



2020 Real-Time Conference April 13th-17th, 2020 Quy Nhon, Vietnam

CONFERENCES

Real-Time 2020	1
ICOPS 2020	3
Conference Reports	
SOFE 2019	3
ANIMMA 2019	3

SOCIETY GENERAL BUSINESS

President's Report	4
Secretary's Report	4

TECHNICAL COMMITTEES

Fusion Technology	4
Nuclear Medical and Imaging	4
Radiation Effects	5
Radiation Instrumentation	5

FUNCTIONAL COMMITTEES

Awards	
Call For Nominations	6
2019 Radiation Effects Awards	6
2019 Radiation Effects Early Achievement Award	6
Call for 2020 Radiation Effects Awards Nominations	6
Publications	6
Transnational Committee	7

We invite you to Quy Nhon on the coast of central Vietnam for the 2020 IEEE Real Time Conference.

Held every two years, this conference is organized by the NPSS Computer Applications in Nuclear and Plasma Sciences (CANPS) technical committee and provides a unique opportunity for scientists and engineers from around the world to come together and share research and experiences with the latest in real-time software techniques and hardware designs. Diverse fields represented at this conference include nuclear and particle physics, plasma and nuclear fusion, nuclear power instrumentation, astrophysics, space sciences, accelerators, medical imaging/ particle therapy and other radiation instrumentation topics.

For this year RT2020, we are excited to include a new topic for the scientific program - Real Time Applications in Machine Learning and Deep Learning. We know this is an active area of research in many disciplines, and we encourage those in the community engaged in such studies to submit an abstract for this conference.

The Real-Time Conference has historically been a relatively small conference (typically 200-250 participants). We are able to create a scientific program that consists only of plenary oral sessions

and dedicated poster sessions for all attendees. In addition, poster presenters will have the opportunity to give a short (two-minute) overview of their papers so that participants can get a better understanding of which posters they may wish to investigate further. This environment should be especially attractive to students and younger scientists looking to promote their work before a knowledgeable and receptive audience.

A preconference program will be available for attendees on the weekend prior to the conference. On Saturday and Sunday there will be a two-day course and workshop on FPGA programming featuring lectures and hands-on programming using a simple FPGA board. In parallel, on Sunday there will be a workshop and tutorial on μ TCA technology and the MTCA 4 standards. Spaces for both of these courses will be limited, so early registration is advised.

A school on Instrumentation and Real Time, aiming at an audience of graduate and Ph.D. students, will be organized from April 19th-24th in Ho Chi Minh City.

RT2020 will take place at ICISE, a modern, well-equipped conference center on the coast of central Vietnam. ICISE was founded by scientists with over 50 years of experience in organizing international meetings ("Rencontres de Moriond" and "Rencontres du Vietnam"). It is located next to the city of Quy Nhon, off the coast in central Vietnam. International travelers can fly to Quy Nhon airport via Ho Chi Minh City or Hanoi.



Vo Hong Hai
General Chair



Masaharu Nomachi
Co-chair

Abstract submission closes on December 14th, 2019, and Early Registration ends March 16th, 2020. Vo Hong Hai, Vietnam National University, Ho Chi Minh City, will be the General Chair for RT2020, with Masaharu Nomachi, Osaka University, acting as Co-Chair. All the information regarding this conference can be found on the website —<https://indico.cern.ch/e/rt2020>. We hope to see you in Quy Nhon this April!

Martin Grossmann, Chair of the CANPS Technical Committee, can be reached by E-mail at martin.grossmann@psi.ch. CONFERENCE REPORTS

Conferences Continued from PAGE 1

The 47th IEEE International Conference on Plasma Science (ICOPS2020)

The 47th IEEE International Conference on Plasma Science (ICOPS2020) will be held in Singapore at the Marina Bay Sands from May 24th–28th, 2020. The ICOPS2020 website was launched in August 2019 and can be found at <http://www.icops2020.org/public.asp?page=home.html>. The General Chair for ICOPS2020 is Professor Rajdeep Singh Rawat of the National Institute of Education, Nanyang Technological University, Singapore. Prof. Rawat is an internationally recognized member of the Plasma Physics and Plasma Nanoscience community and welcomes you all to Singapore. The English name of Singapore is an anglicisation of the native Malay name for the country, Singapura, which was in turn derived from Sanskrit which literally means the Lion City. A great tourist destination, Singapore is a tiny sunny island which has earned its reputation as an exciting place with a cultural potpourri of mainly Chinese, Malays and Indians, not to mention the influx of new immigrants from the rest of the world in recent years. Smaller than a full-stop on the world map, only 761.1 km² in size, Singapore has a bewitching concoction of numerous activities and world-class attractions to engage you either before or after the conference.



Professor Rajdeep Singh Rawat
General Chair, ICOPS2020



Dr. Mary Ann Sweeney
ICOPS2020 Technical Program Co-chair



Dr. Chao Chang
ICOPS2020 Technical Program Co-chair

TECHNICAL PROGRAM

There are two Technical Program Co-Chairs for the ICOPS 2019 conference. Dr. Mary Ann Sweeney (Sandia National Laboratory) and Dr. Chao Chang (X'ian Jiatong University). These Technical Co-Chairs are committed to maintaining the high quality of papers presented at the conference. The ICOPS2020 Technical Program follows the format of previous ICOPS meetings with topics from traditional plasma physics, simulation, diagnostics, engineering and applications, but also includes enhanced technical sessions comprising microwave generation, charge particle and beam sources, high-energy-density plasmas, pulsed-power devices and terahertz sources and applications. Last year the First Asia-Pacific Conference on Plasma and Terahertz Science (APCOPTS) was organized in China as the future Asian version of ICOPS, with a strong component of rapidly emerging Terahertz (THz) Science. The ICOPS2020 is organized together with the Second APCOPTS and it is for this reason that ICOPS2020 has included Technical Area 8.0 on "Terahertz Sources, Radiation and Applications" which includes THz Spintronics, THz Bio, THz Metamaterials and many other aspects of THz science and applications.

Selected invited and plenary presentation will be published in a Special Issue of the IEEE *Transactions on Plasma Science*.

The Technical Program Co-chairs have assembled a diverse group of subject matter experts for their technical program committee and are looking forward to assembling a full four-day program. Topics for this year include:

1.0 Basic Processes in Fully and Partially Ionized Plasmas

- 1.1 Basic Phenomena
- 1.2 Computational Plasma Physics
- 1.3 Space Plasmas
- 1.4 Partially Ionized Plasmas
- 1.5 Dusty Plasmas and Strongly Coupled Plasmas
- 1.6 Plasma Chemistry

2.0 Microwave Generation and Plasma Interactions

- 2.1 Intense Beam Microwave Generation
- 2.2 Fast-Wave Devices
- 2.3 Slow-Wave Devices
- 2.4 Vacuum Microelectronics
- 2.5 Codes and Modelling
- 2.6 Non-Fusion Microwave Systems
- 2.7 Microwave Plasma Interaction

3.0 Charged Particle Beams and Sources

- 3.1 Plasma, Ion and Electron Sources
- 3.2 Intense Electron Ion Beams
- 3.3 Advanced Concepts, Novel Materials, and New Applications

4.0 High Energy Density Plasmas and Applications

- 4.1 Fusion (Inertial, Magnetic and Alternate Concepts)
- 4.2 Particle Acceleration with Laser and Beams
- 4.3 Radiation Physics and X-ray Lasers
- 4.4 High Energy Density Matter
- 4.5 Laser Produced Plasmas
- 4.6 Fast Z pinches
- 4.7 Plasma Material Interactions

5.0 Industrial, Commercial and Medical Plasma Applications

- 5.1 Nonequilibrium Plasma Applications
- 5.2 High-Pressure and Thermal Plasma Processing
- 5.3 Plasma Thrusters
- 5.4 Plasmas for Lighting and Flat-Panel Displays
- 5.5 Environmental and Industrial Applications
- 5.6 Medical and Biological Applications

6.0 Plasma Diagnostics

- 6.1 Optical, X-ray and Microwave Diagnostics
- 6.2 Particle Diagnostics
- 6.3 Electrical (Probe) Diagnostics

7.0 Pulsed Power and Other Plasma Applications

- 7.1 Insulation and Dielectric Breakdown
- 7.2 Opening and Closing Switches
- 7.3 Generators and Applications
- 7.4 Compact Pulsed Power and Applications

8.0 Terahertz Sources, Radiation and Applications

- 8.1 THz Spintronics
- 8.2 THz Bio
- 8.3 THz Communication
- 8.4 THz Optics
- 8.5 THz Metamaterials
- 8.6 THz Spectroscopy and Imaging
- 8.7 THz Electronic Devices

<https://icops2020.meetmatt-svr.net/Account/Login?ReturnUrl=%2FIndex>. Accepted abstracts will be published in IEEE Xplore and must meet the IEEE standards of originality and quality. Please see the website for an abstract template and guidelines for abstract submission.

VISAS

Singapore is one the most visitor friendly countries in the world where many tourists are admitted without visas. For our foreign colleagues that require a VISA for entry into Singapore, a request for an invitation letter can be made through our "Visa Information" webpage on the ICOPS2020 website.

CONFERENCE VENUE

The conference venue is Marina Bay Sands, which includes a 2,561-room hotel and a 120,000-square-metre 45,000 capacity convention-exhibition centre. The complex also houses 74,000-square-metre "The Shoppes" at Marina Bay Sands mall, a museum, two large theatres, "celebrity chef" restaurants, two floating Crystal Pavilions, art-science exhibits, a 340-meters-long SkyPark, and a 150-meters-long "Infinity" swimming pool set on top of the world's largest public cantilevered platform. Marina Bay Sands has three 55-storey hotel towers that are connected by a one-hectare roof terrace, Sands SkyPark. In front of the Event Plaza every evening there is a light and water show that is the largest in Southeast Asia.

The a conference rate of ~US\$235, before taxes, has been negotiated with the conference hotel, Marina Bay Sands, for reservations made prior to the group rate deadline which will soon be announced on conference website. The Conference Banquet will be held at the "Flower Field Hall" at the Flower Dome, Gardens by the Bay.

ADDITIONAL INFORMATION

For the latest ICOPS2020 information (abstract submission, technical program, conference registration, hotel and travel information, etc.) please visit the conference website at: <http://icops2020.org/public.asp?page=home.html>.

Rajdeep Singh Rawat, ICOPS 2020 Chair, can be reached by E-mail at rajdeep.rawat@nie.edu.sg.

ICOPS2020 MINICOURSE

The Minicourse for ICOPS2020 is entitled "Plasma Computations and Simulations" which is coordinated by Professor Ricky Ang of Singapore University of Technology and Design, Singapore. The full-day minicourse, with lunch and two tea-breaks, will comprise four 1.5 hour lectures. (i) Professor John P. Verboncoeur (Michigan State University, USA) on *Overview of Particle-In-Cell (PIC) plasma simulation*, (ii) Dr. Wenjun DING (Institute of High-Performance Computing, Singapore) on *Particle-In-Cell (PIC) Simulation of laser-plasma interaction*, (iii) Professor Ling-Hsiao LYU (National Central University, Taiwan) on *Simulation Studies of Nonlinear Kinetic Processes in Space Plasma* and (iv) Professor Guoyong FU (Zhejiang University, China) on *Kinetic-fluid hybrid simulations of energetic particle interaction with MHD modes in fusion plasmas*.

DATES TO REMEMBER

Some of the important dates for ICOPS2020 are as follows:

20 January 2020

Abstract Submission deadline
(Abstract submission is open)

03 February 2020

Notification of Abstract Acceptance

10 March 2020

Early Bird Registration deadline

20 April 2020

Minicourse Registration deadline

Abstract submission is currently open!

Abstracts will be accepted until Monday, 20th January 2020. Please submit abstracts online at:



Marina Bay Sands Complex—The conference venue and hotel for ICOPS2020

NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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Conference Reports

SOFE2019

June 2nd–June 6th, 2019

Sawgrass Marriott Resort
Ponte Vedra, Florida



Charles Neumeyer
Fusion Technology Chair

The 28th IEEE Symposium on Fusion Engineering, SOFE2019, was held from June 2nd–6th at the Sawgrass Marriott Resort in beautiful Ponte Vedra Beach, FL just south of Jacksonville. The conference was sponsored by NPSS and organized by the Fusion Technology Committee by volunteers from Oak Ridge National Laboratory, Princeton Plasma Physics Laboratory and the University of Tennessee.

This year, SOFE welcomed 276 attendees for four days of presentations on multiple aspects of fusion engineering with four plenary sessions, 14 oral sessions and three poster sessions. Over 292 abstracts were accepted for presentation. It also

included two minicourses on plasma-materials interactions and fusion neutronics, and two townhall planning meetings on the future of the fusion energy program in the U.S. Our national program has entered an exciting era as we transition from plasma physics to a broader nuclear science program and contemplate the development of the first energy-producing fusion reactors. As in the past, over half the SOFE participants were international, but an

even broader attendance was hampered by new U.S. visa restrictions and processing delays despite an early registration and acceptance feature. U.S. (Region 1-6) participants accounted for 45% of the total; Europeans (Region 8) were 26%, and Asians (Region 10) were 26%, with 17% of that coming from China.

Many thanks to our industrial exhibitors, NPSS, the DOE Office of Science Fusion Energy Science Program, the IAEA, U.S. ITER, Princeton University, and the Oak Ridge and Princeton Plasma Physics Labs for providing full support for over 19 students to attend the conference and minicourses. Over 100 selected papers from the conference will appear in a special issue of *IEEE Transactions on Plasma Science* due out this spring.

The conference started with a welcoming reception on Sunday evening bolstered by copious amounts of wonderful Marriot cuisine which continued through all the subsequent events and breaks. A successful Women in Engineering luncheon was held at the conference as well as a Young Professionals reception sponsored by NPSS. In addition to the guest speakers, a mentor/mentee program

paired young professionals with senior scientists and engineers for on-going career coaching and professional interactions. The conference culminated in the awards banquet where both the 2018 and 2019 NPSS Fusion Technology awards were presented along with an award for the best student paper. SOFE2019 and the associated activities were made possible by an outstanding organizing committee spanning two years of planning.

Our SOFE attendees, especially our international participants, deserve our special thanks and appreciation for making the conference an exceptional success. The oral presentations and posters are available on-line to all conference registrants at the password-protected Indico website or through the C4Me mobile app, <https://sofe2020.utk.edu>. The NPSS Fusion Technology Committee looks forward to seeing everyone again at the SOFE2021 in Denver, CO on May 31-June 04, 2021 which will be collocated with the IEEE 2021 Pulsed Power Conference at the Sheraton Denver Downtown Hotel.

ANIMMA 2019

June 17th–June 21st, 2019

Portoroz, Slovenia



Abdallah Lyoussi
ANIMMA General Chair

Instrumentation and measurement in nuclear media as well as radiation detection, measurement and monitoring are key aspects that contribute to the quality of scientific programs in the fields of physics, energy, fuel cycle, waste management, safeguards and homeland security. Furthermore, measurements relying on nuclear physics now play an important role in various fields of application such as biology, medicine and the environment. Since the first edition, the ANIMMA* international conference continues to provide a real opportunity to get together with colleagues, partners and friends to exchange ideas and share knowledge and experience in the nuclear instrumentation, measurement methods and nuclear experimental sciences in general.

The ANIMMA Conference 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 specific 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.

ANIMMA conference was founded in 2009, thus, we celebrated all together the 10th anniversary last June in Portoroz (June 17–21, 2019).

ANIMMA 2019 was locally organized by (Josef Stefan Institute) in a strong partnership of CEA, SCK-CEN, AMU and IEEE/NPSS is the sixth issue of a series of conferences with a scientific program dealing with:

- » A full-day short course
- » Four international workshops
- » Four full days of plenary and parallel sessions
- » At least a plenary lecture each day followed by parallel sessions.
- » Intensive oral sessions for poster presentations everyday followed by plenary poster session.

More than 250 presentations and 330 participants from 31 countries in addition to a permanent exhibition for the industry and research laboratories have been carried out. Furthermore a jury of international experts has elected the two best posters as well as the two best student papers that were rewarded.

The next ANIMMA Conference will be held in 2021 in Prague with local organization by the Czech Technical University of Prague.

**Advancements in Nuclear Instrumentation Measurement Methods and their Applications*

The sixth international conference on Advancements in Nuclear Instrumentation Measurement Methods and their Applications (ANIMMA) will take place from 17 to 21 June 2019 in Grand Hotel Bernardin, Portorož, Slovenia.

Under the honorary patronage of the President of the Republic of Slovenia Borut Pahor.

Committee Chairs
 General Chair: Prof. Dr. Abdallah Lyoussi
 Scientific Committee Chair: Prof. Dr. Michel Giot
 Steering Committee Chair: Dr. Igor Jencic
 Local Organizing Committee Chair: Dr. Luka Snoj
 Workshops Organization Chair: Dr. Christelle Reynard-Carette
 Short-courses Organization Chair: Dr. Ludo Vermeeren

APPLICATION FIELDS

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

Call for Papers: June 28th, 2018
 Abstract Submission deadline: November 6th, 2018
 Notification of acceptance: February 15th, 2019
 Conference registration opening: January 7th, 2019
 Full paper submissions: May 15th, 2019
 Early bird registrations and hotel reservations: May 17th, 2019
 Camera ready papers for proceedings submission: July 15th, 2019

www.animma.com
 Contact: conference@animma.com

ASK AND YE SHALL RECEIVE

When i was crossing the border into Canada, they asked me if I had any firearms with me. I said, "Well, what do you need?"

Steven Wright

TOO MANY STAY INFANTILE

The answer is to grow up, follow the evidence wherever it leads, and acknowledge that reality never extracts as heavy a price as ignorance of reality.

James Flynn

BE PREPARED!

We all hold precious beliefs, but unless they can stand against mockery and abuse, they are worth little.

John Mortimer

BUT NOT IF YOU ARE SANE

In every generation there are quite firm rules on how to behave when you are crazy.

Ian Hacking

BUT...

The mind demands rules; the facts demand exceptions.

Mason Cooley

FAMILIARITY BREEDS IGNORANCE

There is a tendency in our planning to confuse the unfamiliar with the improbable

Thomas C. Schelling

President's Report



Ron Schrimpf
IEEE NPSS President

I write this update from Montpellier, France, where I am attending the RADECS conference. RADECS is the European annual forum on the effects of radiation on electronics and optoelectronics devices and systems. RADECS 2019 is the 30th anniversary edition of the RADECS conference, which is technically cosponsored by NPSS. I first attended RADECS in 1991 and since that time I have made many friends through my participation in the conference, while acquiring a great deal of useful technical information. RADECS is a good example of how NPSS is working to bring together

engineers and scientists from around the world who are working in areas related to nuclear and plasma sciences. RADECS 2019 will celebrate the heritage of the past three decades, while looking to the future and identifying new technical challenges. Montpellier also was the site of the first RADECS in 1989. It combines an historic city center with a vibrant technical community.

The NPSS AdCom is continuing to work on a strategic plan. The plan is organized around the Fields of Interest for the Society:

The fields of interest of the Society are the nuclear and plasma sciences and related emerging technologies. Areas of technical activity include: computer applications in nuclear and plasma sciences; fusion technology; nuclear medical and imaging sciences; radiation instrumentation; radiation effects; particle accelerator science and technology; plasma science and applications; pulsed power science and technology; and nuclear power instrumentation and control systems.

Steve Meikle, the NPSS Vice President, is leading the strategic planning activity. Your thoughts and input related to the plan are welcome—please contact your AdCom representative if you have any ideas.

As an NPSS member, you can download your 2020 Society membership certificate on IEEE Collabratec <https://iee-collabratec.ieee.org/>. The certificate provides a good way to display your participation in NPSS and to promote conversations with colleagues who may not yet be NPSS members, but who would benefit from our activities.

The Nuclear and Plasma Sciences Society recently joined the IEEE Nanotechnology Council as the twenty-third member society. The NTC is a multidisciplinary group whose purpose is to advance and coordinate work in the field of Nanotechnology carried out throughout the IEEE in scientific, literary and educational areas. The Council supports the theory, design, and development of nanotechnology and its scientific, engineering, and industrial applications.

Individual IEEE members can also 'join' the NTC. NTC has approximately 8500 of these nano-interest members, which makes it the second largest IEEE Technical Council. NPSS will be represented on the

NTC by Seiji Samukawa and John Verboncoeur. If you are interested in any aspect of nanotechnology, please check out the NTC or contact one of our representatives.

The NPSS AdCom will next meet on November 1st–2nd, 2019, in Manchester, England. This meeting will follow the Nuclear Science Symposium and Medical Imaging Conference. The IEEE NSS-MIC is the leading annual international meeting for scientists, engineers, researchers, medical physicists and students with an interest in radiation detectors, related technologies and their applications. This year's meeting will also host the 26th International Symposium on Room-Temperature X-Ray and Gamma-Ray Detectors.

As always, I welcome your feedback.

Ron Schrimpf, IEEE NPSS President, can be reached by E-mail at ron.schrimpf@vanderbilt.edu

Secretary's Report

As Ron noted above, our next AdCom meeting will be held in early November, after this Newsletter is complete, so see the March 2020 Newsletter for a report on that meeting.

This is the time of year that is bittersweet for AdCom. In Manchester we will say goodbye and give our deep thanks to those who have served with us as elected AdCom members for the past four years: Monica Blank representing Plasma Science; Bryan Oliver representing Pulsed Power; Dennis Youchison representing Fusion Technology; Ken Galloway representing Radiation Effects, although we are delighted to note that Ken, who was filling the partial term vacated by our President, Ron Schrimpf, has

been elected to serve a full four-year term. Other candidates elected to serve on AdCom as the Class of 2023 include Susana Reyes, Fusion Technology; Arati Dasgupta, Plasma Science; Joshua Leckbee, Pulsed Power. We will welcome them in person at our March retreat and AdCom meeting and their biographies will appear in the March Newsletter.

We also thank three Technical Committee chairs for their years of service. Terms for TC chairs vary in accordance with the specific committee's policies or Constitution and Bylaws and range from two to four years. Charles Neumeyer, who has served as Fusion TC chair has led that committee, which I also chaired many years ago, from appointed to elected TC

status, so we thank and congratulate him for that huge accomplishment. Charles will be followed by Martin Nieto-Perez, our first international Fusion TC chair. Martin is from Instituto Politecnico Nacional, Mexico and has long been an active member of the Fusion Technical Committee. Jae Sung Lee, chair of the Nuclear Medical and Imaging Technical Committee, also steps down at the end of the year and will be replaced by Roger Fulton of the University of Sydney, Australia. Some of us had the pleasure of meeting and working with Roger at the 2018 NSS MIC in Sydney, and Susan Heidger, chair of the Pulsed Power Science and Technology Committee will also step down at the end of the year. Elections in the near future will name her successor. Many thanks to Charles, Jae Sung and Susan for their contributions over the last years.



Albe Larsen
IEEE NPSS Secretary and Newsletter Editor

Albe Larsen, IEEE NPSS Secretary and Newsletter Editor, can be reached by E-mail at a.m.larsen@ieee.org.

Technical Committees

FUSION TECHNOLOGY



Charles Neumeyer
Fusion Technology Chair

Important FTC transitions will take place starting January 1st, 2020. Dr. Martin Nieto-Perez will begin his four-year term as FTC Chair. Martin holds a Ph.D. in Nuclear Engineering (U of Illinois at Urbana-Champaign) and is a professor at the Instituto Politécnico Nacional - IPN - University of Mexico. He has been a member of the FTC since 2015 and presently serves as Awards Chair. Dr. Greg Wallace (Ph.D., Applied Plasma Physics, MIT), a research scientist at MIT and FTC member since 2019, will serve in the position of Vice Chair. Dr. Susana Reyes (SLAC) will begin her four-year term as the FTC elected representative on the NPSS AdCom. Four newly elected FTC committee members will begin their four-year terms: Daniel Brunner (Commonwealth Fusion Systems), Carl Pawley (General Atomics), Roger Raman (University of Washington) and Valeria Riccardo (Princeton Plasma Physics Laboratory).

Special thanks to the those who will retire from FTC duties at the end of the year. Yours truly (Charles Neumeyer), PPPL (ret.) FTC Chair, member of FTC since 2003. Dennis Youchison, ORNL, FTC AdCom representative, member of FTC since 2009. Bill Cary, General Atomics, member of FTC since 2008, and Brad Nelson, member of FTC since 2009. All of these individuals have played key roles in the NPSS FTC and as SOFE organizers.

Charles Neumeyer, Chair of the Fusion Technology Committee, can be reached by E-mail at neumeyer@pppl.gov.

NUCLEAR MEDICAL AND IMAGING SCIENCES



Jae Sung Lee
NMISC Chair

At the time of writing, what promises to a very exciting IEEE NPSS Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) is about to take place in Manchester, UK. Thanks to

the organizing committee for all the hard work that has gone into arranging it. Looking forward, next year's meeting will be in Boston, USA, with Lorenzo Fabris as General Chair and Georges El Fakhri and Ramsey Badawi as MIC Chair and Deputy Chair. 2021 will see the meeting come to Japan for the first time. It will be held in Yokohama with Ikuo Kanno as General Chair and Taiga Yamaya and me as MIC Co-Chairs. Many of you will also be interested in the 2020 PET-MRI and SPECT-MRI Conference ('PSMR') which will take place April 27th through 29th in Valencia, Spain.

We have five newly elected council members starting their three-year terms from 1 January 2020—they are Joyita Dutta (University of Massachusetts, USA), Antonio J. Gonzalez Martinez (Spanish National Research Council, Spain), Marie-Claude Gregoire (Australian Nuclear Science and Technology Organisation, Australia), Craig S. Levin (Stanford University, USA), and Youngho Seo (UCSF, USA). I would like to welcome them and hope we can help them make a 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 Emilie Roncali, NMISC Secretary who will be putting together the next list of candidates.

Congratulations to our Technical Committee award winners. This year's winner of the Bruce Hasegawa Medical Imaging Conference Young Investigator award is Ahmadreza Rezaei from KU Leuven, Belgium for his *contributions to time-of-flight PET image reconstruction and system calibration*. Kris Thielemans from University College London, UK was selected to be the first recipient of the new

Medical Imaging Technical Achievement Award for his *contributions to the development of novel computational techniques and software for quantitative image reconstruction in PET and their translation to clinical practice*.

The 2019 Edward J. Hoffman Medical Imaging Scientist Award was presented to Terry Jones (UC Davis, USA) for his *contributions to the development of PET methodology and its applications in clinical research*.

Thanks to all those who have either volunteered or proposed candidates for awards—I would like to encourage you all to nominate worthy colleagues for the many awards which are available from IEEE and NPSS with deadlines at end of January 2020. More details can be found at <http://iee-npss.org/awards/npss-awards/> and <https://iee-npss.org/awards/iee-awards/>.

Finally, this will be my last newsletter article as chair of NMISC. Roger Fulton from University of Sydney will be taking over from January 2020. Thanks very much to all the committee members from the last couple of years and in particular to Paul Marsden who told me (most of) what was involved in doing this role and also Emilie Roncali who did a lot of work!

Jae Sung Lee, Chair of the NMISC, can be reached by E-mail at jaes@snu.ac.kr.

RADIATION EFFECTS NEWS



Janet Barth
Radiation Effects Steering
Committee Chair

Service awards were presented to RESG's outgoing Senior Member-at-Large, Ethan Cannon and outgoing NPSS AdCom representative, Ron Schrimpf, Vanderbilt University. An election was held during the Open Meeting for a new Member-at-Large. Michael Campola, NASA Goddard Space Flight Center, is the newly elected Junior Member-at-Large.

Janet announced the general chairs for future NSREC Conferences: Hugh Barnaby, Arizona State University, 2020; Steve McClure, Jet Propulsion Laboratory, 2021; Tom Turflinger, Aerospace Corporation, 2022; and Keith Avery, Air Force Research Laboratory, 2023.



Teresa Farris
Radiation Effects Publicity

John Stone, Southwest Research Institute, the General Chair of the 2019 Conference, summarized statistics and highlights of this year's conference. A total of 472 people registered for the technical sessions and 326 people attended the short course. There were 158 registered guests and 37 exhibit-only registrants. The highlight of the social program was dinner and entertainment at the Buckhorn/Texas Rangers Museum on Wednesday, which was attended by 400 people.

The technical sessions featured 133 papers that were presented during the four-day conference; 40 oral presentations, 42 poster presentations, and 51 poster presentations in the Radiation Effects Data Workshop. Five tutorial presentations were given at the Short Course, held on Monday, July 8th. All short-course attendees received copies of this year's course. The Industrial Exhibit, which had 54 exhibitors, was well attended.

Hugh Barnaby, General Chair of the 2020 Conference, discussed his plans for the 2020 Conference that will take place at the Hilton Buffalo Thunder Resort, Santa Fe, New Mexico, July 20th – 24th, 2020. The conference will feature a technical program with ten sessions of contributed papers that describe the latest observations and research result in radiation effects. The program will include oral and poster papers, with a separate dedicated poster session where authors of poster papers can discuss their results with conference attendees. A Radiation Effects Data Workshop and an Industrial Exhibit will be held. Attendees will also have the opportunity to participate in a one-day Short Course on Monday, July 20th. The theme for the 2020 Short Course is "New Technologies Meet Radiation Effects." The Short Course is being organized by Kenneth Galloway, Vanderbilt University. Topics and speakers for the Short Course include:

Radiation Effects in A Post-Moore World, Dr. Dan Fleetwood, Vanderbilt University

Radiation Effects in Emerging Memories, Dr. Matthew Marinella, Sandia National Laboratories

Wide Bandgap Power – SiC, GaN – Radiation Reliability, Dr. Jean-Marie Lauenstein, NASA Goddard Space Flight Center

Radiation Hardness Assurance in The "Wild West" of Commercial Space, Dr. Robert Baumann, Radiosity Solutions LLC and Southern Methodist University (SMU)

The short course will be of interest to both radiation-effects specialists and newcomers to the field. Electronic copies of the short course notes will be distributed to short-course attendees.

The most current information about the Nuclear and Space Radiation Effects Conference, including contact information and paper submission requirements, can be obtained on www.nsrec.com.

Janet Barth, Executive Chair of the Radiation Effects Committee, can be reached by e-mail at jbarth@ieee.com.

Teresa Farris, RE Publicity, can be reached by E-mail at Teresa.farris@archon-llc.com.

RADIATION INSTRUMENTATION STEERING COMMITTEE



Chiara Guazzoni
RISC Chair

As you read this newsletter, the 2019 IEEE Nuclear Science Symposium and Medical Imaging Conference in Manchester (UK) will have ended. Special thanks to Paul Marsden, the General Chair, to Cinzia Da Via' and Yoshinobu Unno, the NSS Program Chairs and all the committee and congratulations to the awardees of our RISC

awards. Rosana Martinez Turtos is the recipient of the Radiation Instrumentation Early Career Award "for contributions to the development of scintillator meta-pixels toward 10ps time resolution." Réjean Fontaine is the recipient of the Emilio Gatti Radiation Instrumentation Technical Achievement Award "for contributions to high channel density instrumentation and high spatial resolution systems in positron emission tomography," and Lothar Strüder is the recipient of the Glenn F. Knoll Radiation Instrumentation Outstanding Achievement Award "for contributions to innovative semiconductor device development and fabrication of sensors with on-chip electronics, for state-of-the-art experiments in X-ray astronomy, XFEL and synchrotron science, and for X-ray fluorescence and diffraction instrumentation". You will read more on the awards ceremony in the next issue of the newsletter.

As already anticipated, the 2020 IEEE Nuclear Science Symposium and Medical Imaging Conference will be in Boston and is on a great track; the 2021 edition will be for the first time in Japan in Yokohama. In 2022 the conference will move to Milan, Italy and I have the responsibility and the honor to serve as General Chair and the site for the 2023 edition has just been selected and will be Vancouver (Canada), so start thinking about your new ideas to be shared and discussed with colleagues.

I would like also to warmly welcome the new Radiation Instrumentation Steering Committee Members-At-Large serving for the 2020-2022 term, Anna S. Erickson, Christer Frojdh, Francisco Javier Ramírez Jiménez, Lodovico Ratti and Maksym Titov.

Last but not least, I would like to remind you all that end of January is the deadline for the IEEE Glenn F. Knoll Graduate Educational Grant and for the IEEE Glenn F. Knoll Post Doctoral Educational Grant. You can find all the relevant details on the dedicated webpage <https://ieee-npss.org/awards/npss-awards/> together with details of all other NPSS awards.

Chiara Guazzoni, RISC Chair, is with Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano and with INFN—Sezione di Milano, P.zza Leonardo da Vinci, 32—20133 Milano—Italy, Phone: +39 02 2399 6147; Fax: +39 02 2399 3699; E-mail: Chiara.Guazzoni@mi.infn.it

Annual report from the Radiation Effects Committee—July 2019

Janet Barth, NASA (ret.), is the present Chair of the Radiation Effects Steering Group, which oversees NSREC Conferences.

The IEEE Radiation Effects Committee (REC) held its annual Open Meeting on July 11th, 2019 at the Marriott Rivercenter Hotel in San Antonio, Texas. The meeting was held during the 2019 Nuclear and Space Radiation Effects Conference (NSREC). Presentations were given by the general chairs of the 2018 through 2020 NSRECs and the 2019 and 2020 European Conferences on Radiation and its Effects on Components and Systems (RADECS).

Janet Barth opened the meeting by recognizing elected and appointed members of the Radiation Effects Steering Group (RESG). The elected members of the 2019 RESG are Robert Reed, Vanderbilt University, Vice Chair; Allan Johnston, J-K Associates, Past Chair; Sarah Armstrong, Naval Surface Weapons Center (Crane), Secretary; Ethan Cannon, Boeing, Senior Member-at-Large; Julien Mekki, CNES, Member-at-Large; and Kyle Miller, Ball Aerospace, Junior Member-at-Large.

Functional Committees

AWARDS

Call for Nominations

It is my great pleasure to remind you that the deadline to nominate your deserving colleagues for IEEE NPSS awards is rapidly approaching, the 31st January 2020 for most awards.

The Awards Committee calls for nominations for a number of awards spanning technical excellence to service, and recognizing superlative performance from early career to lifetime achievement. A brief summary of awards follows.

Merit Award. The Merit Award recognizes outstanding technical contributions to the fields of Nuclear and Plasma Sciences. It includes a plaque, a certificate, and a prize of \$5,000.

Richard F. Shea Distinguished Member Award. The Richard F. Shea Distinguished Member Award recognizes outstanding contributions through leadership and service to the NPSS and to the fields of Nuclear and Plasma Sciences. The award includes a plaque, a certificate, and a \$5,000 prize.

Early Achievement Award. The Early Achievement Award recognizes outstanding contributions to any of the fields of Nuclear and Plasma Sciences during the first ten years of an individual's career. The award comprises a plaque, a certificate, and a \$3,000 prize.



John Verboncoeur
IEEE NPSS Awards Chair

Charles K. Birdsall Award. The Birdsall Award recognizes outstanding contributions in computational nuclear and plasma science. It comprises a plaque and a \$2,000 prize.

Magne "Kris" Kristiansen Award. The Kristiansen Award recognizes individuals for outstanding contributions in experimental nuclear and plasma science with preference given to areas within the broadest scope of plasma sciences encompassing the generation of strong pulsed electromagnetic fields including their interaction with plasmas and other pulsed power applications. The award comprises a plaque and a \$2,000 prize.

Glenn F. Knoll Graduate Education Grant. The Knoll Graduate Education grant recognizes outstanding graduate students in the field of nuclear science instrumentation, medical instrumentation, or instrumentation for security applications. The grant is intended to support travel and attendance to conferences, workshops or summer schools, or special research projects. It include a plaque and a \$5,000 grant.

Ronald J. Jaszczak Graduate Award. 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 and medical imaging sciences to advance his/her research activities. The award includes a prize of up to \$5,000 to support academic and/or research activities.

Robert J. Barker Graduate Student Award for Excellence in Pulsed Power Applications. The Barker Award recognizes and enables outstanding graduate students enrolled in an accredited MS or PhD level research program in the field of nuclear and plasma sciences, in pulsed power applications with preference given to medical and environmental applications and to compact pulsed power research and applications. The award includes a prize of \$3,000, a travel allocation not to exceed \$500, and a plaque.

NPSS Graduate Scholarship Award. The Graduate Scholarship Award recognizes contributions to the fields of Nuclear and Plasma Sciences by a graduate student in the fields of Nuclear and Plasma Sciences. The scholarship includes a certificate, one year paid membership in the NPSS, and \$1,500 prize.

Functional Committees Continued from PAGE 5

NPSS Women in Engineering Leadership Grant. The Women in Engineering Leadership Grant provides leading edge professional development for women in mid-level to senior phases of their careers. The recipient receives a certificate and reimbursement of expenses to travel to and participate in the IEEE Women in Engineering International Leadership Conference, up to a maximum of \$3,000.

IEEE NPSS Best Paper Awards. These awards celebrate the top papers published in the NPSS journals, IEEE *Transactions on Nuclear Science* Best Paper award, IEEE *Transactions on Plasma Science* Best Paper award, and IEEE *Transactions on Radiation and Plasma Medical Sciences* Best Paper award. Note that these awards are selected by the editorial board of the respective journal. Also see the article under Publications below,

Also note that there are many Technical Committee awards managed by the respective Technical Committees. You can learn more about these awards from each Technical Committee's web page linked from the main IEEE NPSS web site.

You can learn more about NPSS Awards, eligibility, and the nominations process at <https://iee-npss.org/awards/npss-awards/>. Please consider nominating your worthy colleagues!

John Verboncoeur, NPSS Awards Committee Chair, can be reached via johnv@msu.edu.

2019 RADIATION EFFECTS AWARDS

2019 IEEE/NPSS Radiation Effects Award

Dr. Gary Lum, Lockheed Martin Corporation, received the 2019 IEEE/NPSS Radiation Effects Award. Gary received his B.S. in physics from University of California, Berkeley in 1970 and his M.S. and Ph.D. in physics in 1973 and 1979, respectively from University of Oregon, Eugene. From 1973 to 1980, Gary was a graduate student under the tutelage of Dr. Cyde Wiegand (experimental physics) and Prof. Emilio Segré (Nobel Laureate) (theoretical physics) at the Lawrence Berkeley National Laboratory, Berkeley, CA. Between 1978 to 1980 he received a postdoctoral fellowship from the University of California, San Francisco Medical Center to improve upon the detection efficiency of gamma rays in the nuclear imaging positron-electron tomography (PET) camera for locating cancer tumors.



Gary Lum
2019 Radiation Effects Award Recipient

Subsequently, Gary joined Lockheed Missiles System Division, Sunnyvale, CA in 1980, to head the radiation effects analysis group. Between 1984 and 1986 he left Lockheed to work at Intel Corporation, Santa Clara, CA, as a device physicist to develop ONO (Oxy-Nitride-Oxy) nonvolatile Electrically Erasable memories and to understand integrated circuit fabrication process. Shortly after 1986, he returned to Lockheed to support the Navy Trident II strategic missile research and several commercial and military space programs.

From 1987 until recently, Gary supported the Navy strategic Fleet Ballistic Missile (FBM) program in understanding the effects of neutral particle beams and the space environment on electronics and headed the technical efforts in extending the service life of several electronic packages. His areas of interest/expertise are: (1) IC fabrication processes of MOS and bipolar technologies and (2) the understanding of radiation effects in semiconductor devices, circuit cards and system assemblies in the nuclear and the natural space environments.

Currently he heads a survivability team in support of a strategic space program funded by the Air Force. He provides recommendations and technical guidance to designers, program managers and to Air Force and Navy customers. He has given several invited lectures on space and nuclear radiation effects in electronics and system hardening techniques at Lockheed Martin sites across the nation, Stanford University and the Naval Postgraduate School. He continues to lecture on radiation effects in electronics at the University of Santa Clara, Santa Clara, CA. Gary continues to support both satellite and missile programs and SBIRs ventures (Small Business Independent Research) at Lockheed Martin in evaluating advanced technologies by testing and in risk assessment analyses of electronic components to radiation.

Satellite and missile programs that he has supported include: IMAX Inc, Iridium, Gravity Probe B, International Space Station, HIRDLS, Hubble Space Telescope, Milstar, THAAD and Star Tracker. In 2007 Gary served on the Defense Science Board Task Force on Nuclear Weapon Effects and in 2008, he served as a technical science advisor on the Defense Threat Reduction Agency TRAC (Threat Reduction Advisory Committee). Gary is currently a Lockheed Martin Fellow, a position that he has held for the past 11 years and which is ranked among the top 1% in the company. Gary has collaborated in research with Sandia National Laboratories and supported several military and space programs in understanding radiation effects in electronics and the implementation of strategic hardened to radiation tolerant or Commercial-Off-The Shelf components striving to balance hardening versus affordability. Gary was a member of the technical Independent Review Team at Sandia National Laboratories for the Qualification Alternative to Sandia Pulsed Reactor program. He was also a member of the Sandia National Laboratories' Executive Advisory Board peer reviewing a Grand Challenge project.

Gary has published over 20 technical papers in the IEEE *Transactions on Nuclear Science* and the Journal of Radiation Effects Engineering and Technology. He has served in many roles at the IEEE Nuclear and Space Radiation Effects Conference and at the Hardened Electronics and Radiation Technology Conference as Short Course speaker, Best Paper Awards Chair, Session Chair for Single Event Effects, Devices and ICs, and Technical Program Chair at both conferences. He is quite well-known for his penetrating questions to help foster the understanding of the technical papers presented and to help engage the audience in appreciating the technical work by the presenters. For the past 28 years he has been a technical paper reviewer and has served over nine times as a member of the best technical paper Awards committee.

Citation: for contributions to the fundamental understanding of space radiation effects in microelectronics influencing spacecraft survivability; through research, testing, and his inquisitive nature.

2019 Radiation Effects Early Achievement Award

Dr. T. Daniel Loveless, University of Tennessee at Chattanooga, received the 2019 Radiation Effects Early Achievement Award. This is the inaugural year of this award. Dr. Daniel Loveless is a UC Foundation Associate Professor of Electrical Engineering at the University of Tennessee at Chattanooga (UTC). He received a B.S. degree in electrical engineering from Georgia Institute of Technology, Atlanta, Georgia, in 2004 and M.S. and Ph.D. degrees in electrical engineering from Vanderbilt University, Nashville, Tennessee, in 2007 and 2009, respectively. Prior to joining UTC in 2014, Dr. Loveless was a senior engineer and then Research Assistant Professor of Electrical Engineering in the EECs Department at the Institute for Space and Defense Electronics (ISDE) at Vanderbilt University where he was involved in radiation effects research related to high-speed analog and mixed-signal circuits (AMS) and in the modeling and design of integrated circuits for the evaluation of radiation effects in advanced CMOS technologies. Dr. Loveless joined UTC in 2014 where he established a microelectronics research program focused on radiation effects and reliability in electronic and photonic integrated circuits and on the design of radiation hardening-by-design methodologies. Additionally, he founded the UTChatSat program focused on undergraduate research and education in small satellites, space-systems engineering, and radiation effects. Dr. Loveless has published over 90 articles in peer-reviewed journals and is a Senior Member of IEEE. His honors include five best conference paper awards and the IEEE NPSS Graduate Scholarship Award for recognition of contributions to the fields of nuclear and plasma sciences.



Daniel Loveless
2019 Radiation Effects Early Achievement Award recipient

Citation: for contributions to radiation effects research in high-speed analog and mixed-signal electronics and student mentorship in the radiation effects community.

CALL FOR 2020 RADIATION EFFECTS AWARDS NOMINATIONS

Nominations are due January 29th, 2020 for awards that will be presented at the IEEE NSREC 2020 Conference July 20th–24th, 2020 in Santa Fe, New Mexico.

Radiation Effects Award Nominations

Nominations are currently being accepted for the 2020 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 the 2020 NSREC in Santa Fe. Nomination forms are available electronically at <http://iee-npss.org/technical-committees/radiation-effects/> and must be submitted by January 29th, 2020. Additional information can be obtained from Julien Mekki, Senior Member-at-Large, for the Radiation Effects Steering Group. Julien can be reached at julien.mekki@cnes.fr.

Radiation Effects Early Achievement Award Nominations

Nominations are currently being accepted for the 2020 Radiation Effects Early Achievement Award. The purpose of this award is to recognize an individual early in his or her career whose technical contributions and leadership have had a significant impact on the field of radiation effects. The \$1500 cash award and plaque will be presented at the 2020 NSREC in Santa Fe. Nomination forms are available electronically at <http://iee-npss.org/technical-committees/radiation-effects/> and must be submitted by January 29, 2020. Additional information can be obtained from Julien Mekki, Senior Member-at-Large, for the Radiation Effects Steering Group. Julien can be reached at julien.mekki@cnes.fr.

Paul Phelps Continuing Education Grant Nominations

Nominations are currently being accepted for the 2020 Paul Phelps Continuing Education Grant. The purpose of the grant is to promote continuing education (attendance at the 2020 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 2020 NSREC in Santa Fe. 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://iee-npss.org/technical-committees/radiation-effects/> and must be submitted by January 29, 2020. Additional information can be obtained from Kyle Miller, Member-at-Large, Ball Aerospace, for the Radiation Effects Steering Group. Kyle can be reached at kbmiller@ball.com.

PUBLICATIONS

Best Paper Awards 2019

The Nuclear and Plasma Sciences Society has instituted an annual Best Paper Award for each of its journals – the IEEE *Transactions on Nuclear Science* (TNS), the IEEE *Transactions on Plasma Science* (TPS), and the IEEE *Transactions on Radiation and Plasma Medical Sciences* (TRPMS). The award is intended to recognize the best paper published in the journal in a given year. The primary consideration in determining the best paper is its quantifiable usefulness to the community. Supplemental factors which are examined include literature citations to the paper, quality, clarity of presentation, originality, significance, and contributions to the field.

Since a period of time must pass before an assessment of the community's interest in a paper can be made, papers considered for the award are those published in the year three prior to the year of the award. For example, to be considered for the award presented in 2019, a paper must have been published in 2016. Quantitative metrics for 2016, 2017, and 2018 are used in the analysis for selection. Full details on these awards can be found at <https://iee-npss.org/awards/npss-awards/>.

We pleased to announce the winners of this year's inaugural awards for TNS and TPS. Note that there was no award for TRPMS this year, since it began publication in 2017 and thus there were no papers published in 2016 eligible for the award. The inaugural award for TRPMS will be presented in 2020.



Noah Hershkwitz receiving the TPS Best Paper Award from John Booske at the University of Wisconsin, Madison.

IEEE Transactions on Nuclear Science Best Paper Award:

The paper selected for the inaugural *Transactions on Nuclear Science* Best Paper Award is "A Comparison of the SEU Response of Planar and FinFET D Flip-Flops at Advanced Technology Nodes," IEEE Trans. Nud. Sci., vol. 63, no. 1, pp. 266 – 272, February 2016, DOI 10.1109/TNS.2015.2508981, by Patrick Nsengiyumva, Dennis R. Ball, Jeffrey S. Kauppila, Nelson Tam, Mike McCurdy, W. Timothy Holman, Michael L. Alles, Bharat L. Bhuvu, and Lloyd W. Massengill.

This paper uses heavy-ion experimental results to characterize single-event upset trends in 16 nm bulk FinFET, 20 nm bulk planar, and 28 nm bulk planar D flip-flops. Experimental data show that 16 nm bulk FinFET flip-flops have considerably lower SEU cross sections than their sub-32 nm planar counterparts for linear energy transfer (LET) less than 10 MeV-cm²/mg. However, FinFET SEU cross section improvement compared to the planar technologies is weak for high LET particles. Three-dimensional technology computer-aided design simulations are used to investigate charge collection mechanisms and single-event transient (SET) pulse widths at these advanced fabrication nodes. Simulation results show that SETs follow conventional scaling trends, which are that SET pulse widths reduce with technology scaling.

Patrick Nsengiyumva received the Ph.D. degree in electrical engineering from Vanderbilt University in 2018 and is currently a radiation effects engineer with the Boeing Solid-State Electronics Development organization. At Boeing, he focuses on the test, modeling, analysis, and mitigation of radiation effects in advanced CMOS circuits and SoCs. He has authored or co-authored over 10 publications in the area of reliability and radiation effects on electronics.

Dennis Ball is a staff engineer at the Institute for Space and Defense Electronics (ISDE) at Vanderbilt University. His research interests include exploring basic mechanisms related to radiation effects at the device and small IC level, ranging from topics such as single event burnout in SiC power MOSFETs and diodes to emerging technology comparisons of single event upset thresholds in bulk versus SOI FinFETs. He has authored more than 60 technical papers and presentations and is a supporting inventor on a patent for using dual interlocked logic circuits as an RHBD technique.

Dr. Jeffrey S. Kauppila is a Research Assistant Professor of Electrical Engineering and Computer Engineering, where he works in the area of radiation-effects modeling and radiation-hardened design for microelectronics and electronic systems. His research focus has centered on the development of radiation-effects-enabled compact models, integration of models with existing and custom-developed process-design-kits (PDK), and the application of the radiation-enabled models in the design of radiation-hardened electronics and systems. Dr. Kauppila has analog/mixed-signal design experience in bipolar junction transistor, bulk CMOS, silicon-on-insulator CMOS, and FinFET technologies with minimum process feature sizes from 6µm to 14nm. Dr. Kauppila has over 70 technical/trade publications on radiation-aware compact modeling, technology characterization for radiation effects response, and the effects of radiation on microelectronic circuit reliability. He has written a chapter in the textbook *Extreme Environment Electronics* (ed. J.D. Cressler and H.A. Mantooth), presented a tutorial presentation at the 2015 Hardened Electronics and Radiation Technology Society Technical Interchange Meeting, and taught the short course "Single-Event Modeling for Rad-Hard-by-Design Flows" at the 2016 IEEE Nuclear and Space Radiation Effects Conference (NSREC). Dr. Kauppila is a licensed professional engineer in the state of Tennessee.

Nelson Tam received his Ph.D. in Electrical Engineering and Computer Science from the University of California, Berkeley in 1991. He joined Intel Mask Operations in 1992 and worked on the research and development of Phase Shifting Mask technology. He holds three patents on the application of self-aligned processing technology to create precise phase-shifted contacts on reticle. In 1997, he transferred to the Intel Digital Enterprise Group to work on pre-Si reliability verification with primary focus on soft error rate (SER) analysis and measurements. From 2006 to 2018, he worked at Marvell Semiconductor Inc. and continued to work on radiation effects on embedded processors, enterprise switches, SSD controllers, and wireless routers. He has published a number of papers on the effects of neutrons, thermal neutrons, heavy ions, and muons in semiconductor memories.

Mike McCurdy received the B.E. and M.S. degrees in electrical engineering from Vanderbilt University. His work and research interests in radiation effects on electronics continue at ISDE. His 17+ years of radiation effects experience includes total ionizing dose, dose rate, single event effects and combined environment effects on discrete and integrated devices at a variety of different facilities. He is author or co-author on more than 35 technical papers, holds one patent and is a Senior Member of the IEEE.

W. Timothy Holman is a Research Associate Professor of Electrical Engineering and Computer Engineering at Vanderbilt University, and a faculty member of the ISDE. His research interests include analog/mixed-signal circuit design and the design, modeling, and simulation of radiation-hardened microelectronics. He has authored or co-authored more than 130 papers and 100 presentations in the area of microelectronics and is a Senior Member of the IEEE.

Michael Alles is a Research Professor in Electrical Engineering at Vanderbilt University, and the Associate Director of the ISDE. His research interests focus on the application of advanced and emerging semiconductor



(Left to right) Patrick Nsengiyumva, Lloyd Massengill, Tim Holman, and Jeff Kauppila receiving the TNS Best Paper Award from Janet Barth at the 2019 IEEE Nuclear and Space Radiation Effects Conference.

technologies in radiation environments. He has authored over 350 publications and presentations and holds two patents. He has 12 years of previous experience in the commercial semiconductor industry.

Bharat Bhuvu is a professor of Electrical Engineering and Computer Engineering at Vanderbilt University. He has been actively involved in design, simulation, and reliability analysis for microelectronic circuits operating in harsh environments. His contributions in the radiation effects area are in characterization of single-event transient pulses, development of single-event mitigation techniques, radiation hardness assurance, and simulation/modeling of single-event effects. He has received Best Paper awards at multiple conferences. He has published more than 400 papers with over 6200 citations

Lloyd W. Massengill is a Professor of Electrical Engineering and Computer Engineering at Vanderbilt University. He helped establish the Microelectronics Circuits Research program at Vanderbilt in 1987 and continues research in the area of radiation hardening by design, radiation effects modeling, and the investigation of radiation failure mechanisms in advanced microelectronics technologies. He has coauthored over 350 papers and conference presentations receiving over 10,000 citations and six conference/journal best paper awards. He is a Fellow of the IEEE.

The award was presented by Janet Barth, Chairperson of the NPSS Radiation Effects Technical Committee, at the 2019 IEEE Nuclear and Space Radiation Effects Conference.

IEEE Transactions on Plasma Science Best Paper Award:

The paper selected for the inaugural *Transactions on Plasma Science* Best Paper Award is "43 Years of Fun Basic Plasma Physics Experiments," IEEE Trans. Plasma Sci., vol. 44, no. 4, pages 347 – 363, April 2016, DOI 1109/TPS.2015.2508744, by Professor Noah Hershkwitz.

This paper presents an overview of some of the low-temperature plasma experiments carried out by Prof. Hershkwitz with his students. It begins with the connection between solitons and the Schrödinger equation, and continues with the discovery of cylindrical solitons. From moving structures, it moves on to stable ones: sheaths and double layers. The question of how to measure double-layer potentials led to the development of emissive probe techniques. Next is discussed the Bohm criterion and the first measurements of the full plasma potential variations of sheaths and presheaths in a single-species plasma, and later in two-ion-species plasmas. Finally, recent measurements of double layers and presheaths in uniform helicon plasma are presented.

Noah Hershkwitz received his B.S. in Physics from Union College ((Schenectady, NY) in 1962 and a Ph.D. in Physics from Johns Hopkins University in 1966. For over 40 years, his research has broadened the understanding of the fundamental properties of plasmas. His work has covered a wide range of plasma phenomena including low-temperature plasmas, semiconductor fabricating plasmas, fusion plasmas, and space plasmas. His groundbreaking contributions to understanding solitons, sheaths and presheaths have impacted semiconductor etching as the plasma sheath plays a major role in the linear acceleration of ions that results in the small features of modern microelectronic circuits. His pioneering work on emissive probes resulted in the development of a new technique for determining plasma potential by analyzing emissive probe emitted current. In 2002 he was the first to measure plasma potential throughout the presheath and sheath at a boundary in a weakly collisional plasma. He has over 240 publications and has supervised 56 Ph.D. students. He is the Irving Languir Professor Emeritus at the University of Wisconsin, Madison, a Fellow of the American Physical Society, and a Life Fellow of the IEEE.

Prof. Hershkwitz was presented the award by Professor John Booske, Chairman of the University of Wisconsin Department of Electrical & Computer Engineering, in a ceremony held at the University of Wisconsin.

[Paul Dressendorfer](mailto:p.dressendorfer@iee.org), Chair of the IEEE NPSS Publications Committee, can be reached by E-mail at p.dressendorfer@iee.org.

TRANSNATIONAL COMMITTEE

**International School for Medical Physics
Quy Nhon, Vietnam
July 27th–28th, 2019**

The International School for Medical Physics was held at the ICISE conference center in Quy Nhon, Vietnam, on July 27th and 28th, 2019. It was jointly organized by a team with members from Vietnam Universities (Da Nang, Ho Chi Minh City), LPC Caen (France) and IEEE-NPSS. The school was intended for students (Master and Ph.D.) in Physics and Medical Physics. Twenty-one students from Vietnam and China participated.

Functional Committees Continued from PAGE 7

The program consisted of lectures and laboratory exercises on applications of physics in medicine. Dimitris Visvikis (NPSS NMISC) gave a comprehensive introduction to Medical Imaging. Patrick Le Dû (NPSS Transnational) gave an answer to the question "What is Medical Physics?" Patrick could not travel to Vietnam this time but gave his presentation online, interacting with students who asked questions. Other lectures covered the history and physics of radiation therapy and the mitigation of organ motion.

The exercises concentrated on imaging. Students were working with the GATE simulation package for medical imaging and radiotherapy. After learning how to install and configure the software on their own laptops they ran a number of exercises, for example simulating various distortions and artefacts that can happen in medical imaging. Using open-source software installed on their own computers enabled the students to continue working with these tools after the school.

An exercise run by Martin Grossmann (NPSS CANPS) used a table-top experimental kit to demonstrate the principle of PET by acquiring the image of a beta-plus source.

Students and lecturers stayed together at ICISE, situated in an isolated tropical grove by the sea. So even if the school was rather short at only two days there was a lot of good interaction between all participants. The students returned very positive feedback in the survey at the end of the school.

The school was followed by a five-day conference on Medical Physics. Although the conference was not organized by IEEE we were able to advertise our society's activities in the plenary session, at an information desk, and by running a slide-show loop on a display at coffee breaks.



Students and lecturers take the school bus to ICIS



EasyPET laboratory exercise



Delivering certificates of attendance

Martin Grossmann, Chair of the CANPS Technical Committee and a member of the Transnational Committee, can be reached by E-mail at martin.grossmann@psi.ch.

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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 January 5, 2020 for the March 2020 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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