



## 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference

### 25<sup>th</sup> International Symposium on Room-Temperature Semiconductor X-Ray & Gamma-Ray Detectors

10–17 November 2018—International Convention Centre (ICC) Sydney, Australia

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The 2018 Nuclear Science Symposium and Medical Imaging Conference marks the 65<sup>th</sup> year of the meeting, and together with the 25<sup>th</sup> International Symposium on Room-Temperature Semiconductor X-Ray & Gamma-Ray Detectors. This year, the conference is of special interest to IEEE Region 10 scientists who will be able to participate and learn from the large and diverse group of people that regularly attend every year.

The technical program was built by selecting contributions from over 1,400 submitted abstracts, with the help of over fifty topic conveners and several hundred technical reviewers. The core programs will run from Monday, November 12<sup>th</sup>, all the way through Saturday, November 17<sup>th</sup>. A rich program of short courses will be offered from Saturday, November 10<sup>th</sup> through Monday, November 12<sup>th</sup>. This intense week will offer, in addition to the core programs, workshops, joint sessions and special events. Our Industrial Exhibition will be open from Tuesday through Thursday and will include what we anticipate being a relaxing networking opportunity during the "Happy Hour" reception on Tuesday evening.

The conference registration is already open on the website as well as further information about the transportation and possible accommodation. There is an extensive list of affiliated hotels with a wide range of rates that we are sure will accommodate all of our guests. The conference website is always kept

up to date. A pre-online program can also be found here: <http://www.nssmic.org/2018/>.

Sydney is the state capital of New South Wales. The Sydney Opera House is famous worldwide as is the Harbour Bridge and both are within walking distance or a short harbor ferry ride from the ICC. Darling Harbour is next to the ICC Sydney and offers many restaurants and licensed venues for casual meetings and discussions—remember November is spring time. This amazing multicultural city offers exquisite art galleries, theatres, classical music concerts, attractive China Town, Japanese Garden, Taronga Zoo, aquarium, and Hyde Park. Many hotels are within walking distance from ICC and offer a wide range of room rates suitable for student accommodation right up to the top-end Sofitel style. Don't forget to extend your stay and make the most of the numerous discounted pre-and post-conference tours in Australia designed exclusively for our attendees through our travel partner.

We are very confident that the meeting in Sydney will be successful and remembered for celebrating the 65<sup>th</sup> Anniversary of NSS, as well as the 25<sup>th</sup> Anniversary of RTSD. On behalf of the 2018 Organizing Committee and the IEEE Nuclear and Plasma Sciences Society, we strongly encourage you to plan to attend the first-ever IEEE NSS/MIC / RTSD to be held in Sydney, Australia. We very much look forward to welcoming you to Sydney in November 2018!



Anatoly Rozenfeld  
General Chair



Ralf Engels  
Deputy General Chair

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## Conferences Continued from PAGE 1

### SCIENTIFIC PROGRAM

For complete details on all topics and program sessions, please visit the conference website at [nss-mic.org/2018](http://nss-mic.org/2018). We have accepted over 1,400 outstanding papers that will be presented in either oral or poster format. Brief descriptions of individual programs follow.

### THE NSS PROGRAM

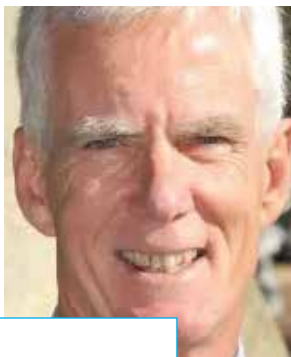
The 2018 NSS will be offering an exciting program this year with a number of new features that will be of interest to all attendees. We will have three plenary sessions that will include more talks of general interest, including reports on new searches for Dark Energy and Dark Matter, an overview of the research being done at the Australian Synchrotron, a talk about the Australian Center for Neutron Scattering, as well as a talk on achieving picosecond timing with scintillators and a talk on how ion therapy can change our lives. One of the plenary sessions will be devoted to presenting our Radiation Instrumentation Awards, which will include the Radiation Instrumentation Early Career Award, the Glenn F. Knoll Outstanding Achievement Award, and the Emilio Gatti Technical Achievement Award. In addition, we will also be presenting the 2018 IEEE Marie Skłodowska-Curie Technical Field Award to Prof. David Nygren, who is well known within the NSS community for having invented the Time Projection Chamber. During the presentation of these awards, you will have a chance to hear each of the award recipients describe their prize-winning work.

Following in the tradition of the past several years, we will have an NSS dinner on Monday evening that will take place in a beautiful setting within the International Convention Center with a foyer overlooking Sydney's beautiful Darling Harbour. This is surely one event that you won't want to miss. The NSS will start on Monday Nov 12<sup>th</sup> and run throughout the week with parallel sessions and will end by lunchtime on Friday with a closing session and a farewell drink.

### 2018 NSS Program Cochairs.



**Craig Woody**  
NSS Program Cochair



**Geoffrey Taylor**  
NSS Program Cochair

*Craig Woody, Brookhaven National Lab, E-mail: [woody@bnl.gov](mailto:woody@bnl.gov) and Geoffrey Taylor, University of Melbourne, E-mail: [gntaylor@unimelb.edu.au](mailto:gntaylor@unimelb.edu.au)*

### THE MIC PROGRAM

The 2018 MIC promises to be a memorable conference, featuring a stimulating and diverse scientific program and special social activities. Following joint sessions with NSS and RTSD on Tuesday, November 13<sup>th</sup>, the MIC will formally

open on Wednesday 14<sup>th</sup> November and run through to Saturday 17<sup>th</sup> November. As well as 16 oral sessions and 3 poster sessions highlighting the best work submitted by researchers all over the world, the scientific program will feature two outstanding keynote speakers. Professor David Reilly, Director of Microsoft Station Q at the University of Sydney, will review recent advances in quantum control systems as they relate to medical imaging and explore their potential role in future medical imaging technologies. Professor Seong-Gi Kim, Director of the Center for Neuroscience Imaging Research at Sungkyunkwan University, will discuss the latest advances in quantitative functional MRI and its potential role in elucidating fundamental physiological mechanisms in the brain. We will have, as usual, plenary sessions dedicated to the major technical achievement awards in our field, the Edward J Hoffman Medical Imaging Scientist Award and the Bruce H Hasegawa Young Investigator Medical Imaging Award. Following the presentation of these awards, you will hear each of the award recipients describe their prize-winning work. In addition, we will have a plenary session featuring the finalists in the student paper award, which are now named the IEEE NPSS Christopher J. Thompson Student Paper Awards, in honor of one of the pioneers of our field. This session will also include a tribute to Chris, recognizing his outstanding achievements and dedication to student learning and mentoring.

The MIC dinner will be held at Luna Park, an iconic Sydney landmark on the foreshore of Sydney Harbour. Guests will be transported by ferry from the convention centre across the harbor to Luna Park where, on arrival, they will enjoy predinner drinks on a private deck, while taking in sunset views of Sydney Harbour, including the famous Sydney Opera House. During dinner we will hear astronomer Dr Ray Norris talk about aboriginal astronomy, a fascinating field that explores the link between Australia's ancient indigenous culture and astronomy. You won't want to miss this event and you certainly won't want to miss the 2018 MIC.

### 2018 MIC Program Cochairs.



**Steven Meikle**  
MIC Program Cochair



**Taiga Yamaya**  
MIC Program Cochair

*Steven Meikle, University of Sydney, Sydney, Australia E-mail: [steven.meikle@sydney.edu.au](mailto:steven.meikle@sydney.edu.au) and Taiga Yamaya, National Institute of Radiological Sciences (NIRS-QST) Chiba, Japan, E-mail: [yamaya.taiga@qst.jp](mailto:yamaya.taiga@qst.jp)*

### THE RTSD PROGRAM

The 25<sup>th</sup> International Symposium on Room-Temperature Semiconductor Detectors (RTSD) represents the largest forum of scientists and engineers developing new solid-state radiation detectors and imaging arrays. Room-temperature

semiconductor radiation detectors are finding increasing applications in such diverse fields as medicine, homeland security, astrophysics and environmental remediation. The objective of this conference is to provide a forum for discussion of the state-of-the-art of the detector technology, including materials improvement, material and device characterizations, fabrication, electronics and applications.

The traditional RTSD Luncheon will feature a two-hour harbor cruise on Tuesday, 13 November, 11:30am - 3:00pm.

### 2018 RTSD Program Cochairs



**Michael Fiederle**  
RTSD Program Cochair



**Ralph James**  
RTSD Program Cochair

*Michael Fiederle, University of Freiburg, Freiburger Materialforschungszentrum Freiburg, Germany E-mail: [michael.fiederle@fmf.uni-freiburg.de](mailto:michael.fiederle@fmf.uni-freiburg.de), Ralph B. James, Savannah River National Laboratory, Aiken, SC-29803, USA, E-mail: [ralph.james@srnl.doe.gov](mailto:ralph.james@srnl.doe.gov)*

### JOINT SESSIONS

As in previous years, a series of Joint Sessions for the NSS, MIC, and RTSD communities has been organized during the week. These sessions will provide an opportunity to highlight research that spans the technologies covered by the three main technical areas of the conference.



**Patrick Le Dû**  
Joint Session Chair

*Patrick Le Dû, Joint Session Chair, E-mail: [patrickledu@me.com](mailto:patrickledu@me.com)*

### INDUSTRIAL EXHIBITS PROGRAM

Vendors with products and services related to the NSS, MIC, and RTSD are participating in the Industrial Program which comprises an exhibition

and technical seminars. The exhibition area central to conference activities will display the latest in products and innovation. The area will be next to the room with the poster sessions and will have coffee service during the Exhibition opening hours. The exhibitor technical session, where the exhibitors will discuss the workings of their instruments, will be on Wednesday

Attendees are invited to visit the exhibition area to see the latest in exhibitor offerings. As previously mentioned, our Industrial Exhibits will be open from Tuesday through Thursday and will include what we anticipate being a relaxing networking opportunity during the "Happy Hour" reception on Tuesday evening.



**Ron Keyser**  
Industrial Program Chair

*Ronald Keyser, Industrial Program Chair, E-mail: [ronkeyser@ieee.org](mailto:ronkeyser@ieee.org)*

### SHORT COURSES

The 2018 NSS-MIC Short Course program in Sydney offers nine full-day courses on a diverse range of topics in nuclear science and medical imaging. All courses are run by experts in their respective fields and address both theoretical foundations and practical examples.

An excellent set of short courses has been organized at the start of the NSS/ MIC programs, covering a wide range of nuclear science and medical imaging technology. Expertly organized by Short Course Chairs: Michael Lerch (NSS) and Andre Kyme (MIC), all courses are one day in length. The first lecture is planned to begin at 08:30 and lunch, refreshments, lecture notes, and a certificate of completion are also provided as part of the short course registration fee.

### Short Courses Schedule

- SC1 Integrated Circuits for Detector Signal Processing  
Saturday, 10 November 2018
- SC2 Detection and Measurement of Radiation  
Saturday, 10 November 2018
- SC3 Biomedical Imaging Fundamentals  
Saturday, 10 November 2018
- SC4 Organic Electronics and Detectors  
Sunday, 11 November 2018
- SC5 PET/MR: Principles and Applications  
Sunday, 11 November 2018
- SC6 Image Analysis and Statistics  
Sunday, 11 November 2018
- SC7 Advanced Photodetectors  
Monday, 12 November 2018

### NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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**SC8** GATE, a GEANT4 Based Simulation Toolkit  
Monday, 12 November 2018

**SC9** Medical Image Reconstruction:  
Theory and Practice  
Monday, 12 November 2018

## SCHOLARSHIPS AND GRANTS

This year we had a record number of applicants, and many grants have been awarded. Special thanks to all members of our selection committees for their help with the process.



**Merry Keyser**  
Scholarship Chair &  
Mobile Apps Cocoordinator

*Merry Keyser, Scholarship Chair, E-mail:*  
[merrykeyser@ieee.org](mailto:merrykeyser@ieee.org)

## WORKSHOPS

A number of exciting workshops are being organized at this year's NSS/MIC by leading international experts on a wide range of topics, including advanced instrumentation for a large variety of applications spanning from underground detection up to medical imaging.



**Katia Parodi**  
Workshop Chair

*Katia Parodi, Workshop Chair, Ludwig-Maximilians-Universität München, Germany, E-mail:*  
[katia.parodi@lmu.de](mailto:katia.parodi@lmu.de)

## This year, five workshops will be offered:

**NSS-WS1** Instrumentation and Measurement in Nuclear Media Workshop—IMNM  
Sunday, 11 November 2018

**NSS-WS2** Workshop on Detectors for Underground Searches of new physics—DEUS “Dark Matter”  
Sunday, 11 November 2018

**NSS-WS3** Workshop on Technology Commercialization  
Sunday, 11 November 2018

**MIC-WS1** New Technologies in Hadron Therapy Workshop  
Tuesday, 13 November 2018

**MIC-WS2** Total-Body PET Imaging Workshop—TBPI  
Saturday, 17 November 2018

## SPECIAL EVENTS

Do not forget our special events program featuring special interest gatherings from WIE, GATE and STIR:

Women in Engineering, “Understanding and overcoming the challenge of unconscious bias at all levels,” Thursday, November 15, 2018, 12:30 pm (Note: this special event requires pre-registration and is limited to 100 participants.)

GATE User’s Meeting: “OpenAccess Simulation Tool for PET, SPECT, CT, Optical Imaging and Radiation Therapy,” Thursday, November 15, 2018 at noon.

STIR Users & Developers Meeting, Thursday, November 15, 2018 at 6 pm.

Please, look for room assignments at the conference.

## SOCIAL EVENTS

### NSS Dinner

After two successful NSS dinners, we will follow this idea and will have our NSS dinner this year in the International Convention Center with a beautiful view over Darling Harbour. The event will take place in the Cockle Bay room on Level 3, after the first day of the NSS Program. This is an excellent opportunity to network with our scientific colleagues in a relaxed atmosphere. The event will take place on Monday starting at 7:00pm.

## MIC Dinner

Guests will be transported by ferry from the convention center across the harbor to Luna Park where, on arrival, they will enjoy pre-dinner drinks on a private deck, while taking in sunset views of Sydney Harbour. After dinner, guests can enjoy complimentary rides in the park. Friday, November 16<sup>th</sup> from 7:00pm to 10:00pm.

## RTSD Luncheon

The RTSD Luncheon, will include extraordinary views of one of the world’s most beautiful and exciting harbors from an expansive sightseeing boat. The two-hour harbor cruise includes an entertaining, personalized commentary on Sydney’s many tourist sights and its rich history and warm people, while enjoying a wide selection of seafood, pre-selected wine, and other savory treats. Tuesday, 13 November, 11:30am–3:00pm.

## CONFERENCE RECEPTION

This year the conference reception will be held in the ICC on Level 5 in the Grand Ballroom. The exact time is announced in the online program and make sure to reserve this time slot to mingle around with your colleagues and friends to exchange knowledge or to create further friendships.

## COMPANION PROGRAM

All tours will depart from and return to the Companion Program Meeting Area in the International Convention Center. This meeting area will serve as a lounge for all the registered companions to gather during the conference. The companion program for the attendees will also offer a wide range of options with tours and events from Sunday, November 11<sup>th</sup> to Friday, November 16<sup>th</sup>. The following interesting and scenic tours will be offered:

- 1) Sydney City Sights (Half Day), Sunday, 11 November 2018
- 2) Cockatoo Island, Monday, 12 November 2018
- 3) Cockatoo Island & Sydney Opera House Tour, Monday, 12 November 2018
- 4) Sydney Opera House Tour, Monday, 12 November 2018

5) Hunter Valley Wine Experience, Tuesday, 13 November 2018

6) Tamarama to Bondi Coastal Walk Private Tour, Wednesday, 14 November 2018

7) Blue Mountains, Thursday, 15 November 2018

8) Magistic Cruisemart Harbour Sightseeing Cruise, Friday, 16 November 2018.

*Please check the Conference page at <http://www.nssmic.org/2018/?s=tours> for registration and deadlines.*

## Australian VISA Requirements

All visitors to Australia are required to obtain a visa or Electronic Travel Authority (ETA) in advance to be granted entry to Australia. An ETA provides authorization to travel to and enter Australia and is electronically linked to your passport. An ETA is for short term stays for tourism or business visitor activities such as attending a conference/meeting, or for contractual negotiations.

*Visit our website at <http://www.nssmic.org/2018/?s=visa> for more information on visa applications.*

## PUBLICATIONS

The Conference Record (CR) is the official repository for manuscripts presented at the 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference and will be made available as a file for download by all registered conference attendees after the conference. The CR also will be submitted to IEEE Xplore for publication. IEEE reserves the right to exclude a submission from distribution after the conference, including exclusion from IEEE Xplore, if the submission does not meet IEEE standards for scope and/or quality.

## REGISTRATION

All registration formalities for participants are again being handled electronically via the conference website [www.nss-mic.org/2018](http://www.nss-mic.org/2018). Participants can register for the conference, short courses, workshops, NSS and MIC dinner and RTSD luncheon, and the Companion Program. Early registration is strongly recommended and payment may be made in several convenient ways such as credit card and wire transfer.

# 28<sup>th</sup> IEEE Symposium on Fusion Engineering SOFE 2019

The 28<sup>th</sup> Symposium on Fusion Engineering (SOFE) will be held June 2-6, 2019 near Jacksonville, Florida at the Sawgrass Marriott Golf Resort and Spa at Ponte Vedra Beach. The conference has an outstanding technical program presented at a world-class PGA Golf and beach resort on the east coast of the United States.

The theme for this SOFE is “the future of fusion—the quest for a US fusion energy program”. As in previous SOFEs there will be two minicourses offered on June 2. One is on plasma-material interactions and another on advanced 3d neutronics. A vendor exhibit and community townhall addressing our theme will also be hosted on June 4. A welcome reception will occur on June 2. A Women in Engineering reception will be held Monday evening and a Young Professionals reception will be held just prior to the townhall meeting Tuesday evening. The SOFE awards banquet will occur at the Marriott on Wednesday evening where the 2018 and 2019 Fusion Technology Awards presentations and the SOFE2019 student award will be presented. SOFE is evolving into an international conference and is open to all engineering, physics and material science

disciplines involved in the pursuit of both magnetic and inertial confinement fusion.

The general conference chair is Dennis Youchison from Oak Ridge National Laboratory and the technical program chair is Brad Nelson, retired from the US ITER Project Office, Oak Ridge. Both Oak Ridge National Laboratory and the University of Tennessee are the official hosts. SOFE is a biennial conference sponsored by the Nuclear Plasma Sciences Society (NPSS) of IEEE and organized by the Fusion Technology Committee of NPSS.

The technical program includes four plenary sessions as well as fourteen oral and three poster sessions. A special session on innovative and disruptive technologies has been added. Other topics include Experimental Devices, Next step Devices and Power Plants, MFE and IFE Alternate Concepts, Divertors and High Heat Flux Components, Chambers, Blankets, and Shields, IFE Fusion Studies and Technologies, Plasma Facing Materials and Surface Engineering, Diagnostics Engineering and Integration, Safety, Operation and Maintenance, Materials, Heating and Current Drive, Disruption Mitigation and Control, Remote Handling and RAMI, Magnet



**Dennis Youchison**  
General Chair

Engineering, Stellarators, Process Simulation and Plant Simulators, Systems Engineering and Large Scale Integration. Submitted papers are eligible for publication in a special issue of IEEE *Transactions on Plasma Science*. Special guest speakers will address reactor technology development for ITER and beyond.

The short course chair is Daniel Andruczyk of University of Illinois. The courses offered at this conference focus on plasma-materials interactions and neutronics for breeding and energy production. Continuing education credits are available for these



**Brad Nelson**  
Technical Program Chair

courses. In addition to the receptions and banquet, the social program also includes a tour of the TPC grounds and club house and access to the resort spa and beach club included with the resort fee.

The Sawgrass Marriott Golf resort and Spa is 40 minutes (32 miles) southeast of the Jacksonville International Airport and 25 miles north of St. Augustine. It can be reached by rental car, taxi or airport shuttle. It has large rooms and villas, multiple pools, a SurfStream wave pool, access to

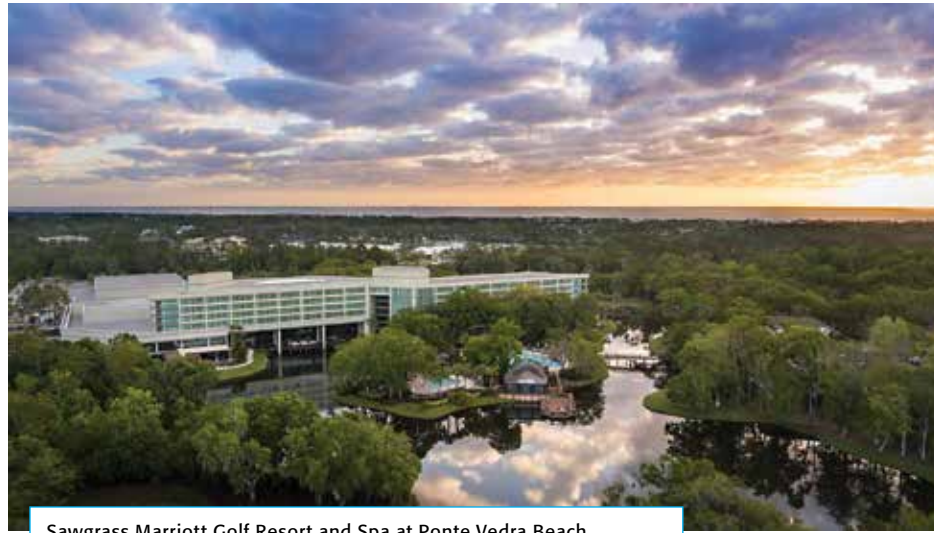


## Conferences

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the adjacent TPC Sawgrass with two championship golf courses, beach activities, spa, fitness center and 6 restaurants and lounges. They also provide a complimentary shuttle for a quick ride over to their private Cabana Beach Club on the stunning Ponte Vedra beach.

*The latest information on the conference including abstract submission, registration, travel and accommodations links can be found at the conference web site hosted by the University of Tennessee. <http://sofe2019.utk.edu/>*



Sawgrass Marriott Golf Resort and Spa at Ponte Vedra Beach

### LONG-RANGE ATTRACTION

We sleep in separate bedrooms, we have dinner apart, we take separate vacations—we're doing everything to keep our marriage together.

*Rodney Dangerfield*

### BUFF(ET) DINNER

I feel like a mosquito in a nudist colony. I know what to do; I just don't know where to start.

*Pat Riley*

### STILL WORKING ON IT

Man is the only animal for whom his own existence is a problem which he has to solve.

*Erich Fromm*

## 2019 IEEE NSREC Is Planning for San Antonio, Texas



**Teresa Farris**  
Publicity Vice Chair

The IEEE Nuclear and Space Radiation Effects Conference will be held July 8-12, 2019 in San Antonio, Texas at the Marriott Rivercenter Hotel. The conference will feature a Technical Program consisting of nine sessions of contributed papers (both oral and poster) that describe the latest observations and research results in radiation effects, an up-to-date Short Course offered on July 8, a Radiation Effects Data Workshop, and an Industrial Exhibit.

Deep in the heart of Texas, San Antonio's bold spirit and historic legacies make it an ideal gateway to the region's culture, scenic beauty and restful retreats. San Antonio has been part of colonial Spain, the Republic of Mexico, the Republic of Texas, and since 1845, the United States. Relics and tales from this iconic past linger along the city streets. Originally colonized by Spain, San Antonio has five beautifully preserved Spanish colonial missions including The Alamo, the location of a famed battle for Texas independence. La Villita Historic Arts Village, a small village that housed Spanish soldiers stationed at The Alamo, is full of life and commerce. Commerce also thrives a few blocks away at Market Square. Known as the largest Mexican market north of the Rio Grande, Market Square is filled with local and imported pieces of art, pottery, jewelry and textiles.

One distinct locale that houses many of San Antonio's unique offerings is the River Walk. Here you will find miles of meandering paths along the banks of the San Antonio River connecting a Texas-sized sampling of hotels, restaurants, shops, historic landmarks, museums and more. Visitors and locals dine aboard river cruisers and the sounds of mariachis echo from the stone bridges above. This is the river that originally inspired the settlement of San Antonio, and it still flourishes today as the city's center.

From the Marriott Rivercenter, step out onto the River Walk, visit the Alamo, and enjoy one of America's most authentic destinations. It is a city alive: a city of poets and lyricists, painters and sculptors, a city rich and humble. Please join us for NSREC 2019 in San Antonio.

### TECHNICAL PROGRAM

The technical program will be chaired by Simone Gerardin from the University of Padova. Papers to be presented at this meeting will describe the effects of space, terrestrial, or nuclear radiation on electronic or photonic devices, circuits, sensors, materials and systems, as well as semiconductor processing technology and techniques for producing radiation-tolerant devices and integrated circuits. The conference will be attended by engineers, scientists, and managers who are concerned with radiation effects.

The conference committee is soliciting papers describing significant new findings in the following or related areas:

#### Basic Mechanisms of Radiation Effects in Electronic Materials and Devices

- » Single Event Charge Collection Phenomena and Mechanisms
- » Radiation Transport, Energy Deposition and Dosimetry
- » Ionizing Radiation Effects
- » Materials and Device Effects
- » Displacement Damage
- » Processing-Induced Radiation Effects

#### Radiation Effects on Electronic and Photonic Devices and Circuits

- » Single Event Effects
- » MOS, Bipolar and Advanced Technologies
- » Isolation Technologies, such as SOI and SOS
- » Optoelectronic and Optical Devices and Systems
- » Methods for Hardened Design and Manufacturing
- » Modeling of Devices, Circuits and Systems
- » Cryogenic or High Temperature Effects
- » Novel Device Structures, such as MEMS and Nanotechnologies
- » Techniques for Hardening Circuits and Systems

#### Space, Atmospheric, and Terrestrial Radiation Effects

- » Characterization and Modeling of Radiation Environments
- » Space Weather Events and Effects

- » Spacecraft Charging

- » Predicting and Verifying Soft Error Rates (SER)

#### Hardness Assurance Technology and Testing

- » New Testing Techniques, Guidelines and Hardness Assurance Methodology
- » Unique Radiation Exposure Facilities or Novel Instrumentation Methods
- » Dosimetry

#### New Developments of Interest to the Radiation Effects Community

### RADIATION EFFECTS DATA WORKSHOP

The Radiation Effects Data Workshop is a forum for papers on radiation effects data on electronic devices and systems. Workshop papers are intended to provide radiation response data to scientists and engineers who use electronic devices in a radiation environment, and for designers of radiation-hardened or radiation-tolerant systems. Papers describing new simulation facilities are also welcomed.

### PAPER SUBMITTAL

Information on the submission of summaries to the 2019 NSREC for either the Technical Sessions or the Data Workshop can be found at [www.nsrec.com](http://www.nsrec.com). The deadline for submitting summaries is February 1, 2019.

### SHORT COURSE

Attendees will have the opportunity to participate in a one-day Short Course on Monday, July 8. The short course is being organized by Steven Moss, who is retired after a long career at The Aerospace Corporation. The course will be of interest both to radiation effects specialists and newcomers to the field.

### INDUSTRIAL EXHIBIT

An Industrial Exhibit will be included as an integral part of the conference and will be chaired by Gregg Panning, of The Aerospace Corporation. Exhibitors will include companies or agencies involved in manufacturing electronic devices or systems for applications in space or nuclear environments, modeling and analysis of radiation effects at the device and system level, and radiation testing.

#### General Chair

John M. Stone,  
Southwest Research Institute  
[jstone@swri.org](mailto:jstone@swri.org)

#### Technical Program Chair

Simone Gerardin,  
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#### Local Arrangements Chair

Brian Sierawski,  
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#### Short Course Chair

Steven C. Moss,  
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Teresa Farris,  
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#### Industrial Exhibits Chair

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*Teresa Farris, Radiation Effects Vice Chair for Publicity, can be reached by E-mail at [Teresa.farris@cobham.com](mailto:Teresa.farris@cobham.com).*

### HIGH JINX

The fourth floor has been moved to the ninth floor.  
*Sign in an Olympia, WA hospital elevator*

### YOU'RE EXCUSED

Old age is when you first realize other people's faults are no worse than your own.

*Edgar A. Shoaff*

### WE SHALL...

You can't escape necessities, but you can overcome them.

*Seneca the younger*

### TILL IT BURSTS

There's only one thing that can keep growing without nourishment: the human ego.

*Marshall Lumsden*

### SWEET TALK??

[She] told enough white lies to ice a wedding cake.

*Margot Asquith*

## President's Report



**Stefan Ritt**  
IEEE NPSS President

I would like to dedicate this article to the women in our society. Our society, as well as IEEE overall, has about ten percent female members. This reflects down to paper authors as well as to conference attendees. Our society has still an under-representation of women in the so-called STEM professions (Science, Technology, Engineering and Math).

What can we do about that as a society? As a first step, IEEE introduced the Women in Engineering (WIE) organization. It dates back to 1993 when the first ad-hoc committee was appointed to investigate how to increase female participation in IEEE. Later it became a standing committee, a WIE Magazine was launched and today the organization connects over 20,000 members in over 100 countries. Find more at <http://wie.ieee.org>. Why not become a member yourself—female or male? You get access to the membership directory for networking, get the monthly newsletter and the WIE magazine, have the opportunity to obtain travel grants, scholarships and awards. In addition, you get a discounted rate to the IEEE International Women in Engineering Leadership Conference <http://ieee-wie-ic.org/>. This event focuses on providing leading-edge professional development for mid-level and senior women through highly interactive sessions designed to foster discussion and collaboration. Several women I spoke with who attended this conference told me this was the most inspiring event ever for them. Please be aware that the NPSS society has a new "NPSS

Women in Engineering Leadership Development Travel Grant" which covers travel and attendance cost up to \$3000 for one individual to attend this excellent conference. Find more information on the NPSS awards page at <http://ieee-npss.org/awards/npss-awards/> and under Awards in this Newsletter. In addition, our society sponsors WIE events at various NPSS conferences <http://ieee-npss.org/women-in-engineering-wie/>. Just last week I was at the IEEE Real Time Conference in Williamsburg, VA, where we had a nice WIE event, where I got lots of positive feedback from both female and male attendees of this event. If everybody just becomes aware of the problems women have in a man-dominated environment, we are already one step further.

What can we do as individuals? Let me speak for myself. In my "day-job" I head a small group of scientists, and I find it very important to create a family friendly environment. Luckily our research lab now has a childcare center, which was founded by scientists who convinced our administration that this was a good idea. Today it helps us a lot in attracting high-class researchers with young families. Furthermore, I strongly support family-related

work contract adjustments. I have both a woman and a man (!) who reduced their employment to 80% to take more care of their children. This is complemented by possibilities for home office and paid leave to take care of sick children. Young families often have difficulties to combine childcare with their job and they need all support they can get.

I hope that some ideas in this article inspire you (or your boss!). Go to some of the web sites above and see if there is anything for you. Maybe I will meet you at a future WIE event, where I would be more than happy to chat with you.

Sincerely,

*Stefan Ritt, IEEE NPSS President, can be reached at the Paul Scherrer Institute CH-5232 Villigen PSI, WBWA/140, Switzerland; Phone: +41 56 310 3728; Fax: +41 56 310 2199; E-mail: [stefan.ritt@psi.ch](mailto:stefan.ritt@psi.ch).*

## Secretary's Report



**Albe Larsen**  
IEEE NPSS Secretary and Newsletter Editor

The NPSS AdCom met in Kona, HI on July 22<sup>nd</sup>. Unfortunately, I was unable to attend that meeting so Peter Clout kindly covered for me. Martin Grossmann provided the list of AdCom actions, and prepared the brief report below.

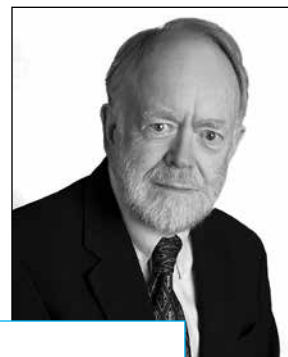
### ADCOM ACTIONS:

- » AdCom moved to approve the establishment of the IEEE Medical Imaging Technical Achievement Award. This is a midcareer award requiring eight to twenty-five years' experience. Passed

- » AdCom approved providing \$25,000 matching funds for the establishment of the IEEE Robert J. Barker Graduate Student Award for Excellence in Pulsed Power Applications. The recipient must be a master's or Ph.D. student and a member of IEEE. The award will be annual. Passed.
- » The RISC Committee moved that NPSS sponsor the SORMA West 2018. Passed.

### FROM FINCOM:

- » AdCom moves to approve the annual Best Paper Awards for TNS, TPS and TRPMS at up to \$1500 each. Passed.
- » AdCom moves to approve the Smart Village New SunBlazer IV and PayGo PBK Supplier Development initiative for 2019 at \$127K. Passed.
- » AdCom moves to set aside \$55k for the Mekong Delta Sustainable Education initiative, pending approval at the November 10<sup>th</sup> AdCom meeting. Passed.



**Peter Clout**  
NPSS Secretary Pro Tem

- » AdCom moves to set aside \$25k for the NPSS Instrumentation School Initiative for 2019, pending approval at the November 2018 AdCom meeting. Passed.
- » AdCom moves to approve the Conference Abstract Software Development initiative for 2019 at \$50k. Passed.
- » AdCom moves to set aside \$168.8K for the NPSS Budget Tool initiative, pending approval at the November AdCom meeting. Passed
- » AdCom moves to approve the initiative providing \$2.5k to support a WIE event at ANIMMA 2019. Passed.

- » It was moved and seconded that the proposed dates and locations of future AdCom meetings shall be placed on the agenda for formal approval at least six months prior to the meetings under consideration. Referred to the Ad Hoc committee.

- » It was moved and seconded that the list of proposed locations and dates for NPSS AdCom meetings in 2019 and 2020 be approved: March 2019, Nashville, TN; June 2019, Orlando, FL after PPS; November 12, 2019, Manchester, UK after NSS/MIC; March 5–7, 2020 Santa Fe, NM; July 10–11, 2020, New Brunswick, NJ; November 7, 2020, Boston, MA after NSS/MIC. Passed.

AdCom will next meet on November 10<sup>th</sup> in Sydney, Australia prior to the NSS/MIC meeting.

### WORTH THE WAIT

The oldest books are only just out to those who have not yet read them.

*Samuel Butler*

### HEIGH-HO!, HEIGH-HO!

Inspiration is for amateurs. The rest of us just show up for work.

*Chuck Close*

## Technical Committees

### COMPUTER APPLICATIONS IN NUCLEAR AND PLASMA SCIENCES



**Martin Grossmann**  
CANPS Chair

The 21<sup>st</sup> Real Time Conference made its most recent North American stop in Williamsburg, Virginia in June. The conference is held every two years. This year's version was a return of sorts, as the 6<sup>th</sup> Real Time Conference was also held there some 29 years ago, in 1989.

All of the names and faces have changed, but much about this conference remains the same

over the years. Then and now the conference attracted some 200+ participants from many different countries. Short courses and all plenary sessions were a draw for a core group of engineers, scientists and students whose focus is on real time computing, fast electronics and high-speed networks in data acquisition, triggering, processing and control. The applications are in many different fields including nuclear, particle, plasma, medical physics and quantum computing.

This year we counted 205 participants from 17 countries. Most came from Asia (39%), followed by Europe (32%) and North America (29%). 202 abstracts were submitted of which 54 were chosen for an oral presentation in plenary sessions.

The conference was held at the Woodlands Hotel and Conference Center on the grounds of Colonial Williamsburg. This recreation of the 18<sup>th</sup> century city and original capital of the Virginia Colony (by English settlers) is the world's largest living history museum. Local chair David Abbott and his team from Jefferson Lab did a tremendous job in running the conference very smoothly.

There was a full preconference program over the weekend before the conference, with two well-attended short courses. The first, on Saturday, was a workshop and practical tutorial on the  $\mu$ TCA commercial standard (MTCA.4) with a focus on applications in experimental physics. On Sunday a day-long course was held on High Level Synthesis programming (C,C++) in SoC-based FPGAs using the Xilinx Vivado development environment.

Throughout the conference's plenary program there were four invited talks and one CANPS award talk. Invited talks included an overview of exascale technologies in high performance computing from Peter Boyle (University of Edinburgh), and from Graham Heyes (Jefferson Lab) we learned about the evolution toward streaming data acquisition techniques for recent experiments as well as for the proposed Electron Ion Collider to be built in the U.S. Larry Thomsen from NASA Langley Research Center talked about a new Cube Satellite program launching this past summer to provide long-term shielding studies for space effect radiation, and David Meer (PSI) gave us an update on the latest technologies being used for cancer treatments using proton beams. Finally, congratulations to this year's CANPS award winner, Tom Fredian from MIT who gave a very nice talk on the evolution of the MDSplus data

acquisition and analysis package. This system is still used worldwide today as a standard within the fusion research community.

The student paper award committee was chaired this year by Pierre-André Amaudruz. From a total of eight submissions, this year's first place winner was Nicolas Tan Jerome (Karlsruhe Institute of Technology) for the paper "Real-Time Local Noise Filter in 3D Visualization of CT Data." Two second place certificates were also awarded, one to Nico Giangiacomi (University of INFN - Bologna) for his paper "General purpose readout board  $\pi$ LUP: overview and results" and the other to Davide Pedretti (University of INFN - Legnaro) for "Nanoseconds Timing System Based on IEEE 1588 FPGA Implementation".

Real Time held its first Women in Engineering (WIE) event during the conference. A small reception was held with around 40 attendees. An ad-hoc panel including Stefan Ritt (NPSS President), Martin Grossmann (CANPS Chair) and two scientists from Jefferson Lab, Latifa Elouadrhiri, and Pam Kjeldsen, led to a lively discussion with the group including several success stories as well as some



## Technical Committees Continued from PAGE 5

of the challenges that many women scientists and engineers have overcome growing up in diverse cultures from around the world.

Midweek during the conference, the attendees were able to take a break and make an excursion just a few miles down the road to Jamestown Island (a U.S. National Park Service site). This small island along the James River is the original site of the first successful settlement by the English in the “New World.” In May 1607, three ships chartered by the Virginia Company of England landed on the island. Conference attendees were treated to fascinating oral presentations by two archeologist guides as they toured the ruins.

The next Real Time Conference will take place in Ho Chi Minh City, Vietnam, in spring 2020.

*Martin Grossmann, CANPS Committee Chair, can be reached by E-mail at [martin.grossmann@psi.ch](mailto:martin.grossmann@psi.ch).*



The participants of the 21<sup>st</sup> Real Time Conference



This year's CANPS Award winner Tom Fredian with General Chair David Abbott and CANPS Chair Martin Grossmann



Lively discussion at the Women in Engineering event



A relaxing moment on the excursion to Jamestown



New IEEE members who signed up during the conference with NPSS President Stefan Ritt

### TAKE A DEEP BREATH—PLEASE!

There's so much pollution in the air now that if it weren't for our lungs there'd be no place to put it all.

*Robert Orben*

### KNOW-IT-ALL'S FAILURE

The greatest obstacle to discovery is not ignorance—it is the illusion of knowledge.

*Daniel Boorstin*

### BUT THEY DON'T TALK BACK

Being president is very much like running a cemetery; you've got a lot of people under you but they are not listening.

*Bill Clinton*

### INFRARED INFLUENCE

People don't change when they see the light. They change when they feel the heat.

*Adage*

### GRAND THEFT

The greatest tragedy in mankind's entire history may be the hijacking of morality by religion.

*Arthur C. Clarke*

### EARLY TO RISE AIN'T SO WISE

I think we consider too much the luck of the early bird and not enough the bad luck of the early worm.

*Franklin D. Roosevelt*

### WHAT'S THIS ABOUT "CAT GOT YOUR TONGUE"?

If cats could talk, they wouldn't

*Nan Porter*

### I WANT MY MONEY BACK

Age is too high a price to pay for maturity.

*Tom Stoppard*



## FUSION TECHNOLOGY



Charles Neumeier  
FTSC Chair

Preparations for transition of the FTC to an elected committee beginning in 2019 are well underway. The objective is to reinvigorate the committee and diversify the representation of geographic regions and institutions. FTC will maintain a committee roster of 16 persons with annual elections to replace 4 candidates per year who will serve 4-year terms. The FTC Chair will serve 2-year terms. The process has now begun with NPSS AdCom approval of newly established FTC Constitution & Bylaws. A strong slate of candidates has been nominated for the first election cycle. NPSS members of the fusion

community are strongly encouraged to vote during the annual IEEE election period, August-September 2018.

Charles Neumeier, Chair of the Fusion Technology, can be reached by E-mail at [neumeier@pppl.gov](mailto:neumeier@pppl.gov).

## NUCLEAR MEDICAL AND IMAGING SCIENCES



Jae Sung Lee  
NMISC Chair

As I write this, the program committee is finalizing the scientific program of the 2018 IEEE NPSS

Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) which will take place in the spectacular new conference center in Sydney from the 10<sup>th</sup> to the 17<sup>th</sup> of November. Anatoly Rosenfeld will be the General Chair with Steve Meikle and Taiga Yamaya serving as MIC Program Chair and Deputy respectively. The program is available at <http://www.nss-mic.org/2018/>.

Looking further ahead, the 2019 IEEE NSS/MIC will be in the UK for the first time, in Manchester, with General Chair Paul Marsden and Dimitra Darambara and Suleman Surti as MIC Chair and Deputy Chair respectively. For 2020 the meeting will be in Boston, USA with General Chair Lorenzo Fabris and Georges El Fakhri as MIC Chair. Finally, the decision has now been taken for 2021 meeting to be held in Yokohama, Japan.

The title revision of MIC student paper awards to IEEE NPSS Christopher J. Thompson Student Paper Awards to honor Chris's memory as an outstanding scientist and his continuous enthusiastic support of students and young scientists was approved by the IEEE at the end of June. In the 2018 NSS/MIC meeting, we will have a special tribute session for Chris on Thursday, November 15<sup>th</sup>, and the newly

named award will be presented for the first time.

This year we have 11 excellent candidates standing for the five seats on NMISC. They are all regular conference contributors and keen to contribute more. Our aim is to try to involve the elected members much more during their term of office. Thanks to everyone who has either volunteered or proposed candidates and to Emilie Roncali, NMISC Secretary, for putting together the list of candidates.

Jae Sung Lee, Chair of the NMISC, can be reached by E-mail at [jaes@snu.ac.kr](mailto:jaes@snu.ac.kr).

## INESCAPABLE CONCLUSION

I have given the matter the fullest consideration and, having examined the problem from all angles, reached the conclusion that it was because I didn't get enough votes.

Howard Green (explaining his election defeat)

## YOU CAN BANK ON IT!

Don't marry for money. You can borrow it cheaper.  
Scottish Proverb

## Functional Committees

## AWARDS



Janet Barth  
IEEE NPSS Awards Committee Chair

We are again soliciting nominations for our NPSS Awards for the coming year, 2019. Members of our community are eligible for a number of awards for exceptional contributions to our field or our Society. These include the highest IEEE level awards, such as, the IEEE Medal for Healthcare Innovations and Technology and the IEEE Marie Sklodowska-Curie Technical Field Award, our Society awards, and numerous Technical Committee and Conference awards. Information about all of these awards can be found on the NPSS website <http://ieee-npss.org/awards/>. The due dates for nominations vary according to the award, but the NPSS Society-level awards are generally due 31 January 2019. It takes time to put together an effective nomination and many awards require endorsement letters, so it's not too early to start thinking about possible candidates and working on nomination packages before the end of this year. There are tips on our NPSS Awards website on how to write a successful nomination.

There are also a number of grants sponsored by NPSS that are designed to help students and young researchers attend various NPSS conferences and Short Courses. The Paul Phelps Continuing Education Grants provide funds for students, postdocs, and unemployed NPSS members to cover the cost of tuition and other expenses for Short Courses offered at NPSS conferences. Many of the NPSS Technical Committees sponsor student awards and travel grants, and many of our conferences also offer NPSS Student Paper Awards for outstanding student contributions at our conferences. Details on how to apply for these awards and grants are given on the NPSS Awards web site.

Please nominate one of your colleagues, or yourself, for one of the many NPSS awards or grants (self nominations are allowed for some of the awards... just check the details to be sure). It's a great opportunity to recognize some of the many outstanding colleagues in our field and to raise the

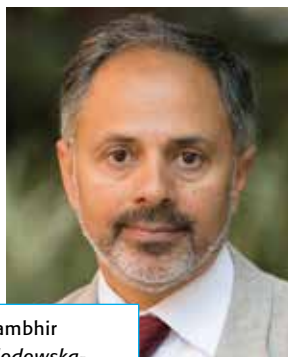
level of prestige of our Society. Visit the NPSS Awards website for details of each award, nomination forms, and submission instructions.

Before preparing a nomination please note the IEEE policy on Hierarchy of Awards. More information about the hierarchy of awards is provided on the NPSS Awards website. IEEE Policy on Award Limitations states "Normally, an individual shall receive only one honor in recognition of a given achievement, unless the significance of the achievement is such as to merit subsequently a higher award. A higher award may be given in the following year or thereafter."

Janet Barth, NPSS Awards Chair, can be reached by E-mail at [jbarth@ieee.org](mailto:jbarth@ieee.org).

## 2019 IEEE Marie Sklodowska-Curie Award

Sponsored by the IEEE Nuclear and Plasma Sciences Society



Sanjiv 'Sam' Gambhir  
2019 Marie Sklodowska-Curie Award recipient

Sam Gambhir brought together the field of cell and molecular biology with that of biomedical imaging to form the field of multimodality molecular imaging of living subjects. He developed and translated strategies for merging nuclear and optical sciences for improved cancer detection and management. These strategies include the imaging of gene and cell therapies through positron emission tomography (PET) and multimodality reporter gene technology. He also developed multimodality imaging agents for use in Raman optical imaging and photoacoustic molecular imaging for applications involving the brain, gastrointestinal tract, and the prostate. His approaches also use novel cell and molecular biology to force cancer cells to reveal themselves through both in vitro and in vivo diagnostics. His work has enabled hundreds of laboratories and companies around the world to utilize molecular imaging to study fundamental biological processes in both animals and humans.

Gambhir is the Virginia & D.K. Ludwig Professor of Cancer Research and the Chair of the Department of Radiology at the Stanford University School of Medicine, Stanford, California, USA.

*Citation: For the development of nuclear and optical science in the field of molecular imaging and cancer treatment*

Dr. Gambhir can be reached by E-mail at [sgambhir@stanford.edu](mailto:sgambhir@stanford.edu).

## Fusion Technology Award



Dr. Larry Baylor  
2018 Fusion Technology Award Recipient

Dr. Larry Baylor of ORNL is the winner of the 2018 Fusion Technology Award, in recognition of his research and leadership in the field of plasma fueling strategies for magnetically confined plasmas, and his role in the fueling, pumping, and disruption mitigation system design activities for the US ITER project. The award will be presented at the conference banquet during the upcoming 2019 Symposium on Fusion Engineering (SOFE).

## 2018 Pulsed Power Science and Technology Guenther Award



Dr. Brett Huhman  
2018 Arthur H. Guenther Award recipient

Dr. Brett Huhman has been selected as the 2018 Arthur H. Guenther Award recipient for outstanding contributions to the field of pulsed-power science and technology by the PPS&T Committee of the IEEE NPSS society. He is cited in this honor for "contributions in assessing and demonstrating the use of Li-ion batteries as a source of prime

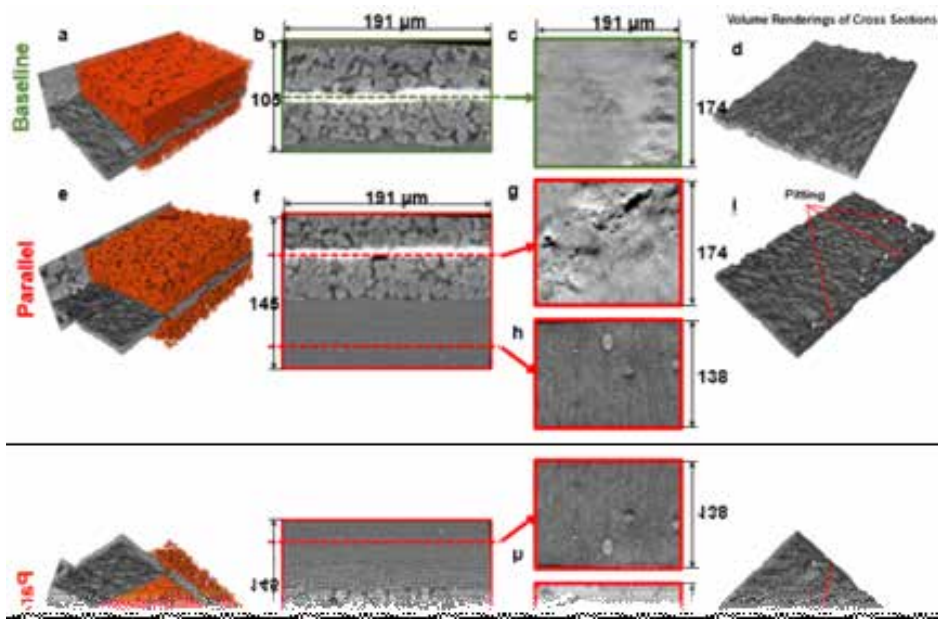
power for Mega-Watt, repetitive, mobile pulsed power systems." This research was performed while obtaining a Ph.D. in Electrical Engineering at Virginia Tech with support from the Edison Memorial Graduate Training Program as an employee of the U.S. Naval Research Laboratory (NRL) in Washington, DC. Huhman also earned his Professional Engineer's License in 2011 in Electrical and Electronics Engineering.

The Arthur H. Guenther Pulsed-Power Award (established in 1997) recognizes outstanding contributions in pulsed-power engineering, science and technology and is presented every two years at the IEEE Pulsed Power Conference awards banquet. Funded by the IEEE Nuclear and Plasma Sciences Society, the Guenther Award is given based on the quality of research contributions (40 points), quality of educational accomplishments (30 points), quality and significance of publications and patents (20 points). The Arthur H. Guenther Pulsed Power Award was known as the Pulsed-Power Science and Technology Committee's Outstanding Student Award before 2007. Huhman's dissertation, entitled "A Single Frequency Impedance Diagnostic for State of Health Determination in Li-Ion 4P1S Battery Packs," demonstrated that changes in the imaginary impedance at a specific frequency can be correlated to changes in the electrochemistry of a set of batteries, which is an advancement over previous work that was focused on a single battery system. In addition to immediate detection of an abuse condition such as overcharge, the diagnostic has been shown to predict the end of life of the battery pack. Any deviations from an established operating envelope as a function of cycle number would indicate premature degradation, which would prompt an operator to remove the system from service before a catastrophic event could occur. A post-mortem computed tomography (CT) analysis of the experimental cells demonstrated a previously unknown mechanism with cells operated at high current in parallel, as the copper current collector in the anode was shown to be damaged. (see Fig. 1) Further research is necessary to explore the impact of this phenomenon on operational systems.

Huhman earned his Bachelor of Science and Master of Science, both in Electrical Engineering, from the University of Missouri - Columbia in 2003 and 2006, respectively. At Missouri, Huhman developed a cold-fog technology using ultraviolet light and a proprietary chemical that was capable of decontaminating an office with a 5 log reduction in 10 minutes. After graduation, he started working for L-3 Titan in 2005 at NRL, and joined the Pulsed Power Physics Branch in 2007. Huhman has been



# Functional Committees Continued from PAGE 5



**Figure 1.** Particle-scale rendering comparison of a baseline cell and parallel-cycled cell (a, e) with the graphite in orange, cross section slice of the electrode (b, f), transverse slice through the copper layer (c, g), trilayer separator with copper deposits (h), and volume renders of the cross sections (d, i). The CT analysis was performed with the NRL Chemistry Division.

working with electromagnetic launchers since 2005, but has also been involved in compact pulsed-power sources such as the Hybrid Radiation Source and other related projects. In 2012 he started his current research program with high-power-density batteries for pulsed power system. Huhman lives in Waldorf, MD with his wife Heather and daughter Aurora.

Huhman (a staff researcher at the Naval Research Laboratory in the Plasma Physics Division) will receive a monetary prize and a certificate indicating his achievement at the combined 22<sup>th</sup> IEEE Pulsed Power Conference and the 46<sup>th</sup> IEEE Conference on Plasma Science (PPPS2019), held in Orlando, FL. The materials analysis was published in the March 2018 issue of the *Journal of Power Sources*, the fundamentals of the frequency technique was published in the January 2017 issue of the *Journal of the Electrochemical Society*, and various other aspects were published in the *IEEE Transactions on Plasma Science*.

## CALL FOR NOMINATIONS

### 2019 IEEE Pulsed Power Science and Technology Awards

Dear Colleague,

Please consider honoring a distinguished member(s) of our community by nominating them for an award. The Pulsed Power Science and Technology Technical Committee (PPS&T/TC) honors contributions and achievements in the field of Pulsed Power through three distinguished awards:

The Erwin Marx Award recognizes outstanding contributions to pulsed power technology by an individual over an extended period of time.

The Peter Haas Award recognizes outstanding contributions to pulsed power technology resulting from an individual's continued effort to develop programs of research, education, and information exchange that are the basis for progress in pulsed power.

The Arthur H. Guenther award recognizes outstanding students in the field of pulsed power by identifying their unique achievements in the field of pulsed power science, engineering and technology development.

The recipients of the awards will receive their honor at the 2019 Pulsed Power Plasma Science (PPPS) Conference in Orlando FL, which is the combined conference of the 22<sup>nd</sup> Pulsed Power Conference and the 46<sup>th</sup> International Conference on Plasma Science.

The deadline for nomination is December 1<sup>st</sup>, 2018. Information about the Erwin Marx, Peter

Haas and the Arthur H. Gunther (student) awards is found at the website <http://ieee-npss.org/awards/technical-committee-awards/>. Click the link to the specific award to view instructions for submission. All nomination materials must be sent as PDF files to the attention of the Awards Committee Chair, Dr. Bryan V. Oliver, at the email address [b.v.oliver@ieee.org](mailto:b.v.oliver@ieee.org). Please note: Eligibility for the Arthur H. Guenther student award requires that the nominee document school enrollment (one long semester minimum) in the calendar year for which the nomination is made.

I strongly encourage you to please look at the website for nomination information and take the time to identify one of the present and/or future leaders in pulsed power science and technology.

Sincerely,  
Bryan Oliver

*Bryan Oliver, PPS&T Award Subcommittee Chair, can be reached by E-mail at [b.v.oliver@ieee.org](mailto:b.v.oliver@ieee.org) or by phone at +1 505 284-7868.*

## RADIATION EFFECTS AWARDS

Nominations are due January 25<sup>th</sup>, 2019 for awards that will be presented at the IEEE NSREC 2019 Conference July 8<sup>th</sup>–12<sup>th</sup>, 2019 in San Antonio, Texas.

### Radiation Effects Award Nominations

Nominations are currently being accepted for the 2019 IEEE Nuclear and Plasma Sciences Society (NPSS) Radiation Effects Award. The purpose of the award is to recognize individuals who have had a sustained history of outstanding and innovative technical and/or leadership contributions to the radiation effects community. The \$3000 cash award and plaque will be presented at NSREC San Antonio. Nomination forms are available electronically at <http://ieee-npss.org/technical-committees/radiation-effects/> and must be submitted by January 25, 2019. Additional information can be obtained from Ethan Cannon, Senior Member-at-Large, for the Radiation Effects Steering Group. Ethan can be reached at 253-65-5104, [ethan.cannon@boeing.com](mailto:ethan.cannon@boeing.com).

### Paul Phelps Continuing Education Grant Nominations

Nominations are currently being accepted for the 2019 Paul Phelps Continuing Education Grant. The purpose of the grant is to promote continuing education (attendance at the 2019 NSREC Short Course) and encourage membership in NPSS. Outstanding members of NPSS who are either Student Members, Post-Doctoral Fellows or Research Associates, or unemployed members needing

assistance in changing career direction can be nominated for the award. The actual amount of the grant will be determined prior to the 2019 NSREC in San Antonio. Funds are to be used towards covering travel costs to attend the NSREC Short Course. The grant also provides complimentary short course registration.

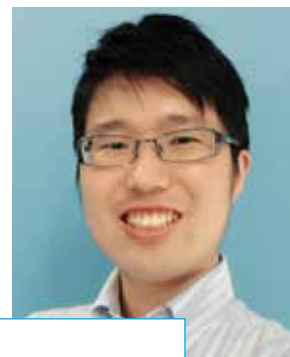
Nomination forms are available electronically at <http://ieee-npss.org/technical-committees/radiation-effects/> and must be submitted by January 25, 2019. Additional information can be obtained from Julien Mekki, Member-at-Large, CNES, for the Radiation Effects Steering Group. Julien can be reached at 33 5 61 27 40 49, [Julien.mekki@cnes.fr](mailto:Julien.mekki@cnes.fr).

## 2018 PHELPS AWARD WINNERS

The 2018 Paul Phelps Continuing Education Grant was awarded to four student members from the radiation effects community. At the opening of the NSREC technical sessions (July 16, 2018), Allan Johnston, Chairman of the Radiation Effects Steering Group, announced the grant awards. The grants included tuition for the 2018 NSREC Short Course and a check for \$750.

The purpose of the Phelps Grant is to promote continuing education and encourage membership in the Nuclear and Plasma Sciences Society (NPSS). The criteria for judging are exceptional promise as a student, postdoc or research associate in any of the fields of NPSS, or exceptional work in those fields by currently unemployed NPSS members with an expectation that attendance at the Short Course will improve the possibility of obtaining a job in an NPSS field.

The four recipients of the 2018 Paul Phelps Continuing Education Grant were Huiqi Gong, Adrian Idefonso, Imène Reghioia and Jennifer Taggart.



**Huiqi Gong**  
2018 Phelps Award Recipient

Huiqi Gong received the B.S. degree in Physics from Wuhan University, Wuhan, China, in 2010 and the M.S. degree in Physics from the Institute of Physics, Chinese Academy of Sciences, Beijing, China, in 2013. He is currently pursuing a Ph.D. degree in Electrical Engineering at Vanderbilt University, Nashville, TN, where he is currently a Research Assistant. His research interests include radiation effects and reliability of semiconductor devices, including planar MOSFETs, FinFETs, nanowire gate-all-around MOSFETs, and micro electromechanical systems (MEMS). He is author or coauthor of 18 publications. His advisor was Dr. Ronald Schrimpf.



**Adrian Idefonso**  
2018 Phelps Award Recipient

Adrian Idefonso is a Ph.D. student in the Georgia Institute of Technology School of Electrical and Computer Engineering in Atlanta, Georgia, USA. He received the B.S. degree in computer engineering from the University of Puerto Rico at Mayagüez, in 2014 and the M.S. degree in electrical and computer engineering from Georgia Tech, in 2017. He was awarded the GEM Fellowship in 2014 and the NSF Graduate Research Fellowship in 2015. Adrian's

research focuses on studying the effects of ionizing radiation on electronic devices, circuits and systems designed using silicon-germanium (SiGe) technologies. The primary goal of his work is to build more robust systems for space-based applications by identifying and implementing novel design strategies that improve the radiation tolerance of analog and RF circuits. Through internships at the Naval Research Laboratory in Washington DC, USA, he has also worked on quantitatively correlating fundamental differences in charge deposition between heavy-ion- and laser-induced single-event transients (SETs) in SiGe heterojunction bipolar transistors. This effort aims to establish laser-based testing as an additional tool to fully qualify electronics for space applications. Adrian is advised by Dr. John D. Cressler, the Schlumberger Chair Professor in Electronics. His current research has been supported in part by the Defense Threat Reduction Agency and the National Science Foundation, and has resulted in 14 authored or co-authored peer-reviewed journal publications and 4 conference publications.



**Imène Reghioia**  
2018 Phelps Award Recipient

Imène Reghioia, was a PhD student at Hubert Curien Laboratory (Saint-Etienne, France), under the supervisions of Pr. Sylvain Girard and Dr. Layla Martin-Samos. She defended her PhD in March 2018. After obtaining her bachelor's degree in electronics engineering in her home country of Algeria, she traveled to France (Saint-Etienne) in order to pursue a master's degree in optics and photonics at the university Jean Monnet of Saint Etienne. She first joined the MOPERE (Materials for Optics and Photonics in Extreme Radiative Environment) group on March 2014, as a trainee for her master's degree on optical fiber-based sensors in harsh environments. After graduating in September 2014, she started her PhD thesis with the same group, where her studies were devoted to the understanding of the basic mechanisms of radiation effects on silica-based materials, such as optical fibers or nanoparticles. Imène investigated the various mechanisms of point defect generation in various classes of optical fibers by different kinds of radiation such as  $\gamma$ -rays, X-rays and electrons. For this purpose, she mainly exploited the cathodoluminescence (CL) spectroscopy in the University of Nova Gorica (Slovenia), thanks to a fruitful collaboration between the two universities. Her PhD work enriches our knowledge concerning the electron radiation effects on silica-based materials which, in turns, enables us to better control and predict the radiation responses of silica-based devices. She published her results in several high impact scientific journals and participated in a number of international conferences. Imène will continue her career with a post-doctoral position at the Laboratoire des Solides Irradiés of Ecole Polytechnique in Saclay, France.



**Jennifer Taggart**  
2018 Phelps Award Recipient

Jennifer Taggart is an Electrical Engineering Ph.D. candidate studying under Dr. Hugh Barnaby at Arizona State University. She received her Master's degree in electrical engineering from ASU in 2015 and her B.S. from The Ohio State University in



Physics and Astronomy in 2007. Her research focuses on the development of radiation hardened resistive memory devices that can withstand the harsh environment of space. This fall she will be graduating from ASU and has accepted a research engineering position at The Aerospace Corporation.

### NPSS Women in Engineering Leadership Development Travel Grant



**Janet Barth**  
IEEE NPSS Awards Committee Chair

The NPSS funds a yearly travel grant for one NPSS member to attend the IEEE Women in Engineering (WIE) International Leadership Conference (ILC). The 5<sup>th</sup> IEEE WIE ILC was held 21<sup>st</sup>–22<sup>nd</sup> May 2018 in San Jose, California. The conference had 1000+ attendees, which included top executives from Intel, Qualcomm and many other high-tech companies. There were two full days of inspirational speakers and workshops covering topics in four “tracks” - Executive Leadership, Empowerment, Innovation, and Disruptive Technology. Several events provided opportunities to connect with remarkable women from all over the world—who are changing the world. For more information on the 2018 WIE ILC see <http://ieee-wie-ilc.org/>. Plans are underway for the 2019 WIE ILC with Kathy Herring Hayashi, IEEE WIE member, chairing the Conference.

The purpose of the NPSS Women in Engineering Leadership Development Travel Grant is to provide leading-edge professional development for women who are in mid-level to senior phases of their careers. One awardee per year receives a certificate and is reimbursed for expenses associated with traveling to and participating in the IEEE WIE ILC, up to a maximum of \$3,000. Eligible nominees must be women who are in mid-level to senior phases of their careers who are members of the NPSS and whose prior technical accomplishments and future potential earmark them as current and future leaders in the field of nuclear and plasma sciences and as role models for future generations of women in the field. For further details see the NPSS Awards web page <http://ieee-npss.org/awards/npss-awards/>. Consider nominating a colleague for this outstanding opportunity. Self-nominations are also encouraged. Nominations are due on January 31<sup>st</sup> 2019.

*Janet Barth, NPSS Awards Chair, can be reached by E-mail at [jbarth@ieee.org](mailto:jbarth@ieee.org).*

### PUBLICATIONS

#### TPS Special Issues Scheduled for Summer and Fall 2018

» July 2018—Special Issue—Selected Papers from Latin American Workshop on Plasma Physics (LAWPP)—2017—Senior Editor: Steven Gitomer; Guest Editors: J. Julio E. Herrera-Velázquez (Coordinator) (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, Mexico DF, México), Martín Nieto-Pérez (Instituto Politécnico Nacional, Querétaro, México), Salvador Portillo (Department of Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM, USA)



**Steve Gitomer**  
TPS Editor-in-Chief

» July 2018—Special Issue on High Power Microwave Generation — Senior Editor: Don Shiffler (Air Force Research Laboratory, Kirtland, NM, USA); Guest Editors: Brooke Stutzman (US Coast Guard Academy, New London, CT, USA), Jim Browning (Boise State University, Boise, ID, USA), Julie Lawrance (Air Force Research Laboratory, Kirtland, NM, USA), Wenlong He (University of Strathclyde, Glasgow, UK)

» August 2018—Special Issue—Plenary and Invited Papers of the 18<sup>th</sup> Chinese National Conference on Plasma Science and Technology—Acting Senior Editor: John Verboncoeur (Michigan State University, East Lansing, MI, USA); Guest Editors: John Verboncoeur (Michigan State University, East Lansing, MI, USA), Chao Chang (Xi’an Jiaotong University, Xi’an, China), Stephen Gold (Naval Research Laboratory [ret], Washington DC USA), & Michael Kong (Old Dominion University, Norfolk, VA USA)

» September 2018—Special Issue on Z Pinch Plasmas—2018—Senior Editor: Farhat Beg (UCSD, San Diego, CA USA); Guest Editors: Alla Safronova (University of Nevada—Reno, Reno, NV

USA) & John Giuliani (Naval Research Laboratory, Washington DC USA)

» October 2018—Special Issue on Pulsed Power Science and Technology — Senior Editor: Weihua Jiang (Nagaoka University, Nagaoka, Japan); Guest Editors: Stephen Bayne (Texas Tech University, Lubbock, TX, USA), Bucur Novac (Loughborough University, Leicestershire, UK), Heather O’Brien (Army Research Laboratory, Adelphi, MD, USA), and Hua Li (Huazhong University of Science & Technology, Wuhan, China)

» November 2018—Special Issue on Selected Papers from PLASMA2017 Japan—Senior Editor: Weihua Jiang (Nagaoka University, Nagaoka, Japan); Guest Editors: Yasushi Ono (The University of Tokyo, Tokyo, Japan), Masafumi Ito (Meijo University, Meijo, Japan), Shinsuke Ohshima (Institute of Advanced Energy, Kyoto University, Kyoto, Japan), and Douyan Wang (Institute of Pulsed Power Science, Kumamoto University, Kumamoto, Japan)

» November 2018—Special Issue—Selected Papers from APSPT-10—2017—Supervising Senior Editor: Paul Chu (City University of Hong Kong, Kowloon, Hong Kong); Guest Editors: Cheng-Che Hsu (Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan), Ta-Chin Wei (Chung-Yuan Christian University, Taoyuan, Taiwan), and Yasunori Tanaka (Kanazawa University, Kanazawa, Japan)

» December 2018—Special Issue on Plasma Assisted Technologies—Senior Editor: Jose Lopez (Seton Hall University, South Orange, NJ, USA); Guest Editor: Igor Matveev (Applied Plasma Technologies, Falls Church VA USA)

## Liaison Reports

### EDUCATIONAL ACTIVITIES BOARD



**Edl Schamiloglu**  
EAB Liaison

#### 2018 IEEE-HKN Student Leadership Conference

IEEE-HKN Student Leadership Conference took place at University of Florida, Epsilon Sigma Chapter on 13-15 April 2018. The successful conference saw participation by 33 chapters and over 80 student attendees. This year IEEE HKN collaborated with IEEE Young Professionals, EPICS in IEEE and IEEE N3XT to create a vibrant event.



IEEE-HKN Student Leadership Conference attendees

### Innovation at Work

The IEEE EAB has launched the Innovation at Work page for the most up-to-date information on EA Continuing and Professional Education programs and get connected with great weekly content. You can find this information at: <http://innovationatwork.ieee.org>. The Innovation at Work topics currently covered are:

- » Cyber Security
- » Ethical Hacking
- » Internet of Things (IoT)
- » Wake-up Radio
- » Artificial Intelligence

### NEXT EAB MEETING

The next IEEE Educational Activities Board Meeting will take place Saturday 17 November 2018 at the JW Marriott, Vancouver, British Columbia, Canada.

*Edl Schamiloglu, the NPSS liaison to EAB, can be reached by E-mail at [edls@unm.edu](mailto:edls@unm.edu)*

## Article

### DSAS: A simulation tool to design high performance SPAD array detectors



**Audrey Corbeil Therrien**  
First Knoll Graduate  
Research Award Recipient

Positron emission tomography (PET) stands out among other imaging modalities by its ability to locate and quantify the presence of marked molecules, called radiotracers, within an organism. The capacity to measure biological activity of various organic tissues provides unique information, essential to the study of cancerous tumors, brain functions and the pharmacodynamics of new medications [1, 2, 3].

With the recent progress of Single Photon Avalanche Diodes (SPAD), we can now use the annihilation photons’ time-of-flight information to improve PET images [4]. These photodetectors detect the scintillators’ low light emission and offer a greatly amplified response with only a small time uncertainty [5]. However, the potential of SPADs has not yet been entirely explored. Instead of summing the currents of a SPAD array, it is possible to use their intrinsically binary operation to build a digital photodetector, able to establish with precision the time of arrival of each scintillation photon. With this

information, the time-of-flight measurements can be much more precise [6].

Yet the design of digital SPAD arrays is in its infancy and design tools for this purpose are rare. To support the development and design of optimized digital and analog SPAD arrays, as well as their readouts, I developed a Monte Carlo simulator, called the Digital SPAD array Simulator (DSAS) [7]. This simulator can model the nonlinear and nonstationary behaviors caused by the discrete nature of SPAD arrays. In short, a SPAD will only create one avalanche at a time, even if several photons impact the active region, and this SPAD will then be unavailable to detect subsequent photons until it has been quenched and recharged. This results in an underestimation of the actual number of incident photons at moderate to high photon flux. DSAS also includes noise generators to adjust the different levels of dark counts, crosstalk and afterpulsing in the array, as well as the possibility to model the internal electrical fields of each SPAD. This latter feature lets us compare the performance of different field configurations for collecting charges and highest avalanche probability. More features are still being developed to better compare different SPAD arrays and select the configurations better suited for specific applications; these will be pushed to the public repository in 2018.

This tool gave our team a much better understanding of which parameters have the biggest influence on the performance of a PET detector and guided our choices in the development of

**ARTICLE Continued on PAGE 10**

### HEADSTRONG HEADWAY

The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends upon the unreasonable man.

*George Bernard Shaw*



## DSAS Continued from PAGE 9

a 3D digital SPAD array optimized for PET [8]. Furthermore, since the photodetector is not the sole actor in the performance of a PET detector, the simulator was built to be compatible with GEANT4. Several studies on scintillator improvements were also conducted, including a study evaluating the improvements brought by incorporating a prompt photon emission mechanism in LYSO crystals. This led us to a configuration with the lowest coincidence time resolution as well as a path to the 10 ps FWHM time resolution objective [9].

DSAS had another important contribution within the Groupe de recherche en Appareillage Médical de Sherbrooke. The output of the simulator can be used as a stimulus for electronic circuit models, helping in the design of novel readout strategies, which could not be tested otherwise. This was used to study the number of Time-to-Digital converters necessary for a single PET pixel as well as the impact of dark counts on the event discriminator [10, 11]. In addition, an electronic implementation of a multi-timestamp timing estimator as well as a calibration protocol were developed using data from DSAS [12, 13]. Finally, a novel approach to energy discrimination based on the timing information of scintillation photons was developed, a feat which would not have been possible without the aid of DSAS [14].

While the current studies done with this simulator focus on PET detectors, SPAD arrays and DSAS

are not limited to this sole application. SPAD arrays are promising for a wide variety of fields, including particle physics, high energy physics, quantum computing, LIDAR and many more. DSAS was constructed to be flexible and may help SPAD array designers and readout designers in many fields.

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## Search for Editor-in-Chief

The IEEE Nuclear and Plasma Sciences Society (NPSS) is undertaking a search for an Editor-in Chief (EiC) for the *IEEE Transactions on Nuclear Science (TNS)*, sponsored by this Society.

The scope of the IEEE TNS covers all aspects of the theory and applications of nuclear science and engineering, including: instrumentation for the detection and measurement of ionizing radiation; particle accelerators and their controls; nuclear imaging; computer applications in nuclear science; effects of radiation on materials, components, and systems; reactor instrumentation and controls; and measurement of radiation in space. Manuscripts considered for publication should report original contributions to the theories, experimental results, or applications of the fields listed under above; although papers of a tutorial or historical nature are also considered.

The Editor-in-Chief position is for a three-year term and is optionally renewable for additional terms. The term of appointment will begin in 2019 after a transition period between the current EiC and the selected applicant.

The function of the Editor-in-Chief is to oversee the daily operations of TNS, including:

- » Recruit and manage Senior Editors
- » Assist in identifying and recruiting Associate Editors
- » Serve as a resource to Senior Editors/Associate Editors on publication policies, etc.

- » Assist as needed in appeals and dispute resolution
- » Interact with the NPSS AdCom and prepare budget estimates and reports
- » Interface with IEEE Publications
- » Monitor the quality and timeliness of the publication
- » Ensure that the TNS follows IEEE Policy and Procedures
- » Execute policies as established by the NPSS Publications Committee
- » ad developments to enhance and strengthen the journal

### REQUIREMENTS FOR APPLICANTS INCLUDE:

- » Solid technical accomplishments and publication record in at least one of the disciplines within the scope of TNS
- » Exemplary service as an associate editor, editor, or in a management capacity for an archival journal

- » Ability and motivation to spend sufficient time to fulfill the duties of the EiC of TNS
- » Formal support from the institution for which the nominee works (waived if self-employed)
- » Demonstrated leadership, organizational and management skills
- » Suitable temperament - ability to work at all levels including with IEEE Publications staff, TNS Editorial Board, editors, reviewers, and authors
- » Commitment to integrity and ethical standards
- » Be a member of IEEE and NPSS
- » Possess an eagerness to continue to move the journal forward to higher levels of accomplishment.

### REQUIREMENTS FOR APPLICATIONS:

- » Brief biography of applicant
- » Complete CV and list of publications of applicant
- » Brief description of how the applicant meets the requirements listed above and vision for the journal

Please submit applications in pdf format to Paul Dressendorfer ([p.dressendorfer@ieee.org](mailto:p.dressendorfer@ieee.org)), Chair of the NPSS Publications Committee, no later than December 31, 2018.

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### 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 October 5th, 2018 for publication in the December 2018 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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