

## ANIMMA 2015

April 20<sup>th</sup> - 25<sup>th</sup> 2015

animma@ipfn.ist.utl.pt



### CONFERENCES

2015 ANIMMA	1
2015 ICOPS	4

### SOCIETY GENERAL BUSINESS

President's Report	2
Secretary's Report	3

### TECHNICAL COMMITTEES

Computer Applications in Nuclear and Plasma Sciences	3
Nuclear Medical and Imaging Sciences	3
Radiation Effects News	4
Radiation Instrumentation	4

### FUNCTIONAL COMMITTEES

Awards	4
Chapters	4
Publications	4

### ARTICLE

Recent Trends in High Resolution Positron Emission Tomography	6
Engineers: Your Brains Need You	6
Five Ways a Small Company Can Attract Talent	7
Special Recognition	7



Abdallah Lyoussi,  
ANIMMA 2015 General Chair

The ANIMMA Conference – Advancements in Nuclear Instrumentation Measurement Methods and their Applications- has always strived to create a special meeting place shared by all those working in nuclear instrumentation and its applications, as we strongly believe that cross-border exchanges between scientists, engineers and industrialists can only lead to the most developed ideas, the best solutions and the most efficient collaborations and partnerships. ANIMMA continues to maintain a high level of scientific and technical quality by presenting not only the latest advances but also the state of the art in each field through the participation of international specialists and experts. It is an ideal meeting for scientists and engineers in the field of nuclear measurement, instrumentation in severe/harsh media, radiation instrumentation, software

engineering, data acquisition analysis and treatment, and related applications to present their work and network with their colleagues from around the world.

Previous conferences in this series *i.e.*, ANIMMA 2009 in Marseille (France), ANIMMA 2011 in Ghent (Belgium) and ANIMMA 2013 in Marseille were a real success thanks to the work of all contributors, committees, partners and sponsors. During ANIMMA 2013 more than 300 oral papers and posters were presented that discussed topics in the areas listed below. In addition there was a conference-long

exhibition with over 20 representatives from industry and research institutes. Over 450 participants attended the conference. Short-courses and workshop initiatives were also successful.

On behalf of the ANIMMA organising committee I am pleased to announce that the next international conference on Advancements in Nuclear Instrumentation Measurement Methods and their Applications - ANIMMA 2015 - will be held from April 20<sup>th</sup> to 24<sup>th</sup>, 2015 in Lisbon, Portugal at the city's Congress Center .



CONFERENCES Continued on PAGE 2

ANIMMA 2015 is the fourth in this series of conferences devoted to endorsing and promoting scientific and technical activities based on nuclear instrumentation and measurements. The main objective of the conference is to unite the various scientific communities not only involved in nuclear instrumentation and measurements, but also in nuclear medicine and radiation. The conference is all about getting scientists, engineers and the industry representatives to meet, exchange cultures and identify new scientific and technical prospects to help overcome both current and future unresolved issues. The ANIMMA conference provides scientists and engineers with an extraordinary opportunity to compare their latest research and development in different areas: physics, nuclear energy, nuclear fuel cycle, safety, security, future energies (GEN III+, GENIV, ITER...), medical and environmental sciences.

The conference topics include instrumentation and measurement for:

- Fundamental Physics
- Fusion diagnostics and technology
- Nuclear Power Reactors
- Research Reactors Centro
- Nuclear Fuel Cycle
- Decommissioning, dismantling and remote handling
- Safeguards, Homeland Security
- Severe accidents monitoring
- Environmental and Medical Sciences
- Education and Training and Outreach

The ANIMMA conference will be held at the Lisbon congress center from April 20<sup>th</sup> to 24<sup>th</sup>, 2015.

For further information, please do not hesitate to contact: [animma@ipfn.ist.utl.pt](mailto:animma@ipfn.ist.utl.pt) or check the conference website: [www.animma.com](http://www.animma.com).

We look forward to welcoming you to Lisbon.

*Abdallah Lyoussi, the General Chairman of ANIMMA 2015, can be reached by E-mail at [Abdallah.lyoussi@cea.fr](mailto:Abdallah.lyoussi@cea.fr).*

#### I'M BETWEEN STAGE 3 AND 4

First you forget names, then you forget faces, next you forget to pull your zipper up and, finally, forget to pull it down.

*George Burns*

#### DIDN'T WORK

A man who would discover a terrible explosive would do more for peace than a thousand of its mild apostles.

*Theodore Herzl*

#### BUT WE ARE NOT CIVILIZED

On the day when two army corps may mutually annihilate each other in a second, all civilized nations will probably recoil with horror and disband their troops.

*Alfred Nobel*



INTERNATIONAL CONFERENCE on ADVANCEMENTS in NUCLEAR INSTRUMENTATION MEASUREMENT METHODS and their APPLICATIONS



The fourth international conference on Advancements in Nuclear Instrumentation Measurement Methods and their Applications (ANIMMA) will take place from 20 to 24 April 2015 at the Lisbon Congress Center, in Portugal

**Instrumentation and Measurement in:**

- Fundamental physics**
- Fusion diagnostics and technology**
- Nuclear power reactors**
- Research reactors**
- Nuclear fuel cycle**
- Decommissioning, dismantling and remote handling**
- Safeguards, homeland security**
- Severe accident monitoring**
- Environmental and medical sciences**
- Education, training and outreach**

The aim of the conference is to bring together scientific, academic and industrial communities involved in research and development related to nuclear instrumentation and measurement methods.

The program emphasizes the latest developments in all measurement stages: radiation detection, in-pile measurements, modeling, electronics, signal acquisition and analysis, interpretation and associated training/education activities.

ANIMMA meeting offers an outstanding opportunity to address complex problems and find advanced and innovative solutions in nuclear instrumentation and measurement sciences and technologies.

**Key dates**

- Abstract submission deadline: December 1, 2014
- Final paper submission deadline: April 6, 2015
- Open registration: January 15, 2015

**Committee Chairs**

- General Chair: Prof. Abdallah Lyoussi
- Steering Committee Chair: Dr. Bruno Gonçalves
- Scientific Committee Chair: Prof. Michel Giot
- Organizing Committee Chair: Dr. Bruno Gonçalves
- Workshops Organization Chair: Dr. Christelle Reynard-Carette
- Short-Courses Organization Chair: Dr. Ludo Vermeeren

Contacts: [animma@ipfn.ist.utl.pt](mailto:animma@ipfn.ist.utl.pt) [bruno@ipfn.ist.utl.pt](mailto:bruno@ipfn.ist.utl.pt) [abdallah.lyoussi@cea.fr](mailto:abdallah.lyoussi@cea.fr)

[www.animma.com](http://www.animma.com)



# ICOPS 2015

[www.ece.unm.edu/icops2015/](http://www.ece.unm.edu/icops2015/)  
e-mail: [icops2015@ieee.org](mailto:icops2015@ieee.org)



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University of New Mexico

Abstract submission opens: 1 September 2014  
Abstract submission deadline: 1 December 2014  
Notification of abstract acceptance: 1 February 2015  
Early registration deadline: 1 March 2015  
Deadline to secure accommodations: 1 March 2015



## President's Report



**Janet Barth**  
President, IEEE NPSS

It is with mixed feelings that I write this, my last newsletter report as President of the IEEE NPSS. It has been a deeply rewarding experience to serve

you, the NPSS membership. I am grateful for the opportunity to see our Society from a broad perspective. Coming from the radiation effects community, I have had the opportunity to become aware of all of the activities and excellent science that is accomplished by other technical communities in the NPSS. I've now met and interacted with our leaders from plasma science, fusion, pulsed power, radiation instrumentation, particle accelerators, and many others, and I have developed a much greater appreciation of how broad and diverse our Society is. The common thread that holds us together is our passion to advance the frontiers of science and technology. At our AdCom meetings, I looked forward to the reports from the Chairs

of our technical committees where we have the opportunity to hear about the success of our conferences and plans for future conferences. Also, I especially appreciate the reports of our IEEE and NPSS award recipients who range from our young student members through our most senior members.

I am completing my term at a time when our Society is doing well by all metrics. In our five-year Society review, we demonstrated that we are committed to the IEEE core values which are implemented through our conferences, publications and policies; have extensive participation in IEEE through volunteer leadership and support of key initiatives such as the IEEE Humanitarian Technology Challenge; have increased the number of our Chapters from 13 to 21; are financially sound; and

#### NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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have a history of running high-quality conferences that are well-attended and financially successful. For this I need to thank the many layers of talented and hard-working NPSS members who contribute to the success of our Society.

I have also had the opportunity to interact with other Societies and Councils at the IEEE Technical Activities Board (TAB) meetings, which are held three times a year. TAB focuses on building and sustaining technical communities that provide technology for the benefit of humanity. As such, Societies and Councils are heavily involved in journals, from which our technical communities develop their identity. More than 160 publications are supported by TAB. Bob Hebner, the Past-President of TAB, is leading an activity to address the impact of the global change in the publishing and research enterprise. The concern is that the change to Open Access publishing is unlikely to provide sufficient funding for the Societies and Councils to continue our level of support of the communities and other activities.

When a paper is written, reviewed, edited and accepted by a periodical, the article is turned over to IEEE staff for final preparation and/or insertion in IEEE Xplore for access by subscribers of the IEEE/ET Electronic Library (IEL), IEEE All-Society Periodicals Package (ASPP), and other large package products.

The revenue from the sale of these products is distributed through the Periodicals Package Program's (PPP) algorithm (to some, this is the "ASPP algorithm"). This process has worked for decades. But recent changes in funding levels and future changes in the publication business threaten its sustainability. Bob is working to summarize the nearer term stresses on the system, which are due to funding shortfalls, and to assess the longer-term risks associated with the Open Access paradigm. The implications have included cross subsidies within Societies to maintain publication rates, stretching out submission-to-publication time to stay within budget, and imposing or enforcing stricter page limits for financial reasons. None of these are sustainable actions.

Bob has proposed a Strategic Planning Approach where TAB leadership works with the Board of Directors and IEEE Financial Committee to determine if this situation is an unintended consequence of other decisions or a necessary allocation of reductions during a particularly difficult financial period. The strategic approach will depend on the answer and could include elements ranging from negotiating a sustainable return, restructuring how TAB entities support journals, and/or exploration of more sustainable outlets for the community-developed IP than the IEEE publication packages.

TAB leadership recognizes the need to be an effective channel for innovative ideas for Societies and Councils to consider and test while successfully convincing IEEE corporate leadership that one-size-fits-all innovations are likely to be costly mistakes. If you have suggestions or comments, Bob has asked that you contact him at [r.hebner@ieee.org](mailto:r.hebner@ieee.org)

As one of my last actions as President of NPSS, I had the honor of conferring a Presidential Service Decree upon Vernon Price on the occasion of his 90<sup>th</sup> Birthday in October. The decree noted his "62 years of continuous IRE and IEEE Membership, including 42 years of service to NPSS marked by his warm personal leadership for over 20 years of membership development, organization and recruiting through Chapters and Conferences internationally, bringing significant honors to both IEEE and NPSS, and for his continued faithful service today." I would like to thank Steve Gold for suggesting the idea of a special recognition for Vern and Ed Lampo for carrying the idea forward and getting a plaque sent to Vern's daughter to surprise him at his celebration. Many of us NPSS members have been directly influenced by Vern to join NPSS and to actively participate on committees. I wish him the very best and thank him for his continued support.

The past two years have gone by quickly, and it is time for me to turn the gavel over to our next President, Dr. John Verboncoeur. John is a professor at Michigan State University and brings a broad technical background to the leadership of NPSS. In 2013 John was named an IEEE Fellow in recognition of his contribution to computational plasma physics and plasma device applications. During his two years as the Vice President/President-Elect of AdCom, John was actively involved with our technical communities, working closely with one technical committee as it transitioned to an elective committee and working with the medical imaging community to develop a strategy to establish a new journal. The IEEE Nuclear and Plasma Sciences Society is in good hands!

It has been an honor and a privilege to be your President.

*Janet Barth, NPSS President, can be reached at the Electrical Engineering Division, NASA Goddard Space Flight Center, Greenbelt, MD, 20771. Phone: +1 301-286-5118 or at [jbarth@ieee.org](mailto:jbarth@ieee.org).*

**THINK ABOUT IT**

The senses do not deceive; it's the judgment that deceives.

*Goethe*

## Secretary's Report



Albe Larsen  
IEEE NPSS Secretary  
and Newsletter Editor

The NPSS AdCom meeting was held in mid-November following the NSS/MIC meeting in Seattle, Washington, too late for a report to be included in this Newsletter, so watch for it in the March 2015 edition.

The end of the year is the time when our AdCom turns over and we have a class of outgoing elected members and a group of members who officially join us on January 1<sup>st</sup>. I would like to thank Class of 2014 AdCom members for their four years of devoted service: Alberto Del Guerra, representing the Nuclear Medical and Imaging community, Ed Lampo representing the Radiation Instrumentation

community, Robert Reed representing the Radiation Effects community, and Bob Zwaska representing the Particle Accelerator Science and Technology community. We welcome the AdCom Class of 2018: Steven Meikle (Nuclear Medical and Imaging Sciences), Stephen Milton (Particle Accelerator Science and Technology), Steven McClure (Radiation Effects) and Paul Lecoq (Radiation Instrumentation). Look for more information about these individuals in the March 2015 Newsletter. We also welcome the continuing service of Brendan Godfrey who completes a vacated Plasma Science and Applications term ending in 2016.

We will also welcome some new TC chairs in 2015, so watch the March Newsletter for more information.

Our first 2015 AdCom retreat and meeting will be held in New Orleans, LA in mid-February.

*Albe Larsen, NPSS Secretary and Newsletter Editor, can be reached by E-mail at [amlarsen@slac.stanford.edu](mailto:amlarsen@slac.stanford.edu)*

**FOR GOOD OR BAD?**

It is not possible for any thinking person to live in such a society as our own without wanting to change it.

*George Orwell*

## Technical Committees

### COMPUTER APPLICATIONS in NUCLEAR and PLASMA SCIENCES



Martin Purschke,  
CANPS Chair

The big event for the Computer Applications in Nuclear and Plasma Science (CANPS) Technical Committee this year was the very successful Real Time Conference, which was held in Nara, Japan in May 2014. As it is customary, the CANPS student award committee, chaired by Christian Bohm from the University of Stockholm, selected four papers from about 30 outstanding qualified contributions. Over the course of the coming year, the four award winners will write up a short summary of their research which earned them their award, and put their work into context.

We will start the series with Marc-André Trétrault, who received the award for his outstanding contribution "Real-Time Discrete SPAD Array Readout Architecture for Time of Flight PET." The future Dr. Trétrault works at the University of Sherbrooke, Québec, Canada. He has been working in the field of

PET instrumentation for more than 10 years. He is a regular at the Real-Time and NSS/MIC conferences, and is at this point an author or co-author of 18 publications. Find this report under Articles toward the end of this Newsletter, and look for reports from the other award recipients in upcoming Newsletters.

Meanwhile, work is in progress for the 2016 Real Time Conference. Follow this column for updates!

*Martin Purschke, Chair of the Computer Applications in Nuclear and Plasma Science Technical Committee can be reached at Brookhaven National Laboratory, Upton, New York phone: +1 631 344-5244; Fax: +1 631 344-3253; E-mail: [purschke@bnl.gov](mailto:purschke@bnl.gov).*

### NUCLEAR MEDICAL AND IMAGING SCIENCE



Dimitris Visvikis  
NMISC Chair

The 2014 IEEE NPSS Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) has taken place at the Washington State Convention Center in Seattle between the 8<sup>th</sup> and the 15<sup>th</sup>

of November. There were 118 and 461 oral and poster presentations respectively, including a whole day of joint NSS/MIC, NSS/TSD, NSS/MIC/RTSD sessions. A short-courses program covering different topics of interest in nuclear science, medical imaging and radiotherapy was included, in addition to three short refresher courses during lunch breaks. Finally this was the first-ever paperless IEEE NSS/MIC conference.

The 2015 IEEE NSS/MIC meeting will take place in San Diego, CA, at the Town and Country Resort from the 31<sup>st</sup> Oct to 7<sup>th</sup> Nov, and Vesna Sossi will be the General Chair for the meeting, while Adam Alessio and Lawrence MacDonald will serve as the MIC Program Chair and Deputy Program Chair respectively.

In 2016 the IEEE NSS/MIC meeting is returning to Europe and will be held in Strasbourg, France with Maxim Titov as the General Chair, with myself and Suleman Surti serving as the MIC Program Chair and Deputy Program Chair respectively. The 2017 IEEE NSS/MIC meeting will take place in Atlanta.

The newly elected Council members starting their three-year term from 01 Jan 2015 are Kris Thielemans, Jae Sung Lee, Volkmar Schulz, Joyita Dutta, and Paul Vaska. I welcome them and look forward to their significant contribution within the NMISC. I would also like to thank those who did not get elected this year and encourage them as well as others to volunteer in next year's elections by contacting Andrew Goertzen, NMISC Secretary and Chair of the Nominations Subcommittee who is responsible for putting together the list of candidates every year. In addition, I would like to congratulate Steve Meikle for his election as one of our two NPSS Administrative Committee (AdCom) representatives (from 01 Jan 2015 to 31 Dec 2018).

I will be providing an extensive review of this year's winners of the Bruce Hasegawa Medical Imaging Conference Young Investigator and Edward J. Hoffman Medical Imaging Scientist Awards presented during the recent 2014 NSS/MIC conference in my next newsletter article in March. However I would like to encourage you all to nominate worthy colleagues from our community for numerous awards which are available from IEEE and NPSS with deadlines end of January 2015. More details can be found at <http://iee-npss.org/awards/> and <http://iee-npss.org/awards/iee-awards/>.

Finally, I am happy to announce that NPSS has decided to develop a new journal that will allow regrouping of all NPSS activities in the medical domain, including different radiation technology and application areas such as medical imaging and radiotherapy as well as plasma-based medical sciences. Completing this process will of course take several months and I will therefore keep you updated as these plans progress. Watch this space!

*Dimitris Visvikis, Chair of NMISC, can be reached at the National Institute of Health and Medical Research (INSERM), UMR1101, LaTIM, CHRU Brest, Bat 1, 2 avenue Foch, Brest, FRANCE; Phone: +33 298-01-81-14; Fax: +33 298-01-81-24; E-mail: [dimitris.visvikis@inserm.fr](mailto:dimitris.visvikis@inserm.fr)*

**AHEAD OF HIS TIME**

War must be made as deadly to the civilian population back home as it is for the troops in the front lines. Let the sword of Damocles hang over every head, gentlemen, and you will witness a miracle – all wars will be stopped instantly if the weapon is called bacteriology.

*Alfred Nobel*

## RADIATION EFFECTS NEWS

## Annual report from the Radiation Effects Committee July 2014



Marty Shaneyfelt  
RE Chair

Marty Shaneyfelt, Sandia National Laboratories, is the present Chairman of the Radiation Effects Steering Group, which oversees NSREC Conferences.

The IEEE Radiation Effects Committee (REC) held its annual Open Meeting on July 17<sup>th</sup>, 2014, at the Marriott Rive Gauche, Paris, France, during the 2014 Nuclear and Space Radiation Effects Conference (NSREC). The meeting included presentations from the general chairs of the 2013 through 2015 NSRECs.

An election was held during the Open Meeting for a new Junior Member-at-Large to the Radiation Effects Steering Group (RESG). The RESG welcomes Simone Gerardin, University of Padova, as its newly elected Junior Member-at-Large. Simone joins Gary Lum, Lockheed Martin Space Systems Company, and Sylvain Girard, Université de Saint-Etienne, who are serving as Senior-Member-at-Large and Member-at-Large, respectively.

An election was also held for the RESG Nominating Committee. The purpose of the Nominating Committee is to determine the official slate of nominees for officers of the RESG (Executive Vice-Chair and Secretary). The elected members who will compose the committee are Paul Dodd, Sandia National Laboratories, John Stone, Southwest Research Institute, Tim Oldham, Ball Aerospace, and Rocky Koga, The Aerospace Corporation. Dan Fleetwood, Vanderbilt University, RESG Past Chair, will chair the Committee.

During the Open Meeting, Marty presented awards to outgoing RESG Member-at-Large, Nick van Vonno, Intersil Corporation, and Paul Dodd, Sandia National Laboratories, who completed his four-year term as an AdCom member.

Marty announced the general chairs for upcoming NSRECs: Michael Xapsos, NASA GSFC, Robert Reed, Vanderbilt University, Veronique Ferlet-Cavrois, ESA/ESTEC, and Ronald Lacoé, The Aerospace Corporation, for the 2015-2018 NSRECs, respectively.

Robert Ecoffet, CNES, 2014 Conference General Chair, summarized some statistics for the 2014 conference. A total of 519 people attended the technical sessions and 311 people attended the short course. In addition, 99 exhibitor-only staff were registered for the industrial exhibits and there were 170 registered guests. The technical sessions were very strong, with 208 papers presented during the

four-day conference (54 oral presentations, 91 posters, and 63 Data Workshop). There were four outstanding tutorial reviews given during the Short Course on July 14<sup>th</sup>. Short Course attendees also received a CD of the 1980-2014 Short Course notebooks. The industrial exhibit, which had 48 exhibitors, was well attended.



Teresa Farris  
Vice Chair Publicity

Michael Xapsos, NASA-GSFC, 2015 Conference General Chair, announced that NSREC will be held July 13<sup>th</sup> - 17<sup>th</sup>, 2015, at the Marriott Copley Place in Boston. This conference will feature a technical program consisting of approximately ten sessions of contributed papers (both oral and poster) that describe the latest observations and research results in radiation effects, a Radiation Effects Data Workshop, and an industrial exhibit. Attendees will also have the opportunity to participate in a one-day Short Course on Monday, July 13<sup>th</sup>. The theme for the short course is "Practical Problems in Spacecraft Design," and is being organized by Tim Oldham, Ball Aerospace. The presenters of the short course include:

- Dr. Patrick O'Neill, NASA Johnson Space Center, who will give a talk on "Radiation Environments Inside Spacecraft."
- Dr. Leif Z. Scheick, Jet Propulsion Lab, who will give a talk on "Design Approaches for Radiation Survivable Space Power Systems."
- Dr. Mark Robbins, Surrey Satellite, who will give a talk on "Design Challenges for Optical Payloads Used within the Space Radiation Environment."
- Dr. Joe Mazur, The Aerospace Corporation, who will give a talk on "No Charge Left Behind: A Review of the Charging Phenomenon and Associated Hazards."

The short course should be of interest to both radiation effects specialists and newcomers to the field.

For the most current information on the Nuclear and Space Radiation Effects Conference, including information on paper submission, please visit [www.nsrc.com](http://www.nsrc.com).

Marty Shaneyfelt, Chair of the Radiation Effects Technical Committee, can be reached by E-mail at [shaneymr@sandia.gov](mailto:shaneymr@sandia.gov). Teresa Farris, the Vice Chair for Publicity can be reached at [teresa.farris@aeroflex.com](mailto:teresa.farris@aeroflex.com)

## RADIATION INSTRUMENTATION

At the writing of this report we were only a few weeks from the opening of the 2014 Nuclear Science Symposium and Medical Imaging Conference (2014 NSS/MIC, <http://www.nss-mic.org/2014>), that was to take place in Seattle, Washington from 8<sup>th</sup> - 15<sup>th</sup> November at the Washington State Convention Center (WSCC). The

will be presented for the first time. These are the Ronald J. Jaszczak Graduate Award and the Charles K. Birdsall Award for Contributions to Nuclear and Plasma Sciences.

The Jaszczak Award recognizes and enables an outstanding graduate student enrolled in an accredited Ph.D. curriculum, Post-doctoral Fellow or Ph.D. level Research Associate in the field of nuclear medical and imaging sciences to advance



Tony Lavietes,  
RI Chair

NSS Program Chair was Dr. Ingrid Gregor, the first woman Program Chair in the history of the NSS. Dr. Gregor has also been instrumental in the creation of new paper submission and acceptance criteria, having initiated and co-chaired the committee tasked with this activity, and is dedicated to bringing a high-quality program together for conference attendees.

The 2014 NSS/MIC was the first "paperless" conference in an effort to become more environmentally conscious. All traditional hardcopy publications were replaced with a mobile application (mobile app) that included the conference program, comprehensive venue information, in-app messaging, local area information, and much more. In addition, the WSCC - well known for their "green" activities - assisted us in reducing or eliminating waste wherever possible. We are now evaluating the results of the new environmentally-friendly format of the 2014 NSS/MIC. The future format of the NSS/MIC conference will be based on the successes of this experiment and thus far, things look pretty good.

All of these changes required a tremendous amount of additional effort by the committee. While each committee member was instrumental in the successful execution of this event, the level of effort of a few individuals was noteworthy: Dora Merelli (Conference Coordinator) for her tireless efforts to make the first mobile app useful and Dick Kouzes (Local Arrangements Chair) for staying on top of the continually evolving conference programs and event organization. The committee worked hard to offer an outstanding program to make this a unique and memorable event and we certainly hope that you found the conference in Seattle beneficial and enjoyable.

The Radiation Instrumentation annual awards for 2014 were presented during the 2014 NSS/MIC. This year, we lost one of our most distinguished colleagues, Dr. Glenn Knoll. In honor of the countless contributions, dedication to his students, and inspiration to the many people in this field, one of these awards, the Radiation Instrumentation Outstanding Achievement Award, has been renamed as the Glenn F. Knoll Outstanding Achievement Award. The newly titled award has been presented for the first time this year. The awardees for this year were as follows:

Dr. Robert Klanner, 2014 Glenn F. Knoll Outstanding Achievement Award, for the development of high-precision silicon detectors and calorimeters, their successful use in particle physics experiments, and the education of junior scientists in physics and applications of detectors.

Dr. Jelena Ninkovic, 2014 Radiation Instrumentation Early Career Award, for contributions to developments of Avalanche Photodiodes in Geiger

mode, especially SiPMs with bulk-integrated quench resistors for single photon and particle detection, and of DEPFET active pixel vertex detectors.

In addition, since he was unable to attend the 2013 NSS/MIC, we took the opportunity to present Dr. Veljko Radeka the prestigious 2013 IEEE Marie Skłodowska-Curie Award for the development of new radiation detectors, electronics, and systems that operate at the fundamental limits of performance, enabling discoveries in many areas of science. This award was presented jointly by Dr. Craig Woody (NPSS Awards Chair) and Dr. Peter Staecker (2014 IEEE Past President).

In addition to these important events, we held two elections within our community. The first was the annual election of five representatives on the Radiation Instrumentation Steering Committee (RISC). It is a pleasure to introduce and congratulate the most recent Radiation Instrumentation Steering Committee (RISC) members: Cinzia Da Via, Ingrid Gregor, Merry Keyser, Joe Mauger, and Stefan Ritt - each elected for a three-year term (2015-2017). They join present RISC members David L. Chichester, Lorenzo Fabris, Michael Fiederle, Christer Fröjdh, Chiara Guazzoni, Michael Hynes, Paul Lecoq, Martin Purschke, Daniel Stephens, and Craig Woody. As of 1 January 2014 the RISC officers were: Tony Lavietes (Chair), Patrick Le Dü (Vice-Chair), and Chuck Melcher (Past-Chair). Continuing for 2014 were Brad Roscoe (RISC Secretary) and Sara Pozzi (RISC Awards Chair). I would like to express the committee's thanks to the outgoing RISC members Etienne Auffray, Ralf Engels, Dick Lanza, Maxim Titov, and Gary Varner for their three years of excellent service.

The second election was to select a Radiation Instrumentation Technical Committee representative (one of two seats) on the NPSS AdCom. I would like to introduce and congratulate Paul Lecoq and wish him well in his newly elected position. I would also like to recognize and thank the outgoing RITC representative, Ed Lampo, for his outstanding contributions.

We are now looking forward to the next conference, the 2015 NSS/MIC (<http://www.nss-mic.org/2015>) that will be held in San Diego, California. The format of this conference will build upon the successes of the 2014 NSS/MIC and take advantage of all that this beautiful location has to offer. Please visit the conference website to learn more about this program. We look forward to seeing you in San Diego.

## Upcoming NSS/MIC Conferences

2015: 31<sup>st</sup> Oct - 7<sup>th</sup> Nov  
San Diego, California  
Vesna Sossi, General Chair  
John Valentine, NSS Program Chair  
Chiara Guazzoni, Deputy NSS Program Chair

2016: 29<sup>th</sup> Oct - 5<sup>th</sup> Nov  
Strasbourg, France  
Maxim Titov, General Chair  
Eckhard Elsen, NSS Program Chair  
Susanne Kuehn, Deputy NSS Program Chair

Tony Lavietes, Chair of the Radiation Instrumentation Technical Committee, can be reached by E-mail at [a.lavietes@ieee.org](mailto:a.lavietes@ieee.org).

## Functional Committees

## AWARDS COMMITTEE

## Call for 2015 NPSS Awards Nominations

Nominations for the 2015 NPSS Awards are due at the end of January of 2015. Next year we will present our four long-standing NPSS Awards: the Merit Award, the Shea Distinguished Member Award, the Early Achievement Award and the Graduate Scholarship Awards, but in addition, two new awards

will be presented for the first time. These are the Ronald J. Jaszczak Graduate Award and the Charles K. Birdsall Award for Contributions to Nuclear and Plasma Sciences.

The Jaszczak Award recognizes and enables an outstanding graduate student enrolled in an accredited Ph.D. curriculum, Post-doctoral Fellow or Ph.D. level Research Associate in the field of nuclear medical and imaging sciences to advance



Craig Woody,  
Awards Chair

his or her research activities. The Birdsall award will recognize outstanding contributions in computational nuclear and plasma science, with preference given to areas within the broadest scope of plasma physics encompassing the interaction of charged particles and electromagnetic fields.

A complete description of all of the NPSS Awards, including prizes, eligibility, due dates, nomination forms and instructions for submitting nominations is available on the NPSS Awards website. In addition, the website lists information about other NPSS Technical Committee and conference awards. Most

of the NPSS award nominations are due at the end of January 2015, so it's time to start thinking about good potential candidates and gathering information about them. The website also gives some useful tips on how to write a successful nomination, so please have a look at this when putting together the nomination packages. If you have any questions about any of the NPSS Awards or related IEEE Awards, please feel free to contact Craig Woody, NPSS Awards Chair and Chair of the IEEE Technical Activities Board Awards and Recognition Committee, at [woody@bnl.gov](mailto:woody@bnl.gov).

**2014 FUSION TECHNOLOGY AWARD**



Dr. Felix Schauer

Dr. Felix Schauer of the Max Planck Institute for Plasma Physics in Greifswald, Germany is the 2014 Fusion Technology Award recipient. Dr. Schauer received his Master's degree in "Technical Physics" at the Graz University of Technology (TUG), in Graz, Austria, in 1973. He started his professional career as assistant professor at the Institute for Electromagnetic Energy Conversion of the TUG where he worked in the fields of cryogenic and electrical engineering; particularly on the development of a superconducting (SC) AC power transmission line. In 1979 he received his Doctorate from the Faculty of Electrical Engineering, and then spent three years in the United States as a guest scientist. As such, he joined the SC power transmission line project at Brookhaven National Laboratory (BNL) where his main achievement was the development of the high voltage bushing of the horizontal 240 kVrms cryogenic current lead. During an eight-month stay with the MHD Technology Group of the MIT Francis Bitter Magnet Lab he was involved with acoustic emission diagnostics and electrical insulation problems of large SC magnets. In 1982 he succeeded in gaining his Professional Engineering license for the State of New York.

After returning to the TUG, Dr. Schauer worked on SC electrical machinery and magnets, and successfully defended his habilitation thesis in 1986 on the subject of "Superconductor Application in Energy Technology." He was invited as a visiting scientist at the Kernforschungszentrum Karlsruhe (now "Karlsruhe Institute of Technology," KIT), in Karlsruhe, Germany, where he performed studies on SC magnets, application possibilities for the newly discovered high temperature superconductors, and SC magnetic energy storage.

In 1992 Dr. Schauer joined the technical team of the Wendelstein 7-X (W7-X) stellarator fusion project at the Max Planck Institute for Plasma Physics, in Greifswald, Germany, as a cryogenic engineer. He was responsible for the design, construction and test of the W7-X cryostat prototype, and was involved in the SC coil development. In 1996 he became head of the cryogenics department and subsequently, with his team, designed and specified the complex-shaped plasma vessel, outer vessel, and ports. He then turned to the development and specification of the helium refrigeration concept as well as the cooling circuits for the cold W7-X components.

Dr. Schauer lead the basic concept development of the challenging thermal insulation and shield of the cryostat, and worked together with the manufacturer on the detailed solutions requiring many innovations to cope with its extreme geometry and accuracy requirements. He also began the conceptual design of the current leads for the SC coils where he proposed the unique solution of an "upside down" orientation of a feed-through for a large magnet system.

Since 2005 Dr. Schauer has served as head of the W7-X engineering division and a member of the project board. His team is tasked with conception, development, FE analyses, tests, and instrumentation of W7-X components, as well as with evaluation of design changes and nonconformities during assembly of the stellarator.

In recent years Dr. Schauer took the initiative to develop a realistic technical concept for the HELIAS stellarator fusion reactor with a stronger magnetic field than previously considered. He proposed a new magnet structure design and showed that the coils as well as the coil protection system could be built on the basis of ITER technologies.

Dr. Schauer's inventiveness and versatility is documented by his coauthor- and authorship of numerous papers as well as disclosed patent specifications and granted patents in different fields of engineering.

**Citation:** *In recognition of his many outstanding contributions to fusion engineering and superconducting magnet technology, in particular relating to the design and construction of the stellarator experiment Wendelstein 7-X and design of the stellarator reactor HELIAS 5-B."*

**2014 RADIATION EFFECTS AWARD**

Janet L. Barth, NASA GSFC - retired, received the 2014 IEEE/NPSS Radiation Effects Award.



Janet Barth

Janet L. Barth retired from NASA's Goddard Space Flight Center (GSFC) and currently holds the position of an Emeritus Scientist. At her retirement she served as the Chief of the Electrical Engineering Division (EED) at GSFC where she was responsible for the delivery of spacecraft and instrument avionics to several of NASA's science missions, including the Solar Dynamics Observatory, the SWIFT Burst Alert Telescope, the Lunar Reconnaissance Orbiter, the Global Precipitation Measurement Mission, and the Magnetospheric Multiscale Mission. She also oversaw development of microwave and optical communications systems and suborbital avionics systems at the Wallops Flight Facility. In 2014, Ms. Barth was presented with the Robert H. Goddard Award of Merit, the highest individual honor that can be bestowed to a Goddard Space Flight Center employee.

She began her NASA career as a cooperative education student at GSFC working in the area of radiation environments and effects research. Later she was a lead radiation hardness assurance engineer for NASA flight projects and supported the NASA Electronic Parts and Packaging (NEPP) Program, which focuses on the reliability of electronic parts for space programs. She was a member of the team that developed NASA's systems engineering approach to radiation hardness assurance for emerging technologies. Starting in 1999, she worked on the development of NASA's Living With a Star (LWS) Program as a member of the science pre-formulation/proposal team and the LWS Program Science Architecture Team. In 2001 she was selected as the Project Manager for the LWS's Space Environment Testbed and from 2002 to 2008, she was a branch manager in the EED.

Janet is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and is the President of IEEE's Nuclear and Plasma Sciences Society. She is actively involved with the IEEE Nuclear and Radiation Effects Conference (NSREC), teaching the Short Course in 1997 and serving as a Guest

Editor for December issues of the *Transactions on Nuclear Science* from 1998-2000, the Technical Program Chairwoman in 2001, and the General Conference Chairwoman in 2006. She is a regular participant in the European Radiation and its Effects on Components and Systems (RADECS) Conference and has served as a session co-chair, the NSREC liaison to the RADECS Conference Technical Committee in 2001, and as a Short Course instructor at the 2009 RADECS Conference.

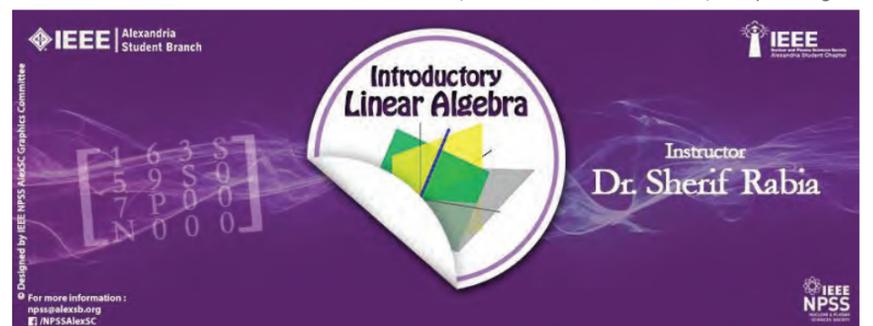
**Citation:** *For contributions to understanding the space radiation environment and to the development of flight-qualified spacecraft systems.*

**CHAPTERS**



Hossam Farag, Alexandria Student Chapter Secretary

The IEEE NPSS Alexandria Student Chapter (AlexSC) is a professional voluntary organization aiming, in the first place, to serve students, professionals, and engineers interested in Nuclear and Plasma Sciences here in Egypt and all around the world. Realizing that the nuclear engineering discipline is an interdisciplinary field, it was essential to help enabling students to possess abilities to integrate different disciplines in order to understand certain physical theories or solve certain engineering problems.



The IEEE NPSS AlexSC was pleased to offer the students a mathematics course, namely "Introductory Linear Algebra," which is an extensively used mathematical tool in many applied engineering problems. Furthermore, it is the basis upon which is based the quantum theory, one of the most fundamental theories used in Nuclear Sciences and Engineering.

The course was among essential mathematics for dynamical systems simulation. It was a prerequisite to a Monte-Carlo techniques course to be offered in the near future by the chapter. The course was taught in an interactive way, where the students made short presentations on certain topics introduced during the course.

The course provided an explanation of the basic concepts in Linear Algebra and introduced the audience to the basic analysis of differential equations. It is worth mentioning that the course was video recorded, and the lectures are going to be available, in the near future, on the web. These recordings will be used to build up an open online courseware, which is one of the projects to be undertaken by the chapter.

Lastly, I'd like to mention that on the first of September 2014, the chapter arranged a one-day visit to Egypt's Second Research Reactor; ETRR-2; at Anshas that is located around 60 km from Cairo. The goal of this visit was to tour the different nuclear facilities associated with the research reactor and to get an insight into the versatility of services it offers.

We intend to arrange more courses, visits, seminars and conferences in the coming period, as our new-

born student chapter is now well-established, having new volunteers and a clear administrative structure which guarantees the chapter's sustainability.

*Hossam. M. Farag, Secretary of the Alexandria Student Chapter, can be reached by E-mail at [mhossam1992@gmail.com](mailto:mhossam1992@gmail.com)*

**PUBLICATIONS**



Steve Gitomer TPS Editor-in-Chief

**Upcoming TPS Special Issues**

- Oct 2014 Special Issue on *Images in Plasma Science* – Guest Editors: Ankur Agarwal (Applied Materials Inc., Sunnyvale, CA USA), Mohan Sankaran (Case Western Reserve University, Cleveland OH), XinPei Lu (HuaZhong University of Sci. & Tech., WuHan, P.R. China), Donald Shiffler (Air Force Research Laboratory, Albuquerque NM USA) & William White (Air Force Research Laboratory, Albuquerque NM USA) – 300 papers submitted – Status: submission deadline passed; to be published in October 2014

- Oct 2014 Special Issue on *Pulsed Power Science and Technology* – Guest Editors: Ravi Joshi (Old Dominion University, Norfolk, VA USA), Mark Sinclair (AWE Aldermaston, Berkshire, UK), Douyan Wang

- (Kumamoto University, Kumamoto, Japan) & David Wetz (University of Texas at Arlington, Arlington, TX USA) 98 papers submitted – Status: submission deadline passed; to be published in October 2014

- Dec 2014 Special Issue on *Plasma Assisted Technologies* – Guest Editors: Igor Matveev (Applied Plasma Technologies, Falls Church VA USA) & Timothy Ombrello (Air Force Research Laboratory, Wright-Patterson AFB, OH USA) – Status: submission deadline past; to be published in December 2014

- Dec 2014 Special Issue on *Plasma Propulsion* – Guest Editors: Michael Keidar (George Washington University, Washington DC USA), Andy Hoskins (Aerojet Corporation, Arlington VA USA), Kurt Polzin (NASA Marshall Space Flight Center, Huntsville AL USA), and Haruki Takegahara (Tokyo Metropolitan University, Tokyo Japan) 50 papers submitted – Status: submission deadline passed; to be published in December 2014

- Dec 2014 Special Issue of *IEEE Transactions on Plasma Science for APSPT-8* (8th Asia-Pacific International Symposium on the Basics and Applications of Plasma Technology) – Guest Editors: Jong-Shinn Wu (Mech. Eng. Department, National Chiao Tung University, Taiwan; [chongsin@faculty.nctu.edu.tw](mailto:chongsin@faculty.nctu.edu.tw)), Kungen Tei (Electrical & Material Science, Kyushu University, Japan; [teii@asem.kyushu-u.ac.jp](mailto:teii@asem.kyushu-u.ac.jp)), Cheng-Che Hsu (Chem. Eng. Department, National Taiwan University, Taiwan), Ta-Chin Wei (Chem. Eng. Department, Chung-Yuan Christian University, Taiwan) 51 papers submitted – Status: submission deadline passed; to be published in December 2014

• Jan 2015 *Special Issue on Megagauss Magnetic Fields: Production & Application* — Guest Editors: Matt Domonkos (AFRL — Air Force Research Laboratory, Kirtland AFB, Albuquerque NM USA) and Kenneth Struve (Sandia National Laboratories, Albuquerque NM USA) — Status: submission deadline 31<sup>st</sup> July 2014

• Mar 2015 *Special Issue on Atmospheric Pressure Jets and Their Applications* — Guest Editors: XinPei Lu (HuaZhong University of Science and Technology, WuHan China) & Alexander Fridman (Drexel University, Philadelphia PA USA) — Status: submission deadline 15<sup>th</sup> July 2014

• Mar 2015 *Special Issue on Electromagnetic Launchers* — Lead Guest Editor: Harry Fair (University of Texas, Austin TX USA), Guest Editors: Melody Hummel, Tom Hum, Xinjie Yu, Markus Schneider, Jun Li, and John Mallick — Status: submission deadline 1<sup>st</sup> October 2014

• Apr 2015 *Special Issue on Z-Pinch Physics* — Guest Editors: John Guiliani (Naval Research Laboratory, Washington DC USA), Brent Jones (Sandia National Laboratories, Albuquerque NM USA), Sergey Lebedev (Imperial College, London UK), and Farhat Beg (University of California at San Diego, San Diego CA USA) — Status: submission deadline 1<sup>st</sup> August 2014

• Apr 2015 *Special Issue on Plenary and Invited Papers from ICOPS/Beams 2014* — Guest Editors: Donald Shiffler (Air Force Research Laboratory, Albuquerque NM USA), and Chunqi Jiang (Old Dominion University, Norfolk VA USA) — Status: submission deadline 31<sup>st</sup> August 2014

• May 2015 *Special Issue of Tutorial Papers from Minicourse on Low Temperature Plasmas* — Guest Editor: John Foster (University of Michigan, Ann Arbor MI USA) — Status: submission deadline 1<sup>st</sup> October 2014

• June 2015 *Special Issue – Spacecraft Charging Technology 2015* — Guest Editors: Henry B Garrett (Jet Propulsion Laboratory, USA), Albert Whittlesey

(Jet Propulsion Laboratory, USA), Dale C Ferguson (AFRL, USA), Dr. Joseph Minow (NASA MSFC, USA), Michael Bodeau (Northrop Grumman Aerospace Syst, USA), Victoria A Davis (Leidos, USA), Linda Parker (Jacobs Technology, USA), Adrian Wheelock (AFRL/RVBXR USA), Jean-François Roussel (ONERA/DESP, France), Denis Payan (CNES, France), Alain M Hilgers (ESA, The Netherlands), David J Rodgers (ESA/ESTEC, The Netherlands), and Mengu Cho (Kyushu Institute of Technology, Japan) — Status: submission deadline 31<sup>st</sup> October 2014

*Steve Gitomer, Editor-in-Chief of the IEEE Transactions on Plasma Science, can be reached by E-mail at [sgitomer@crdfglobal.org](mailto:sgitomer@crdfglobal.org).*

## ARTICLES

### Recent Trends in High Resolution Positron Emission Tomography

By Marc-André Trétraut



Marc-André Trétraut

Positron emission tomography (PET) instrumentation is at an interesting turning point, especially for high-resolution imaging. Detectors for this type of medical imaging modality now showcase spatial resolutions just below the millimeter. This means we are reaching the physical limits given by the positron range, which is the mean distance the positron travels before it finds an electron partner. So how to improve image quality? What can help biologists and medical doctors improve their diagnostics? One of the answers is to improve image contrast by refining the data quality before it is given to the image reconstruction software.

The original data come, from the gamma radiation pairs emitted by the positron's annihilation with an electron. A detector ring captures this radiation and uses the timing and geometric data to associate related pairs with an electronic collimation. The finer the timing data, the better the system can reject the background noise, thus improving contrast. Furthermore, if sufficient timing resolution is available, the reconstruction software can calculate the time of flight and estimate the positron's location on the line of response (fig. 1), also improving contrast. Increasing the timing resolution has thus become a major research topic in the field.

Current detectors reach around 100 to 400 ps full width at half maximum coincidence timing resolution, which translate in a 30 to 120 mm

time of flight uncertainty. Although sufficient for human-sized scanners, this is still inadequate for the small animal context. To reach below 100 ps timing resolutions, every aspect of the detector module must be analyzed and optimized [1]. The first element is the scintillator crystal, followed by the photodetector and readout electronics. We will focus here on the latter two.

The current photodetector of choice is an array of single photon avalanche diodes (SPAD), also known as silicon photomultipliers [2]. They are compact, immune to magnetic fields, have good timing, require relatively low bias voltage (~20 V) and have single-photon resolution. On the other hand, their response is nonlinear; they suffer from random dark count noise, which is temperature dependent.

Their excellent timing performance is determined by the photodetection efficiency, to which the so-called fill factor strongly contributes. The fill factor represents the actual photosensitive fraction on the detector, which is less than 100% due to dead areas taken up by routing, integrated electronics, and cell isolation. Very simple arrays have only passive electronic elements and reach a 78% fill factor. Application-specific smart devices integrate active circuits to finely control each SPAD device and/or recover per-cell information, but drop to a fill factor as low as 3%. The compromise between embedded features and fill factor for the target application is therefore a major concern.

As for noise considerations, although it is possible

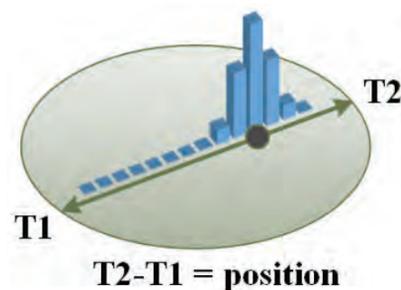


Figure 1: The position of the positron annihilation on the line of response can be estimated through time of flight when high precision time stamps are available.

to design SPAD devices in commercial submicron CMOS, it is preferable to use an optoelectronic process to significantly reduce the dark count noise. On the other hand, circuit structures in

these technology nodes are generally very large, quickly reducing the fill factor. So again, a design compromise must be reached when using classical integration.

Vertical heterogeneous integration brings an elegant solution to both problems. First, 3D stacking allows the readout electronics to be placed under the photodetection area, removing the need to compromise between the fill factor and smart circuit complexity. Second, each layer can be designed in separate technology nodes, allowing designers to merge the best of both worlds (or more!).

Following this "More than Moore" mindset, the Sherbrooke group has been working on a three-layer photodetector dedicated to small animal PET, with an embedded real-time data acquisition system (fig 2) [3]. The top tier holds the SPAD cells designed in high voltage CMOS [4], the middle tier the sensing and bias circuits, and the bottom tier the acquisition system. At the time of this writing, the two bottom tiers have been tested successfully and the third tier is being bonded in clean rooms. This is by no means the only project integrated this way: a HL-LHC/Atlas pixel detector prototype exploits this technology [5], and there will certainly be more coming as vertical integration becomes widespread. Meanwhile, this is our first attempt at 3D integration, and we are eager to see the results. In the long run, we want to leverage this technology and keep working towards reaching 10 ps timing resolution, which would provide effective time of flight for small animal applications.

[1] S. E. Derenzo, W.-S. Choong and W. W. Moses, "Fundamental limits of scintillation detector timing precision", *Physics in Medicine and Biology*, vol. 59, no 13, pp. 3261

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[3] M.-A. Tétrault, E. Desaulniers Lamy, A. Boisvert, C. Thibaudeau, M. Kanoun, F. Dubois, R. Fontaine and J.-F. Pratte, "Real-Time Discrete SPAD Array Readout Architecture for Time of Flight PET," *IEEE Trans. Nucl. Sci.*, under review, submitted June 2014, available on arxiv.org

[4] B.-L. Berube, V.-P. Rheume, A. C. Therrien, S. Parent, L. Maurais, A. Boisvert, G. Carini,

S.A. Charlebois, R. Fontaine and J.-F. Pratte, "Development of a Single Photon Avalanche Diode (SPAD) Array in High Voltage CMOS 0.8 um dedicated to a 3D Integrated Circuit (3DIC)," *IEEE NSS-MIC Conference Records*, N34-002, 2012

[5] P. Pangaud, D. Arutinov, M. Barbero, F. Bompard, P. Breugnot, J.-C. Clemens, D. Fougeron, M. Garcia-Sciveres, S. Godiot, T. Hemperek, H. Kruger, Jian Liu, T. Obermann, A. Rozanov and N. Wermes, "Upgrades of the HL-LHC/ATLAS hybrid pixels detector: Test results of the first 3D-IC prototype," *IEEE NSS-MIC Conference Records*, 2013

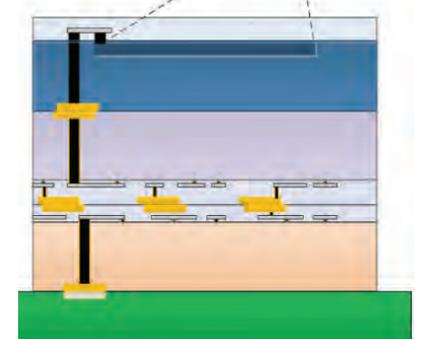
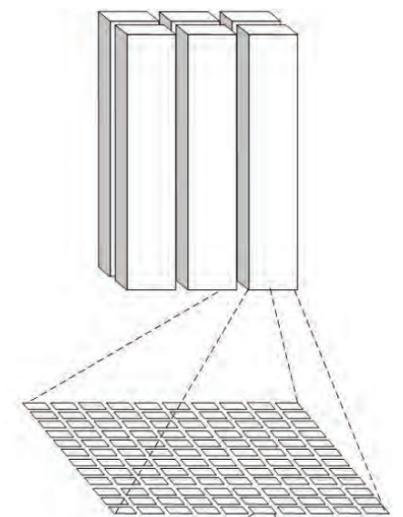


Figure 2: The detector stack. The scintillator stands on top of the SPAD array, implemented in a HV CMOS process (blue). The sensing and bias circuits are in the 2nd layer (purple) with the data acquisition system on the bottom (orange) soldered to a PCB (green).

## ENGINEERS: YOUR BRAINS NEED YOU!

By John R. Platt

From *Today's Engineer*, November 2014

Theoretical physicist Michio Kaku once called the human brain "the most complicated object in the known universe." The problem is, even though we know that the brain is complex, we really don't know all that much about it. Oh, sure, we know what the brain looks like, but much of how it really

functions remains a mystery. That void in our scientific knowledge comes with a cost. Lack of understanding regarding how the brain works — and how to treat it when it isn't working properly — has an economic impact that exceeds \$1 trillion in the U.S. every year. Alzheimer's disease alone will cost the American society \$214 billion in direct medical expenses in 2014, a number that is expected to rise to \$1.2 trillion by 2050, according to the Alzheimer's Association. That doesn't even include lost economic opportunities associated with the disease. Closing

the gap in our knowledge and understanding of the brain is the focus of the BRAIN Initiative, which was announced by President Obama in 2013. Short for "Brain Research through Advancing Innovative Neurotechnologies," the BRAIN Initiative aims to accelerate the advances in technology that will help researchers to study the brain, understand how it functions, learn how those functions relate to human behavior, and comprehend the mechanisms of brain diseases such as Alzheimer's disease, schizophrenia, traumatic brain injury, post-traumatic

stress disorder, and epilepsy. The Initiative was launched with \$100 million in funding through the National Institutes of Health (NIH), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF), as well as hundreds of millions in additional investments from numerous foundations. Answering the questions posed by the BRAIN Initiative requires the invention of technologies that do not yet exist. That won't be possible without the participation of engineers from across a wide range of disciplines, says Dr.

Bin He, IEEE Fellow and the chair of this month's IEEE EMBS BRAIN Grand Challenges Conference, which will be held 13-14 November in Washington, D.C. Engineering the Brain. To date neuroscientists have been the most active participants in the BRAIN Challenge, but they can't do the work alone. "Engineers, particularly IEEE members, should play an important role in this national initiative to develop and advance neurotechnology," He said. Members of the IEEE Engineering in Medicine & Biology Society in particular, he points out, are already international leaders in neurotechnology. Getting them together with neuroscientists and representatives from the federal government will help move things further forward. "We're fortunate that we'll have a lot of federal officials attending the conference," He said. "The conference will provide an opportunity to hear engineers and view what they are already doing in neurotechnology." According to He, "there are many, many things engineers are doing which are very important parts of this BRAIN Initiative." One clear way to illustrate this is the more than 160 posters that will be presented at the conference. Attendees, He said, "can look at the many poster presentations and get a feel as to

what kind of brain research engineers are doing, including developing neural sensors, neural circuits, neural control algorithms and much more." Similarly, the federal government would like to use the BRAIN Initiative to engage more people to direct their work in the direction of brain research. "Paradigm-shifting technologies come from taking people who have engineering, mathematical and physics backgrounds who haven't applied it to neuroscience before and getting them to think about these problems in ways the traditional communities haven't," said Kip Ludwig, program director for neural engineering at the NIH's National Institute of Neurological Disorders and Stroke. Current brain research, Ludwig explained, has been limited by the state of technology. "There's a lot we don't understand about the brain, and a lot of experiments we have wanted to conduct for years, but there literally was not the technology available to conduct those experiments," he said. Technology currently allows researchers to study only a tiny fraction of the 100 billion neurons on the human brain, and even that is only possible by using electrodes that perturb the brain and can cause unanticipated changes. "You can still learn a lot," Ludwig said, "but you can't learn everything you want

to by any stretch of the imagination." It hasn't been enough to determine how the brain creates electrical signals and what role they play in either health or — more importantly — disease. "We need to be able to identify the circuits in the disease pathology that aren't working well, why they're not working well, and understand how electrical stimulation or a drug can correct that abnormality." That's just starting to change following advances in areas such as optogenetic stimulation and two-photon microscopy. "Things are starting to be possible now," Ludwig said. "We're trying to create this toolset that will enable experiments that everybody's always wanted to do and are critical for understanding the brain but we just haven't had the ability to measure them." It Takes a Community Solving the challenges of the BRAIN Initiative will require a large number of people with a large number of skills. "This is dozens of different areas of expertise we're talking about," Ludwig said. He said that's the advantage of federally funded research: it's a collective, collaborative effort that can exist outside of corporate requirements for short-term goals. "Everyone realizes that this is going to be the engine that drives medical device advances and the economy. What we want to do is

to work with industries and academia to understand what they're already doing in this area, and then to understand what can be done in a pre-competitive space to make it more community driven." That, he said, will allow everyone to take advantage of the work being done today in the decades to come. The IEEE EMBS BRAIN Grand Challenges Conference is just one step along the way to solving these problems. Dr. He said IEEE Transactions on Biomedical Engineering will publish a special issue devoted to the conference in 2015, and he expects an ongoing dialogue related to the BRAIN Initiative. Meanwhile, Ludwig suggests that any engineers interested in learning more or in participating in the BRAIN Initiative visit their website and contact the NIH. Although much of this work is being done by the top minds in various fields, Dr. He said he is particularly excited about the work being done by the next generation of engineers, many of whom entered the conference's Young Investigator Awards Competition. "We hope to guide them and provide more opportunities for them to play a bigger role in the Initiative," he said. - See more at: <http://www.todaysengineer.org/2014/Nov/BRAIN-Initiative.asp#sthash.NIWcNjW7.dpuf>

## FIVE WAYS A SMALL COMPANY CAN ATTRACT TALENT

In spite of large companies offering higher salaries, more benefits, more resources

By Gary Perman

Are you feeling the pain? Is the lack of skilled talent for your open positions bleeding you dry? Even the amount of responses to your job postings is minuscule, and most resumes don't even come close to the skills and experience you need to get the job done. In the meantime, your team is over-worked, your product development is suffering, and your market penetration is behind. Then to add salt to the wounds, if you finally find someone that you like, you risk losing them to a job offer at a larger company.

"The shortage of engineers and the increased competition among corporations for top engineering talent have made filling of both entry-level and experienced positions at the "Blue Oval" a year-round effort," echoed Laura Kurtz, Manager of U.S. Recruiting at Ford Motor Co.

Remember the "good ol' days" pre-recession, pre-bubble bursts? When all you had to do was post a job on your favorite job board and your in-box filled with resumes. And I mean good, qualified resumes. Those days are gone, yet many technology executives still think that's what happens. Yet, in reality, you post a job and you receive hundreds of resumes, but they are NOT qualified. If you are lucky, a handful are worth talking to.

"The talent market is getting very competitive, so you can't just rely on business-as-usual practices.

We have to go out and we have to seek out passive candidates," says Ms. Kurtz.

So if talent is hard to find, and big companies are beating us out of the great talent, what will it take to attract and retain great talent at smaller companies?

Here are five important ways to attract technical talent to your company:

- Show them the important problem they can solve. If you want to attract an engineer, give them a problem to solve — it's in their DNA. Engineers are wired to solve problems and want to make a difference in the work they do — create a product, solve a problem, and make something better. Small companies can use those basic human characteristics to attract engineering talent to their company and use it to keep them. If you want to attract a sales/Business Development pro offer them a challenge, as well as the ability to earn money without capping their ceiling. Great sales people are competitors and love a challenge; to better their numbers, to hunt and conquer new territory, to win new customers. To accomplish what others have not. Show them how they can achieve this.

- Assess your staff and then assess new candidates with "Core Value Influencer Assessments." Behavioral and Value system assessments are valuable tools to provide hiring managers with inside information to better match a technical professional with your existing team with closer cultural fit, worth ethic verification, and core value systems that match your team's. When you make a good fit in these areas, your team works closer together, they are happier, leading to longer retention. My experience as a headhunter is that the two greatest reasons technical talent leaves a company is 1) no longer challenged and 2) personality conflicts with their boss. Penny Fillhouer, a workforce consultant and owner of Because 'Fit

Matters says "by determining workforce 'fit,' a small company can literally save millions of dollars using workforce 'fit' hiring processes and assessments focused on staff and candidate values. Amazon, Yahoo, Integra and Hulu are among companies who have discovered successful hiring and retention using these tools. Such tools don't have to be expensive either; many are less than \$200.

- Have realistic expectations. Most job descriptions are written in search of a 'Water Walker.' The perfect person. Although we all want a Water Walker, talent can do the job and excel at it while growing your company and her own career. Hiring Managers and HR tend to write a job description describing the ideal candidate and ask for the world, when in reality, you don't need all those skill sets. Be realistic. Hire 80 percent of the requirements. An 80 percent employee with a good cultural and values (chemistry) fit is far more attractive, easier to retain, more motivated and will initially cost less as he/she develops to the 100 percent skill set you desire.

- Communicate during the hiring process. The most frequent complaint towards the hiring manager and the company? You don't communicate! What starts out as an honest priority to hire and interview gets set aside to put out other fires. In the meantime, we risk losing good, hard-to-acquire talent. Once a person begins the interview process, it is only natural for them to look around to see what else is out there. A great candidate will NOT wait for you while you go off on a tangent to put out other fires, travel or go on vacation in the middle of the interview process. We all have to do a better job of communicating. Once a hiring manager pulls the trigger to begin searching for technology talent, you MUST make it a priority. I've seen too many talented professionals lost to other companies simply because the hiring manager dropped the ball... took too long to interview, took too long to make

a decision, strung candidates along because they "wanted to see more candidates" — when the right person is sitting across from them. This can cost companies millions of dollars in continued search, delayed projects and lost revenue.

- Sell your company as a smart choice. Perks are important; additional vacation time, flex time, paid time off, and others. Yet, in addition, we need to SELL our companies and the opportunities they offer. Large companies can outpay you, out-benefit you, and provide more resources than you can. You will have a tough time competing at that level. Do you offer career growth? Do you offer resources a large company just can't offer, such as an "open door" practice, input to the executive team or even the president? Bonus, equity and commission incentives the big boys can't offer? Or travel perks? Do you offer creative, innovative challenges, time to innovate? Ability to think outside the box? Maybe you offer an individual office rather than a cubical. Tell your story — not only do you want to tell the history of the company, it is also important that you tell your story. Tell why you joined the company. What attracted you to the company? Why do you stay with the company? If you are the founder — tell your successes and failures and your company growth. What challenges do you face as a company and for this position? Allow another member of your team to also meet your candidate and encourage him to share his story as well.

- See more at: <http://www.todaysengineer.org/2014/Nov/management-attracting-talent.asp#sthash.uilXcvTp.dpuf>

## SPECIAL RECOGNITION

October 15, 2014 marked the 90<sup>th</sup> birthday of Vernon G. Price. His family gathered for a special celebration; with greetings, remembrances, and birthday wishes from his friends and family. Our society arranged for a Presidential Service Decree plaque honoring his many years of IEEE service, and for his NPSS service, especially his work on membership development. Included are a copy of the plaque and a birthday picture of Vern with the plaque.

Vern has been a member of IEEE for six decades! Actually until 1963 he was a member of the Institute

of Radio Engineers, IRE. In that year IEEE was founded as the combination of the IEE and IRE. He has been a member and NPSS volunteer for 42 years, serving 20 years on Membership activities. At one time or another, Vern has been a member of 13 IEEE Societies— but he has been with NPSS for by far the longest!

In addition to his long and devoted IEEE service, Vern also had a distinguished professional career beginning with work for the U.S. Navy during WWII as a radio technician (and for Vern, as a ham radio operator) which interrupted his electrical engineering



studies at the University of Utah. He returned to Utah, completed his BSEE and MSEE degrees, and continued in coursework until the Korean War loomed and he worked at the Navy Electronics Laboratory in San Diego on sonar systems. In 1955 he was encouraged to come to Palo Alto and worked in GE's Microwave Laboratory. Through GE he was able to continue his graduate education in the Department of Electrical Engineering at Stanford University. In 1962 he became one of the early employees of Stanford's Two-Mile Accelerator Center (later to become the Stanford Linear Accelerator

**SPECIAL RECOGNITION** Continued on PAGE 8

Center and then the SLAC National Acceleratory Laboratory), designing microwave wave guides for the new machine. Once the machine was finished, Vern became the head of the Machine Operations Group and remained so until three years before his retirement. During those three years he worked in the Instrumentation and Controls Department.

Vern's work at Stanford allowed him early access to desktop computers, both professionally and as a hobbyist. He is still well-versed in computer hardware and software. Other hobbies have included ham radio, obtaining a pilot's license, and maintaining his fluent German. Now he focuses much energy on genealogy which also draws on his extensive computer skills.

He might be 90, but Vern's interests and activities are still young – as attested to by these few selected birthday wishes, including my own. He still continues active service as a member of the NPSS membership Committee where he provides considerable 'back room' support. He even attends meetings and assists at the registration desk when long-distance travel isn't required.

#### Selected Birthday Greetings

Vern, we go back almost 30 years. We have worked together and volunteered together. The times we have spent at the IEEE NSS/MIC Membership Booth are what I remember best. You are so dedicated, organized, and responsible. Your friendly presence is remembered by all longtime NSS folks. Thank you for your many years of IEEE service. Happy 90 Year Birthday!

#### Ed Lampo, IEEE-NPSS

Vern has to be the most tech-sawy 90 year old in the world! Not only is he able to use advanced technology, but he contributes to IEEE and genealogy standards, applies technology (such as his idea for QR labels on tomb markers) and is able to diagnose and resolve complex computer problems - in multiple languages!

#### Ted Dorff, friend

Each month I look forward to seeing your smiling face check in at the Silicon Valley Computer

Genealogy Group meeting - always a little late! I also appreciate the astute questions and comments from you in any class I've been in. Thanks for your support of the group and the genealogy community.

#### Lesly Klippel, friend

I have many great memories of the times I have spent with you and your family. Do you remember dancing with Martha and me in your living room to Styx or trips to the beach? I do. I spent a lot of time at your house especially during the summer. You and your family were always welcoming and supportive. You had a profound influence on my life. It was nice to have a second home where I knew I was welcomed and loved. I didn't realize at the time how blessed I was but I do now. Thank you!

#### Sandra Burnett Bluhm, childhood friend of Vern's daughter, Martha

Whenever Uncle Vernon would come to visit, I enjoyed that he would sit down by me and we would visit. We had many great conversations over many years about a variety of subjects. It could have been about cows or computers, old family stories or concern about the world today. Whatever the subject, we just seemed to be able to have a good discussion and both enjoy it.

#### Joe Jones, nephew

I had called Uncle Vernon to help me with my father's computer...Dragon Speak...etc...It was just like having you in the same room. Your quiet voice walking me through the steps. Like you were looking over my shoulder, gently, step by step until I understood what I needed to do.

#### Heather Scaife, niece

Vernon you are the most patient man I know. A great, kind, spiritual, companion to my sis Pat and a wonderful loving father to your children. You taught them well.

#### Colleen Gentry, sister-in-law

Ed Lampo, long-time NPSS member, past treasurer, and current elected AdCom member from the Radiation Instrumentation community,

prepared this special note recognizing Vernon Price on his 90<sup>th</sup> birthday, with assistance from Vern's daughters Martha Siegel and Karen Zensius, and NPSS secretary Albe Larsen. Ed can

be reached by E-mail at [e.lampo@ieee.org](mailto:e.lampo@ieee.org).



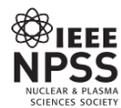
**IEEE Nuclear and Plasma Sciences Society**  
**Presidential Service Decree**  
 Conferred upon  
**Vernon G. Price**

*NPSS is privileged to offer heartfelt Congratulations and Gratitude to Vernon G. Price on the occasion of his 90th Birthday, for his 62 years of continuous IRE and IEEE Membership, including 42 years of service to NPSS marked by his warm personal leadership for over 20 years of membership development, organization and recruiting through Chapters and Conferences internationally, bringing significant honors to both IEEE and NPSS, and for his continued faithful service today.*

Presented this 15th day of October, 2014




Janet L. Barth  
President, IEEE NPSS





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#### NEWSLETTER EDITOR:

Albe Dawson Larsen  
 SLAC National Accelerator Laboratory  
 MS-64  
 2575 Sand Hill Road  
 Menlo Park, CA 94025  
 Tel: +1 650 926 2748  
 Fax: +1 650 926 3570  
 E-mail: [amlarsen@slac.stanford.edu](mailto:amlarsen@slac.stanford.edu)

#### EDITOR EMERITUS:

W. Kenneth Dawson  
 TRIUMF, 4004 Westbrook Mall  
 Vancouver, British Columbia  
 Canada, V6T-2A3.  
 Tel: +1 604 738 6701  
 E-mail: [k.dawson@ieee.org](mailto:k.dawson@ieee.org)

#### CONTRIBUTORS LISTED ALPHABETICALLY:

Janet L. Barth, W. Kenneth Dawson, Tiana Dodson,  
 Hossam Farag, Teresa Farris, Steve Gitomer, Ed  
 Lampo, Albe Larsen, Anthony Lavietes, Abdallah  
 Lyoussi, Martin Purschke, Edl Schamiloglu, Felix  
 Schauer, Marty Shaneyfelt, Marc-Andre Tretraut,  
 Craig Woody, Dimitris Visvikis

#### CONTRIBUTED ARTICLES

Publicity releases for forthcoming meetings, items of interest from local chapters, committee reports, announcements, awards, or other materials requiring society publicity or relevant to NPSS should be submitted to the Newsletter Editor by January 5<sup>th</sup>, 2015 for publication in the March 2015 Newsletter.

News articles are actively solicited from contributing editors, particularly related to important R&D activities, significant industrial applications, early reports on technical breakthroughs, accomplishments at the big laboratories and similar subjects. The various *Transactions*, of course, deal with formal treatment in depth of technical subjects. News articles should have an element of general interest or contribute to a general understanding of technical problems or fields of technical interest or could be assessments of important ongoing technical endeavors.

Advice on possible authors or offers of such articles are invited by the editor.

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