case maybe even more demanding than usual. Nevertheless, the 2011 ISIT organizers have demonstrated uncommon problem-solving skills (a special mention should go here to the Saint Petersburg local organizing team). Eventually, everything was just right, including the abundant supply of vodka on the ISIT gala dinner tables, which contributed to lower the high adrenaline levels developed during the organization.

As usual, the Symposium featured an outstanding technical program (co-chaired by Bruce Hajek, Simon Litsyn and Boris Ryabko), with inspiring plenary talks from Erdal Arıkan, Zhanna Reznikova, Wojciech Szpankowski and Vladimir Tikhomirov. The highlight of the Symposium was the Shannon Lecture, entitled "From Constrained Signaling to Network Interference Alignment via an Information-Estimation Perspective," and delivered by Shlomo Shamai (Shitz). The Symposium once again featured a number of events organized by the Student Committee, and in particular an Information Theory "Wiki" night, where students were invited to provide input to the initiative led by Alon Orlitsky and Ruediger Urbanke for a *Platform for Online Science and Technology Education and Research*. Alon and Rudi briefly presented this exciting idea at the annual IT Society Board of Governors meeting, and I hope they will report on progress in future meetings and perhaps in a dedicated article in this Newsletter.

Before beginning the list of the many happy news and events connected to ISIT, I'd like to start by remembering the late Jack Wolf. Jack is one of the giants of our field, and has inspired directly or indirectly the work of countless information theorists. A memorial was organized on June 30, 2011 and a tribute is planned on September 19, 2011 in connection with the Shannon Memorial Lecture at the Center for Magnetic Recording Research at UCSD. Furthermore, an article remembering Jack Wolf will be published in a future issue of this Newsletter.

After ISIT and the annual IT Society Board of Governors meeting, it is time to look back at the many accomplishments of our members, at the state of our Society and at the several outstanding initiatives of our volunteers. First, I'd like to congratulate

Dave Forney, who received the 2011 Wyner Service Award, and Abbas El Gamal, recipient of the 2012 Shannon Award. We are all looking forward to Abbas' 2012 Shannon Lecture, in Cambridge MA, next July. Then, I would like to acknowledge all the IT Society members who obtained IEEE awards in 2011. While the complete list was included in the brochure of the Awards Lunch at ISIT 2011, here I'd like to congratulate in particular Toby Berger (2011 IEEE Richard W. Hamming Medal), Arogyaswami J. Paulraj (2011 IEEE Alexander Graham Bell Medal), Ingrid Daubechies (2011 IEEE Jack S. Kilby Signal Processing Medal), Tom Richardson and Ruediger Urbanke (2011 IEEE Koji Kobayashi Computer and Communications Award), Vince Poor (2011 IEEE Eric E. Sumner Award), and Moe Win (2011 IEEE Kiyo Tomiyasu Award). Finally, I'd like to congratulate all the IT Society members elected IEEE Fellows in 2011. This year has been exceptionally strong, with 31 newly elected Fellows.

Every year, our Society Awards Committee goes through a very thorough discussion to select candidates for the *Information Theory Paper Award*, which is eventually decided by vote at the annual Board of Governors meeting. In 2011, the *Information Theory Paper Award* is given to two papers: "Information-Spectrum Approach to Second-Order Coding Rate in Channel Coding", by M. Hayashi, and "Channel Coding Rate in the Finite Blocklength Regime", by Y. Polyanskiy, H.V. Poor, S. Verdú. Both papers appeared in the IEEE Transactions on Information Theory. I'd like to thank our Award Committee members, and in particular its chair, Muriel Medard, for their dedication and hard work in the evaluation and ranking of the papers nominated for this award.

Two key items when assessing the state of our Society are our finances and our Transactions. As far as finances are concerned, I am happy to report that the IT Society is in very good health. Our revenues are strong, and consistently above our projected budget, year after year. This has allowed us to fund some very remarkable initiatives such as the Annual Information Theory School, on which I'd like to report below. The IEEE Transactions on Information Theory continues to be the most cited IEEE journal in terms of total number of citations, and among the top journals in terms of impact factor (for what value this controversial bibliometric may have). Our publication queue has grown significantly, and our Editor in Chief, Helmut Bolcskei, has taken a very aggressive set of measures to regain control and stability of the final submission to publication delay. For this reason, we have approved an increase in the page budget of the Transactions for 2011, with some significant financial implications, such that for the first time in several years our projected budget for 2012 is (slightly) negative. This fact points out that despite our financial solidity, fiscal responsibility is always a priority. Furthermore, the growing trend of the Transactions on Information Theory in terms of total page budget and Editorial Board is calling for some thorough strategic thinking. Quoting from Helmut's presentation at the annual Board of Governors: "What

*continued on page 6*

## Annual IT Awards Announced continued from page 1

Forney, Jr. was Editor of the IEEE Transactions on Information Theory from 1970 to 1973, and currently serves on its Executive Editorial Board. He has been a member of the Board of Governors of the IEEE Information Theory Society for three terms: during 1970–76, 1986–94, and 2004–10, and was President twice: in 1992 and 2008. In 1998, he was Co-Chair of the 50th Anniversary ISIT at M.I.T. He is currently a member of the IEEE Awards Board, and chairs its Awards Review Committee. He has been awarded the 1970 IEEE Information Theory Group Prize Paper Award, the 1972 IEEE Browder J. Thompson Memorial Prize Paper Award, the 1990 and 2009 IEEE Donald G. Fink Prize Paper Awards, the 1992 IEEE Edison Medal, the 1995 IEEE Information Theory Society Claude E. Shannon Award, the 1996 Christopher Columbus International Communications Award, and the 1997 Marconi International Fellowship. In 1998 he received an IT Golden Jubilee Award for Technological Innovation, and two IT Golden Jubilee Paper Awards. He received an honorary doctorate from E.P.F.L., Lausanne, Switzerland in 2007. He was elected a Fellow of the IEEE in 1973, a member of the National Academy of Engineering (U.S.A.) in 1983, a Fellow of the American Association for the Advancement of Science in 1993, an honorary member of the Popov Society (Russia) in 1994, a Fellow of the American Academy of Arts and Sciences in 1998, and a member of the National Academy of Sciences (U.S.A.) in 2003.

The Information Theory Society Paper Award is given annually to outstanding publications in the fields of interest to the Society appearing anywhere during the preceding two calendar years. The award committee produces a set of fully documented recommendations, upon which the Board of Governors vote. The two papers that share the prize provide considerable new advances in the area of error probability of codes.

The paper by Polyanskiy *et al.* champions an alternative to the classical “error exponent analysis” as a benchmark for the behavior of codes at finite blocklength. In practice, the desired probability of error is usually fixed, and we are trying to maximize the rate. This is precisely the approach expounded in the paper. It looks at the maximum channel coding rate achievable at a given fixed blocklength and error probability. Upper and lower bounds are given on the size of any code for a given blocklength and error probability (referred to as converse and achievability bounds). These bounds are tighter than existing bounds for wide ranges of parameter sets and blocklengths as short as 100. In addition, as an alternative to the usual large deviation techniques, Polyanskiy *et al.* also introduce the notion of channel dispersion, which leads to a tight (and simple to compute) approximation to the bounds using a central limit theorem approach. The paper is a very relevant and important piece of work, given the recent advances on capacity achieving codes at large blocklength. A problem that will receive much attention in the future will be to achieve similar performance at shorter blocklength as for longer blocklength, and this work will serve as a guide for how capacity is sacrificed by the shorter code lengths.

The paper by Hayashi presents original ideas concerning the behavior of the probability of error of channel codes for rates in the vicinity of channel capacity. The results are presented in terms of

the second order coding rate. The author extends his own results of similar nature on source coding, using the method of information spectrum developed by Han and Verdú. In this extension to channel codes, the author reports on the difficulties of applying the method to channels with cost constraints, and shows the way around the problem by considering the log likelihood ratio between the conditional output distribution and a defined distribution. The results are very innovative and shed light on some nebulous areas such as the behavior of the Gallager bound in the neighborhood of capacity, giving examples in which that behavior is not optimal, contrary to common belief.

The awards committee noted that the central-limit theorem asymptotic approximations in both papers can be seen to be in the intellectual continuity of the work of Wolfowitz, Weiss, Dobrushin and, in particular, Strassen:

V. Strassen, “Asymptotische abschätzungen in Shannons informationstheorie”, in *Trans. 3rd Prague Conf. Inf. Theory*, Prague, 1962, 689–723.

Most importantly, in the view of the awards committee, the work in both awarded papers provides results for the important case of the AWGN channel, which cannot be obtained straightforwardly from Strassen’s work.

The Joint Information Theory and Communications Society Paper Award recognizes outstanding papers published in any publication of the Communications Society or the Information Theory Society during the previous three calendar years. It is chosen by a committee formed of members of both the IT Society Awards Committee and the Communications Society Awards Committee. The chairing of the committee alternates between the two societies and this year the committee was chaired by the IT Society. The 2011 Joint Information Theory and Communications Society Paper Award was awarded to two papers. The first paper, “Wireless Information-Theoretic Security”, by Matthieu Bloch, João Barros, Miguel R. D. Rodrigues, and Steven W. McLaughlin, is in the area of information theoretic security, which has recently been revived and attracted significant interest in the research community. There have been many works in the general area and fundamental results presented in other papers. However, the committee commended the paper by Bloch *et al.* for the fact that it provided an excellent bridge between information theory and communications by presenting a protocol which, rather than using the channel to directly communicate in a secret fashion (as done in Wyner’s wiretap work for example), uses the channel to generate a secret key, and then uses this key for secure communication. While this may fall short of the secrecy capacity (as the authors also argue) it allows the authors to provide codes for key generation (in particular reconciliation) and exploit the instances in which the eavesdropper channel quality is better than that of the legitimate receiver. It also allows the generated key to be either used in an information theoretically secure way (using a one time pad) or in conjunction with cryptographic methods. The paper thus constructs a very effective opportunistic key agreement protocol. The paper’s contribution builds ties between information theoretic security and the traditional cryptographic security.

### Finalists for ISIT 2011 Student Paper Award

| Paper  | Student Author  |
|--|-----------------|
| Prediction of Priors for Communication over Arbitrarily Varying Channels     | Yuval Lomnitz   |
| To Feed or Not to Feed Back  | Himanshu Asnani |
| Channels with Intermittent Errors  | Arya Mazumdar   |
| Communicating Remote Gaussian Sources over Gaussian Multiple Access Channels | I-Hsiang Wang   |
| On Unconditionally Secure Multi-Party Sampling from Scratch                  | Ye Wang         |
| Sum Degrees-of-Freedom of Two-Unicast Wireless Networks                      | Ilan Shomorony  |
| Covering Point Patterns  | Andreas Malär   |
| On the Decoding Complexity of Cyclic Codes Up to the BCH Bound               | Davide Schipani |
| Degrees of Freedom of the Interference Channel: a General Formula            | Yihong Wu       |
| The Dispersion of Infinite Constellations                                    | Amir Ingber     |
| Capacity of Gaussian Channels with Duty Cycle and Power Constraints          | Lei Zhang       |
| A Potential Function View of Information Theoretic Interference Games        | Suvarup Saha    |
| On Codes that Correct Asymmetric Errors with graded Magnitude Distribution   | Eitan Yaakobi   |
| Localization from Incomplete Noisy Distance Measurements                     | Adel Javanmard  |

The second paper, "Multiuser MIMO Achievable Rates With Downlink Training and Channel State Feedback" by Giuseppe Caire, Nihar Jindal, Mari Kobayashi, and Niranjay Ravindran, presents a novel and useful treatment of the use of feedback for MIMO systems. It makes a significant contribution to understanding the role of feedback in the context of channel measurement, particularly when the cost of the feedback must be taken into account. In so doing, the paper shows the benefit of using digitized feedback, based on information-theoretic principles. The paper explicitly takes into account the fact that the feedback channel is itself noisy and that the system must therefore be considered in terms of distortion. The paper presents a scheme of shared and dedicated training, which is novel and quite non-trivially extends the existing schemes. One of the novel approaches of the paper is that it goes beyond considering the error in channel estimation as a SNR penalty at the receiver. The gains shown are quite large in terms of degrees of freedom. The paper uses of information theory in designing new approaches for feedback in MIMO systems.

The ISIT Student Paper Award is given annually to one or more outstanding papers in that year's IEEE International Symposium on Information Theory for which a student (or students) is the primary author, and is also the presenter of the paper. The winners of this year's awards will be announced soon on our Society Website,

while the awards committee reviews carefully the finalist papers. The finalists are given in the table above.

The presentations were excellent. Stay tuned to find out the winner!

The IEEE IT Society Chapter of the Year Award annually recognizes a chapter that has provided their membership with the best overall set of programs and activities.

The 2011 Chapter of the Year Award is presented to the Spain Chapter. The official mention is: "For providing an outstanding set of technical and educational activities ranging from invited talks, to meetings on coding and communications theory, and a school of information theory, which served its own IEEE membership and the IEEE membership beyond its borders".

Congratulations to all the winners. We look forward to recognizing more of our outstanding members in the year to come.

Your first VP,  
Muriel Médard.

## 2011 IEEE Information Theory Society Chapter of the Year Award

The Spain Section Chapter received the 2011 IEEE Information Theory Society Chapter of the Year Award for their contribution to spreading the enthusiasm for open problems in Information Theory. The IEEE Information Theory Society Spain Chapter was founded in 1996 by Professor Josep Domingo-Ferrer, as founding Chair, with Professor Josep Rifà-Coma as Vice-Chair. Last year, Professor Pedro Crespo was elected Chair of the Chapter. He has focused his efforts on organizing Information Theory-related events with the different universities and research centers in Spain. The Spain Chapter is using the web to publicize the activities related to IT thereby boosting collaborations among all IT researchers in Spain. This year in particular, Professors Angel Lozano and Ezio Biglieri organized the 11th Winter School of Information Theory at Universitat Pompeu Fabra, Professor Juntti

arranged an IEEE Communication Theory Workshop in Sitges, and Professor Rifa hosted the International Castle Meeting on Coding Theory and Applications in Barcelona. In addition, the researchers in information theory and signal processing for communications meet twice a year to align and discuss their research activities, to which a significant number of the chapter members contribute regularly. The last such meeting took place in July in the beautiful city of San Sebastian, where Professor Sergio Verdú gave an IEEE distinguished lecture on Non-asymptotic Information Theory while enjoying the outstanding local gastronomy and good weather. The Chapter is honored to receive the 2011 IEEE Information Theory Society Chapter of the Year Award and will continue to work on upgrading and expanding its efforts and activities.

---

## President's Column *continued from page 3*

is the future of the Transactions ten years from now?" To respond to this question, in agreement with the Editor in Chief and the Board of Governors, I have created an *Ad-Hoc Committee on the Future of the Transactions* and I am pleased to report that Abbas El Gamal has accepted to serve as chair.

I also would like to acknowledge the extraordinary work of our volunteers and in particular the organizers of the Information Theory Schools. The annual North American School of Information Theory took place in July 2011 in Austin TX. This by-now classic event for graduate students has reached its 4th edition, and keeps going strong: 122 students met on the UT Austin campus during memorial day weekend, and attended a dense program of lectures, social events and professional enrichment and interaction, led by the organizers Tie Liu, Sriram Vishwanath, Robert Cui, Elza Erkip, Aaron Wagner, Jean Francois Chamberland and Henry Pfister, with the web help of our Online Committee Chair Matthieu Bloch and the advice of Gerhard Kramer (Chair of the Membership and Chapters Committee) and of Aylin Yener (Chair of the Students Committee). In 2012, the North American School will be held at Cornell, organized by Aaron Wagner and Salman Avestimehr. As you know from the past issue of the IT Newsletter, the 11th European Winter School of Information Theory took place very successfully in Barcelona in March 2011, organized by Angel Lozano, Ezio Biglieri and Xavier Mestre. In the mean-

time, the 12th European Winter School is already in the pipeline, and is being organized in Turkey by Deniz Gunduz and Gerhard Kramer. The IEEE IT Society is directly involved in these schools not only in terms of its members' volunteer efforts, but also in terms of modest but critically helpful financial support. I believe that investing in these schools has a very high payoff for our Society. In fact, both the energy dedicated by the organizers and the enthusiasm demonstrated by the students attending these events are very reassuring for the future of our field.

My final note goes to our Society Chapters. First, I'd like to acknowledge the Spain IT Society Chapter for winning the Chapter of the Year award, as the result of a very strong set of initiatives and activities. Then, I'd like to invite all of you to catch up with the activities of your local Chapter simply by following the links from [www.itsoc.org/people/chapters](http://www.itsoc.org/people/chapters). Chapter chairs are encouraged to use their itsoc.org web space to keep their members informed of all upcoming and ongoing events. In particular, I'd like to reiterate the invitation to all Chapters to take advantage of the IT Society Distinguished Lecturer Program (see [www.itsoc.org/people/committees/membership-and-chapters-committee](http://www.itsoc.org/people/committees/membership-and-chapters-committee)), and proactively make contact with the Distinguished Lecturers in order to invite them for a lecture and a visit. As always, if you would like to get more involved in the activities of the Society or share your comments, please contact me at [caire@usc.edu](mailto:caire@usc.edu).

## IT Society Members Honored

Irwin Mark Jacobs and Jack Keil Wolf are the winners of the prestigious 2011 Marconi Society Fellowship and Prize, in recognition of their lives' work which dramatically boosted the speed, capacity and accuracy of voice and data transmissions around the world.

Jacobs, a former professor at UC San Diego and co-founder of communications companies Linkabit and Qualcomm, was cited for his contributions in satellite-based and digital communications, including Code-Division Multiple Access (CDMA), which became the standard for 3G cellular networks. Among his many awards, he has received the President's National Medal of Technology.

Wolf, the Stephen O. Rice Professor of Electrical and Computer Engineering at UC San Diego, was cited for his contributions in data compression and data storage technology. He was a Shannon award winner and a member of the National Academy of Engineering and the National Academy of Sciences. Sadly, Wolf died on May 12, 2011 just after his selection for the Marconi Prize.

The Marconi Society, established in 1974 by Gioia Marconi Braga, daughter of radio inventor Guglielmo Marconi, each year recognizes one or two scientists who pursue advances in communications and information technology for the social, economic and cultural development of all humanity.

## The Historian's Column

This column is about "Predictive History"; this is a new kind of history that records ahead of time the events that happen in the future. That is, it is a scientific form of prophecy, as all predictions are. I am sure that within the ranks of our community there will be skeptics despite the fact that what we all do (more or less) is to develop tools that allow us to predict the future. The general public might accuse us of charlatanism, but we know better.

So, what gave me this idea is the fact that I have been the general co-chair of the ISIT in St. Petersburg which by now is past History. However, as I am writing this column, the event has not yet taken place. So I thought I would engage in a form of "Predictive History", where upon I will tell you what happened, before it happens!

Being close to the details of the organization provided me of course with a unique advantage towards minimizing the probability of error. If my predictions prove accurate I can boast prophetic capability, if they prove wrong, it will be a source of fun for everyone. So, it is a win-win situation.

Let me first start with a very momentous event in the days before the event. In fact, let us go way back to 2008 when I accepted the challenge of co-chairing the Symposium in Russia. Everyone was warning me of the multitude of risks involved and the possibility of disastrous eventualities. But, what is life without risk and adventure? So, I boldly stepped forward and joined forces with Volodja Blinovskiy (my co-chair). The pressure however, did cause me some anxiety. So one evening I actually prayed to the Force for inspiration on how to be a good chair and how to handle the challenge. Lo and behold, soon after that an angel appeared in my dream and, speaking on behalf of the Force, offered me a choice. I could choose either **unlimited power**, or **unlimited funds**, or **unlimited wisdom**! I felt proud and virtuous and chose unlimited wisdom. The angel told me, after a thunderous approval by the Force, that my request was granted.

*Anthony Ephremides*



All excited, the next morning I called Volodja and told him what had transpired overnight. He listened to me carefully and asked me whether I felt I had indeed unlimited wisdom. I said "sure". Then he asked, what was the first conclusion that I arrived at given my new and unlimited amount of wisdom? My answer was: "I should have chosen the money"!

Those of you who were at the ISIT know full-well that this part of my predictive history is 100% accurate and "on the money" (no pun intended) since I actually did utter these words at the banquet. But beyond this "cheap" prediction that was under my control, I will engage in riskier "raconteur" exercises.

This ISIT took place in glorious weather conditions (how about that?). Although the shadow of the "tsars" has faded by now, the shadow of totalitarian "realism" has survived. The silhouette of the hotel Prebaltiskaya (now "Park Inn") is that of a behemoth from the Soviet era. Huge and boxy and at odds with the playful colors of its new name, it stands by the tidal waters of the Bay of Finland (the edge of the Bothnian Gulf that is an offshoot of the Baltic Sea) and dominates its neighbors. It was quite a sight to have hundreds of IEEE IT delegates with their red bags buzzing around the lobby of this refurbished giant from the era of the red regime.

The logistics of the Symposium proved to be a "piece of cake" in the able hands of Veronika Prohorova, one of the most resourceful and able colleagues from the Russian side who along with Anton Sergeev and the support of many others ensured down to the last detail that everything ran smoothly.

The quality of the food was another surprise. Although there was some sort of chaotic disorder at breakfast, the lunches proved to



**After the 2011 ISIT it's time to relax.**

be up to the standards of mass-produced convention food (neither better, nor worse).

The lingering smoke in the lobby from the “die-hards” who still puff on tobacco products brought back images of “smoke-filled” rooms of another era. Russia is not yet on the anti-smoking band-wagon.

A long walk from the hotel took the delegates to the terminus of one of the metro lines. Two stops later they would reach the Nefsky Prospect, that is the “hub” of the city with its full charm of architecturally marvelous buildings, canals, churches, and palaces.

Memorable meals at the Sadko restaurant (for a few select delegates) reminded us that there is no good and bad type of cuisine; only good and bad food. Classic Russian fare proved to be of excellent quality in that venue.

The trips to and from the airport and the Moscow Railway Station, as well as Wednesday’s afternoon city tour, provided a nice, albeit superficial, view of the new Russia and its “Venice”.

The room of the plenary talks overcame its claustrophobic ambience through the use of multiple screens arranged in a logical but unorthodox way.

But, of course, the most important element in the Symposium is the technical program. Over eight hundred (800) participants milled around and attended the sessions that included over six hundred (600) papers, plus the posters of the recent results session on Wednesday morning. Shlomo’s Shannon Lecture was a huge success. We tried hard to prevent him from delivering it in Russian. Two hundred plus delegates attended the tutorials on Sunday before the elegant welcome reception. And the banquet, ah the banquet! That hub of activity of any conference, where the delegates come as close as they can to partying and celebrating. Vodka, sparkling wine and (yes!) even Hermitage red wine!

I would say that the program of this ISIT was among the best , with Tom Cover’s talk being the most densely attended. No paradox in that! And to top it all, the Symposium had a handsome surplus.

So, how is all that for predictive narration?

## GOLOMB'S PUZZLE COLUMN™

## Primes and Divisibility

Although there is no uniform probability distribution on the set  $Z^+$  of all positive integers, certain probabilistic statements obviously make sense: Since every  $n$ th integer is a multiple of  $n$  (for every  $n \in Z^+$ ), the “probability that a random integer is a multiple of a give integer  $n$ ” is  $1/n$ .

The next four questions, similarly, have answers that can be made rigorous.

- 1) What is the probability that a random positive integer is square-free? (A number is square-free if it is not divisible by the square of any prime number.)
- 2) What is the probability that two randomly chosen positive integers are relatively prime (i.e. have no common prime factor)?
- 3) What is the probability that a randomly chosen square-free positive integer is a multiple of a given prime number  $q$ ?
- 4) More generally, what is the probability that a randomly chosen square-free positive integer is a multiple of a given square-free integer  $n$ ?

The Prime Number Theorem (PNT) asserts:

$$\pi(x) \sim x / \ln x \text{ as } x \rightarrow \infty$$

Solomon W. Golomb



where  $\pi(x)$  = number of prime numbers  $\leq x$ ,  $\ln x = \log_e x$ , and “ $f(x) \sim g(x)$  as  $x \rightarrow \infty$ ” means that  $\lim_{x \rightarrow \infty} (f(x)/g(x))$  exists and equals 1. The PNT may be loosely restated as: “The probability that a random positive integer in the vicinity of  $x$  is prime is  $\approx 1/\ln x$ .”

The next two problems can be answered by probability calculations that assume, if  $p_1, p_2, p_3, \dots$  are distinct prime numbers, then divisibility by  $p_i$  is statistically independent of divisibility by  $p_j$ , for  $i \neq j$ . (This is provable for finite sets of primes, but is only an assumption for infinite sets of primes.)

5. What is the probability that, if  $n$  is a randomly chosen integer in the vicinity of  $x$ , then  $n$  and  $n + 2$  are both primes?

More generally,

- 6) What is the probability that, if  $n$  is a randomly chosen integer in the vicinity of  $x$ , then  $n$  and  $n + 2k$  are both primes for given  $k \in Z^+$ ?

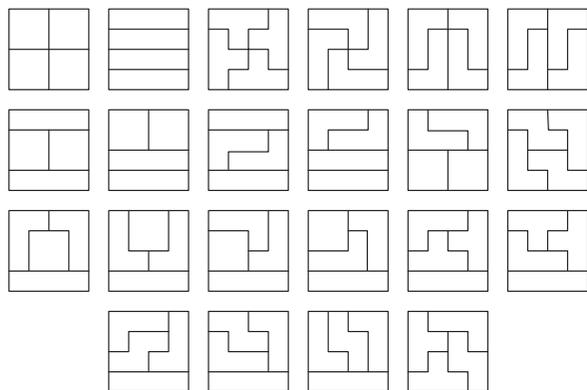
(The answers to 5. and 6. lead to the *conjectured* asymptotic formulas for the number  $T_2(x)$  of “twin primes”  $\leq x$ , and for  $T_{2k}(x)$  for the number of prime pairs separated by  $2k$  up to  $x$ .)

# Polyomino Tilings Solutions



Solomon W. Golomb

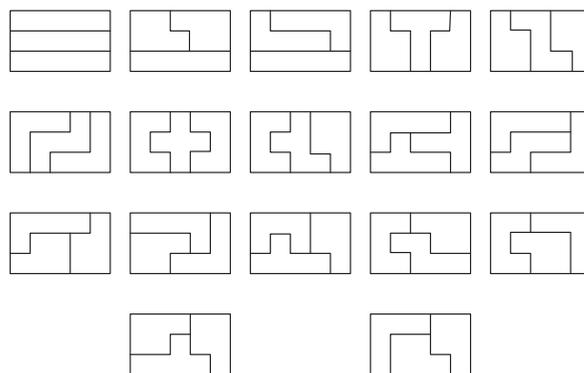
1) Four tetrominoes in a  $4 \times 4$  square has 22 inequivalent solutions.



The six figures in the top row each use four copies of a single tetromino. The six figures in the second row each use two copies of two different tetrominoes. The remaining ten figures each use three different tetrominoes, one of them twice. By a coloring argument, the T-tetromino (T) if used, must occur an even number of times. The L-tetromino (L) has no symmetries, and

appears most frequently among the solutions.

2) Three pentominoes in a  $3 \times 5$  rectangle has 17 inequivalent solutions.



Of the twelve pentominoes, only the W (W) fails to occur in any solution. The very versatile P pentomino (P), compact and with 8 different orientations, is the most frequently used shape.

# IEEE Information Theory Society Board of Governors Meeting Minutes

June 02 11 UCSD, La Jolla

Natasha Devroye

**Present:** Giuseppe Caire, Muriel Medard, Bruce Hajek, Gerhard Kramer, Nihar Jindal, Natasha Devroye, Andrea Goldsmith, Frank Kschischang, Abbas El Gamal, Alex Vardy, Al Hero, Emanuele Viterbo, Prakash Narayan, Aylin Yener, David Tse, Hans-Andrea Loeliger, Sriram Vishwanath, Paul Siegel, Emina Soljanin, Alex Grant (Skype for first 30 minutes), Matthieu Bloch, Michelle Effros, Sergio Verdu, Rolf Johannesson, Li Ping, Max Costa.

The meeting was called to order at 1:38pm by the Information Theory Society (ITSoc) President, Giuseppe Caire, who welcomed the Board of Governors (BoG).

- 1) The minutes of the BoG Meeting on 9/28/2010 at Allerton were approved.
- 2) The agenda was approved.
- 3) Giuseppe Caire presented the President's report: newly elected board members and officers were welcomed, outgoing board members were thanked, and ITSoc members that were elected IEEE Fellows were congratulated.

Giuseppe Caire reported that the society is in great financial health, that the IEEE Transactions on Information Theory continue to be of high technical quality, that the conferences and workshops organized ran flawlessly, and that the society is an IEEE leader in terms of its member services.

Of the many on-going initiatives in 2011, the president selected one to highlight – to reduce the submission-to-publication (sub-to-pub) time for the IEEE Transactions on Information Theory. An important step in this direction was the recent switch to ScholarOne. The president will work with the editor in chief and editorial executive board on reducing the sub-to-pub time.

Giuseppe Caire's first objective as incoming president is to "do no harm." Other new action items include:

- Increasing ITSoc presence in IEEE wide strategic initiatives such as the IEEE SmartGrid Forum.
- Exploiting financial surpluses, and finding a way to guarantee long-term funding of the IT schools.
- Closely following the IEEE Technical Activities Board (TAB) discussion on Open Access. Giuseppe Caire plans to promote the "physics model" already being practiced by the IT society members through the usage of arXiv.
- Preparing for the 5 year review.

Giuseppe Caire thanked Frank Kschischang for leaving the society in such an excellent condition.

- 4) Division IX Director Al Hero presented his report: he explained IEEE organization and where the ITSoc stands in Division IX – the "Signals and applications" division. He explained the role of the TAB: to monitor societies, spread good practices, and approve budgets. TAB is interested in suggestions for how to make IEEE more cohesive. How the societies are split into the various divisions (e.g. signal processing, control, information theory societies) was discussed, and Al Hero was open to making suggestions at the Board of Directors meetings regarding how to better split the societies (e.g. why are we in a different division than control).

Al Hero reported on the IEEE: 70% of IEEE revenue comes from publications and conferences, IEEE has about 405,541 members and about 100,000 student members. Student membership has drastically increased in the past 10 years, but retention (i.e. after they graduate) remains challenging.

Al Hero reported on ITSoc membership: it is international, with increases in membership from India, Japan, UK, South America and decreases in membership in the US. This decline in US membership may be partly due to the availability of IEEE Xplore through many US universities.

Al Hero reported that the following are topics of current IEEE interest:

- how to deal with the IT society's decline in membership
- whether Open Access (making publications freely available) will kill societies, who depend on revenue from publications
- new IEEE products: the IEEE is pushing to make their primary product – information – available on different electronic media
- new IEEE initiatives such as the smart grid, cloud computing, life sciences, and humanitarian activities (EPICS, South Africa wind project)

A discussion was started on Open Access. Andrea Goldsmith asked Al Hero to clarify the concern that Open Access would kill societies – what is Open Access, what is the concern, and what is IEEE doing to mitigate this? Al Hero, a strong believer in Open Access, stated that it is viewed as a threat to the societies, as when publications are made free, the provider becomes irrelevant. He believes we are currently in a transition period where we can post work on arXiv without affecting IEEE yet as libraries still purchase IEEE Xplore as they do not realize that we have substantial access already. He believes in the future IEEE will be a manager of Open Access rather than a (for pay) provider of

publications. Nihar Jindal asked whether NSF will take the lead of NIH regarding Open Access? Al Hero stated that there is no indication of this yet, and it has been a year since White House initiated a call to action essentially requiring the adoption of Open Access. IEEE is currently de-facto "Open Access friendly" in that it allows authors to openly publish their work in other places. IEEE performed a study on the cost of Open Access, and concluded that it would cost about [dollar]3,000–4,000 or so per paper to make it completely available to all. It was asked whether this could be written into NSF proposals. It was concluded that Open Access is one of the biggest open and active issues for IEEE, and input is sought. There is still much uncertainty, but Al Hero believes Open Access should be embraced rather than ignored.

- 5) ITsoc treasurer Nihar Jindal reported on the ITsoc's excellent financial health.

The end of year forecast for 2010's operating surplus is +\$263,000, which is \$241,000 more than budgeted. The society made over \$100,000 surplus on conferences.

Nihar Jindal asked whether the society wants to consider ways of using the surpluses, exploring the use of mechanisms other than putting it into the bank. One suggestion was made to put money in IEEE foundations in order to access it over a longer term to support events such as the successful IT schools. Nihar Jindal will explore this IEEE foundation possibility.

Nihar Jindal highlighted that while IEEE downloads are increasing, IEEE Transactions on Information Theory downloads are decreasing. The IEEE Transactions on Information Theory are still the 13th most downloaded publication, but this may be something to keep in mind for future years given our publication-dependent revenue.

Abbas El Gamal asked why we have more than \$100,000 surplus on conferences, and why they are not made more affordable instead. Giuseppe Caire responded that the IEEE guidelines suggest budgeting for 10% profit, and that due to effective organization, the actual profits are often closer to 20%. Giuseppe Caire believes that going below 10% surplus is dangerous, and suggests that we devise smart ways of using the surplus cash instead. Abbas El Gamal asked whether we can create an endowment? Al Hero responded that during the recent financial crisis it was forbidden to transfer cash to IEEE foundations and that this has not yet been reversed by the IEEE due to legal issues involved with being a non-profit organization. Before July, societies could make a donation that would serve a specific purpose, to be taken out at a later date such as for example the Padovani lecture endowment. This appears to no longer be possible but should be monitored and discussed in the future. Al Hero will convey the ITsoc's interest in IEEE foundations to the IEEE.

- 6) Membership and Chapters committee report was given by Gerhard Kramer.

The 2011 members were outlined.

The 2011 Schools of Information Theory were outlined:

- 2011 Taiwan Winter School, in January, organized by S. Moser
- European Winter School, in Barcelona in March, organized by A. Lozano and X. Mestre
- North American School, at UT Austin in May, organized by S. Vishwanath and T. Liu
- Wireless Summer School, in Oulu in July, organized by M Juntti

The Padovani Lecturer for 2011: Richard Baraniuk was approved by Roberto Padovani and the Committee. Andrea Goldsmith believes requiring Roberto Padovani's approval of the chosen lecturer sets a bad precedent. Gerhard Kramer replied that this approval was meant as a courtesy rather than a true question, but was amenable to Andrea Goldsmith's suggestion to inform rather than request approval of the selected Padovani lecturer from Padovani in future years.

Gerhard Kramer outlined the Distinguished Lecturer program and encouraged the BoG and various chapters to make use of these excellent lecturers.

Gerhard Kramer raised issue 1: does BoG need to approve the Schools of IT? The North American School of IT is the society's 3rd largest event in terms of attendance and budget (following ISIT and ITW), and has the Padovani Lecture associated with it. It was agreed that the requirement for BoG approval be limited to funding and technical co-sponsorship requests.

Gerhard Kramer raised issue 2: should the School of IT always be registered with IEEE as a conference? In 2010 it was registered to move financial liability from the organizers to IEEE and the ITsoc. This was useful in shaping some contracts (e.g. dorms), and was not much work. Gerhard Kramer thus recommended that a School of Information Theory with a large budget and attendance be registered as a conference with the IEEE. He also noted that in the paperwork for previous years, the organizers made clear that the School was not seeking to make a profit (rather, it is subsidized), which does not align with the usual 10% profit IEEE recommendations. This appeared to be fine by IEEE.

Gerhard Kramer raised issue 3: school attendance. In November 2010, the BoG approved the motion That students attending the IT Summer School must be members of the Information Theory Society, which goes against the ITsoc constitution which says (Article VII, Section 2): "Meetings, conferences, symposia or conventions of the Society shall be open on an equal basis to all members of the IEEE." The question of how to formulate our policies for IT School attendance was discussed at length. Issues that were raised included: whether we want the dominant attendees of the school to be students, whether non ITsoc students should be supported, whether allowing non-student people from industry to attend would interact with the

value of tutorials at ISIT (which they could essentially get for much less \$ at the IT School), and how to structure the registration fees with regard to members/non-members of IEEE and/or ITsoc.

Andrea Goldsmith moved “That IEEE Information Theory Society Student Members attending the IT Summer School have their registration (or other) fees reduced.” The Board approved the motion.

Alex Vardy proposes a motion to strike down the November 2010 motion “That students attending the IT Summer School must be members of the Information Theory Society” in a spirit of regret. Sergio Verdu proposed a motion to have the just passed motion “That IEEE Information Theory Society Student Members attending the IT Summer School have their registration (or other) fees reduced.” override the November 2010 motion “That students attending the IT Summer School must be members of the Information Theory Society.” This motion was approved.

- 7) Muriel Medard reported on the Outreach Committee on behalf of Todd Coleman and Christina Fragouli. In short, there was a mentor breakfast, and WITHITS lunch activities going on at ITA. A full report is to be given at the next BoG meeting. Aylin Yener and Christina Fragouli will work together on future joint Student Committee and Outreach Committee events.
- 8) Andrea Goldsmith reported on the Nominations and Appointments Committee: she provided an overview of its members and responsibilities.

Regarding the Wyner Award Selection Committee: since it is relatively new there are few former winners to appoint. A bylaw change from last year was made: the 1st VP is no longer ex-officio, and one additional member and former winner are now also required.

The implementation of staggered 3-year terms for the Fellows Committee was completed.

Andrea Goldsmith made the following suggestion: after the fall elections presidents should canvass new and ongoing BoG members about their committee interests in order to ease staffing of these committees. Alex Vardy said he has a list of past editors in chief which he will pass on (useful for the Shannon Award Committee staffing).

Andrea Goldsmith proposes to change the Fellows Committee formation date from October 1 to something later than Dec. 15.

Andrea Goldsmith noted that the staggered 3-year terms has worked well – adding this to the bylaws could be considered.

Andrea Goldsmith stated that the Student and Online Committee are not yet standing committees, but already act like them. Giuseppe Caire is in favor of adding these to the standing committees. Motions need to be formulated about this.

Andrea Goldsmith suggested recommending ITsoc members for awards outside of the society such as the Baker prize for the best theory paper as the BBVA Award. She questioned how to staff the non-IEEE awards committees – under the Awards Committee, or through separate committees? Gerhard asked whether we should advertise the Baker prize so general members could make nominations?

- 9) Giuseppe Caire presented the report on the 2010 Fellows Committee on behalf of Frans Willems. He suggested that the BoG take a look at the short slide online; there are no surprises.
- 10) Matthieu Bloch reported on the Online Committee: Nicholas Laneman drove the website design in the last 4 years and deserves a great deal of credit. The website is up and running smoothly and for the first time is seeing a stabilization in the number of visits. Most visitors to the ITsoc website view the information for authors, IT schools, upcoming conferences, and news pages. Matthieu Bloch’s hope is that the website will replace the mailing list as the main source of information, allowing the mailing list to become a digest. The website has many convenient features, including the ability to host conference websites. He hopes that in future years ITW will use the ITsoc website rather than other domain names, and noted that ISIT already dangles off of the ITsoc site.

Giuseppe Caire asked about the ability to host videos on the ITsoc website. Matthieu stated that their original idea was to host videos through another service (e.g. YouTube or Vimeo) and embed them into the website. However such sites seem to limit the size of videos to 10 minutes each (universities are exempt). Giuseppe Caire believes this issue is resolvable (e.g. cut into shorter, linked blocks); Matthieu Bloch will report back on progress.

Matthieu Bloch will post clear guidelines on how to post announcements on the ITsoc website.

- 11) Aylin Yener reported on the Student Committee:

- ISIT 2010 event 1: roundtable research discussion with student leaders. Lunch was provided, T-shirts were distributed.
- ISIT event 2: a panel on “recipes for a good talk”, lunch was provided. The panelists were thanked.
- For some of these student events, the rooms booked were too small – while 120 students attended, 40 had to be turned away. In future years, Aylin Yener suggests making sure that large rooms are booked for these popular student events.
- At Allerton 2010 a new event was introduced – Information Theory Jeopardy, which about 25 students attended. The Student Committee is thinking of trying it again with participation from faculty, who are encouraged to collectively make fools of themselves.

- The Student Committee is talking to the Outreach Committee about joint events in the future.
- The Student Committee wishes to thank Bobak Nazer for his service.
- Aylin Yener thanked the ITsoc for their support of the School of IT in past years. She and Gerhard Kramer are handing off the School of IT organization to the next generations. The North American School of Information Theory is to be held at UT Austin over memorial day weekend in 2011, and will be organized by Sriram Vishwanath and Tie Liu. The instructors will include Richard Baraniuk, Bob Gray, Sanjoy Mitter, and Emre Telatar. The enthusiasm about the school is spreading, and many international schools are popping up.

Max Costa asked about the requirements for starting a school of information theory: is a chapter needed? Are certain requirements to be met? Aylin Yener and Gerhard Kramer replied that nothing is formally needed except time and initiative. If the Student Committee becomes a standing committee, its relationship to the Schools of IT should be made clear. Giuseppe Caire believes that the Student Committee should be involved in the content (e.g. choosing and inviting lecturers), and that the Chapter and Membership Committee should be more supervisory. The Committees could be more involved if technical co-sponsorship and financial help is requested. Gerhard Kramer suggests putting instructions on how to run successful Schools of IT online, but is supportive of the distributed approach to the IT school which relies largely on local enthusiasm.

Giuseppe Caire, on behalf of the BoG, thanked Gerhard Kramer and Aylin Yener for their commitment to the School of Information Theory. The BoG applauded their efforts.

Gerhard Kramer spoke about the School of IT held on Jan. 17, 2011 in Taiwan. Stephan Moser organized this small one day event. It was an excellent small, local initiative.

12)Sriram Vishwanath spoke about 2011 North American School of IT. He thanked Gerhard Kramer and Aylin Yener for bringing the School of IT so far. He outlined the plans for the 2011 summer school:

- free lodging at UT Austin (in contrast to previous years). It will act as a hotel with a credit card provided to reserve the room (but not charged). No cheques to/from students as in past years.
- May 27–30 to overlap with Memorial Day
- website is up, with logistics outlined
- change in structure: 2 long core information theory and coding lectures, and 3 medium applications and interdisciplinary lectures.
- Statistics on new versus old students will be tabulated.

- Try to accept/accommodate everyone. They currently have 230 dorm rooms. Last year there were many last minute cancelations.

A motion to sponsor the 2011 North American School of Information Theory for \$20,000 was made. A motion to increase this to \$25,000 was made and approved unanimously.

13)Sergio Verdu reported on the Publications Committee: Helmut Bolcskei expects to present a plan of action at the BoG meeting in August 2011 at ISIT in St.Petersburg. He is making a huge effort to reduce the increasing sub-to-pub times.

The policy on previous publications was outlined online, and states that:

Contributions should comprise novel and previously unpublished material; however, prior publication in conference proceedings of portions of the material shall not preclude publication in this journal when such prior or concurrent publication is referenced in the paper itself at the time of submission. If authors submit a nearly verbatim copy of a prior conference publication, they should indicate to the editors in a cover letter why they believe that such resubmission is warranted. Editorial decisions will take into account previous dissemination of the submitted material.

Hans-Andrea Loeliger suggests that the last sentence be reworded to “publication” rather than “dissemination”, as arXiv postings are often verbatim copies of IEEE Transactions on Information Theory submissions. This change would not discourage authors from posting on arXiv. A few years ago, a discussion was had on the policy of verbatim submissions /re-publications of work. No conclusion was made then. Should the BoG decide that verbatim submissions (e.g. from ISIT papers) are permitted, it was suggested that this be clearly worded.

Helmut Bolcskei is successfully recruiting more senior associate editors, which is not an easy task. It was particularly hard to find associate editors in certain fringe areas, where the IEEE Transactions on Information Theory is not the central publication venue, and hence many of the selected associate editors publish the bulk of their work elsewhere. It was suggested that the IEEE Transactions on Information Theory may want to consider changing their focus. Frank Kschischang suggests selecting only associate editors that make IEEE Transactions on Information Theory their publication home. As a whole, the board hopes to clarify the scope of the IEEE Transactions on Information Theory. For example, Abbas El Gamal questions the presence of machine learning in the Transactions.

Motion to approve Alexei Ashikhmin as associate editor for the IEEE Transactions on Information Theory – Coding Techniques was unanimously approved.

Motion to approve David Burshtein as associate editor for the IEEE Transactions on Information Theory – Coding Techniques was unanimously approved.

Motion to approve Nicolo Cesa-Bianchi as associate editor for the IEEE Transactions on Information Theory – Coding Techniques was unanimously approved.

Motion to approve George Moustakides as associate editor for the IEEE Transactions on Information Theory – Detection and Estimation was unanimously approved.

Motion to approve Yasutada Oohama as associate editor for the IEEE Transactions on Information Theory – Source Coding was unanimously approved.

In appointing associate editors, the BoG agreed that it would be useful if there was a mechanism for reporting less-than-professional behavior to the Editor in Chief, which would aid in making associate editor nominations.

- 14) Muriel Medard reported on the Awards Committee: she outlined the members and the committee's main responsibilities: the joint IT/Comsoc Paper Award, the IT Paper Award, the ISIT Student Paper Awards, and the Baker Prize.

Regarding the joint IT/Comsoc Paper Award – the IT and Communications societies take turns leading the process. When ITsoc leads, nominations are due March 1; when the Communications society leads, the nominations are due on Feb. 15, which aligns with all other Comsoc paper awards. Muriel Medard suggests having a single deadline which does not change depending on who is leading. Andrea Goldsmith encourages pushing for a later deadline to allow more time for nominations. A discussion was held about where to put this deadline and it was agreed that the BoG would like both the IT and joint IT/Comsoc Paper Award nomination deadlines to March 1. Muriel Medard will make a request to the Comsoc to change the deadline to March 1.

Regarding the IT Paper Award – there are numerous discrepancies on the web about the 2 year versus 3 year nomination window and nomination dates. These should be resolved.

Gerhard Kramer asked whether the IT/Comsoc nominations are automatically considered for the IT Paper Award? Muriel Medard responded that these two awards are run separately, but that the chair of the committee for one award could approach the nominee if they believe the paper is more suited to the other award. Papers may also be nominated for both.

Regarding the ISIT Student Paper Awards – at future ISIT meetings the committee will try to schedule all finalists between Monday and Thursday. The committee – composed of the entire Awards Committee – will meet on Thursday before the banquet; if there is a clear decision the announcement will be made at the banquet, otherwise it will be announced later. In future years, it was suggested that the guidelines for the number of papers to be

recognized be followed: in the bylaws up to 3 papers may be recognized, but in 2010 this was not enforced.

Regarding the Baker Prize: Andrea Goldsmith and Dave Forney were instrumental in resurrecting this prize, a prize that spans multiple societies and considers papers published 3–5 inclusive years ago that have already been awarded, as well as others that are award-worthy. Frank Kschischang noted that the entire BoG should look at paper awards. Muriel Medard, chairing the Awards Committee is worried about over-taxing the awards committee with this additional award. A suggestion was made to have the whole committee be involved in the Baker Prize nomination as its nomination deadline falls later than the others, on July 1, 2011.

- 15) Bruce Hajek reported on the Conference Committee.

The ISIT 2010 in Austin books are nearly closed, and a surplus of \$105,000 is estimated

ISIT 2011 in St. Petersburg:

- Concerns were expressed about the visas: various issues such as that passports have to be valid for 6 months after you leave Russia, that the exact arrival and departure dates/travel itinerary must be known in advance, and that you need a visa letter (from conference organizers or hotel) must be made clear to ISIT attendees. There are several good websites about Russian visas.
- Regarding the visa letter: this is the responsibility of the local organizers. The BoG wishes to emphasize the importance of timely visa letters, and hopes that the local organizers will start planning for this immediately. The BoG recommends tourist visas rather than business visas.
- Rolf Johannesson brought up the issue of visa waivers, which would greatly simplify the travel arrangements of ISIT participants. Reference was made to <http://eng.news.kremlin.ru/transcripts/1381>, which covered the elimination of bureaucratic barriers on the way to technical modernization of Russia. The BoG moved to request Evgenii P. Velikhov's support in obtaining a visa waiver for ISIT 2011. This motion was approved unanimously.
- The Feb.15 ISIT deadline is firm.
- The BoG moved to provide a loan of \$5,000 for posters at ISIT, which was approved.

A motion to approve a loan of \$60,000 for ISIT 2012 in Cambridge/MIT was unanimously approved.

ISIT 2013 to be held in Istanbul is coming along. Nothing to report.

A motion to approve a loan of \$30,000 for downpayments for ISIT 2014 to be held in Hawaii was unanimously approved.

A proposal to hold ISIT 2015 in China/Hong Kong is expected for the summer of 2011 (next BoG).

The ITW 2010 in Cairo made a profit of \$18,000. The organizers have made a proposal for a winter School of Information Theory.

The Conference Committee is awaiting the final ITW 2010 in Dublin report.

A motion to approve a loan of \$15,000 for ITW 2011 in Paraty, Brazil was unanimously approved.

There is a new proposal for ITW in Lausanne at the end of 2012, with general chairs Christina Fragouli and Emre Telatar, and program chairs Suhas Diggavi and Rudiger Urbanke. Three special topics will be emphasized: "Recommender Systems' Algorithms and Analysis," "Secrecy and Privacy in Networks," and "Biology." Registration was proposed to be 650 euros for IT members for a 5 day workshop. The BoG generally perceived 650 euros to be high for a workshop and suggests cutting this by 25%. The BoG also expressed concern about the odd topics in which the organizers have little expertise and recommend that the very broad "Biology" topic be narrowed down. There was a motion to approve this workshop proposal; not approved due to the above concerns.

A motion to approve technical co-sponsorship of ITA 2011 with IEEE Xplore access was approved.

A motion to approve technical co-sponsorship of Allerton 2011 access was approved.

A motion to approve technical co-sponsorship of a Wireless Information Theory Workshop/Summer School to be organized in Oulu, Finland just before ISIT 2011 was approved.

The 2nd IEEE International Conference on Smart Grid Communications (SmartGridComm) <http://www.ieee-smartgridcomm.org/> requests technical co-sponsorship. Giuseppe Caire recommends waiting to vote until the official request has been made, then voting over e-mail.

Bruce Hajek encouraged members of the BoG interested in serving on the Conference Committee to contact him.

16) It was proposed to have the 3rd BoG meeting of 2011 at ITW in Paraty, Brazil from Oct. 16–20, 2011. Max Costa is in favor of having the meeting in Paraty, in line with the tradition of having it at ITW every other year (BoG was held at the ITW in Taormina in 2009). Concern was raised that Paraty is a 3–4 hour drive from Sao Paulo and Rio de Janeiro. Vans will be on standby in Paraty to leave for the airports. Alex Vardy recommends that the BoG supports ITWs by showing up at these meetings. A concern was expressed about sufficient attendance.

17) Giuseppe Caire recommends that the annual BoG be held on Sunday July 31, right before ISIT 2011.

18) There were no other issues.

The meeting was adjourned at 6:20 pm.

## Report on the 7th Asia-Europe Workshop on “Concepts in Information Theory”

*Han Vinck*

The 7th Asia-Europe workshop on “Concepts in Information Theory” was held in Hotel Bellevue in the beautiful Rhinevalley near the Loreley in Boppard, Germany, from July 27–July 29. The workshop is based on a longstanding cooperation between Asian and European scientists. The first workshop was held in Eindhoven, the Netherlands in 1989. The idea of the workshop is threefold: improvement of the communication between the scientist in the different parts of the world; exchange knowledge and ideas; pay a tribute to a scientist that contributed to the theme of the workshop in a scientific, but as important, didactic way. In the past we paid tributes to Jim Massey, Jack Wolf, Te Sun Han and Han Vinck. For this workshop Kingo Kobayashi accepted our invitation to be the guest of honour.

Kingo Kobayashi was the key lecturer with a presentation on “finite state channels.” The 25 participants enjoyed the sixteen lectures in the two-day workshop, followed by a boat tour to the “Loreley” and a wine tasting in the cellars of the workshop hotel “Bellevue”.

The proceedings can be downloaded from:

<http://www.exp-math.uni-essen.de/~vinck/aew/Final%20Proceedings%20AEW7%20-%202011.pdf>.

The picture shows the participants and Prof. Kingo Kobayashi during his lecture.



## Report on the Fourth Annual School of Information Theory

*Tie Liu and Sriram Vishwanath*

The Fourth Annual School of Information Theory was held in Austin between May 27–30th with 122 students and postdocs in attendance. The school aims at fostering interactions, both in the form of friendships and research collaborations between students; and between students and other researchers present at the event. The event differs from a traditional conference or workshop in that it is completely student-focused, where each student presents her/his research in an informal and friendly environment. Although the theme is information theory, the event featured research from a diverse set of related fields.

*September 2011*

This is the fourth year of the Information Theory School, with previous year events being organized at Penn State, Northwestern and USC in 2008, 2009 and 2010 respectively. This year was different from previous years in a few aspects: It was held in early summer (end of May) rather than mid/late summer. This was done in order to avoid a head-on collision with the severe Texas summer. This was also the first year when the founding chairs of the Information Theory School – Gerhard Kramer and Aylin Yener, took on an advisory role, and the event organization was handed to a team comprised of Tie Liu and Sriram Vishwanath (general chairs);

*IEEE Information Theory Society Newsletter*

Shuguang Cui, Elza Erkip and Aaron Wagner (program chairs), Jean Francois Chamberland and Henry Pfister (social chairs), Matthieu Bloch (webmaster) and Bobak Nazer (publicity chair).

Overall, the event this year had 5 speakers. The lectures during the school were divided into two themes – of “information theory” and “applications of information theory”. The information theory talks were given by Robert Gray (Stanford), Emina Soljanin (ALU Bell Labs), and Emre Telatar (EPFL), while those from an interdisciplinary perspective were given by Rich Baraniuk (Rice) and Sanjoy Mitter (MIT). Rich Baraniuk’s lecture was this year’s Roberto Padovani lecture, sponsored by him annually as part of the School.

In his lecture, Robert Gray used the notion of stationary codes to build bridges between distortion-rate theory and results from probability and applied probability and presented some very insightful results from this connection. Emina Soljanin gave an entertaining and colorful seminar on balls and urns and connections with the coupon collector problem. Emre Telatar used the white board to deliver an eloquent lecture on polar codes, from the basics to the very advanced details. Turning to the theme of applications, Rich Baraniuk helped the students develop an understanding of compressive sensing from both a theoretical and an applied perspective. Sanjoy Mitter brought out the connections between information theoretic problems and related problems in control and estimation.

As usual, student participation was a requirement for attendance: every student presented her or his work in the form of a 1-minute talk followed by a poster session. These poster sessions were highly interactive and diverse, with discussions continuing well past the end of the poster session.

Socializing is an important component of the school, and this year, we had three social events: A pool-side party on the first day, a pizza and movie night on the second day and a bowling night on the third day. In addition to this, breakfast and lunches were catered by some of Austin’s top-rated restaurants.

On Monday the 30th of May, we were joined by Alon Orlitsky and Rudiger Urbanke who are pioneering a new and exciting project for the Information Theory community. This project, envisioned as an accurate and detailed Wikipedia for information theory, already has multiple student and faculty participants of the School involved as contributors. We anticipate this project will gain momentum over the years and we hope Alon and Rudi will consider working with future Schools in building this database of knowledge in Information Theory.

The 2011 school would not have been possible without the support of our sponsors. The IEEE Information Theory So-



The IT school group picture!

ciety Board of Governors, the Army Research Office (ARO) under Robert Ulman’s program, The new Science of Information Center (Brent Ladd), Princeton University (Vincent Poor), Rice University (Behnaam Aazhang), Texas A&M University (Costas Georghiades) and University of Texas, Austin (Jeffrey Andrews). The school also relied very heavily on the support of staff from the Wireless Networking and Communication Group (WNCG) at UT Austin, including Jennifer Graham and Baldemar Silva. Lastly, the tireless student volunteers who assisted with every activity during the School with a smile were: Abhik Das, Harpreet Dhillon, Jubin Jose, Ioannis Mitliagkas, Zrinka Puljiz, Aneesh Reddy, Hongbo Si, Sarabjot Singh and Rajiv Soundararajan.

The 2011 School represents an experiment wherein the school’s main organizational effort moved from its founding parents (Aylin and Gerhard) to us. We are very grateful for the support and advice given to us by Aylin and Gerhard. Organizing the school has been a great experience for us, and we hope this will continue with the 2012 school, to be organized at Cornell University.

We invite you to browse the 2011 School website <http://www.itsoc.org/school> for photographs, student posters, lecture slides, video recordings, and more. Enjoy!

# Information Theory Workshop (ITW) September 3-7, 2012 Lausanne - Switzerland



## Workshop Chairs

Christina Fragouli (EPFL)  
Emre Telatar (EPFL)

## Technical Program Chairs

Suhas Diggavi (UCLA)  
Rudiger Urbanke (EPFL)

## Call for Papers

The past decade has seen an exponential increase in the data stored in distributed locations in various forms including corporate & personal data, multimedia (videos, photos) and also medical data in repositories. The grand challenge is to store, process and transfer this massive (and growing) amount of data, efficiently and securely over heterogeneous communication networks. This leads to interesting connections between information theory and areas such as machine learning, privacy & cryptography and bio-informatics.

The focus of this workshop is in exploring such connections.

The scope of the workshop includes, but is not limited to the following topics:

- Information theoretic security
- Privacy and cryptography
- Machine learning and information theory
- Information theory in biology
- Network data compression
- Multi-terminal information theory
- Graph-based codes and iterative decoding
- Compressed sensing

## Important deadlines:

Paper Submission: April 2, 2012  
Notification of Acceptance: June 19, 2012  
Camera Ready Submission: July 10, 2012

Further information regarding the technical and social programs, workshop registration, and hotel accommodations will be posted on the website: <http://itw2012.epfl.ch>

Contact: [itw2012@epfl.ch](mailto:itw2012@epfl.ch)



## Technical Program committee

Erdal Arıkan  
Giuseppe Caire  
Sae-Young Chung  
Max Costa  
Elza Erkip  
Alex Grant  
Tracey Ho  
Syed Ali Jafar



Tara Javidi  
Yiannis Kontoyiannis  
Gerhard Kramer  
Frank Kschischang  
Vijay P. Kumar  
Olivier Levêque  
Hans-Andrea Loeliger  
Nicolas Macris



Olgica Milenkovic  
Andrea Montanari  
Alon Orlitsky  
Ashutosh Sabharwal  
Devavrat Shah  
Shlomo Shamai  
Mikael Skoglund  
Toshiyuki Tanaka

Leandros Tassioulas  
Antonia Tulino  
Daniela Tuninetti  
Sergio Verdu  
Pramod Vishwanath  
Sriram Viswanath  
Pascal Vontobel  
Aylin Yener

## Conference Calendar

| DATE                      | CONFERENCE  | LOCATION               | WEB PAGE  | DUE DATE           |
|---------------------------|---|------------------------|---|--------------------|
| October 19–21, 2011       | IEEE Swedish Communication Technologies Workshop (Swe-CTW)  | Stockholm, Sweden      | <a href="http://www.ee.kth.se/swe-ctw-2011">http://www.ee.kth.se/swe-ctw-2011</a>   | Passed             |
| November 6–9, 2011        | 8th International Symposium on Wireless Communication Systems   | Aachen, Germany        | <a href="http://www.ti.rwth-aachen.de/iswcs2011">http://www.ti.rwth-aachen.de/iswcs2011</a>                                   | Passed             |
| November 6–9, 2011        | Asilomar Conference on Signals, Systems, and Computers (Asilomar 2011)                                  | Pacific Grove, CA, USA | <a href="http://www.asilomarssc.org">http://www.asilomarssc.org</a>   | Passed             |
| December 5–9, 2011        | 2011 IEEE Global Communications Conference (GLOBECOM 2011)  | Houston, TX, USA       | <a href="http://www.ieee-globecom.org/">http://www.ieee-globecom.org/</a>   | Passed             |
| February 29–March 2, 2012 | 2012 International Zurich Seminar on Communications   | Zurich, Switzerland    | <a href="http://www.izs.ethz.ch/">http://www.izs.ethz.ch/</a>   | September 25, 2011 |
| March 25–30, 2012         | IEEE INFOCOM 2012   | Orlando, FL, USA       | <a href="http://www.ieee-infocom.org/">http://www.ieee-infocom.org/</a>   | Passed             |
| May 6–9, 2012             | 2012 IEEE 75th Vehicular Technology Conference (VTC2012-Spring)   | Yokohama, Japan        | <a href="http://www.ieeevtc.org/vtc2012spring/">http://www.ieeevtc.org/vtc2012spring/</a>                                     | September 30, 2011 |
| May 14–18, 2012           | 10th Intl. Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt 2012) | Paderborn, Germany     | <a href="http://www.wi-opt.org/">http://www.wi-opt.org/</a>   | January 6, 2012    |
| June 10–15, 2012          | IEEE International Conference on Communications (ICC 2012)  | Ottawa, Canada         | <a href="http://www.ieee-icc.org/">http://www.ieee-icc.org/</a>   | September 6, 2011  |
| July 1–6, 2012            | 2012 IEEE International Symposium on Information Theory (ISIT 2012)                                     | Cambridge, MA, USA     | <a href="http://isit12.org/">http://isit12.org/</a>   | February 3, 2012   |
| August 27–31, 2012        | 7th International Symposium on Turbo Codes & Iterative Information Processing                           | Gothenberg, Sweden     | <a href="http://www2.ee.kth.se/conferences/turbo-symposium-2012/">http://www2.ee.kth.se/conferences/turbo-symposium-2012/</a> | March 9, 2012      |
| September 3–7, 2012       | 2012 IEEE Information Theory Workshop (ITW 2012)  | Lausanne, Switzerland  | <a href="http://itw2012.epfl.ch/">http://itw2012.epfl.ch/</a>   | April 2, 2012      |

Major COMSOC conferences: <http://www.comsoc.org/confs/index.html>