NPSS NEWS

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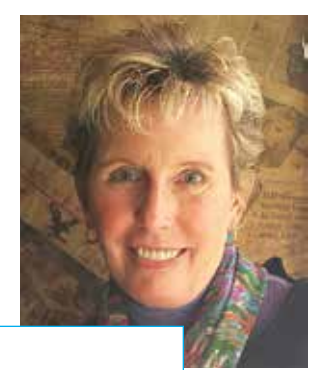
2021 Nuclear and Space Radiation Effects Virtual Conference NSREC 2021 July 19th–23rd, 2021

Steve McClure
General Chair

Janet Barth
Chair, RESG



Teresa Farris
Vice Chair, Publicity,

The 58th Nuclear and Space Radiation Effects Conference will be held virtually from July 19th–23rd, 2021. The conference is sponsored by IEEE Nuclear and Plasma Science Society (NPSS) with guidance provided by the Radiation Effects Steering Group (RESG). Steve McClure, Jet Propulsion Laboratory, is the General Conference Chair, and Janet Barth, NASA (retired), is RESG Chair. Corporate supporters of the conference include The Aerospace Corporation, Cobham, IR HiRel Products, An Infineon Technologies Company, Jet Propulsion Laboratory, L3Harris, NASA NEPP, Radiation Test Solutions, Renesas, SkyWater Technology, and Southwest Research Institute.

The NSREC organizing committee has worked hard to offer an interesting and outstanding program for this year's conference and will continue the tradition of previous Nuclear & Space Radiation Effects Conferences by offering a Technical Program, a Short Course that precedes the technical program, a Radiation Effects Data Workshop, and an Industrial Exhibit. Engineers, scientists, and managers from around the world who are interested in radiation effects will attend.

TECHNICAL PROGRAM

Brian Sierawski
Technical Program Chair

The Technical Program Chair, Brian Sierawski, Vanderbilt, and his committee have assembled an outstanding set of technical papers that are organized into ten oral sessions and a poster session. Papers presented in the NSREC technical sessions are expected to be submitted for publication after the conference in the January 2022 issue of the IEEE *Transactions on Nuclear Science* (TNS), subject to the standard TNS peer review process. A Radiation Effects Data Workshop is also included in the Technical Program with papers that emphasize data on electronic devices and systems and descriptions of new simulation tools and radiation test facilities. These papers will appear in a non-peer-reviewed workshop record. In addition to the contributed papers, three invited talks will be presented that are of general interest to conference attendees.

SHORT COURSE

The Short Course Chair is Marta Bagatin, University of Padova, Dept. of Information Engineering. The theme of the 2021 course is "Challenges and

CONFERENCES Continued on PAGE 2

President's Report

This is my first newsletter article as President of NPSS. I am honoured to lead this Society representing approximately 3,000 members across nine technical fields as diverse as nuclear and plasma science, fusion technology, radiation instrumentation, nuclear medical imaging, particle accelerator science, nuclear and pulsed power, technical applications, and radiation effects.

My own background is in nuclear medical imaging. I attended my first IEEE conference, the Nuclear Science Symposium and Medical Imaging Conference, in 1991. It was held in the unique Southwest U.S. city of Santa Fe, New Mexico, with its distinctive Pueblo architecture, creative arts community and historical links to indigenous and colonial eras. At that time, the Medical Imaging Conference (MIC) was much smaller than the Nuclear Science Symposium (NSS), having begun as an off-shoot of the NSS Radiation Instrumentation community. Detector and data acquisition technologies originally developed for high energy physics applications were finding new uses in the medical imaging field, fostering a great deal of cross-fertilization between these communities. At the same time, scientists with expertise in the mathematics of inverse problems were attracted to the field to solve some of the complex data reconstruction problems arising from the use of these new devices. It was an exciting time to be a graduate student in a rapidly growing field. The NSS-MIC, like most of our conferences, has grown from a relatively small U.S. -oriented conference in the early 1990s into a genuinely global event with approximately 2,000 attendees each year. This spirit of collaboration and innovation is what brings the diverse fields of NPSS together and volunteerism is what drives it.

Steve Meikle
IEEE NPSS President

As I begin my two-year term as President, the NPSS is in very good shape due to the outstanding contributions of many volunteers. I am particularly thankful to my predecessor, Ron Schrimpf, who moves into the role of Past President and Nominations Chair. Ron has very capably steered NPSS through one of its most challenging periods owing to the impacts of Covid-19 on our activities, particularly our conferences (more on this below). Thanks to Ron's leadership, together with our Treasurer Ralf Engels and all our very dedicated conference committees, NPSS has managed the challenges and uncertainties that 2020 threw at us extremely well. Although the impacts of Covid-19 will be felt throughout 2021 and beyond, we are in great shape to meet them head-on thanks to their dedication and foresight, backed by excellent advice and support from IEEE Meetings, Conferences and Events (MCE).

I also thank our past Presidents, Stefan Ritt and John Verboncoeur, who have provided and continue to provide (to AdCom and myself personally) their wisdom, insight and mentoring. I am also very grateful to our Secretary, Albe Larsen, who not only contributes her outstanding organisational skills to AdCom but also does an excellent job of editing this newsletter. I look forward to working with Vesna Sossi from the University of British Columbia, who assumes the role of Vice President, along with the Chairs of our Technical Committees and Elected Members and Liaison Representatives. I would like to introduce our Functional Committee Chairs for 2021: Steven Gold (Chapters), Peter Clout (Communications), Susanne Kuehn (Conferences), Dan Fleetwood (Distinguished Lectures), Alberto Del Guerra (Fellows), Harold Flescher (Finance), Sal Portillo (Membership), Jean-Luc Leray (Membership Vice Chair), Paul Dressendorfer (Publications), Martin Grossman (Transnational) and Srilalan Krishnamoorthy (Young Professionals). I look forward to working with them in 2021 to advance the goals of NPSS on behalf of our members. I would also like to take this opportunity to thank our outgoing Committee Chairs for all they have done for NPSS: Heiko Koerte (Membership Vice Chair, Industry), Bruce Mellado (Membership Vice Chair, Africa) and Christian Bohm (Transnational), as well as our outgoing Liaisons: Kathy Harkay (PAC Oversight Committee and APS-DPB) and Patrick Le Dû (Transnational Schools).

Our Society runs several leading international conferences and publishes peer-reviewed journals showcasing the latest scientific advances in our fields of interest. We organise educational and career development activities throughout the world for students and professional engineers at all career stages. We also collaborate with other IEEE societies and councils in these endeavours and in leading efforts to advance humanity through the technology we develop. In future columns I will write in more detail about the broad range of Society activities, new initiatives to support our strategic goals, and opportunities for you to participate in and shape your Society. In the meantime, I encourage you to read the contributions in this edition of the newsletter, and to explore the NPSS web site and our social media pages, where you will find more information about the Society's many activities and new initiatives.

When I was elected to NPSS AdCom in the class of 2018, one of the biggest challenges facing NPSS and IEEE more broadly was the popular move towards 'open access' publishing which turns the business model of scientific publishing on its head. IEEE responded slowly and cautiously in the first instance but now offers a number of pathways towards open access should we wish to take them up. NPSS decided not to 'flip' any of our journals at this stage. With maturation of the debate, funder agreements for open access publishing and the emergence of new 'read and publish' subscription models, the future of scientific publishing looks less uncertain than it did five years ago. However, together with IEEE Publications, we continue to monitor this space to ensure the ongoing scientific quality and sustainability of our publications.

The challenge of open access publishing has been somewhat dwarfed by Covid-19 and its impact on our conferences. Like most scientific societies, we managed this major upheaval in 2020 by flipping our conferences from 'in person' to 'virtual'. Apart from our conference Program Chairs ageing more rapidly in 2020 than they would in a normal year, this worked out surprisingly well. Software solutions for live and 'on demand' streaming, including freely available options in many cases, were deployed, registration fees were adjusted, budgets were scrapped and recrafted. Attendances were, in most cases, up on past years and based on feedback received so far, the vast majority of attendees found the virtual experience satisfactory and appreciated the efforts of conference organisers to provide them with an opportunity to present their latest research and interact with their peers in new and interesting ways. The challenge and opportunity, of course, will be how to reimagine our conferences in a post-Covid world. Now that people have experienced virtual conferences will they want to go back to 'in person' events? Or will they expect the choice to attend either 'in person' or 'virtual', in other words a hybrid conference? How do we budget for hybrid conferences if we don't know, in advance, how many will choose the 'in person' option and, therefore, expect to be fed, caffeinated and accommodated? How do we meet the expectations of our exhibitors who are so vital to the success of our conferences?

These are some of the questions my committee will deal with over the coming months in consultation with our technical communities, *i.e.*, yourselves. I encourage you to reach out to your elected representative(s) on AdCom and your Technical Committee Chairs with your ideas on this and any other issues you feel NPSS should address. We welcome your input. It is, after all, your Society.

Steve Meikle, IEEE NPSS President, can be reached by E-mail at steven.meikle@sydney.edu.au.

Conferences

Continued from PAGE 1

Marta Batagin
Short Course Chair

Opportunities for Radiation Hardening in Advanced Technologies."

Presentations and speakers for the four sessions are:

HARDENING TECHNIQUES FOR DIGITAL CIRCUITS
Dr. Balaji Narasimham,
Broadcom

HARDENING TECHNIQUES FOR ANALOG AND MIXED-SIGNAL CIRCUITS
Dr. Daniel Loveless,
University of Tennessee at Chattanooga

HARDENING TECHNIQUES FOR IMAGE SENSORS
Dr. Vincent Goiffon, ISAE-SUPAERO,
University of Toulouse

SYSTEM-LEVEL HARDENING—WHAT COULD GO WRONG, AND HOW TO MAKE IT RIGHT
Kay Chesnut,
Raytheon Intelligence & Space at Raytheon Technologies

INDUSTRIAL EXHIBIT

Larisa Milic, EMPC, is the Industrial Exhibit Chair. The (virtual) exhibit will allow conference attendees to discuss new developments in radiation-hardened and radiation-tolerant electronics, engineering services, facilities, and equipment with participating vendors. If you need more information about the exhibit, please visit http://www.nsrec.com, or contact Larisa at lmilic@empc.com.

ADDITIONAL INFORMATION

For the latest information on the conference, including the technical program and registration forms, please visit our web site at http:/www.nsrec.com.

You may also contact the General Chair, Steve McClure, E-mail: steven.mcclure@jpl.nasa.gov or the Publicity Chair, Teresa Farris, E-mail: teresa.farris@archon-llc.com.

Secretary's Report

Albe Larsen
IEEE NPSS Secretary and Newsletter Editor

The NPSS Administrative Committee (AdCom) met virtually on November 6th and 7th at the end of the virtual 2020 NSS-MIC. Finance and Communications committees met the week before, on October 31st. Despite the challenges of Covid-19 and the transition of 2020 conferences to virtual events, our society continues to maintain an even keel financially, although income in 2020 and in 2021 may be considerably lower than in prior times. Steve Meikle, in his President's letter above, has addressed issues facing our conferences. 2021 also has considerable uncertainty and potentially high penalties if cancelling or amending existing contracts becomes necessary. Areas potentially impacted by reduced income will include awards, travel grants and amenities at conferences. At this point there are many uncertainties in our financial future.

President Ron Schrimpf also discussed the impact of Covid and the move in 2020 to virtual conferences. On a positive note, lower-cost virtual events allowed increased attendance in all cases. However, there are many questions concerning charges, live vs recorded presentations, how to deal with questions, and so on. AdCom members on the front lines discussed these issues at length. Integrating new attendees into the community is a challenge without the easy mingling of an in-person event.

Ron thanked AdCom for its support over his term. He now continues as Past President and Nominations Chair.

Steve Meikle, now our new president, talked about our strategic plan. Our vision is to "be the leading nuclear and plasma sciences community," and our mision is "to provide opportunities for scientific exchange and career development, and to promote a diverse and inclusive community of nuclear and plasma scientists and engineers." Our strategic goals are:

NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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A. To offer high quality technical conferences, community engagement, networking and outreach activities that meet the educational, research and professional development needs of our community;

B. To provide publications that are among the highest ranked journals in their respective fields;

C. To encourage growth of a diverse and inclusive community of volunteers, with a particular focus on internationalization and increasing the participation and leadership opportunities for under-represented groups;

D. To undertake impactful development activities that foster technological innovation, with priority given to activities related to the NPSS fields of interest, and to sustainability for recurring activities.

Our mision, vision and goals will be reviewed in 2025.

John Verboncoeur, our Division IV Director, reported on the many meetings he has attended since the last AdCom meeting in July. Overall, IEEE is in good financial shape. It is converting its financials to a new system with development on track. The transition should occur this May.

John has assumed the role of the Publication Products and Services Board (PSPB) Vice President. PSPB has agreed to join the multiple major-publisher Committee on Publication Ethics (COPE), but will continue to maintain the Prohibited Authors list. It is not clear whether the list will be shared.

PSPB has made a major effort to reduce publishing misconduct and to that end has broken up publication editorial-review rings and has increased education to reduce plagiarism. PSPB has also been asked to propose governance changes that can be integrated into the Ethics and Member Conduct process. Two items identified include the correction of publication records when violations are found, and ensurance that the Prohibited Authors list will only be used in regard to publications violations.

Check out the IEEE app for both Android and Apple Smart phones. Improvements continue with releases monthly. The app is widely deployed and has been downloaded in over 180 countries. About a third of the downloads have been by nonmembers.

John is also co-chair of a joint MGA-TAB ad hoc committee to develop local groups that are project oriented and work with a local specialization. These may involve one or more Technical Activities units and will operate under Section or Region management. These groups may hold conferences or produce publications, but only with an MOU with an authorized IEEE unit. These groups require annual renewal and are intended to focus on current hot/new topics and encourage local participation. This will be voted on by TA and MGA boards in mid-November.

This was John's last AdCom meeting as Division IV director but continues to serve in several IEEE roles and, pending TAB approval, will run for TAB VP-elect in 2021.

Our technical committees have focused much of their energy on creating effective virtual conferences. Read their reports below and check out IEEE's Introduction to Virtual Events at https://ieeemce.org/planning-basics/virtual-hybrid/introduction-to-ieee-virtual-events/. Through at least the first half of 2021 it looks as if virtual conferences will dominate.

ADCOM ACTIONS

» The NMISC and RISC—following the approval of the Memorandum of Agreement with the Room Temperature Semiconductor Detectors Symposium (RTSD) Scientific Advisory Committee (SAC) - jointly move that RTSD be a fully sponsored conference of NPSS when it is held in conjunction with the IEEE Nuclear Science Symposium and Medical Imaging Conference. Approved. 19Y, 0N, 1A.

» The PAST TC Executive Committee moves that NPSS support for Teacher's Day at International and regional Particle Accelerator Conferences hosted in the Americas, approved by NPSS AdCom in 2015 for a 5-year period, be extended for another 5 years. The cost to NPSS is $5k per conference. Approved. 20Y 0N 1 A.

» Motions from the October 31st Finance Committee Meeting.

- AdCom approves the funding of the Cameroon 134 Villages Program (2020 initiative) at $60k. This is a joint program with USTDA. 17Y, 1N, 4A.
- Initiative to fund joint IEEE Smart Village/Rotary Covid Telehealth program in Kenya, Uganda and Ghana at $90k. Failed. 11Y, 6N, 6A. Note that these funds are returned to the NPSS reserves where in future only 3% of the amount will be available for initiative use.
- AdCom approves funding for India Low-cost e-mobility Infrastructure at $25k. Approved. 13Y, 3N, 5A.

» AdCom approves the revisions of the NPSS Constitution and Bylaws recommended by the ad hoc review committee. It was moved to table these until the March 2021 meeting. 18Y, 1N, 0A.

» AdCom approves the adoption of the NPSS Strategic Plan 2021-25 as presented. Approved. 21Y, 0N, 0A

The results of the election for NPSS President and Vice President/President-elect are Steven Meikle, University of Sydney, as President and Vesna Sossi of the University of British Columbia as our ne VP/President-elect. Heartfelt congratulations to both of them and to our new AdCom members who are introduced below.

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

NEW ADCOM OFFICERS AND MEMBERS

President—Steven Meikle

Steve Meikle
IEEE NPSS President

Steven Meikle (M'96-SM-'00) is a Professor of Medical Imaging Physics at the University of Sydney and Head of the Imaging Physics Laboratory at the Brain and Mind Centre (BMC). He received his Ph.D. from the University of New South Wales in 1995. He was a medical physicist at Royal Prince Alfred Hospital in Sydney from 1987-2004, a visiting research associate at the Division of Nuclear Medicine and Biophysics, UCLA School of Medicine from 1991-2 and a post-doctoral research scientist at the MRC Cyclotron Unit in London from 1995-6, before joining the University of Sydney in 2004. He is best known for his contributions to the development of quantitative emission computed tomography and small animal molecular imaging. He has published nine book chapters and more than 200 research papers which have attracted over 6,000 citations (h-index 44). He has served on the Nuclear Medical and Imaging Sciences Council (2004-9) and as an elected NMISC representative on the Administrative Committee of NPSS (2015-18), and is currently President of NPSS. He has organised IEEE short courses and workshops, was Deputy General Chair of the 2013 Nuclear Science Symposium and Medical Imaging Conference and Co-Chair of the 2018 Medical Imaging Conference. He is a Senior Member of the IEEE, a Fellow of the Australian Institute of Physics and serves on the Board of the journal *Physics in Medicine and Biology*.

Vice President/President-elect—Vesna Sossi

Vesna Sossi
IEEE NPSS Vice President/President-elect

Vesna Sossi received the Laurea degree from the University of Trieste, Italy, in High Energy Physics in 1986 and the Ph.D. degree from the University of British Columbia (UBC), Vancouver, B.C., Canada in Nuclear Physics in 1991. She is now a Professor in the UBC Physics and Astronomy Department and has been leading UBC PET and PET/MRI neuroimaging since 2009. She initially worked on detectors and data analysis as applied to measurements of nuclear reactions cross sections at the Canadian Nuclear Physics Laboratory TRIUMF and then transitioned to Nuclear-Medicine based imaging. Since then, she has worked in many areas ranging from instrumentation-related topics such as development of data reconstruction and quantification algorithms, motion correction for high resolution PET data, design and development of a preclinical MR-compatible PET insert, to more applied areas such as development of novel kinetic modeling approaches for PET tracers and performance and interpretation of preclinical and clinical studies. Her publication list includes more than 210 peer-reviewed papers and 300 abstracts; she sits on several national and international review committees and is a reviewer for many journals and conferences. She has attended the IEEE MIC meetings since 1993 and has served on the Nuclear Medical and Imaging Sciences Council (NMISC), the Marie-Sklodowska-Curie Award Committee, was MIC Program chair in 2012 and NSS-MIC General Chair in 2015 and appointed for 2023. She served on the IEEE NPSS AdCom from 2017 to 2020.

Vesna Sossi, IEEE NPSS Vice President/President -elect can be reached by E-mail at vesna@phas.ubc.ca.

New AdCom Members–Class of 2024

Christine Coverdale—Plasma Science and Applications

Christine A. Coverdale
Plasma Science and Applications

Christine A. Coverdale is a Distinguished member of the Technical Staff at Sandia National Labs. Her work focuses on a range of problems in Z-pinch physics and associated diagnostics, radiation effects, and radiation detection systems. Christine has been actively involved in both IEEE and APS for many years, and is a Fellow of both the IEEE and APS.

Christine Coverdale may be reached by E-mail at cacover@sandia.gov.

Martin Grossmann—Transnational Committee Chair

Martin Grossmann,
Transnational Committee and CANPS

Martin Grossmann works as a physicist in the Center for Proton Therapy (CPT) at the Paul Scherrer Institute (PSI), Switzerland. He studied in Münster (Germany), Lausanne (Switzerland) and at CERN and obtained a Ph.D. from Zürich University for experimental work on rare muon decays. In 1996 he joined the PSI proton therapy team and developed the control system for the world's first treatment facility using a magnetic scanning proton beam. Since then he has been responsible for the control and safety systems of the proton therapy installations which include three treatment rooms built by PSI plus a fourth room that integrates a commercial proton Gantry into the PSI facility.

Martin is a senior member of the IEEE. He has been a member of the NPSS committees CANPS (since 2007) and RISC (2016-2019). He joined AdCom in 2017 as the CANPS representative and Social Media Liaison and took over the CANPS chair in 2018. He has been active in various roles as organizer of the Real Time Conference since 2016, as well as lecturer and organizer for the NPSS Instrumentation Schools in Cape Town, South Africa (2018), Kuala Lumpur, Malaysia (2019), Jakarta, Indonesia (2020) and Dakar, Senegal (2020). As of 2021 he will chair TNC.

Martin Grossmann can be reached by E-mail at mertin.grossmann@psi.ch.

Robert Miyaoka—Nuclear Medical and Imaging Science

Robert Miyaoka
Nuclear Medical and Imaging Science

Robert Miyaoka is a Research Professor in Radiology and an Adjunct Professor in Electrical Engineering at the University of Washington. He received his Ph.D. in Electrical Engineering from the University of Washington in 1992 and has been a member for the UW Department of Radiology since graduating. He is Director of the Translation BioImaging Core, SPECT/CT Physics and the Small Animal PET/CT Resource for the UW Department of Radiology. His research is focused on PET and nuclear medicine instrumentation and physics. Current research includes development of novel PET detectors; organ specific PET systems; quantitative SPECT/CT; and development of wearable radiation detector technology. He is the author of ~90 peer-reviewed publications, holds five patents and has grant funding from the National Institutes of Health for novel PET and wearable radiation detector technology development.

Robert Miyaoka may be reached by E-mail at rmiyaoka@uw.edu.

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Secretary's Report

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Evgenya Simakov—
Particle Accelerator Science and Technology

Evgenya Simakov
Particle Accelerator Science and Technology, partial term ends 2022

Evgenya I. Simakov (M'18 SM'18) received her Ph.D. degree in Physics from Massachusetts Institute of Technology, Cambridge, MA, USA in 2005. She came to Los Alamos as a visiting student in 2003 to work on the design and cold testing of a PBG accelerator as a part of her Ph.D. work. In 2005 she joined LANL as a Director's Postdoctoral Fellow and became a staff member in 2007. She is currently a physicist at the Accelerator Operations and Technology division in Los Alamos National Laboratory. Her current research interests include advanced electromagnetic structures for accelerators, high gradient acceleration, novel cathodes, and advanced electromagnetic structures from S-band to infrared. She served and serves as a PI on a number of the advanced accelerator projects funded by LANL LDRD, DOE HEP, and DOD. Dr. Simakov is a Fellow of the American Physical Society, and a recipient of several awards including the 2010 DOE Recovery Act Early Career Research Grant and the 2011 Presidential Early Career Award for Scientists and Engineers. She participated in many review committees, serves on the Core committee for the Advanced Accelerator Concepts (AAC) workshop and co-chaired AAC 2018.

Evgenya Simakov can be reached by E-mail at smirnova@lanl.gov.

Technical Committee Chairs

Jason A. Marshall—
Plasma Science and Applications

Jason A. Marshall
Chair, PSAC

Dr. Jason A. Marshall is the Associate Superintendent of the Plasma Physics Division of the Naval Research Laboratory in Washington, D.C. Dr. Marshall received degrees in Anthropology and Chemistry from Eastern New Mexico University (B.S.,1994 and B.S., 1995) and degrees in Chemistry and in Materials Science from the Washington State University (M.S., Chemistry, 2000; Ph.D., Materials Science/Chemical Physics, 2002). After graduation and a postdoctoral fellowship at the University of New Mexico, he began working for the Air Force Research Laboratory in 2003 as a researcher, program manager and branch chief of the High-Power Gas and Chemical Laser branch. In 2010 Dr. Marshall accepted a two-year assignment in the Office of the Secretary of Defense, Pentagon, Washington DC as a staff specialist with oversight of the Department of Defense's Directed Energy programs. Following this Pentagon assignment, he began work at the Air Force Office of Scientific Research as the Plasma and Electro-energetic Physics basic research portfolio program manager where he championed and funded a broad range of research including low temperature plasmas, strongly coupled plasma systems, ionospheric plasma physics, field emission physics, pulsed power, and beam-wave interactions. He is a senior member of IEEE.

Jason Marshall can be reached by E-mail at j.alexander.marshall@ieee.org.

John D. Valentine—
Radiation Instrumentation

John D. Valentine
Chair, RISC

John Valentine has been active in RISC for over 20 years, serving as an elected Member-at-Large in 1998, 2000-2002, 2006-2008, 2017-2019 and elected as Vice Chair for 2019-2020. He is now serving as RISC Chair for the 2021-2022 term. In addition, John served on several NSS-MIC Site Selection Committees (prior to the formation of the Joint Oversight Committee), including serving as Chair for the 2003 NSS-MIC site selection, served as IEEE *Transactions on Nuclear Science* Editor for NSS contributions in 2001-2004, served as NSS Program Chair in 2010 and 2015, and will serve as NSS Program Co-Chair in 2023. John earned his Ph.D. in Nuclear Engineering at the University of Michigan prior to tenures in Nuclear & Radiological Engineering faculties at the University of Cincinnati and the Georgia Institute of Technology (Georgia Tech); he then worked at Lawrence Livermore National Laboratory and Science Applications International Corp (SAIC, now Leidos) prior to assuming his current position at Lawrence Berkeley National Laboratory as the National and Homeland Security Program Manager.

John Valentine can be reached by E-mail at jdvalentine@lbl.gov.

Marion M. White—
Particle Accelerator Science and Technology

Marion M. White
Chair, PAST

Marion M. White received her Ph.D. in experimental particle physics from MIT, studying electroweak interactions at the DESY and CERN electron-positron colliders. She remained with the MIT group until returning to the United States to join the Advanced Photon Source (APS) at Argonne National Laboratory. As the linear accelerator (linac) group leader, Marion was responsible for construction and commissioning of the APS electron-positron injector linac. She then served as senior scientific advisor during design and initial production phases of the 1.3-MW SRF linac at the Spallation Neutron Source, with oversight responsibility for front-end and linac systems. Marion was responsible for Argonne's production of magnets and supports for the LCLS undulator system at SLAC. She is a member of the cavity-based X-ray FEL R&D project team and, since August of 2020, a 50% detailee to DOE-HEP in the new Accelerator R&D and Production area.

Marion has served on xPAC and LINAC conference committees, chaired the 2016 North American Particle Accelerator Conference, and is a frequent participant in outreach programs to students and women. She has been a member of the American Physical Society (APS) for 25+ years, serves as Secretary/Treasurer of the Division of Physics of Beams since 2018, and is an APS Fellow. She has been a Senior Member of the IEEE for more than 15 years.

Marion M. White can be reached by E-mail at mwhite@anl.gov.

Technical Committees

NUCLEAR MEDICAL AND IMAGING SCIENCES

Roger Fulton
Chair, NMISC

2020 was a challenging year, but despite the difficulties the first-ever virtual NSS-MIC-RTSD conference was delivered very successfully by the Boston organizing committee, led by General Chair Lorenzo Fabris. A total of 1390 registrations were received from 36 countries, exceeding the 1100 registrants expected. Abstract submissions numbered 1093; 540 in NSS, 447 in MIC, 95 in RTSD, and the rest in technical sessions. There were 31 exhibitors and six sponsors. In consideration of the necessity to switch to virtual delivery, and the understanding of local service providers who waived contracts with the conference, the Joint Executive Subcommittee (JES) has agreed to a request that the NSS-MIC return to Boston for a conventional face-to-face meeting in 2024. Due to the continuing pandemic worldwide, the 2021 meeting in Yokohama will be delivered in virtual mode.

Four Christopher J. Thompson Student Paper Awards were presented at the conference for the most outstanding poster and oral student presentations. First place went to Marta Freire from the Institute for Instrumentation and Molecular Imaging in Valencia for her paper entitled *Performance evaluation of an edgeless PET insert for small animal imaging*. She received a certificate and $500. Certificates were also awarded to the three runners-up—Second: Jannis Dickmann from the Ludwig-Maximilians-Universität, Munich for the paper *Joint dose minimization and variance optimization for fluence-modulated proton CT*, Third: Francis Loignon-Houle from the Université de Sherbrooke for *Exploring the limits of time-based DOI estimation using fast scintillation timing signals*, and Fourth: Joshua Moo from King's College, London for the paper *Real-time reconstruction for a scanning CMOS intraoperative probe by deep learning*. Congratulations to the winners and all 75 applicants who entered the competition!

During the conference, NMISC held its Annual General Meeting (AGM) and a joint meeting with RISC. At the joint meeting a motion was passed that the Room Temperature Semiconductor Detectors Symposium (RTSD) Scientific Advisory Committee (SAC) be a fully sponsored conference of NPSS when it is held in conjunction with the IEEE NSS-MIC. Subsequently, a similar motion was passed at the November 2020 AdCom meeting.

RISC and NMISC also agreed to establish separate subcommittees to facilitate the development and submission of NPSS Initiative proposals https://ieee-npss.org/adcom-info/ with the aim of ensuring that there are sufficient high-quality submissions to enable all the available funds to be spent each year.

NMISC subcommittees continue their work and gave reports at the AGM. Andrew Goertzen and his conference record subcommittee is looking at ways to address the steady decline in the number of papers submitted to the conference record each year. The balanced representation subcommittee chaired by Joyita Dutta is developing strategies to benchmark and increase the opportunities for early career researchers to participate in leadership and conference-related service roles.

The need to take a strategic, long-term view of topics for future MIC conferences was a topic of discussion at the AGM, led by Vesna Sossi. The idea behind this proposal is to keep the MIC meeting current and relevant to attendees as the medical imaging field evolves. A subcommittee to consult with the NMISC membership and develop strategies in this area will be formed in early 2021, and I am grateful to Vesna for agreeing to act as Chair.

Last, but by no means least, on behalf of NMISC, I thank all NMISC members whose terms ended at the end of 2020 for their service to the Council: Secretary Emilie Roncali, AdCom representative Vesna Sossi, TRPMS Senior Editor Joel Karp, and elected members at large Kira Grogg, Mathieu Hatt, Nicolas Karakatsanis, Andre Kyme, and Christoph Lerche.

Roger Fulton, Chair of the NMISC, can be reached by E-mail at roger.fulton@sydney.edu.au.

PULSED POWER SCIENCE AND TECHNOLOGY

David Wetz
PPST Chair

We hope this newsletter finds everyone healthy and doing well in 2021. This is being written in late December 2020 when the pandemic uncertainty is still high. The vaccine has recently been released and we are so hopeful at this time that things will go well, and that we can get back to hosting in-person conferences soon! In mid-November we announced that the next Pulsed Power Conference (PPC), which is collocated with the Symposium on Fusion Engineering (SOFE), in Denver, Colorado, would be kept in the same location but moved to

December 12th–16th, 2021. We hope that this date is sufficiently late to allow us to host a safe in-person conference. The PPC will be chaired by me, Dr. David Wetz, from the University of Texas at Arlington (UTA), and SOFE will be chaired by Dr. Kevin Freudenberg from Oak Ridge National Laboratory (ORNL). We have a great organizing committee in place and look forward to the unique collaboration an in-person meeting affords. Please plan to attend and help us to maintain the rich history and reputation of both valuable technical conferences.

The PPST welcomes four new elected members to the committee this year. They are Dr. Theodore 'Chris' Grabowski from Sandia National Laboratories, Dr. Kevin Lawson from Booze Allen Hamilton (BAH), Dr. Jason Sanders from Transient Plasma Systems Inc., and Capt. James Schrock, Ph.D., from the Air Force Research Laboratories. We welcome these members onto the committee for their four-year term and look forward to working with them. We would also like to thank the members who are rolling off the committee for their time and contributions to the committee. These are Dr. Randy Curry from University of Missouri—Columbia, Dr. Will White from Verus Research, Dr. Ken Struve from Sandia National Laboratories, and Dr. Frank Hegeler from the Naval Research Laboratories (NRL). In this year's annual election the PPST will have four additional elected positions to fill so please reach out to us if you are interested in nominating yourself or others.

Best wishes for a happy and healthy 2021 and we look forward to seeing everyone again soon at the next PPC-SOFE in Denver in December 2021.

David Wetz, Chair of the Pulsed Power Science and Technology Committee, may be reached by E-mail at wetz@uta.edu.

RADIATION EFFECTS

Janet Barth
Chair, REC

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 December 7th, 2020 at the virtual 2020 Nuclear and Space Radiation Effects Conference (NSREC). Presentations were given by the general chairs of the 2019 through 2021 NSRECs and the chair of the 2021 European Conference 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 2020 RESG are Robert Reed, Vanderbilt University, Vice Chair; Allan Johnston, J-K Associates, Past Chair; Sarah Armstrong, Naval Surface Weapons Center (Crane), Secretary; Julien Mekki, Centre national d'études spatiales (CNES), Senior Member-at-Large; Kyle Miller, Ball Aerospace, Member-at-Large; and Michael Campola, NASA Goddard Space Flight Center, Junior Member-at-Large.

A service award was presented to RESG's outgoing Senior Member-at-Large, Julien Mekki. Allan Johnston gave a presentation on the revised process for electing a nomination committee to select the candidates for the new Vice-Chair and Secretary of the Radiation Effects Steering Group (RESG). The election will be held in the spring of 2021 and managed by the IEEE. Janet Barth gave a presentation on the revised nomination process for the election for a new Member-at-Large. The election was held the week after the conference via Survey Monkey. Rubén García Alía, Organisation européenne pour la recherche nucléaire (CERN), is the newly elected Junior Member-at-Large.

Janet announced the general chairs for future NSREC Conferences: Steve McClure, Jet Propulsion Laboratory, 2021; Tom Turflinger, Aerospace Corporation, 2022; Keith Avery, Air Force Research Laboratory, 2023; and Heather Quinn, Los Alamos National Laboratory, 2024.

Hugh Barnaby, Arizona State University, the General Chair of the 2020 Conference, summarized statistics and highlights of the 2020 conference. A total of 484 people registered for the technical sessions and attended the short course which was included in the technical program registration fee for NSREC 2020. There were 35 exhibit-only registrants. The highlight of the social program was a "selfie" contest sponsored by the Radiation Effects Steering Group.

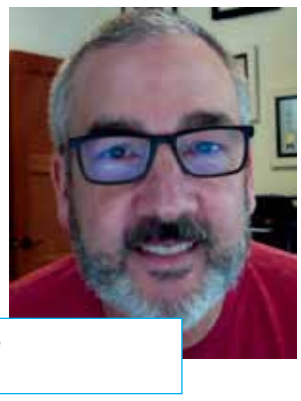
The NSREC 2020 was held in a virtual format from November 29th through December 8th. All presentations were available "on-demand" through December 30th. The technical sessions featured 144 papers that were presented during the four-day conference: 45 oral presentations, 52 poster presentations, and 47 poster presentations in the Radiation Effects Data Workshop. Four tutorial presentations were given at the Short Course, held on-demand on Sunday, November 29th and Monday, November 30th. On December 1st, the Short Course Chair, Ken Galloway, Vanderbilt University, hosted a panel Q&A session with the four Short Course presenters: Dan Fleetwood, Matthew Marinella, Jean-Marie Lauenstein, and Robert Baumann. All short-course attendees received copies of this year's course. The Industrial Exhibit, which had 37 exhibitors, was well attended.

Steve McClure, General Chair of the 2021 Conference, discussed his plans for 2021. The conference will feature a technical program with ten sessions of contributed papers that describe the latest observations and research results 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 19th. The theme for the 2021 Short Course is "Challenges and Opportunities for Radiation Hardening in Advanced Technologies."

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.

RADIATION INSTRUMENTATION



John Valentine
RISC Chair

The purpose of the Radiation Instrumentation Technical Committee (RITC) is to promote the development and application of radiation detectors, radiation instrumentation, nuclear electronics and measurement techniques for ionizing radiation and to serve the interests of people involved in the aforementioned activities. All IEEE NPSS members who have an interest in these topics are self-identified as RITC members. More information on our Technical Committee is available at https://ieee-npss.org/technical-committees/radiation-instrumentation/

The RITC is managed by the Radiation Instrumentation Steering Committee (RISC), which has fifteen members-at-large elected from the general membership of the RITC. Each year, five members-at-large are elected for a three-year term on RISC. The deadline for member-at-large nominations (including self-nominations) is June 1st. As of January 1, 2021, I have the pleasure and honor of serving as RISC Chair for the term 2021-2022. During this term, I will depend heavily on our newly elected RISC Vice Chair Srilalan Krishnamoorthy (University of Pennsylvania, USA), our Immediate Past Chair Chiara Guazzoni (Politecnico di Milano and INFN, Italy), and our secretary Merry Keyser. I look forward to building on Chiara's successes throughout her term as RISC Chair.

RITC member participation in the Technical Committee activities is fundamental and strongly encouraged. Several ways of serving and participating are possible, from upgrading one's membership from standard member status to senior member status, to nominating deserving persons for the RISC Awards, to nominating/self-nominating a candidate for the Member-At-Large position, to suggesting and making scientific and educational contributions beneficial to the RITC Community. There are plenty of opportunities for all—our goal is to always strive to better serve the larger RITC Community, so please don't hesitate to help us work toward that goal.

The RISC, in conjunction with the Nuclear Medical and Imaging Sciences Council (NMISC), oversees the annual Nuclear Science Symposium and Medical Imaging Conference (NSS-MIC). In addition, the NSS-MIC will be formally welcoming the Room-Temperature Semiconductor Detector (RTSD) conference as a RISC-managed, IEEE-sponsored conference in 2021. RTSD has long been associated with the NSS-MIC and has formalized that relationship moving forward. As you all know, COVID-19 forced the 2020 NSS-MIC to be entirely virtual. Due to the current status of COVID-19 and all of the complexities associated with putting on an in-person or hybrid in-person/virtual conference in this environment, it has recently been decided that the 2021 NSS-MIC/RTSD will also be entirely virtual. The organizing committee led by General Chair Ikuo Kanno and Deputy General Chair Ralf Engels had been planning to hold the conference in Yokohama, Japan, October 16th–23rd. While we look forward to making it to Japan in the near future, we know that the organizers will deliver an outstanding virtual conference in 2021. We all look forward to getting back to in-person NSS-MIC-RTSDs very soon!

John Valentine can be reached at Lawrence Berkeley National Laboratory; phone: +1 510 486-4920; mobile +1 619 371-0016; E-mail: jdvalentine@lbl.gov.

Functional Committees

AWARDS

CLASS OF 2021 FELLOWS

The IEEE offers Institute Awards, and most Societies and Society Technical Committees also offer awards. Elevation to IEEE Fellow is a prestigious honor awarded each year to no more than 0.1% of the full IEEE membership by the Institute's Board of Directors. Nominations are made from among Senior Members. Nominees must be supported by at least six Fellows. After being reviewed and ranked by the appropriate IEEE Society, the nominations are forwarded to the Institute's Fellow Committee who then recommend a list of candidates to the IEEE Board of Directors for their consideration. The Nuclear and Plasma Sciences Society is justifiably proud of its Fellows. We present here the Class of 2021Fellows, and wish them each our heartfelt congratulations.

Valentin T. Jordanov

Valentin Jordanov
Class of 2021 Fellow

Valentin T. Jordanov received an M.S. in Engineering Physics from Sofia University, Bulgaria, and a Ph.D. in Nuclear Engineering from the University of Michigan, Ann Arbor. His professional career of over forty years is in the field of Nuclear Electronics. He is one of the pioneers in digital pulse processing (DPP). In the early 1990s he developed a time-invariant digital method to synthesize, in real time, trapezoidal pulse shapes that were impossible to obtain using analog techniques. His pioneering method radically transformed radiation spectroscopy instrumentation. Valentin worked actively to proliferate DPP technology by providing design services as a consultant. He designed the DPP of Canberra's Inspector 2000 and the LYNX MCAs and the detector electronics of Niton's hand-held X-ray analyzers which received R&D 100 awards.

Dr. Jordanov has made notable contributions in analog pulse processing, particularly in the area of portable and low power instrumentation. His work includes the design and development of preamplifiers, radiation hardened hybrid circuits, and other front-end electronics. In 1995, at Amptek, he designed the MCA8000A - the world's smallest MCA at that time.

In order to achieve highly efficient signal processing algorithms, Valentin combines analog signal processing and DPP technology. He has applied this innovative approach in the development of pulse-shape discrimination, space instrumentation and other applications requiring fast and power-efficient operation. The space radiation instrument CEASE (1997) is an example of his approach.

In 2011, Dr. Jordanov founded LABZY, LLC where he continues to develop innovative DPP algorithms and radiation measurement devices. In 2019, the International Bureau of Weights and Measures selected one of these devices to be used in the reference metrology of beta radionuclides.

Valentin has ten patents and has published numerous papers. He has presented classes on DPP and has provided Nuclear Electronics training as an expert for the IAEA.

Valentin Jordanov can be reached by E-mail at jordanov@ieee.org.

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Functional Committees

Continued from PAGE 5

Yakov Krasik

Yakov Krasik
Class of 2021 Fellow

Yakov Krasik was born in Ryasan, Russia in 1953. He is married, has two sons, one daughter and seven grandchildren. He received an M.S. in Experimental Nuclear Physics from Tomsk Polytechnic, Tomsk, Russia in 1976 and a Ph.D. in Physics and Mathematics from the Joint Institute for Nuclear Research, Dubna, Russia in 1980. He joined the Institute of Nuclear Physics, Tomsk, Russia as Senior Research Scientist in 1980 and in 1986 became the Head of the High Current Ion Beam Laboratory. In 1991 he joined the Plasma Laboratory, Weizmann Institute of Science, Israel headed by Prof Yitzhak Maron. studying current-carrying plasmas. In the same year he emigrated to Israel. In 1997, he joined the Technion R&D Foundation as a Senior Research scientist where he established with Prof. Joshua Felsteiner the Plasma Physics and Pulsed Power laboratory (4PL) in the Physics Department, Technion, Haifa, Israel. He was appointed Associate Professor in 2002 and Professor in 2008. In 2018 he was awarded the Max Knoll Chair in Electronics and Opto-Electronics. He has coauthored over 290 peer-reviewed papers and holds 26 patents. He has supervised 22 Ph.D. graduates. Prof. Krasik is a frequent contributor at the IEEE NPSS conferences and his graduate students have received best student paper awards. He was visiting Professor at the Imperial College, London, UK, Karlsruhe Institute of Technology, Germany, Professor at Institute of Applied Science, Mianiyan, China and Deakin University, Australia.

During the period 1980-1988, Dr. Krasik received numerous awards from the Russian Academy of Sciences, the Ministry of Highest Education and Sciences, Russia, and the Institute of Nuclear Physics, Tomsk. The Technion awarded him in 2003 for his work on anti-terrorism defense technologies and in 2006 the Henri Gutwirth award. In 2020 he received the NPSS Magne "Kris" Kristiansen Award. He is a Fellow of the APS.

Yakov Krasik can be reached by E-mail at fnkrasik@physics.technion.ac.il.

Johan Nuyts

Johan Nuyts
Class of 2021 Fellow

Johan Nuyts is a Professor of the Faculty of Medicine at KU Leuven—University of Leuven, Belgium. He is with the Department of Nuclear Medicine & Molecular Imaging and with the Medical Imaging Research Center (MIRC). He is also an Honorary Professor in Medical Radiation Sciences, Faculty of Health Sciences, University of Sydney. His main research interest is iterative reconstruction in PET, SPECT and CT. Ongoing research projects focus on maximum-a-posteriori reconstruction in emission tomography, reconstruction with motion correction in CT, correction for attenuation and motion in PET/CT, PET/MRI and TOF-PET, and multimodal imaging for Selective Internal Radiation Therapy (SIRT).

Johan Nuyts can be reached by E-mail at johan.nuyts@uzleuven.be.

TECHNICAL COMMITTEE AWARDS

Plasma Science and Applications

2020 Igor Alexeff Outstanding Student in Plasma Science

Alexander Rososhek
2029 Igor Alexeff Outstanding Student in Plasma Science Award Recipient

Alexander Rososhek (Technion—Israel Institute of Technology) has been selected as the recipient of the 2020 Igor Alexeff Outstanding Student in Plasma Science Award for his experimental and numerical research on submicrosecond timescale underwater electrical explosions of single wires and wire arrays and the study of the generated strong shock waves. In his experimental work, Mr. Rososhek used pulsed high-current generators with output current pulses in the range of 40—600 kA and rise times in the range 50—1000 ns in combination with diagnostics which included time- and space-resolved visible spectroscopy, frame and streak cameras, photodiodes and photomultipliers, and a variety of current and voltage probes.
To complement his experimental studies, Mr. Rososhek performed sophisticated hydrodynamic and magnetohydrodynamic simulations coupled with Equations of States for the wire material and water and conductivity models. His work has led to a number of original results. For example, using weak shockwaves generated at the onset of phase transitions, Mr. Rososhek was able to characterize solid-state—liquid—vapor-phase transition energies with unprecedented accuracy. He also showed that the evolution of the shockwave generated by an underwater electrical explosion of a wire cannot be adequately described using the self-similar method commonly used in earlier research and that the evolution of the exploded wire should be taken into account. Further, he demonstrated that the explosive event is accompanied by the development of a thermal instability, which should be included to correctly simulate the wire's conductivity.

Mr. Rososhek received a bachelor's degree in physics from Technion in 2015. The following year, he joined Prof. Yakov Krasik's group in the Plasma and Pulsed Power Laboratory at Technion and is currently in the process of completing his Ph.D. research.

RADIATION EFFECTS

2020 IEEE/NPSS Radiation Effects Award

Philippe Calvel
2020 Radiation Effects Award Recipient

Philippe Calvel, retired from THALES ALENIA SPACE, owner RADCONSULT, received the 2020 Radiation Effects Award.

Philippe Calvel has been actively engaged in and recognized as a leader in the understanding and modeling of radiation effects across a broad range of technologies for nearly 40 years. He began his career as an engineering graduate from the Institute National des Sciences Appliquées (INSA) de Toulouse, France, Semiconductor Physics Department in 1981. He joined Thomson-Espace, space equipment manufacturer in 1982 as a radiation effects engineer. In 1986, Philippe joined ALCATEL SPACE to head the Radiations Effects Group and was named the Head of Radiation Department at THALES ALENIA SPACE in 1998. Philippe was nominated in 2006 as "Company Radiation Effects Skill Leader" and elected in 2013 as "THALES ALENIA SPACE Senior Radiation Expert". Philippe retired from THALES in July 2019 and is currently a consultant at RADCONSULT.

Philippe published over 69 refereed papers and articles, many in the IEEE *Transactions on Nuclear Science*. His research spanned a broad range of topics, including single event effects mechanisms understanding, modeling, and calculations, total ionizing and non-ionizing dose mechanisms understanding, modeling, and calculations, and space radiation environment understanding and modeling. His work and leadership resulted in the development of successful radiation effects models, including the 1995 release of PROFIT, an empirical model to predict SEU proton sensitivity of digital parts from SEU heavy ions sensitivity data. The model is widely used in the community.

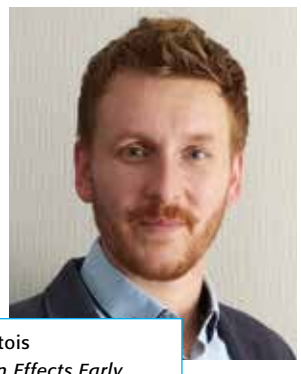
Philippe served as the Radiation Hardness Assurance Manager for major spacecraft development programs including: the SPACEBUS 4K family (1998); GLOBALSTAR-2 satellites constellation (2000) which had to mitigate huge total non-ionizing dose (TNID) stress from trapped protons on bipolar linear devices; IRIDIUM-NEXT satellite constellation (2008) which resulted in the development and implementation of a full COTS Radiation Hardness Assurance Program for massive implementation of COTS devices on IRIDIUM-NEXT satellites; and O3B satellites constellations (2011) which were launched into orbits which exposed the satellites to severe total ionizing dose levels.

In addition to his commercial work, Philippe has been actively engaged in the space radiation effects community, in particular the work beginning in 1987 to create and launch a European Radiation Effects on Components and Systems (RADECS) Conference and his subsequent support of the RADECS Committee. In 1996, he co-organized the first RADCOTS workshop together with TRAD and the University of Montpellier. In 2002, Philippe was elected as the RADECS Committee President for a five-year term and was re-elected in 2007 and 2012 for a total of 15 years of service. During this period, he fostered the development of strong technical exchange and cooperation between the radiation effects communities and led the RADECS effort to hold the Conference across Europe including Russia. In addition to his support of the RADECS Committee and Conferences, Philippe supported the IEEE Nuclear and Radiation Effects Conference (NSREC), being elected in 1992 to a three-year term as a Member-at-Large on the IEEE Radiation Effects Steering Group (RESG). In 1995, he created the NSREC/RADECS Liaison positions on the NSREC RESG and the RADECS Committee. In 1995-2000, he served as RADECS Liaison on the IEEE RESG. Philippe also served several times as a reviewer and session chairman for both conferences.

The most important event of these excellent IEEE RESG and RADECS relations was the joint organization of IEEE NSREC/RADECS in 2014 in Paris. Philippe retired as RADECS President in September 2017 and the new generation is clearly acting in the same direction for the technical benefit of both radiation effects communities.

Citation: *for leadership in the development of the RADECS Association, in the development of strong links between RADECS and IEEE/NPSS and the growth and federation of the Radiation Effects Community.*

2020 Radiation Effects Early Achievement Award



Cédric Virmontois
2020 Radiation Effects Early Achievement Award Recipient

Cédric Virmontois, Centre National d'Études Spatiales (CNES) in Toulouse, received the 2020 Radiation Effects Early Achievement Award.

Cédric Virmontois is a detection chain and radiation expert at Centre National d'Études Spatiales (CNES) in Toulouse. He received the Engineering degree in Physics from the Institut National des Sciences Appliquées (INSA) of Toulouse in 2008 and the Ph.D. degree in Microelectronic and radiation effects from the Institut Supérieur de l'Aéronautique et de l'Espace (ISAE Supaero) of Toulouse in 2012. His Ph.D. research focused on displacement damage-induced degradation effects in CMOS image sensors. Since receiving his Ph.D. degree, Cédric has been working on radiation effects on solid-state image sensors and optoelectronic devices. First, he has focused on radiation effects on CMOS Image Sensor (CIS), especially on radiation-induced dark current. Cédric has also contributed to the understanding and modeling of dark-current Random Telegraph Signals (RTS) in CIS. He contributed to the discovery of total-ionizing-dose-induced RTS in silicon-based image sensors. Cédric has extended his radiation effects knowledge to other solid-state imaging technologies and has focused on dark current RTS similarities in CIS and CCD devices (silicon-based sensors). He was the first to highlight the RTS discrepancies between silicon, mercury cadmium telluride (HgCdTe), and indium gallium arsenic (InGaAs) image sensors.

For more than the past five years, at CNES, Cédric focused his work on radiation effects in the most recent generation of pinned photodiode CIS to make it possible to use this advanced technology in space. Today, this technology is exploited in numerous space-imaging missions and is used especially in the SuperCam imager developed by Cédric, which is employed on the Perseverance MARS2020 NASA Rover. Today, Cédric directs the development of four imaging instruments based on this advanced technology.

Dr. Virmontois has published over 40 articles in peer-reviewed journals and is a Senior Member of the IEEE. He has served in many roles at the IEEE Nuclear and Space Radiation Effects Conference and Radiation Effects on Components and Systems Conference, as Short Course speaker, Session Chair Photonic Devices and ICs and member of the best technical award committee. For the past 10 years he has been a technical paper reviewer. Since 2012 Cédric has been General Chairman of the annual Radiation Effects on Optoelectronic Detectors Workshop and Co-Chairman of the Space and Scientific CMOS Image Sensor Workshop organized by CNES.

His honors include four best conference paper awards, five outstanding student paper awards and the IEEE Paul Phelps Continuing Education Grant for recognition of contributions to the fields of nuclear and plasma sciences.

Citation: *For contributions to the understanding of radiation effects on solid-state image sensors, particularly the origins of radiation-induced dark current random telegraph signals.*

Call for 2022 Radiation Effects Award Nominations

Nominations are due January 29th, 2022 for awards that will be presented at the IEEE NSREC 2022 Conference July 18th–22nd, 2022 in Provo, Utah.

Radiation Effects Award Nominations

Nominations are currently being accepted for the 2022 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 2022 NSREC in Provo. Nomination forms are available electronically at http://ieee-npss.org/technical-committees/radiation-effects/ and must be submitted by January 29, 2022. Additional information can be obtained from Kyle Miller, Senior Member-at-Large, for the Radiation Effects Steering Group. Kyle can be reached at kbmiller@ball.com.

Radiation Effects Early Achievement Award Nominations

Nominations are currently being accepted for the 2022 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 2022 NSREC in Provo. Nomination forms are available electronically at http://ieee-npss.org/technical-committees/radiation-effects/ and must be submitted by January 29, 2022. Additional information can be obtained from Kyle Miller, Senior Member-at-Large, for the Radiation Effects Steering Group. Julien can be reached at kbmiller@ball.com.

Paul Phelps Continuing Education Grant Nominations

Nominations are currently being accepted for the 2022 Paul Phelps Continuing Education Grant. The purpose of the grant is to promote continuing education (attendance at the 2022 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 2022 NSREC in Provo. 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 29, 2022. Additional information can be obtained from Michael Campola, Member-at-Large, for the Radiation Effects Steering Group. Michael can be reached at michael.j.campola@nasa.gov.

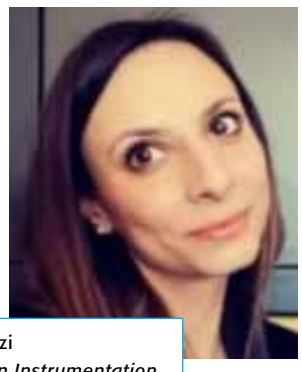
Radiation Instrumentation

Paul Lecoq
Chair, RI Awards Subcommittee

2020 has been a very special year, with a long period of uncertainty for the organization of the Boston NSS-MIC conference. But it was decided very quickly that the awards should be maintained so as not to penalize the best members of our community and to keep their motivation at the highest level.

And this was a good decision, as proven by the large number of nominations received for the three prestigious Radiation Instrumentation Technical Committee (RITC) awards:

» The Radiation Instrumentation Early Career Award, for which five excellent candidates were nominated. This award is given to a young investigator in recognition of significant technical contributions to the fields of radiation instrumentation and measurement techniques for ionizing radiation. The prize, consisting of U.S. $1,500 and an engraved plaque has been awarded to Arianna Morrozi from INFN Perugia, nominated by Daniele Passeri, *for contributions to numerical modelling of radiation damage effects in semiconductor detectors and to the development of TCAD models of synthetic diamond and negative capacitance materials for advanced radiation sensor.*



Arianna Morrozi
2020 Radiation Instrumentation Early Career Award recipient

» The Emilio Gatti Radiation Instrumentation Technical Achievement Award, with no less than seven outstanding nominees. Given to an individual, in recognition of mid-career significant and innovative technical contributions in the field of radiation detectors, radiation instrumentation, and/or nuclear electronics, and/or measurement techniques for ionizing radiation, this award consists of U.S. $2,000 and an engraved plaque. The quality of the nominations was so high that the voting process looked similar to the election of a pope! Finally, Stefan Ritt from PSI, nominated by Réjean Fontaine, was unanimously awarded this prestigious prize, *for contributions to the development and democratization of ultra high-speed digitizers.*

Stefan Ritt
Emilio Gatti Radiation Instrumentation Technical Achievement Award recipient

» The Glenn Knoll Radiation Instrumentation Outstanding Achievement Award, with two brilliant candidates, runners up from last year. This award is given to an individual, in recognition of outstanding and enduring contributions to the field of radiation instrumentation. The prize consists of U.S. $3,000 and an engraved plaque. Here again, the decision has been very difficult, as both candidates were fully deserving of the award, finally attributed to Svatoslav Pospisil from the Czech Technical University in Prague, nominated by André Sopczak, *for contributions to the development and application of pixelated radiation detectors in medical, high-energy and space science.*

Stanislav Pospisil
2020 Glenn Knoll Radiation Instrumentation Outstanding Achievement Award recipient

A virtual ceremony took place at the NSS opening session on November 2nd , giving an opportunity to the three awardees to show up to officially receive their awards and to say a few words of thanks.

I would like on my side to say that it has been an honor for me to chair the Radiation Instrumentation Awards subcommittee and to warmly express my gratitude for all the members of this committee for their outstanding job: Chiara Guazzoni, Susanne Kuehn, Zane Bell, Hartmut Hillemanns, Dick Lanza and Patrick Le Dû.

Paul Lecoq, Chair of the Radiation Instrumentation Awards Subcommittee, can be reached by E-mail at Paul.Lecoq@cern.ch.

2020 Glenn F. Knoll Education Grants

Craig Woody
Knoll Education Grants Subcommittee Chair

The NPSS Glenn F. Knoll Education Grants are awarded to outstanding postdoctoral fellows and graduate students in the fields of nuclear science instrumentation, medical instrumentation, and instrumentation for security applications. They are intended to support travel to and attendance at conferences, workshops or summer schools, or to fund special research projects. The grant is $5000. There are two education grants, one for graduate students and another for postdocs. More information about these grants is given on the NPSS Awards website https://ieee-npss.org/awards/npss-awards/

2020 Glenn F. Knoll Postdoctoral Education Grant

Nicola Lusardi
2020 Glenn F. Knoll Postdoctoral Education Grant recipient

The 2020 Glenn F. Knoll Postdoctoral Education Grant was awarded to Nicola Lusardi from the Politecnico di Milano. His grant was awarded for his outstanding contributions to digital electronics in configurable devices. The principal goal of Nicola's activity is to develop instrumentation for the precise measurement of fast timing signals using high speed time to digital converters and to achieve increasingly better timing resolution over many parallel channels. Given the current restrictions on travel due to the pandemic, Nicola plans to use most of his grant money to supplement his research activities at his home institution.

Call for 2022 Glenn T. Knoll Grant Applications

In 2020, only the Knoll Postdoctoral Grant was awarded, as there were no nominations for the Knoll Graduate Grant. This was most unfortunate since there are surely many outstanding graduate students in our community who would be deserving of this grant. However, to be considered, it does require submitting a nomination. Therefore, to all our faculty members and advisors, please consider nominating your students and postdocs for these prestigious awards. The deadline for the 2021 grants has now passed, but the deadline for the 2022 grants is January 31st, 2022, so please start working on your nominations early and be sure and submit them before the deadline.

CHAPTERS

Steve Gold
IEEE NPSS Chapter Coordinator

The NPSS Chapters program exists to support local activities in the technical areas of interest of our members. Our Section Chapters are local units of the IEEE that are part of their Region and Section, but are affiliated with the NPSS, while our Student Branch Chapters (SBCs) are student-run organizations with a faculty advisor that are formed within an IEEE university student branch, and are also affiliated with the NPSS. (In some cases, they can be affiliated with more than one IEEE Society.) Chapters support the local activities of their members by sponsoring lectures, workshops, volunteer projects, and social activities. In addition, they provide opportunities for networking and leadership training. The goal of the NPSS chapters program is to provide technical and financial support to our roster of existing chapters around the world, and to promote the formation of new chapters.

Calendar year 2020 was another year of growth for the NPSS chapters program, and saw the formation of five new Chapters. In January, a new Student Branch Chapter was established at Michigan State University. Its founding co-chairs were Mitchell Schneider and Sneha Banerjee and its faculty advisor is Prof. Peng Zhang. Both co-chairs received NPSS Chapter Founder's plaques in recognition of their accomplishment. This was our fifth SBC in the U.S. and our fifteenth worldwide. Then in February, a new Section Chapter was formed in Nanjing, China. Its founding chair is Prof. Zhi Fang and its co-founder is Feng Liu, both of whom received Chapter Founder's plaques. This was our second Section Chapter in China and our 24th worldwide. Also in February, a new joint societies (NPS/MAG/IM/PC) Section Chapter was established in South Africa. Its founding chair is Richard Newman, and he also received a Chapter Founder's plaque, which was delayed for several months because of an interruption in international shipping due to the pandemic. This became our second Section Chapter in Africa and the Middle East, and our 25th worldwide. Beginning in March, the Coronavirus pandemic began to impact in-person chapter activities, but nevertheless new chapter efforts continued. In July, two new Student Branch Chapters were formed. In Sri Lanka, the new University of Moratuwa SBC was formed, with Randima Hasanthi as the founding chair and R.M. Damayanthi as its faculty advisor, becoming our 16th SBC and our seventh in Asia. In Kerala India, the new Sahrdaya College of Engineering and Technology SBC was established, with Aleena Joby as the founding chair and Yuvaraj V. as its faculty advisor. This was our seventh SBC in India and our eighth in Asia. Both Randima and Aleena received Chapter Founder's plaques, with Randima's also

Continued on PAGE 8

Functional Committees

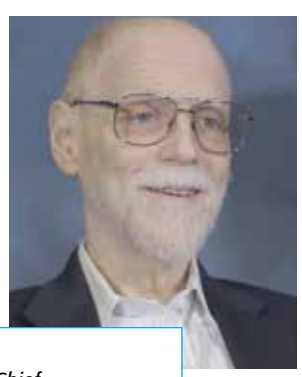
Continued from PAGE 5

presented virtually during a Distinguished Lecturer's presentation to the chapter. With these additions, the NPSS had 25 Section chapters and 17 SBCs at the end of 2020, as shown in the accompanying chapter map, and efforts are already under way to establish additional new chapters, and in particular new student branch chapters.

If a college or university already has an IEEE Student Branch, a new NPSS student branch chapter can be formed by submitting an electronic petition signed by six student or graduate student members of the NPSS and by a faculty advisor who is also an NPSS member. Once the petition is complete and endorsed by the Counselor of the Student Branch, the chapter is established as soon as it is approved by the NPSS and by the IEEE Region in which the educational institution is located. To assist in the formation of new student chapters, as well as to provide an opportunity for students to "try out" the NPSS, our society offers free one-time-only NPSS membership to new or existing IEEE student members via links posted on the NPSS students page https://ieee-npss.org/students/. Also, a new NPSS initiative can provide free IEEE and NPSS membership, but not membership renewals, to students in low-income countries (countries eligible for IEEE e-membership) to support existing SBCs or to assist in the formation of new SBCs. For additional information on these two programs, or for any assistance in the establishment of a new NPSS chapter, please contact Steve Gold, the NPSS Chapter Coordinator, at steeve@ieee.org.

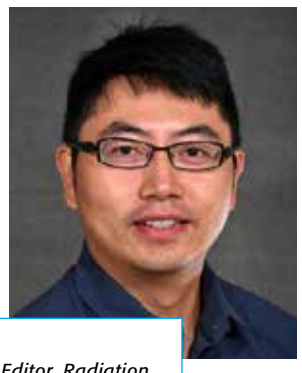
PUBLICTIONS

Paul Dressendorfer
Publications Committee Chair



Zane Bell
TNS Editor-in-Chief

The IEEE *Transactions on Nuclear Science* is pleased to announce the addition of two new Associate Editors to its team of Editors. Prof. Yuntao Wu was appointed as an Associate Editor to handle Radiation Instrumentation manuscripts dealing with scintillators. Prof. Wu was born in Zhejiang, China, in 1984. He received the M.Sc. in Materials Physics and Chemistry from the China Jiliang University, China, in 2009, and the Ph.D. in Materials Science from the Shanghai Institute of Ceramics, Chinese Academy of Sciences, China, in 2012. From 2012 to 2014 he was with the Shanghai Institute of Ceramics, Chinese Academy of Sciences as an Assistant Professor. In 2014, he joined the Scintillation Materials Research Center at the College of Engineering, University of Tennessee, as a Postdoctoral Research Associate. He then joined the Materials Science and Engineering Department at University of Tennessee as a



Yuntao Wu
TNS Associate Editor, Radiation Instrumentation

Research Assistant Professor in 2017. Since 2019, he has been with the Shanghai Institute of Ceramics, Chinese Academy of Sciences, where he is currently a Full Professor of Materials Science and the Deputy Director of Artificial Crystal Research Center.

Since 2006 he has been involved mainly in the development of inorganic scintillators for radiation detection. He is author or co-author of more than 100 papers published in international journals and conference proceedings. His current research interests include development of organic and inorganic scintillators. He was the recipient of the 2017 IEEE/NPSS Radiation Instrumentation Early Career Award, having been cited for "contributions to the development of inorganic scintillators for radiation detection applications." He served as an Associate Editor for the 2019 special issue of TNS devoted to SCINT2019 conference.

Sacit Cetiner
TNS Associate Editor, Nuclear Power Instrumentation and Control

Dr. Sacit Cetiner was appointed as an Associate Editor to oversee papers in the area of Nuclear Power Instrumentation and Control. Dr. Cetiner was born in Izmir, Turkey. He received his M.S. degree in Electrical Engineering in 2005, and Ph.D. in Nuclear Engineering in 2008, both from The Pennsylvania State University. For his M.S. degree, he focused primarily on the development of a computational framework to perform single event upset (SEU) simulations in semiconductor memories at the device level using Monte Carlo methods. He was the lead scientist at The Pennsylvania State University Radiation Science and Engineering Center Breazeale Nuclear Reactor conducting SEU experiments at the neutron beamlines. For his Ph.D. thesis, he worked on time-of-flight spectrometry methods for detection of energetic ions emitted from surfaces specifically for application in neutron depth profiling (NDP). His research identified two potential candidates for heavy ion time-of-flight spectrometry, one of which was demonstrated to be suitable for NDP applications.

After graduation, Dr. Cetiner joined Oak Ridge National Laboratory (ORNL) as an R&D Associate. During his career, he was principally involved in the development and adoption of novel measurement methods and technologies for advanced reactors. This involvement gave him the opportunity to have a broad knowledge of various sensing needs in a nuclear reactor with a specific focus on advanced reactors. His involvement in the review process for the U.S. Nuclear Regulatory Commission as an augmented staff member for a number of safety evaluations provided experience with the breadth and depth of information on nuclear power plants.

Dr. Cetiner was appointed the U.S. Department of Energy technical point of contact for the Versatile Test Reactor (VTR) Experiment Instrumentation and Controls (I&C) area. VTR is a sodium fast reactor funded by the Department of Energy, Office of Nuclear Energy, and designed by Idaho National Laboratory, Argonne National Laboratory, and ORNL. Dr. Cetiner also serves as the I&C Thrust Lead for the Transformational Challenge Reactor (TCR) program. The mission of the TCR program is to demonstrate the feasibility of additive manufacturing in the fabrication of key core structures.

Both Prof. Wu and Dr. Cetiner are valuable additions to the staff of TNS and we welcome their forthcoming contributions to TNS.

Paul Dressendorfer, Chair of the NPSS Publications Committee, can be reached by E-mail at p.dressendorfer@ieee.org.

TRANSNATIONAL COMMITTEE

Jakarta and Dakar Radiation Instrumentation Workshops and Schools

Martin Grossmann
CANPS and Transnational Committees Chair

NPSS has, for the last several years, organized and sponsored 'Radiation Instrumentation Schools' under the auspice of the CANPS, RISC, NMISC and TNC committees.

Starting in Osaka (Japan-2014), Ho Chi Minh City HCMUS (Vietnam-2016) and Cape Town -ITEMBA (South Africa-2018), five to ten-day-long schools were organized with the aim to provide exercises and associated lectures for selected students, mainly Master's degree candidates, on Real Time (electronics, triggering, data acquisition), radiation detectors and medical imaging. In addition to NPSS and local organizers, Osaka University and KEK in Japan as well as the Prague Technical University (CTU) participated in the organization of the schools.

The exercise sessions, which were emphasized in these schools, allowed students to manipulate radiation detection devices, their read-out electronics, data acquisition hardware and software under the expert supervision of lecturers and teacher assistants. In these schools, hands-on exercises are the key feature.

"Students learn a lot from the exercises, especially from their own mistakes. This type of experience is usually not learned from text books."

Some years smaller events were also organized as a complement: (Corfu- Greece (2016); Rabat, Morocco (2018); Dakar, Senegal (2019); ICISE, Quy Nohn, Vietnam (2019); IPEN-São Paulo, Brazil (2020).

Due to the COVID travel lockdown, most of our 2020 program was cancelled and instead two virtual workshops were organized in the fall, one in Jakarta (Indonesia) and the other in Dakar (Senegal).

The common objective for these two workshops was to train Master's level students in the area of radiation detectors and their applications. This was achieved through a combination of three days of Zoom lectures and demonstrations. Due to the pandemic it was not possible to organize hands-on exercises locally; instead we did use remote demonstrations to introduce the students to Timepix and EasyPET.

The local organization of the Jakarta workshop (9th–11th November) was headed by Prof. Supriyanto Ardjo Pawiro from University of Jakarta.

Ninety-one students and 76 guests (many of them academic teaching assistants) were registered as participants. Most came from surrounding Asian countries (Malaysia, the Philippines, Vietnam, Singapore and Japan).The program details can be seen at https://indico.cern.ch/event/954199/

The local organization of the Dakar workshop (3rd–5th December) was handled by Prof. Oumar Ka from the Cheikh Anta Diop University, Dakar, Senegal. Eighteen students were present on site in Dakar, and 14 students from South Africa and Botswana participated remotely. The detailed program can be seen at https://indico.cern.ch/event/954194/

A special Women In Engineering and Sciences (WIE event) was organized at the end of the workshop on December 5th by Prof. Cinzia DaVia (NPSS WIE liaison) who introduced the IEEE WIE and (locally) by Mrs Fatou ka Gueye. More than 60 local women and students in the sciences attended.This event was chaired by Mrs Faye Ndeye Arame Boye—Full Professor in the Faculty of Sciences and Techniques, University Cheikh Anta Diop of Dakar (UCAD) and Director General of the Senegalese Authority for Radiation Protection and Nuclear Safety since 2011.

Local presentations were made by:

- Mrs Ndiaye Aida Diop, President of Women in Mining Sénégal, about women engineers in mining
- Mme Ndiaye Khadidjatou Sow: Enseignante de fonction, Professor at 'lycee Demba Diop at Mbour.' Head of the 'gentle office and girls' education.' She reported on various Senegalese projects, particularly about how to increase the participation of female students in scientific programs in Senegal.

This was followed by student participated discussions, which ended with a final 'get together' event.

The following contributed to these schools: Christian Bohm, Cinzia Da Vià, Martin Grossmann, Patrick Le Dû, Masaharu Nomachi.

Martin Grossmann, Chair of CANPS and the TNC, can be reached by E-mail at martin.grossmann@psi.ch.

AND SHOULDN'T HAVE

The trouble with talking too fast is you may say something you haven't thought of yet.

Ann Landers

PICTURE THAT!

I am not strange, I am just not normal.

Salvador Dali

IS THE PRODUCT CONSTANT?

It is criminal to steal a purse, daring to steal a fortune, a mark of greatness to steal a crown. The blame diminishes as the guilt increases.

Friedrich Schiller

I HEAR YOU

The only way to entertain some folks is to listen to them.

Frank Hubbard

SICK! SICK

Everything that used to be a sin is now a disease.

Bill Maher

PROBLEMATIC

The problem is not that there are problems. The problem is expecting otherwise and that thinking having problems is a problem.

Theodore Rubin

Local organizer Supriyanto Ardjo Pawiro speaks to teachers and students at the virtual Instrumentation School Jakarta

Hands-on experiments had to be replaced by online demonstrations. Here, Martin Grossmann at home in Switzerland shows the EasyPET experiment to students in Indonesia, the Philippines, Vietnam and Malaysia

Local organizer Oumar Ka (center) with a group of students who attended the virtual Instrumentation School onsite in Dakar—a rare sight in times of COVID-19

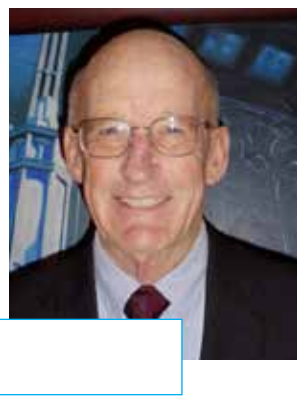
Attendees of the hybrid WIE event at the Dakar school following the presentations (both on-site and remote) and the panel discussion

Liaison Reports

HUMANITARIAN ACTIVITIES

Ieee Smart Village—Next Generation (ISVx)

Members Hall of Honor and Fund



John Nelson
ISVx President

The IEEE Smart Village – Next Generation (ISVx), in consultation with IEEE Foundation launched the "IEEE Smart Village Members Hall of Honor Fund." The impetus for the fund is to recognize Ray Larsen and Robin Podmore, the co-founders of IEEE Smart Village, for their foresight, dedication and contributions made to ISVx. The goal of the fund is to sustain an annual balance of $100,000 while covering educational financial support annually of between USD $10,000–$15,000. The fund is expected to solicit annual donations into perpetuity to support the program. Disbursements could be increased or decreased based on financial success of the fund.

Donations will support activities that fall under ISV's Education Pillar thereby investing in potential future Hall of Fame inductees. Supported activities will focus primarily on ISVx entrepreneurs but may be expanded to other beneficiaries of ISVx projects. Financial support may include, but not be limited to:

- Educational assistance funding to ISVx entrepreneurs
- Travel grants for supporting educational activities —such as Power Africa or other conference attendance
- Encourage mentoring of entrepreneurs through travel grant support between home offices of entrepreneurs for the purpose of educational cross-training
- Educational grants for entrepreneurs at accredited educational and training institutes
- Other worthwhile educational preschool, primary, secondary and vocational training activities that may help empower the beneficiaries of ISVx projects
- Special educational programs developed in conjunction with IEEE Smart Village such as and similar to the Regis University Program designed to promote project development.

At the end of 2020, the fund had accumulated a total of $50,000, 50% of the initial goal. Contributions can be made to the IEEE Foundation's ISVx Hall of Honor fund at https://www.ieeefoundation.org/SmartVillage_donation. Feel free to contact Michael Deering for more information: m.deering@ieee.org.

Ray Larsen Inducted into IEEE Smart Village "Hall of Honor"

NPSS former President Raymond (Ray) Larsen has been the first member inducted into the IEEE Smart Village "Hall of Honor." The award was announced at the Rotary Silicon Valley Smart Village E-Club meeting on November 7th, 2020. Ray is the co-founder of IEEE Smart Village and was honored along with fellow co-founder Robin Podmore.

Ray has devoted countless hours each year for over a decade to the IEEE Smart Village Initiative. In 2010, Ray saw a need for providing electricity to communities in Haiti after a devastating earthquake. He formed a team of engineers and volunteers to bring renewable electric power to Haiti through a portable, renewable power station called the SunBlazer. (See photo below taken in Haiti with Ray in the light blue shirt and light tan hat.) Ray and his team's design of the SunBlazer included a solar photo voltaic (PV) power system mounted on a trailer for portability. Included in the trailer were the essential controls and battery system used to store the produced energy along with portable battery kits which were used to allow the villagers to take power back to their homes to provide light and electricity for other such things ventilation fans, cell phone charging and other similar appliances. Ray obtained funding and support from NPSS and the Foundation to produce and deliver 15 of the SunBlazers for communities in Haiti.

Ray and his wife Albe are both long standing members of IEEE and NPSS. Together, Ray and Albe have been valuable leaders and supporters of NPSS. Ray was the chair of IEEE Smart Village through May of 2020 and helped create a new IEEE Smart Village Governing Board presently consisting of 11 societies and one technical council. Ray continues to serve IEEE Smart Village as vice president of the Advisory and History Committee.

Ray Larsen
IEEE Life Fellow and IEEE Smart Village Hall of Honor first inductee

John Nelson, ISVx President, can be reached by E-mail at jnelson@neieng.com, and Ray Larsen, IEEE NPSS liaison to IEEE humanitarian activities including ISVx, SSIT, SIGHT and others, can be reached by E-mail at larsen@slac.stanford.edu.

Articles

Low Temperature Plasma Against Viruses

Mounir Laroussi
Old Dominion University

Since the start of the recent COVID-19 pandemic many plasma researchers have been asking themselves if plasma can play a role in the inactivation of the SARS-CoV-2 virus which is at the origin of the pandemic. Recently reports have been published by a few investigators who did conduct some tests and found that yes; indeed, low temperature plasma (LTP) can inactivate the virus in the matter of a few minutes. This article introduces the reader to the role plasma has been playing in the inactivation of microorganisms with a particular focus on viruses. But first let me introduce what viruses are.

Viruses are biological agents/particles that can infect most life forms. They do not possess metabolism of their own so they rely on host organisms to replicate. Viruses are made of a genetic material (DNA or RNA), a protein coat (capsid) that protects the genetic material and lipids envelope that surrounds the capsid while the virus is outside a host cell. In humans, some viruses can cause severe diseases while others may cause non-life threatening illnesses. The replication cycle of a virus can briefly be described in the following five steps: 1. Attachment: binding between viral capsid and host cellular surface; 2. Penetration: release of the virion into the cytoplasm; 3. Uncoating: the viral capsid is removed; 4. Replication: DNA Replicates in a large amount; and 5. Release: virus is assembled into its protein capsid and induces cell lysis leading to its release from the host.

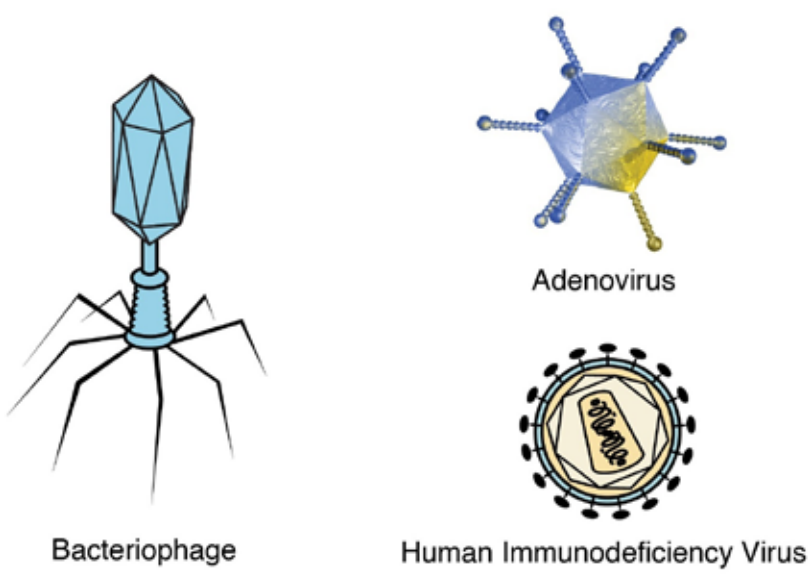


Fig. 1 Three types of viruses. Source: NIH-National Human Genome Institute.

Figure 1 shows schematics of some viruses.

Experiments on the use of LTP to kill viruses preceded the present pandemic. Investigators have been looking into the possibility of using LTP in this context for many years [1] – [3]. In fact the early groundbreaking work of using atmospheric pressure LTP to kill microorganisms started about 25 years ago when it was reported that LTP could inactivate bacteria quite efficiently in the matter of seconds or minutes depending on the strain [4], [5]. Since then research in this plasma biological application expanded dramatically into other areas of biology and medicine [6] – [10]. But let's keep the focus on viruses. So the following is a sample of what has been done so far. Figure 2 shows photographs of two sources of atmospheric pressure LTP developed at this author's laboratory.

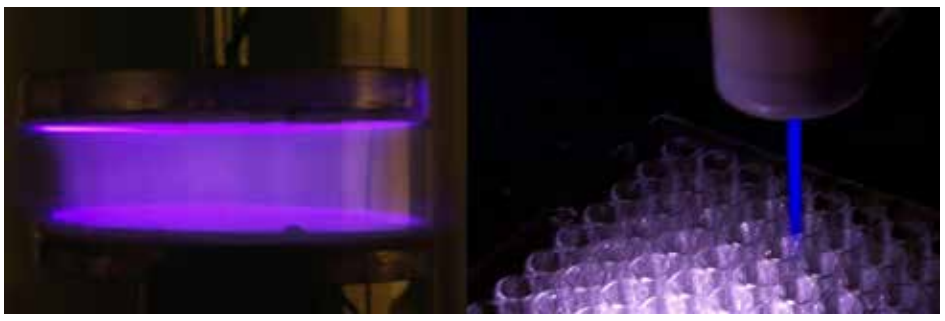


Fig. 2 Photographs of two LTP sources. Left: Dielectric Barrier Discharge (DBD); Right: Plasma Pencil

Yasuada et al. used a dielectric barrier discharge (DBD) to inactivate the bacteriophage lambda, or λ-phage, which is known to infect Escherichia coli bacteria [1]. They found that the plasma generated by the DBD inactivated λ-phages suspended in solution with a 6-log reduction in merely 20 seconds and with a decimal value (D-value) of 3 seconds. Zimmermann et al. reported on the inactivation on adenoviruses using a surface micro-discharge (SMD) [2]. Adenoviruses possess double stranded DNA within a protein capsid but without a lipid bilayer envelope. Adenoviruses are stable and can tolerate environmental variations (temperature, pH, UV…) but cause only mild diseases in humans. Briefly, the results of these investigations showed that a 240 seconds exposure to SMD air plasma resulted in more than 3-log viral inactivation, and better than the inactivation efficacy of UV alone. These investigators reported that both the infectivity and the replication of the virus were inhibited by the plasma-generated reactive oxygen species (ROS) and reactive nitrogen species (RNS). Both Yasuda et al. and Zimmermann et al. found that the plasma damages the capsid proteins of the viruses but not necessarily their genetic material (DNA/ RNA).

Wu et al. used atmospheric pressure cold plasma to inactivate airborne MS2 bacteriophages for sub-second time [3]. They used admixture of Ar/O2 and He/O2 (2% oxygen) to generate the plasma. Viral inactivation was shown to exhibit linear relationships with the plasma generation power and exposure time with up to 95% inactivation (1.3-log reduction) after a sub-second airborne exposure at a power of 28 W. SEM images, SDS-PAGE, and agarose gel analysis of exposed waterborne viruses showed various levels of damage to both surface proteins and to the RNA genes after plasma exposure [3]. This resulted in loss of viability and infectivity of the virus.

» When the COVID-19 pandemic started posing a serious threat to the global community there was an urgency not only to produce efficacious and safe vaccines but also to develop technologies that can rapidly decontaminate personal protective equipment (PPE), including face masks. To meet this challenge a number of plasma researchers conducted tests using various plasma sources and various PPE-relevant target materials (plastics, cloth, etc.). Tests were also done to see if LTP can inactivate viruses in airborne aeorosols. For example, Bisag et al. used a volumetric DBD reactor to inactivate bioaerosols containing purified SARS-CoV-2 RNA flowing through it. They reported that for residence times less than 0.2 seconds in the plasma the viral RNA was degraded [11].

» Since SARS-CoV-2 infectious virions are known to be viable on various surfaces such as plastics and metals for several hours Chen et al. conducted surface inactivation tests using cold atmospheric plasma (CAP) [12]. They used argon feed gas to generate CAP and applied it to inactivate SARS-CoV-2 on various surfaces including plastic, metal, cardboard, basketball composite leather, football leather, and baseball leather. Their results showed that CAP was able to inactivate the virus on the six selected surfaces with a plasma exposure time less than 180 seconds [12].

» The above results, although preliminary, seem to support the premise that LTP is a technology that can help overcome serious healthcare challenges. In the past 25 years investigators have shown that LTP can inactivate bacteria, fungi, biofilms, pathogenic proteins, and viruses quite efficiently [1] – [3], [11] – [15]. These successes have finally attracted the attention of healthcare experts as evidenced by their adoption of LTP to treat some dermatological conditions, wound infections, and others. One can safely say that sooner rather than later low temperature plasma would ultimately play some role in future innovative medical therapies.

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I SECOND THAT!

Honesty may be the best policy, but it is important to note that apparently, by elimination, dishonesty is the second-best policy.

George Carlin

SO, THEY ARE NOT THAT SMART

Success is a lousy teacher. It seduces smart people into thinking they can't lose.

Bill Gates

Experience and Performance of Persistent Memory for the DUNE Data Acquisition System

Over the last years, large-scale computing systems have been moving towards decoupling compute and storage capabilities. In fact, high-performance computing environments are experiencing a huge increase in data volume which makes the data consumption more difficult for the computing nodes.

Emerging high-performance storage technologies are opening up the possibility of designing new distributed data acquisition system architectures in which the live acquisition of data and their processing are decoupled through a storage element such as persistent memory devices.

Adam Abed Abud
Second Prize Recipient, Student Paper Award, IEEE NPSS Real Time Conference 2020

The purpose of this paper is to characterize the performance of persistent memory devices in the context of the data acquisition system for one large particle physics experiment, DUNE. This experiment must be capable of storing, upon a specific signal, incoming data for up to 100 seconds, with a throughput of 1.5 TB/s, for an aggregate size of 150 TB. The modular nature of the apparatus allows splitting the problem into 150 identical units operating in parallel, each at 10 GB/s. The target has to be able to dedicate a single CPU to each of those units for both data acquisition and storage.

Given the importance of the data being recorded, DRAM technology is not a viable solution for the DUNE storage buffer as it cannot provide storage persistence. One possible way to achieve the target goal is to use fast storage media such as the Intel® Optane™ Data Center Persistent Memory Modules or DCPMMs (Figure 1).

Synthetic benchmarks executed on the system showed that DCPMMs are capable of sustaining high request rates when used as storage devices. The maximum achieved writing bandwidth is approximately 8.5 Gbit/s (Figure 2). In addition, a high-level application that leverages DCPMMs was also developed and integrated with a prototype setup in order to validate its potential use for the DUNE supernova storage buffer. The current generation of DCPMMs can sustain only 80% of the required target throughput. One hopes that the new generation of persistent memory devices will be able to fill the performance gap that is needed for the data acquisition system of the DUNE experiment.

Adam Abed Abud (corresponding author) can be reached at adam.abed.abud@cern.ch. He is affiliated with both the University of Liverpool and CERN.

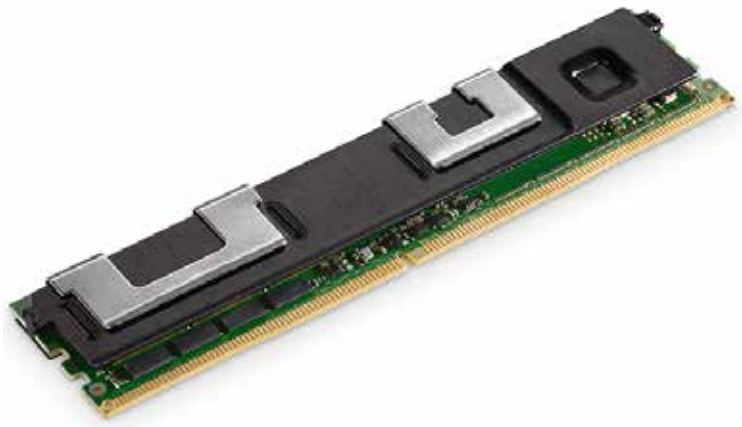

Figure 1: Intel® Optane™ Persistent Memory. Source: https://www.anandtech.com

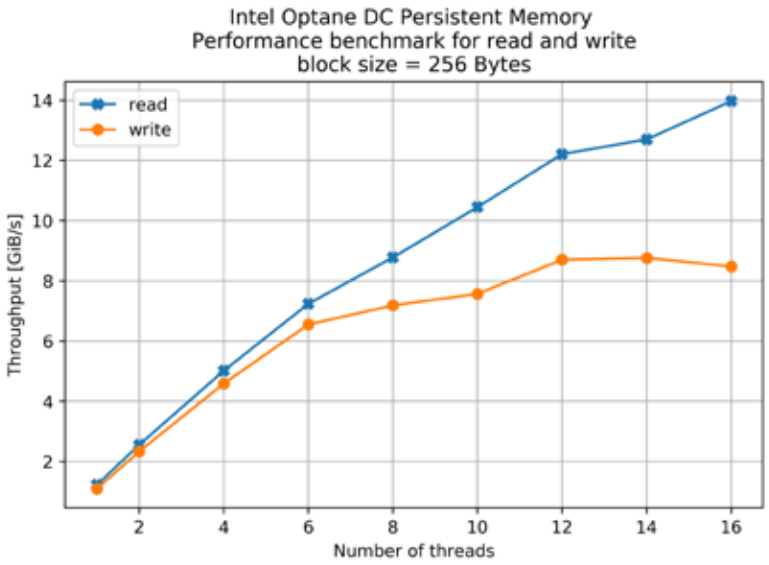

Figure 2: Throughput as a function of number of threads for a block size of 256 bytes in the case of both sequential reading and sequential writing.

In Memoriam

Dr. Anna Cellar

Dr. Anna Celler, a fantastic colleague, mentor, educator and pioneer in medical imaging, passed away on December 24th, 2020, after a two-and-a-half-year battle with uterine cancer.

Born and raised in Poland, Dr. Celler received her M.Sc. in 1974 and her Ph.D. in 1980 from the University of Warsaw where she became an expert in nuclear physics. After spending some time in research laboratories in Poland, France, and Finland, she moved to Canada with her husband and joined the Charge Exchange Group at TRIUMF in 1984. In 1991, Anna joined the nuclear medicine department at the Vancouver General Hospital as a clinical medical imaging physicist. Soon, she was overseeing the quality assurance program of 12 nuclear medicine departments around the Lower Mainland. In 1995, Anna was certified as a member of the Canadian College of Physicists in Medicine (CCPM) in recognition of her competence in physics as applied to medicine. She became a Fellow of the CCPM one year later.

Dr. Celler's passion for research led her to create the Medical Imaging Research Group (MIRG) in 1991 at the Vancouver General Hospital (VGH) / University of British Columbia (UBC). Her research interests were related to image quantification with diagnostic nuclear medicine imaging modalities, particularly with single photon emission computed tomography (SPECT). Anna is considered a pioneer in quantitative and dynamic SPECT, as well as a leading expert in dosimetry for radiopharmaceutical therapies using SPECT. As an example, Siemens implemented a "profile attenuation correction system" in their medical equipment which was a method fully developed by Anna. In 2012, Anna received the Sylvia Fedoruk prize for her work in dual isotope imaging with positron emission tomography (PET). Dr. Celler was also part of a multi-institutional and multidisciplinary team led by researchers at TRIUMF (Canada's national particle accelerator center) that developed methods of producing the isotope Tc-99m with a cyclotron. This method received Health Canada's approval in early December 2020 and will make it possible to avoid shortages of this radioisotope which is used in more than 80% of all nuclear medicine diagnostic procedures. This work was awarded the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering in 2015. Anna's work has also found multiple applications in the development of personalized patient dosimetry for radiopharmaceutical therapies.

Over the last three decades, Dr. Celler supervised numerous trainees in medical physics. She supervised postdoctoral fellows, graduate students, undergraduate students, and nuclear medicine residents. Most of her trainees now have leading positions in academia, industry, and healthcare. She was an active member in the IEEE NPSS Medical Imaging community and hardly missed any Medical Imaging Conferences over the years of her active research.

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Courtesy of Roz Hershkowitz

Dr. Noah Hershkowitz,

Noah Hershkowitz, a leading experimental plasma physicist, died in Madison, Wisconsin on November 13th, 2020 from encephalopathy. He will be remembered for profound and wide-ranging contributions to plasma physics and engineering. He is perhaps best known for creative advances in plasma diagnostics and to the understanding of sheath electrostatic boundaries that surround plasmas, but he also made significant contributions to the magnetic-mirror confinement concept in fusion energy research, and to plasma-aided manufacturing. He was an intellectual leader of the plasma community who educated a generation of plasma scientists.

Hershkowitz was born August 16th, 1941 in Brooklyn, New York. He earned a B.S. in Physics from Union College in 1962, and a Ph.D. in Physics from Johns Hopkins University in 1966 for experimental measurements of the Mössbauer effect. After graduating, he joined the University of Iowa as an Assistant Professor of Physics where he continued experiments in nuclear physics. After earning tenure in 1971, and attending a plasma seminar on solitons, he decided to switch to plasma physics. This was quickly followed by seminal measurements of plasma solitons and double layers, advancing fundamental understanding of nonlinear plasma dynamics as well as the Earth's magnetosphere. After a flurry of contributions to fundamental plasma physics, including sheaths, diagnostics, and magnetic cusp confinement, he was recruited to lead the magnetic-mirror fusion effort at the University of Wisconsin-Madison in 1981.

From the Phaedrus fusion laboratory, Hershkowitz and his students sought to improve confinement using the tandem mirror concept, and novel end-cell magnet configurations. However, after funding was shifted to focus on the tokamak approach, he returned focus to sheaths and diagnostics, but now with application to the burgeoning area of plasma etching of semiconductors. He led the plasma etch group in the Center for Plasma-Aided Manufacturing at UW-Madison for over a decade, contributing to the plasma physics of semiconductor manufacturing during the era in which these techniques were responsible for enabling Moore's law by dramatically shrinking the size of etch features.

Although his contributions to engineering continued, particularly in plasma-based propulsion technologies, the last two decades of his career were largely defined by a return to fundamental plasma physics experiments. He made seminal contributions to plasma sheaths during this era, providing the first experimental tests of models that had been commonly used, but never verified. These experiments will be remembered both for the confirmation of existing models that they provided, but also for the surprises that they revealed, which motivated a return to better understand how sheaths work.

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In Memoriam

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Dr. Anna Cellar

Because of all her contributions to clinical duties, teaching, and research, Dr. Celler was awarded the Gold Medal of the Canadian Organization of Medical Physicists (COMP) in 2018, the highest distinction given by this organization.

Anna profoundly valued colleagues and friends. She cared deeply about her trainees and the people around her, and created and led a lively work and research environment. She will be remembered not only for her scientific achievements, but also for her incredible joy of life, her love for the mountains, hiking and skiing and for always being prepared to offer help and support. She will be tremendously missed.

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Dr. Noah Hershkowitz

Hershkowitz's work has been recognized by several top prizes, including the 2004 James Clerk Maxwell Prize for Plasma Physics from the American Physical Society (APS), and the 2015 Marie Sklodowska-Curie Award from IEEE. He will be remembered not only for his scientific contributions, but also his leadership. He was the founding Editor-in-Chief of the influential journal Plasma Sources Science and Technology and led that journal for 16 years. He served on boards and executive committees of many leading professional organizations, including as Chair of the APS Division of Plasma Physics and as the U.S. Commissioner for Plasma Physics of the International Union of Pure and Applied Physics. He was a Fellow of the American Physical Society, American Vacuum Society, Institute of Physics, and IEEE.

Beyond his scientific contributions, Hershkowitz will be remembered as a devoted teacher and a kind and caring colleague and mentor. He suffered from primary progressive multiple sclerosis, and was in a wheelchair for the last half of his career, but this did not seem to slow him down. His ability to continue his prodigious pace of scientific discovery, despite this disability, was an inspiration to us all.

This remembrance was written by Scott Baalrud, University of Michigan, John Booske, University of Wisconsin-Madison, and Ronald Gilgenbach, University of Michigan.

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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 no later than April 5, 2021 for inclusion in the June 2021 Newsletter.

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