



2022 IEEE/APS NA-PAC Albuquerque, New Mexico, August 7th-12th, 2022

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Stephen Milton
General Chair

The 2022 North American Particle Accelerator Conference (NA-PAC22) will be held at the beautiful Hotel Albuquerque Old Town in the heart of New Mexico. Held every three years, NAPAC is distinct from the larger International Particle Accelerator Conference. Whereas the latter might have more than 1,000 participants, the NA-PAC typically hosts 400 participants, thus offering a much more personal feel without sacrificing the world-class science, technology, and engineering. The format also lends itself well to minicourses in a wide range of topics, and its regional nature allows for broader participation from North American students and early career scientists and engineers. Short courses are planned to be offered in project management, systems engineering, cryocooling, machine learning and artificial intelligence. These details are being developed and will be communicated on the conference website.

As the largest domestic particle accelerator conference, NA-PAC brings together experts in

all fields of accelerator science, technology, and engineering. Because it covers the entire spectrum of accelerator STE topics, it is extremely useful for students, post-docs, technicians, and engineers. Attendees can be exposed to the entire field and interact with many of its best in one place.

New Mexico is a confluence of Indigenous, Spanish, and American influences as evidenced in the state's unique cuisine, music, and architecture. Hotel Albuquerque sits in the city's historic Old Town neighborhood and is surrounded by shops, restaurants, and other attractions many of which are within walking distance. If you want to explore



Balloons at the Albuquerque International Balloon Fiesta



Sandra Biedron
Technical Program Chair

further, one can consider the short, picturesque train ride to Santa Fe, the nation's highest and oldest state capitol. An easy walk from the train station brings you to the famous Santa Fe Plaza. Whatever your interests, we believe you will truly enjoy your stay in the Land of Enchantment—while discussing accelerators, of course.

The conference is cosponsored by the Institute of Electrical and Electronics Engineers (IEEE) Nuclear and Plasma Sciences Society and the American Physical Society (APS) Division of Particles and Beams.

Come and join us for NA-PAC22 and experience it for yourself. Please visit the NA-PAC22 website at <https://attend.ieee.org/napac-2022/> for conference details and travel planning tips.

Cynnamon Spain, NA-PAC Vice Chair for Publicity, can be reached by E-mail at Cynnamon@cyncs.com.

CONFERENCES Continued on PAGE 2

NA-PAC Cont. from PAGE 1

SCIENTIFIC PROGRAM

NA-PAC22 is an international event with a North American regional flair open to the worldwide accelerator community and industry. Attendees will be presented with cutting-edge accelerator research and development results and will gain the latest insights into accelerator facilities across the globe. Topical areas to be covered include:

- » Circular and Linear Colliders
- » Photon Sources and Electron Accelerators
- » Novel Particle Sources & Acceleration Techniques
- » Hadron Accelerators
- » Beam Dynamics and EM Fields

- » Beam Instrumentation, Controls, Feedback and Operational Aspects
- » Accelerator Technology
- » Applications of Accelerators, Technology Transfer, and Industrial Relations.
- » Accelerator Technology
- » Machine Learning, Artificial Intelligence (AI), Data Analytics, and High-Performance Computing for Particle Accelerators

PAPER SUBMITTAL

Information on the submission of summaries to the 2022 NAPAC for either the Technical Sessions or the Data Workshop can be found at <https://attend.ieee.org/napac-2022/>. The deadline for submitting abstracts is February 4, 2022.

CONFERENCE COMMITTEE

Conference Chair
Stephen Milton

Scientific Program Chair
Sandra Biedron

Local Organizing Committee Chair
Louis Peterson

Local Organizing Treasurer
Kimberly Nichols

Local Organizing Admin Support
Melissa Martinez

Stephen Milton, NA-PAC22 General Chair can be reached by E-mail at svmilton@lanl.gov



Hot-air Balloon over Albuquerque

Conference Report

ANIMMA 2021, 21st–25th June 2021

Prague, Czechoslovakia

The conference on Advancements in Nuclear Instrumentation Measurement Methods and their



Abdallah Lyoussi
General Chair

Applications, ANIMMA, has always strived to create a special meeting place shared by all those working in nuclear instrumentation and its applications, as we strongly believe that cross-border exchanges among scientists, engineers and industrialists can only lead to the most developed ideas, the best solutions and the most efficient collaborations and partnerships. ANIMMA continues to maintain a high level of scientific and technical quality by presenting not only the latest advances but also the state of the art in each field through the participation of international specialists and experts.

Since the beginning of 2020, travelling around the world to attend meetings, congresses, symposia, and conferences has been highly handicapped by the Covid-19 pandemic whose development differs from place to place and time to time. Teleworking, virtual meetings, distance courses are used as substitutes for the traditional face-to-face meetings, with an inevitable loss of quality from the lack of the human contacts which are believed to be of paramount importance to build enthusiasm for a project, an idea, a collaboration, a grouping of individuals.



Ivan Stekl
Steering Committee Chair

In such a context, the ANIMMA2021 committees (Program, Organizing and Steering committees), by following the sanitary rules as well as the Czech government recommendations, dedicated best and huge efforts in designing the Conference in a



Stanislav Pospisil
Steering Committee Co-Chair



Ratislav Hodak
Local Organizing Committee Chair



Patrick Le Dô
ANIMMA IEEE/NPSS Representative

hybrid layout to make it highly attractive and very efficient for both the on-site participants as well as the remote ones.

Therefore, the best possible communication means provided the opportunity not only to remotely follow or deliver presentations, but also to interact online in the best possible way with the authors and contributors as well as the exhibitors, with the other connected experts, and to access recorded materials in delayed mode to cope with the time-zone differences. This also required a fully committed and flexible conference management team to create a conference that is rewarding for both presenters and attendees.

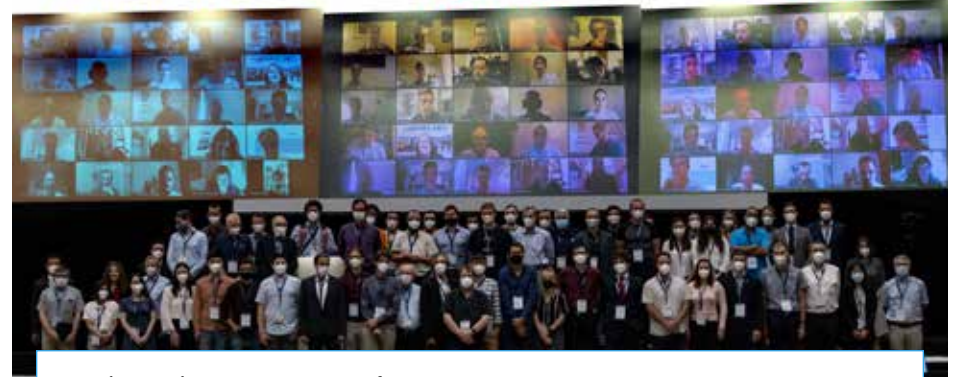
ANIMMA-2021 was held in hybrid mode from June 21st–25th at the Clarion Congress Hotel in Prague, Czech Republic. The conference was

ANIMMA 2021

Prague, Czech Republic

Hybrid mode

June 21-25, 2021



Attendees at the 2021 ANIMMA Conference.

locally organized by the Czech Technical University represented by the institute of experimental and applied physics (IEAP) in a strong partnership with CEA (France), SCK-CEN (Belgium), Aix-Marseille University (France), Josef Stefan Institute (Slovenia). The ANIMMA2021 was technically co-sponsored by IEEE/NPSS.

The conference program dealt with:

- » Two full-day short-courses: The classical lectures have been given in part on-site, and in part via remote connection. They have been streamed to all students simultaneously via a Zoom meeting, allowing for interaction between students and lecturers. The practical sessions have been performed by IEAP and CAEN. Some exercises were in remote mode, simultaneously for the students on-site and those remotely connected and the other part as a real hands-on course for the students on-site. Separately, a remote, interactive demonstration session was organized for the remotely connected students. Short-course participants had the opportunity to perform a multiple choice test (35 multiple-choice questions on all courses) immediately after the courses.
- » Three international workshops: The topics of the workshops addressed in this 7th ANIMMA edition focused on instrumentation for major research facilities in fusion and fission fields, crystalline materials for radiation detection in harsh media and prospective technologies for the future of nuclear medicine. 19 speakers and 71 people participated from 22 countries. Each workshop included time slots for discussion and exchange between speakers, experts and participants. These

periods were useful to share opinions, cross-fertilize skills and expertise and identify collaborative research axes to go further by solving scientific and technological challenges.

» Three prestigious keynote lecturers:

- Dr. William D. Magwood, IV, Director-General, OECD Nuclear Energy Agency (NEA) on "Nuclear Solutions: Innovation for an Energy Transition,"
- Dr. Alan Owens, European Space Agency, ESTEC and IEAP on "Recent developments in sensor materials,"
- Prof. Dr. Katia Parodi, Ludwig-Maximilians-Universität München, Department of Experimental Medical Physics on "Getting to the point in particle therapy."

» Four plenary sessions on a new transversal topic on "Current trends in development of radiation detectors,"

- A second new topic on "Space sciences and technology."
- Over 270 contributions presented in 31 parallel oral sessions
- A permanent poster session

ANIMMA-2021 welcomed 320 attendees from 29 countries including 65 graduate students. 30% of the attendees participated physically and 70% attended remotely.

NUCLEAR & PLASMA SCIENCES SOCIETY NEWS

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The ANIMMA2021 attendees deserve our warmest thanks and consideration for making this seventh edition an exceptional success in an extraordinary situation.

All the committee members are looking forward to welcoming everyone again at ANIMMA2023 in Pisa and Viareggio in Tuscany, Italy on June 12th–16th, 2023.

Prof. Dr. Abdallah LYOUSSI, ANIMMA General Chairman and Program Committee Chair, E-mail at abdallah.lyoussi@cea.fr



Ludo Vermeeren
Short Courses Organization Chair



Christelle Reynard-Carette
Workshop Organization Chair

HONEST REASON

People who are brutally honest get more satisfaction out of the brutality than out of the honesty.

Richard J. Needham

PLAIN GEOMETRY

We live on an island surrounded by ignorance. As our island of knowledge grows, so does the shore of our ignorance.

John Wheeler

TO BE CONTINUED

Sometimes I lay awake at night and ask, "Where have I gone wrong?" Then a voice says to me, "This is going to take more than one night."

Charles Schultz

President's Report



Steve Meikle
IEEE NPSS President

As I write this article, my hometown of Sydney has just emerged from 106 days of lockdown caused by the Delta outbreak that started in July. This is the same strain that caused major challenges in many countries, including those with high vaccination rates. However, the data show that vaccination is effective in reducing the incidences of severe COVID, hospitalizations and deaths. There are also hopeful signs of effective treatments for severe COVID. Approximately half the world's population has received at least one dose of vaccine and several regions have reached over 90% including my own state of New South Wales. I sincerely hope that by the time this newsletter reaches you, lockdowns will be a thing of the past and we can start to look forward to a much brighter future, including a return

to face-to-face teaching, conferences and meetings in 2022.

My most recent newsletter article (September issue) was written soon after we held our mid-year AdCom virtual meeting. AdCom is the governing body of NPSS which sets the strategic direction for our Society, supports our conferences and publications, including this newsletter and four scientific peer-reviewed journals, approves and gives awards and manages our Society's finances. As I write this article, we are due to hold our next AdCom meeting in two weeks' time. Therefore, I don't have much new to report since the last article. However, between AdCom meetings there have been a couple of important developments.

First, a further update on EduCom. You may recall that we have an ad hoc working group, led by Past President Stefan Ritt, which has been working on the terms of reference for this new standing functional committee. I can now report that the work of this ad hoc has concluded. The terms of reference will be presented at the upcoming AdCom for endorsement and EduCom will commence operations in January 2022. Keeping in mind that the terms of reference are still to be endorsed by AdCom, they are as follows.

"The purpose of the Educational Committee (EduCom) is to provide strategic advice to NPSS AdCom on new educational initiatives, to effectively manage the Schools as an ongoing sustainable educational activity, and to act as the main point of contact for all educational activities of NPSS. The Chair shall be appointed for a one-year term by the President as per the NPSS Bylaws. The other members of EduCom shall include the following functional committee chairs: Distinguished Lecturers, Chapters and Local Activities, Transnational, Young Professionals, and the liaisons to IEEE Women in Engineering and the Educational Activities Board. These members are all ex officio. The EduCom shall be responsible to AdCom for the NPSS Schools, identifying and helping to establish new educational initiatives in collaboration with technical committee chairs, identifying hosts and speakers for NPSS educational activities and creating and maintaining an EduCom page on the NPSS web site."

I have invited Stefan to be the inaugural chair of EduCom and he has graciously accepted the role. I am excited to see how this important new committee evolves under his strong leadership.

The second important development is the establishment of the IEEE NPSS Foundation Fund under the leadership of Finance Co-Chair Hal Flescher who conceived the idea of the Fund and steered it through the approvals process on behalf of NPSS. The purpose of the Fund is to provide the Society with greater certainty and flexibility in the

way we finance initiatives that have been successful during their three-year pilot phase and which we wish to continue without putting added pressure on our operating budget. The Instrumentation Schools are a recent example of such an initiative. The NPSS Fund will permit NPSS to fund successful imperatives, such as the Schools, when the operational budget cannot afford to do so. The establishment of the Fund was recently approved by the Vice President Technical Activities. It will accept donations from NPSS and other donors in support of NPSS mission-driven society, education, outreach, diversity and humanitarian efforts. I will have more to report about the NPSS Foundation Fund in future newsletters.

As usual, I encourage you to reach out to me or your elected representative(s) on AdCom and your Technical Committee Chairs with any ideas or issues you feel NPSS ought to address. We welcome your input.

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

Secretary's Report



Albe Larsen
IEEE NPSS Secretary and Newsletter Editor

As noted by Steve Meikle, in his report above, our latest AdCom meeting falls well after the deadline for this Newsletter. Hence, I am going to use this space to talk a little about the Newsletter and then I have left space to include, before printing, the AdCom actions from our October meeting.

Our survey last year indicated that those who replied valued the Newsletter and also were eager to see it convert to an electronic format. Only one respondent was unwilling to read the Newsletter as an electronic offering. We have been looking at software possibilities and have not yet settled on what seems just right, but we do realize that this conversion is important and will make it happen as soon as we can.

Much more important, however, is the recent lack of submitted content to the Newsletter. Not only are our Technical and Functional committee members of AdCom asked to contribute. So are chairs of upcoming conferences, people whose research may not yet be in journal-publishable state but may be of interest to the NPSS audience, graduate students who have won awards for meritorious papers – all are asked to consider contributions to this Newsletter. It is only sustainable if there is adequate content of interest to our members, so please do your part and contribute! Thanks.

AdCom Actions for the Meeting of the IEEE NPSS Administrative Committee, 23 October 2021

- » NMISC move that AdCom approve that the 2022 PSMR (PET/SPECT/MR) be an NPSS technically co-sponsored conference. Passed. 18Y, 0N, 3A
- » NMISC move that AdCom approve that NPSS pay the technical co-sponsorship administrative fee for the 2022 PSMR conference. . Passed. 17Y, 0N,4A
- » AdCom approves that funding of the **Bruce H. Hasegawa Young Investigator Medical Imaging Science Award** be changed as follows:

Funding: Funded by the Nuclear Medical and

Imaging and Sciences Technical Committee of the IEEE Nuclear and Plasma Sciences Society [IEEE Nuclear and Plasma Sciences Society's Nuclear Science Symposium \(NSS\) and Medical Imaging Conference \(MIC\) budget](#).

Passed 19Y, 0N, 1A.

- » AdCom approves funding of the **Radiation Instrumentation Early Career Award** be changed as follows:

Funding: Funded by the Radiation Instrumentation Technical Committee of the IEEE Nuclear and Plasma Sciences Society [IEEE Nuclear and Plasma Sciences Society's Nuclear Science Symposium \(NSS\) and Medical Imaging Conference \(MIC\) budget](#). Passed. 19Y, 0N, 1A

- » AdCom approves that the **Paul Phelps Continuing Education Grant** be changed as follows:

Description: To promote continuing education and encourage membership in NPSS.

Prize: Maximum of \$15K per year as follows: To provide up to \$3,000/year to each NPSS conference sponsoring [Short-Courses continuing education](#)

[courses](#), up to a maximum of \$15,000 per year for all grants. Funds are to be used to cover tuition costs and/or travel costs to attend [Short-Courses continuing education courses](#). Actual award amounts for individual grants and use of funds for applicable travel expenses are decided by each NPSS Conference.

Funding: Funded by the Nuclear and Plasma Sciences Society.

Eligibility: Outstanding Student Members of NPSS and members of NPSS who are either [Student Members, Post-Doctoral Fellows or Research Associates](#), or unemployed Members of NPSS who need assistance in changing career direction.

Basis for Judging: Exceptional promise as a [Graduate Student student, postdoc or research associate](#) in any of the fields of the NPSS, [or showing](#) exceptionally good past work in those fields for currently unemployed NPSS members [and with](#) an expectation that attendance at one or more of the [Short-Courses continuing education courses](#) will result in improved possibility of obtaining a job in an NPSS field.

Presentation: Presented each year at the NPS sponsored conference in which the [Short-Courses](#)

Technical Committees

NUCLEAR MEDICAL AND IMAGING SCIENCES COUNCIL



Roger Fulton
NMISC Chair

At the time of writing, it is early October, and the 2021 NSS/MIC in Yokohama is rapidly approaching. Like the 2020 meeting in Boston, it will be a fully virtual conference. I would like to congratulate the entire organizing committee, and in particular our MIC Co-Chairs Jae Sung Lee and Taiga Yamaya, for putting together such a high-quality meeting under difficult circumstances. Hopefully we can return to face-to-face meetings again very soon. At present the organizing committee of the 2022 conference in Milan is planning a hybrid conference which is a promising sign.

This year the NMISC Annual General Meeting (AGM) will be held after the NSS/MIC on November 1st, rather than during the conference, due to the later than usual close of voting in the NPSS elections. This will enable the new NMISC members to attend the AGM. We will also elect a new NMISC Vice-Chair at the AGM, to replace Andrew Goertzen, who moves into the chair at the end of 2021. Outcomes of the AGM will be announced in the next newsletter.

By the time you read this, the following 2021 recipients of three prestigious MIC awards will have been announced.

Prof. Paul E. Kinahan, University of Washington
The Edward J Hoffman Medical Imaging Scientist Award

'For contributions to PET and PET/CT in the areas of image reconstruction, multi-modality imaging, and quantitative imaging and the support and training of early-career scientists'

Dr. Taiga Yamaya, National Institutes for Quantum Science and Technology
The Medical Imaging Technical Achievement Award

Secretary's Report Continued from PAGE 3

continuing education courses are given. The awards will be handled prior to the dates of the Conference, so that award recipients can apply the corresponding funds towards covering tuition and/or travel costs to the Short Courses continuing education courses. Passed. 16Y, 2N, 3A.

» The WIE Liaison moves, seconded, that NPSS AdCom adopt the WIE pledge to "Work toward gender-diversified panels at all IEEE meetings, conferences, and events, including our own."

Passed. 19Y, 2N, 0A.

» EduCom: The EduCom ad hoc moves that AdCom approve the establishment of an Educational Committee as a new Functional Committee of the NPSS AdCom. 18Y, 1N, 2A.

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

'For contributions to PET imaging physics, especially novel PET detectors, system geometries, and application-specific PET systems'

Dr. Kuang Gong, Massachusetts General Hospital and Harvard Medical School
The Bruce Hasegawa Young Investigator Medical Imaging Science Award

'For contributions to machine learning-based PET image reconstruction, image denoising and attenuation correction as well as advanced PET point-spread-function modeling and novel PET system design'

Congratulations to these very deserving winners and thank you to all those who nominated and supported candidates for these awards. To those who were nominated for an award and were unsuccessful, please consider nominating again. Unfortunately, only one candidate can be selected each year.

Two new NMISC subcommittees have been formed this year. An Initiatives Subcommittee chaired by Robert Miyaoka that will endeavour to encourage and facilitate the development of high-impact NPSS initiative proposals, and a subcommittee on Future MIC Fields of Interest, chaired by Vesna Sossi, that will seek to ensure that topics at future MIC conferences continue to reflect current and future directions in medical imaging and to attract a wide audience.

As 2021 ends, we sadly say goodbye and thank you to the following elected members whose terms are coming to an end: Nicola Belcari, Taiga Yamaya, Georges El Fakhri, and Chuck Melcher. My term as chair also ends and I wish Andrew Goertzen every success as the incoming chair. My personal thanks to Andrew and Jae Sung for their constant support as vice-chair and immediate past chair, and to our Secretary Nicolas Karakatsanis without whose attention to detail nothing would happen. On behalf of NMISC I would like to extend our thanks to Jae Sung for his six years of service as vice-chair, chair, and past chair, and for so expertly managing the awards process as Awards and Fellowship Chair during 2020/21.

Finally, please keep the following nomination deadlines in mind and consider nominating a colleague for IEEE Fellow or an award.

NPSS Awards—January 31, 2022.
IEEE Fellow—March 1, 2022
MIC Awards—July 15, 2022.

Roger Fulton, NMISC Chair, 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. It is with some regret that we inform you that the collocated 2021 IEEE Pulsed Power Conference (PPC) and Symposium on Fusion Engineering (SOFE) was forced to go virtual. The conference was moved from its original dates of May 31st–June 4th, 2021 to December 12th–16th, 2021 to maintain an in-person format in Denver, Colorado. The Delta variant and travel restrictions, both domestically and internationally, forced us to into a virtual format in early September 2021. By

the time this article comes out, we will be only a few days from hosting the event. Although we wish we could maintain an in-person format so that we can greet each other in person, we are very optimistic that we will have a great attendance and technical program for our attendees. We have learned so many lessons from all the virtual meetings we have already attended, and we are confident that we can put on a great show. Hopefully you are attending and you will find it to be a great experience.

The PPC is chaired by me, Dr. David Wetz from the University of Texas at Arlington (UTA), and SOFE is chaired by Dr. Kevin Freudenberg from Oak Ridge National Laboratory (ORNL). We have a superb organizing committee, led by Dr. John Mankowski from Texas Tech University in Lubbock, Texas for PPC and Dr. Hutch Neilson from Princeton Plasma Physics Laboratory (PPPL) in Princeton, New Jersey for SOFE, working tirelessly to put together an outstanding program. The content will be available for some time after December 12th, 2021 so if you miss the conference and still want to view the technical content, it won't be too late. Visit the conference website, <https://uta.engineering/ppcsofe2021/>, for more information.

My term as Chair of the PPS&T Committee comes to an end on December 31st, 2021. Between trying to put on an excellent 2021 PPC-SOFE meeting and helping to lead the PPS&T Committee, it has been a very exciting and rewarding two years as Chair. I am passing the Chair torch on to our current Vice Chair, Heather O'Brien from the U.S. Army Research Laboratory (ARL) in Adelphi, Maryland. Our new Vice Chair is Emily Schrock from Sandia National Laboratories in Albuquerque, New Mexico. The committee is in amazing hands with these two special people, and we all are so grateful for their commitment and service to IEEE NPSS and to PPS&T. Thank you to everyone in the NPSS community for your support of me the past two years. We hope everyone has a very safe and happy holiday season! Happy New Year and hopefully 2022 brings us all back together for in-person meetings and events.

David Wetz, PPST Chair, can be reached by E-mail at wetz@uta.edu.

RADIATION EFFECTS



Teresa Farris
Vice Chair, Publicity,

Annual report from the Radiation Effects Committee—December 2021

Robert Reed, Vanderbilt University, is the present Chair of the Radiation Effects Steering Group, which oversees NSREC Conferences.



Robert Reed
REC Chair

The IEEE Radiation Effects Committee (REC) held its annual Open Meeting on July 23rd, 2021 at the virtual 2021 Nuclear and Space Radiation Effects Conference (NSREC). Presentations were given by the general chairs of the 2020 through 2022 NSRECs and the chairs of the 2021 and 2022

European Conference on Radiation and its Effects on Components and Systems (RADECS).

Janet Barth, NASA (ret.), outgoing REC Chair, opened the meeting by recognizing elected and appointed members of the Radiation Effects Steering Group (RESG). The elected members of the 2021 RESG are Robert Reed, Vanderbilt University, Vice Chair; Allan Johnston, J-K Associates, Past Chair; Sarah Armstrong, Naval Surface Weapons Center (Crane), Secretary; Kyle Miller, Ball Aerospace, Senior Member-at-Large; Michael Campola, NASA Goddard Space Flight Center, Member-at-Large; and Rubén García Alía, Conseil européenne pour la recherche nucléaire (CERN), Junior Member-at-Large. Janet recognized outgoing members of the RESG; outgoing elected members are Allan Johnston, Sarah Armstrong, and Kyle Miller.

Janet also recognized Conference Chairs Hugh Barnaby, Arizona State University, NSREC 2020, and Steve McClure, NASA Jet Propulsion Laboratory, NSREC 2021, as well as NSREC Meeting Planner Anne Meadows and the ETC team for their outstanding support in delivering two excellent virtual conferences.

Robert Reed, incoming REC Chair, continued the meeting by recognizing elected and appointed members of the 2022 RESG and the elected members of the NPSS Advisory Committee. Janet will take over the Past Chair role. The newly elected members of the RESG are Kay Chesnut, Raytheon Technologies, Vice Chair; and Arto Javanainen, Jyväskylä University, Secretary. He also recognized Michael Campola and Rubén García Alía, as the Senior Member-at-Large and Member-at-Large, respectively. The election of the new Junior Member-at-Large was held electronically after the conference, Mike Tostanoski, Radiation Test Solutions, is the new Junior Member-at-Large.

Robert announced the general chairs for future NSREC Conferences: Tom Turflinger, Aerospace Corporation, 2022; Keith Avery, Air Force Research Laboratory, 2023; Heather Quinn, Los Alamos National Laboratory, 2024, and Dolores Black, Sandia National Laboratories, 2025.

Hugh Barnaby, the General Chair of the 2020 Conference, summarized statistics of last year's 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.

Steve McClure, the General Chair of the 2021 Conference, summarized statistics of this year's conference. A total of 569 people registered for the technical sessions and attended the short course which was included in the technical program registration fee for NSREC 2021. There were 137 student registrants.

The NSREC 2021 was held in a virtual format from July 16th–23rd. All presentations were available "on-demand" through Aug 15th, 2021. The technical sessions featured 98 papers that were presented during the five-day conference: 31 oral presentations, 37 poster presentations, and 30 poster presentations in the Radiation Effects Data Workshop. Four tutorial presentations were given at the Short Course, held on-demand on Sunday, July 16th–18th. On July 19th, the Short Course Chair, Marta Bagatin, University of Padova, hosted a panel Q&A session with the four Short Course presenters: Balaji Narasimham, Daniel Loveless, Vincent Goiffon, and Kay Chesnut. All short-course attendees received copies of this year's course. The Industrial Exhibit, which had 33 exhibitors, was well attended, as were the 26 Industrial Webinars.

Thomas L. Turflinger, The Aerospace Corporation, General Chair of the 2022 Conference, discussed his plans for the 2022 Conference that will take place at the Utah Valley Convention Center in Provo, Utah, on July 18th–22nd, 2022. The conference will feature 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 18th.

The Short Course Chair is Sylvain Girard, Université of St. Etienne. The theme of the 2022 course is "Multi-Scale, Multi-Physics of Radiation Effects".

Presentations and speakers for the four sessions are:

» **From radiation environments to radiation-matter interactions**

Speaker: Giovanni Santin (ESA)

» **Experimental characterization of radiation effects parameters for device and circuit level modeling**

Speaker: Philippe Paillet (CEA DAM)

» **Modeling Cumulative Radiation Effects: Devices to Integrated Circuits**

Speakers: Hugh Barnaby and Ivan Sanchez Esqueda (ASU)

» **Multi-scale, multi-physics modeling and simulation of single event effects at device and circuit levels**

Speakers: Jean-Luc Autran & Daniela Munteanu (University of Marseille)

2022 Attendees will receive the NSREC Short Course Compendium CD/Stick with 1980-2022 presentations with registration!

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

Robert Reed, Executive Chair of the Radiation Effects Committee, can be reached by e-mail at robert.reed@vanderbilt.edu.

RADIATION INSTRUMENTATION STEERING COMMITTEE



John Valentine
RISC Chair

As I write this update, we are about to kick off our second consecutive virtual Nuclear Science Symposium and Medical Imaging Conference (NSS-MIC) with our sibling Nuclear Medical and Imaging Sciences Council (NMISC). We all sincerely hope this will be the last virtual NSS-MIC and are planning accordingly for a hybrid (in-person and virtual) 2022 NSS-MIC in Milan, Italy. As we've indicated over the last year and a half, check the conference web sites early and often to get the latest updates: <https://ieee-npss.org/nss-mic-conference-links/>

The 2021 NSS/MIC Organizing Committee has gone to extraordinary lengths to ensure a productive virtual conference and its success was evident from the beginning. All of these efforts will hopefully translate in large part to hybrid conferences as we experiment with this format over the coming years as a means of being more inclusive through outreach to underrepresented communities of radiation instrumentation scientists and engineers. In addition, it is worth reminding everyone that 2021 NSS/MIC Organizing Committee has graciously agreed to reconvene for the 2026 NSS/MIC/RTSD (Room-Temperature Semiconductor Detector conference) in Yokohama, Japan – the site where we planned to have the 2021 conference. We look forward to visiting Yokohama!

A mentioned in my previous update, to increase the likelihood of an in-person conference, SCINT 2021 has been postponed to 2022 and renamed. SCINT 2022 <https://web.cvent.com/event/66cab405-2615-464f-85c9-5be76bb271d0/summary> will be held September 19-23, 2022 in Santa Fe, NM, USA.

Beyond our Radiation Instrumentation conferences, the 2021 Radiation Instrumentation annual award

winners were recently announced and honored in an NSS plenary session:

» The Radiation Instrumentation Early Career Award (RIECA) is given to a young investigator in recognition of significant and innovative technical contributions to the fields of radiation instrumentation and measurement techniques for ionizing radiation. The prize consists of US\$1,500 and an engraved plaque. For 2021, the award goes to Dr. Yihui He, Professor at Soochow University, China. Dr. He was nominated by Dr. Mercuri Kanatzidis of Northwestern University, USA with a citation reading "For contribution to the significant and innovative work on the developing of novel semiconductor detectors for the next-generation ionizing radiation detection at room temperature".



Dr. Yihui He
RIECA Recipient

» The Emilio Gatti Radiation Instrumentation Technical Achievement Award (RITAA) recognizes a mid-career individual who has made significant and innovative technical contributions in the field of radiation detectors, radiation instrumentation, and/or nuclear electronics, and/or measurement techniques for ionizing radiation. The prize consists of US\$2,000 and an engraved plaque. For 2021, the award goes to Dr. Matteo Porro, Project Leader, European XFEL GmbH, Germany. Dr Porro was nominated by Carlo Fiorini, Politecnico di Milano,



Dr. Matteo Porro
RITAA Recipient

Italy with a citation reading "For extraordinary contributions to the development of soft X-ray imaging detectors with mega-frame rate and single photon detection capability for Photon Science experiments with X-ray Free Electron Lasers".

» The prestigious Glenn F. Knoll Radiation Instrumentation Outstanding Achievement Award (RIOAA) is given to an individual in recognition of outstanding and enduring contributions to the field of radiation instrumentation. The prize consists of \$3,000 and an engraved plaque. For 2021, the award goes to Charles R. "Chuck" Hurlbut of Eljen Technology, USA. Chuck was nominated by Dr. Richard Kouzes of Pacific Northwest National Laboratory with a citation reading "For contributions to decades of development and enhancement of organic scintillator technology for applications to radiation detection in the nuclear and plasma sciences."



Charles R. Hurlbut
RIOAA Recipient

Congratulations to all of the recipients!

And note, it isn't too early to start thinking about nominating someone for the 2022 Radiation Instrumentation Awards.

Stay safe and be kind to each other!

More information on the Radiation Instrumentation Technical Committee is available at <https://ieee-npss.org/technical-committees/radiation-instrumentation/>

John Valentine, RISC Chair, is with Lawrence Berkeley National Laboratory; Phone: +1(510)486-4920; Mobile +1(619)371-0016; E-mail: jvalentine@lbl.gov

Functional Committees

AWARDS



Stefan Ritt
IEEE NPSS Awards Chairman

The deadline for most of our NPSS Awards for 2022 is approaching quickly, on Jan. 31st, 2022. Please consider nominating somebody for one of our prestigious awards or grants. Members of our community are eligible for a number of awards for exceptional contributions to our field or our Society. These include the highest IEEE level awards, such as the IEEE Medal for Healthcare Innovations and Technology and the IEEE Marie Skłodowska-Curie Technical Field Award, our Society awards, and numerous Technical Committee and Conference awards. Information about all of these awards as well as tips on how to write a successful nomination can be found on the NPSS website <http://ieee-npss.org/awards/>

For the second time we are accepting nominations for the Edward J. Hoffmann Grant. Dr. Hoffmann was a scientist whose research in medical imaging was instrumental to the development of the Positron Emission Tomography (PET) scanner, which is today used to detect cancer and other diseases. After he passed away in 2004, his wife, Carolyn G. Hoffman, teamed with the IEEE Foundation to create the IEEE NPSS Edward J. Hoffman Early Career Development Grant to provide support to outstanding early-career researchers in the field of medical imaging. The grant may support a pilot project, purchase of laboratory equipment or visits to other labs or institutions and more.

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

how to apply for these awards and grants are given on the NPSS Awards web site.

Please nominate one of your colleagues, or yourself, for one of the many NPSS awards or grants (self nominations are allowed for some of the awards, details can be found in the award descriptions). It is a great opportunity to recognize some of the many outstanding colleagues in our field and to raise the level of prestige of our Society. Visit the NPSS Awards website <http://ieee-npss.org/awards/> for details of each award, nomination forms, and submission instructions.

Stefan Ritt, IEEE NPSS Awards Chair, can be reached by E-mail at stefan.ritt@psi.ch.

2021 Radiation Effects Grants and Award



Teresa Farris
Vice Chair, Publicity,

2021 Phelps Grant Winners

The 2021 Paul Phelps Continuing Education Grant was awarded to three student members from the radiation effects community. At the opening of the Virtual NSREC Conference (July 19th, 2021), Janet Barth, Chair of the Radiation Effects Steering Group, announced the grant awards. The grants included tuition for the 2021 NSREC Short Course and a check for \$750.

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

The three recipients of the 2021 Paul Phelps Continuing Education Grant were Marine Aubrey, Fernando Fernandes dos Santos, and Maria Gorchichko.

Marine Aubrey is a 2018 graduate of the IPSA Paris (Polytechnic Institute of Advanced Sciences) engineering school. After doing her master internship at the CNES (National Center for Space Studies), she joined the MOPERE (Materials for Optics and Photonics in Extreme Radiation Environment) group of Laboratoire Hubert Curien in October 2018 to pursue a doctorate. She is now a Ph.D. student at

Technical Committees Continued from PAGE 5



Marine Aubrey
2021 Phelps Grant Recipient

University of Saint-Etienne and Politecnico di Bari under the supervision of Pr. Sylvain Girard, Pr. Emmanuel Marin and Pr. Luciano Mescia. She is studying the combined radiation and temperature effects on optical fiber amplifiers for space applications. More specifically, she investigated how these coupled effects impact the amplifier performances and the properties of rare-earth doped fibers. Her Ph.D. thesis is co-funded by the CNES (under the responsibility of Dr. Julien Mekki) and iXblue (Dr. Thierry Robin). As a Ph.D. student, she created the IEEE student branch of the University of Saint-Etienne and she is actually the founding chair of its NPSS student branch chapter.



Fernando Fernandes dos Santos
2021 Phelps Grant Recipient

Fernando Fernandes dos Santos received his BSc degree in Computer Science from Universidade Estadual do Oeste do Paraná (UNIOESTE) in 2014 and his M.Sc. degree from Universidade Federal do Rio Grande do Sul (UFRGS) in 2017. Currently, he is a Ph.D. student at UFRGS working on fault tolerance in HPC and safety-critical applications.

Mariia Gorchichko received the Specialist Degree



Photo: Mariia Gorchichko
2021 Phelps Grant Recipient

from the National Research Nuclear University "MEPhI" in Moscow, Russia, in 2016, and her Master's Degree in Electrical Engineering from Vanderbilt University in 2019. From 2014-2017, she was a Trainee, Engineering Technician, and Research Engineer with JSC Russian Space Systems, Moscow, Russia. In these positions, she developed an FPGA-based bus controller, designed and performed gamma-irradiation tests, and developed and calibrated SPICE models and macro-models to account for the effects of total-ionizing-dose (TID) effects on microelectronics for use in space systems. During her Master's and Ph.D. research at Vanderbilt, Mariia has performed original studies of the TID response, low-frequency noise, and random-telegraph noise of MOS devices with complex architectures and nanoscale dimensions. Mariia has been author or co-author of eight peer-reviewed journal articles. Mariia has presented her work at several international conferences, including the IEEE Nuclear and Space Radiation Effects Conference (NSREC), and was co-author of the Outstanding Student Paper of the 2019 NSREC.

2021 IEEE/NPSS Radiation Effects Award



Lloyd Massengill
2021 IEEE/NPSS Radiation Effects Award recipient

Lloyd Massengill,
Vanderbilt University and
Reliable MicroSystems LLC

Lloyd W. Massengill is a Professor of Electrical and Computer Engineering at Vanderbilt University in Nashville, TN. He received the Ph.D. degree in Electrical and Computer Engineering from North Carolina State University in 1987 and joined Vanderbilt that same year. During his 30+ year academic career, Prof. Massengill has been involved in the development of modeling techniques to simulate the failure modes of integrated circuits in hostile environments, allowing designers to identify and correct potential risks prior to deployment. He has led research into fundamental radiation exposure failures in modern integrated systems which led to the discovery of mechanisms such as rail-span collapse, single-event charge sharing, and pulse quenching. Additionally, he has developed analytical models for single event upset and single event pulse broadening, and he has been involved in the creation of novel fault-tolerant circuit designs, including DILL, DCC, SNACC, and hardened A/MS subsystems including ADCs, PLLs, and SERDES. This work has been supported by the DoD across DTRA, NRO, USN, USAF, OSD, DARPA; and by many of the commercial firms involved in the Defense Industrial Base. He has over 400 publications in the area.

In the 1990s, Dr. Massengill helped establish the Radiation Effects Research Group at Vanderbilt, now the world's largest academic group specializing in the effects of radiation on ICs. Over his career he has trained many young engineers in the fields of rad-effects modeling and rad-hard design of integrated circuits, many of whom remain in this field today.

In 2003, he co-founded the Vanderbilt Institute for Space and Defense Electronics, an academic center providing research-driven engineering support for mission-critical microelectronic circuits. This center has provided a radiation-vulnerability assessment for every major technology node to 7nm and the primary radiation-response models to the DoD in support of several major acquisition programs, including the U.S. Navy and U.S. Air Force.

In 2016, he founded Reliable MicroSystems LLC, a design services company specializing in concept-to-foundry creation of high-reliability electronics for fault-tolerant applications. He established Reliable MicroSystems to meet customer-driven needs for the application of advances in fundamental research to applied hi-reliability system design, both commercial and DoD.

Dr. Massengill has been Guest Editor for the IEEE *Transactions on Nuclear Science*, Technical Program Chair, Short Course Chair, and General Chair for the IEEE Nuclear and Space Radiation Effects Conference. He has also served as Chairman of the HEART Society Steering Group. He is a Fellow of the IEEE.

Citation: for technical contributions to understanding radiation effects in microelectronics and leadership in the radiation effects community.

Radiation Effects Call for 2022 Award Nominations

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

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 NSREC Provo, Utah. 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, NASA GSFC, for the Radiation Effects Steering Group.

Michael can be reached at michael.j.campola@nasa.gov.

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 NSREC Provo, Utah. 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, NASA GSFC, for the Radiation Effects Steering Group. Michael can be reached at michael.j.campola@nasa.gov.

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, Utah. 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 Ruben Garcia Alia, Member-at-Large, NASA GSFC, for the Radiation Effects Steering Group. Ruben can be reached at ruben.garcia.alia@cern.ch

Teresa Farris, Radiation Effects Vice Chair for Publicity can be reached by E-mail at farris@archon-llc.com.

PUBLICATIONS



Steven J. Gitomer
Editor-in-Chief

Announcing the 2021 TPS Best Paper Award

The winner of the 2021 TPS Best Paper Award has been selected (please refer to our TPS home page for details about the award at <https://ieee-npss.org/publications/transactions-on-plasma-science/>). This year is the third year that the award is being given, and I am pleased to announce that the paper, "A Primer on Pulsed Power and Linear Transformer Drivers for High Energy Density Physics Applications" Published in: IEEE *Transactions on Plasma Science*, Volume: 46, Issue: 11, Nov. 2018, Page(s): 3928 – 3967. The lead author of this 40 author paper is Professor Ryan D. McBride, of the Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, MI, USA. See Professor McBride's biosketch along with the full list of coauthors and abstract of this paper below. The award plaque, certificate and check will be presented to Professor McBride representing the team of co-authors at an upcoming virtual IEEE NPSS Pulsed Power Conference in December 2021. This is an open access paper and is freely available to our readers. Congratulations to Professor Ryan McBride and the team of co-authors on this accomplishment.

R. D. McBride (Member, IEEE, 2000) received the Ph.D. degree from Cornell University, Ithaca, NY, USA, in 2009, where he conducted experimental research on wire-array z-pinch implosions using the 1-MA COBRA pulsed-power facility. From 2008 to 2016, he was with Sandia National Laboratories, Albuquerque, NM, USA, where he held appointments as a Staff Physicist and a Department Manager. At Sandia, he conducted research in nuclear fusion, radiation generation, and high-pressure material properties using the 25-MA Z pulsed-power facility. Since August 2016, he has been an Associate Professor with the Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, MI, USA. In May 2021, he became the Director of the University's Plasma, Pulsed Power, and Microwave Laboratory, which includes two linear transformer driver (LTD) facilities: MAIZE (~1MA, ~100 ns) and BLUE (~150 kA, ~100 ns). His research interests include plasma physics, nuclear fusion, high-power radiation generation, pulsed-power technology, plasma diagnostics, and the dynamics of magnetically driven, cylindrically imploding systems. Most recently, his research has been focused on both experimental and theoretical studies of magnetized liner inertial fusion (MagLIF). MagLIF is presently one of the United States' three mainline approaches to studying controlled inertial confinement fusion in the laboratory

39 Co-authors...W. A. Stygar, M. E. Cuneo, D. B. Sinars, M. G. Mazarakis, J. J. Leckbee, M. E. Savage, B. T. Hutsel, J. D. Douglass, M. L. Kiefer, B. V. Oliver, G. R. Laity, M. R. Gomez, D. A. Yager-Elorriaga, S. G. Patel, B. M. Kovalchuk, A. A. Kim, P.-A. Gourdain, S. N. Bland, S. Portillo, S. C. Bott-Suzuki, F. N. Beg, Y. Maron, R. B. Spielman, D. V. Rose, D. R. Welch, J. C. Zier, J. W. Schumer, J. B. Greenly, A. M. Covington, A. M. Steiner, P. C. Campbell, S. M. Miller, J. M. Woolstrum, N. B. Ramey, A. P. Shah, B. J. Sporer, N. M. Jordan, Y. Y. Lau, and R. M. Gilgenbach

ABSTRACT: The objectives of this tutorial are as follows: 1) to help students and researchers develop a basic understanding of how pulsed-power systems are used to create high-energy-density (HED) matter; 2) to develop a basic understanding of a new, compact, and efficient pulsed-power technology called linear transformer drivers (LTDs); 3) to understand why LTDs are an attractive technology for driving HED physics (HEDP) experiments; 4) to contrast LTDs with the more traditional Marx-generator/pulse-forming-line approach to driving HEDP experiments; and 5) to briefly review the history of LTD technology as well as some of the LTD-driven HEDP research presently underway at universities and research laboratories across the globe. This invited tutorial is part of the Mini-Course on Charged Particle Beams and High-Powered Pulsed Sources, held in conjunction with the 44th International Conference on Plasma Science in May of 2017.

Liaison Reports

HUMANITARIAN ACTIVITIES: IEEE SMART VILLAGE

Once again, we can report that IEEE Smart Village continues to move forward on several important fronts despite interferences of the COVID Pandemic.

NPSS PROJECTS: ZAMBIA AND ARGENTINA

The two main NPSS-supported projects reported upon last Newsletter, *Electrification to Combat Deforestation Areas of Chaco Argentina*, and a UNHCR Refugee camp/ city of 15,000 people in Mayukwayukwa, Zambia, are making deployment plans and fine tuning of business plans and on-the-ground teams for launch. The detailed business plans are complex and need to show paths to both financial sustainability as the result of the initial pilots plus a path to financial scalability to benefit at least a million people. COVID has delayed access but not stopped moving the projects forward. These are both maximum grant projects (\$200k) that must show realistically clear paths forward, requiring extra scrutiny up front. Review meetings for finalization of technical and business goals to launch are scheduled to be complete by December 31st.



Ray Larsen
IEEE NPSS Liaison to IEEE SSIT and Humanitarian Activities, Past Chair, ISV

ISV-ROTARY-GLOBAL TELEHEALTH NETWORK (GTN) PROJECTS: UGANDA AND KENYA

The initial GTN, electrification and Internet projects were designed to service a Boys' School, Hospitals, Clinics, and a Refugee Camp of 123,000 near the DR Congo border. The projects involve the support of two ISV Entrepreneurs, Renewable Energy Innovators (REI) in Cameroon, and Maa Trust in Kenya, as well as the local Rotary Clubs. Telehealth is a centerpiece of both, designed to extend care to currently unserved or underserved areas. ISV provides the critical electricity and internet/intranet connectivity, as well as developing future plans for electric vehicles to make remote village mobile clinic visits on a regular basis. All key medical personnel are in-country or at least on the Continent. Each project has very strong on-the-ground leadership from local Rotary Clubs who are well steeped in managing and securing Rotary Global Grant funding for major projects. The grants and Club donations for these projects were over \$254K, with ISV providing 70K, a leveraging ratio of 2.6X. Funding through Rotary Grants is complicated and was mastered only by the patience and persistence of Dr. Jack Higgins, MD, of Los Altos Rotary Club and President of the Global Telehealth Network (GTN) partner. Both projects are now fully funded and underway.

STANFORD CONFERENCE ON IDEAL VILLAGES September 29th-30th, 2021

6th Annual Ideal Village Conference: "Post-Pandemic Normal—The Path Forward"

This organization started in 2015, the same year that ISV moved from an independent IEEE Community Solutions Initiative Committee (CSI) to IEEE Smart Village (ISV). Ray Larsen, co-founder of ISV, was invited to present at the first Conference but there was no intervening interest in ISV's work until this year when we were again invited to speak, and also to chair a one-hour Session called *Energy and Environment* with three speakers as follows:



Professor, Sunny Anand

John Nelson, P.E., ISV President, "An Overview of IEEE Smart Village".

Dr. Paul N. Edwards, Director of the Program on Science, Technology & Society at Stanford; Co-Director of the Stanford Existential Risks Initiative, "The Sixth Assessment Report of the IPCC" (Intergovernmental Panel on Climate Change Working Group I, August 2021)"

Dr. Robin Podmore, ISV Co-Founder and Vice President, ISV-Rotary e-Club of Silicon Valley, President "The Rotary International and IEEE Smart Village Partnership".

These talks were all well received and noted by the organizers as a highlight of the conference. The entire program featured excellent speakers on topics of interest to ISV members. The two-day sessions were:

Wednesday, Sept. 29th, 2021 (Pacific Time; 7:30AM-12:00PM):
Healthcare, Education, Water & Sanitation, Inaugural & Closing Keynotes, Key Takeaways

Thursday, Sept. 30th, 2021 (Pacific Time; 7:30AM-12:00PM)
Sustainable Livelihoods, Energy & Environment, Societal Issues, Closing Keynote, Key Takeaways

All talks can be viewed on FaceBook and YouTube here:
<https://www.facebook.com/science4society>; <https://www.youtube.com/IdealVillageConference>

We strongly recommend the Climate Change Zoom presentation by Paul Edwards, but there are many outstanding talks in most other sessions as well. The strongest emphasis was the creation of sustainable businesses and livelihoods by many unique technology avenues, especially some focusing on women's empowerment for sustainable livelihoods from waste and agricultural products. The reduction of thousands of tons daily of wastes in major cities for land reclamation and recycling by-products is especially impressive.

Follow-up Meetings: Due to the strong feedback from over 1200 attendees and thousands of hits on the FaceBook and YouTube links, including by interested Silicon Valley investors, the organizers decided to aim for an early follow-up meeting at Stanford to discuss next steps in promoting collaborations. Both ISV and WHEELS

Donations to IEEE Smart Village may be made through the IEEE Foundation:
https://www.ieeefoundation.org/SmartVillage_donation

Continued on PAGE 8

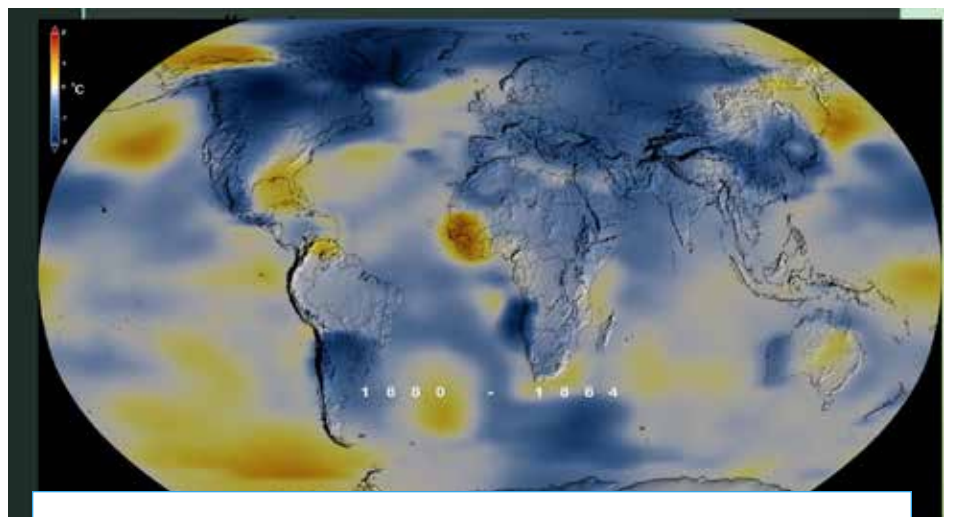
Cumulative Achievements – Feb 2021

- Direct ISV Funding – Seeding Entrepreneurs**
 - 190 Stand-alone deployment sites initiated
 - 87 projects in 18 countries since 2009
 - 16 Active projects in 9 countries
- Leveraging – ISV Incubation Leads to Scaling**
 - 6,346+ PV Solar Panels installed producing 929.3 KW *
 - 41.04 MWh of installed energy storage *
 - 62,429 Customer Connections
 - 187,974 Currently receiving the benefits of power
 - 5,033 Connections to productive uses of power
 - 628+ New business start-ups since arrival of power
 - 1.35+ Million people under transformation to receive power

* Outlier: GVE 4,000 panels & 38.5 MWh storage

Going to Scale
Key is Leveraging Numbers are the cumulative sum of ISV + 3rd party funded programs

ISVx Summary to 2021, John Nelson, President



Global Temperature Mid Industrial Revolution- Dr. Paul Edwards, Stanford & U. Michigan

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Rotary Focus Areas ← Supported By → **IEEE Smart Village Technologies**

Reliable Electricity

Telecomms & Internet

Computers

Electric Transportation

Environment

AI – Virtual Instructors

ISVx-Rotary Partnership, Dr Robin Podmore, ISV VP & President Silicon Valley ISV Rotary e-Club

CONSTRUCTION & DEMOLITION (C&D) WASTE from RECYCLABLE WASTE

PROBLEM

SOLUTION

Shastri Park C&D Processing facility recycling more than 85% C&D waste

In absence of these facilities, this waste would end up in the eco-sensitive areas like Yamuna

Waste Recovery India

Liaison Reports Continued from PAGE 7

Global Foundation, listed as Partners of the meeting, were called upon in the Closing Keynotes, and invited to a follow-up strategy meeting at Stanford on October 15th to explore partnerships such as SVSV, the new ISV Rotary e-Club of Silicon Valley led by (ISV VP) Dr. Robin Podmore, President. Ideal Village Conference partners are exploring options for launching a "Rural Development Center of Excellence" at Stanford to coordinate, collaborate, and communicate the efforts of multiple entities (including ISV) dedicated to eliminating rural poverty from the 'Global Village,' a term coined by Marshall McLuhan in 1962: <https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp111999>

ISV MANAGEMENT AND SOCIETIES GOVERNING BOARD MEETING REPORT

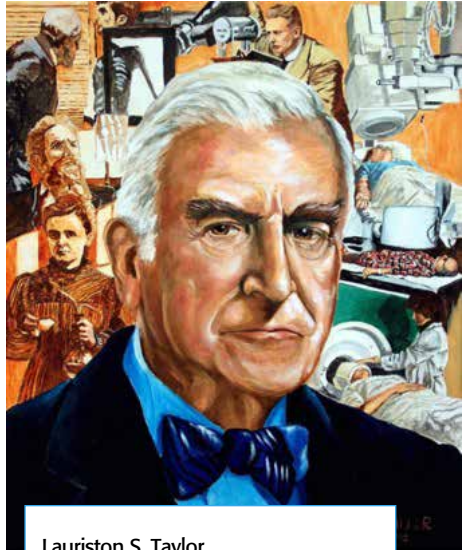
The management of ISV consists of a GOVERNING BOARD (GB), chartered in June 2020, of twelve Societies and one Council, each with an appointed member. Prof. Jane Lehr is the current NPSS member. Pedro Ray, 2010 IEEE President, is President of the GB. Additional members of the GB are ISV President John Nelson, Finance Vice President Ed Rezek, and two members elected by ISV Entrepreneurs, Jude Numfor, CEO of Renewable Energy Innovators Cameroon, and Monica LaBiche Brown, President of Africa Development Promise in Uganda and Rwanda.

The meeting of October 15th was chaired by Joe Lillie, who recently served as IEEE Board Finance Chair but formerly served three years as ISV Finance Chair and was hugely helpful. Joe also reported as Chair of a GB ad hoc committee charged by President Pedro Ray to review where ISV might best "fit" within IEEE in future from a high-level IEEE perspective. Jane Lehr of NPSS served on the ad hoc, which considered seven different alignment options. Joe reported on the status of ad hoc discussions so far, to be discussed further in the GB at large. We can expect further discussions from those responsible for the high-level IEEE structure and financial management.

The ad hoc committee summary statement to date was that any alignment change must "strengthen ISV relationships with all TAB Societies or materially improve engagement of IEEE members volunteering and supporting the program."

John Nelson, ISV President, has welcomed the *ad hoc* efforts and specifically strives to engage GB members and other Society volunteers directly in the work of finding, developing, evaluating and supporting all new entrepreneurial initiatives through and beyond the pilot project stages.

NATIONAL COUNCIL ON RADIATION PROTECTION (NCRP)



Lauriston S. Taylor
Chair of first U.S. Advisory Committee on X-ray and Radium Protection

The roots of the National Council on Radiation Protection and Measurements (NCRP) as a non-profit, Congressionally-chartered, scientific organization go back more than 90 years and are intimately related to the formation of its international counterpart, the International Commission on Radiological Protection (ICRP). In July 1928, with the idea of forming an international organization on radiological protection, the Second International Congress of Radiology invited several countries to send representatives to the Congress to discuss protection problems and prepare initial X-ray protection recommendations. Lauriston S. Taylor, from the National Bureau of Standards (now NIST), was chosen as the U.S. representative to the international radiation protection group. Dr. Taylor's responsibility was to convey the group's recommendations to the various constituencies in the U.S. and obtain their approval to organize a national committee that could deal most effectively with the radiation protection problems faced in the United States. In 1929, the U.S. Advisory Committee on X-Ray and Radium Protection was established with Dr. Taylor acting as chairman. In 1946, the Advisory Committee was renamed the National Committee on Radiation Protection until NCRP was

officially chartered by the U.S. Congress in 1964, at which time it took its current name.

Throughout its history, the Council and its predecessors have functioned as effective advisors to the nation on radiation protection issues and have provided the fundamental guidance and recommendations necessary for the regulatory basis of the control of radiation exposure, radiation-producing devices, and radioactive materials in the U.S. One common theme among all the organizations and regulatory entities and recommending bodies is the philosophy that radiation protection is based on the principles of justification, dose limitation, and keeping the dose to workers and the public As Low As Reasonably Achievable (ALARA). The effectiveness of the ALARA principle is demonstrated in the area of occupational radiation safety at U.S. nuclear power plants. Every plant has a well-developed program for maintaining radiation exposures ALARA that involves the entire workforce. As a result, although the annual occupational effective dose limit is 50 mSv, the actual average annual effective dose is about 1 mSv. NCRP recommendations and guidance documents have had a great influence on the application and implementation of these principles and the protection of the population while permitting the beneficial use of technologies that may lead to radiation exposure. This is evident from the more than 200 reports and commentaries published by NCRP.



Headquartered in Bethesda, MD, today NCRP consists of the President, Senior Vice-President, Director of Science, Board of Directors, and Staff together with about 100 Council members covering over 40 scientific disciplines who have been elected by the Council based on their widely recognized



The workload continues to grow so attracting new volunteers is critical.

HISTORICAL NOTE: IEEE Smart Village grew up from a maverick subcommittee of the IEEE and UN Foundation *Humanitarian Technology Challenge* that we called the *Community Solutions Initiative* (CSI), to stress the necessity of community engagement and empowerment, not just better-mousetrap designs. In 2015 it gained status as ISV, an IEEE-wide non-profit under support of the IEEE Foundation, administered by Power and Energy Society but continuing support depends upon future performance and other factors. ISV is striving to greatly strengthen partnership ties (e.g. WHEELS and Rotary) but also to develop support from private partners and donors beyond the IEEE family.

Special thanks to all involved and especially the new Working Groups in Southeast Asia (India, Bangladesh, Sri Lanka), Africa, Latin America, North America, Oceania, and China; these will be featured in future issues.

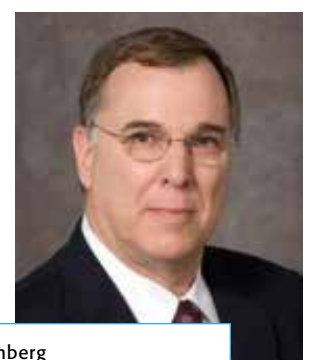
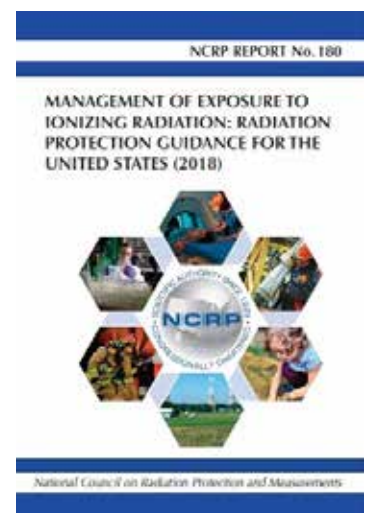
Ray Larsen, NPSS Liaison to SSIT and Humanitarian Projects via IEEE HAC and SIGHT, can be reached by E-mail at larsen@slac.stanford.edu.

expertise in their respective scientific fields. These scientists volunteer their time to provide to the Nation independent expert assessments and recommendations on a wide variety of radiation health issues requested by the federal agencies and departments in the public interest. The full scope of NCRP activities is organized under seven Program Area Committees (PACs) each with its own Scientific Vice-President.

Among the more notable of NCRP's most recent publications is Report No. 180 on radiation protection guidance for the United States authored by NCRP Council Committee (CC) 1. This document was requested by the NRC and EPA in advance of federal regulatory revisions of radiation protection standards. The Report updates the previous (1993) NCRP Report No. 116 which recommended the basic radiation protection practice and dose limits that were adopted by federal and state regulations and have been in use for decades. This project offered NCRP the opportunity to develop radiation protection guidance considering new knowledge of radiation effects and the cultural and societal changes that have occurred over the last several decades. Report No. 180 included sources and exposures that were not specifically addressed in previous recommendations, such as patients exposed during diagnostic and interventional medical procedures, caregivers for patients treated with radioactive materials, voluntary participants who may be exposed to ionizing radiation in medical research, emergency workers, and the general public exposed to naturally occurring radiation sources, including those enhanced by technology. This is one of many examples of NCRP's impact on the science of radiation protection and measurements. Some sense of the impact can be observed in the over 16,400 citations to NCRP documents that have occurred in just the last 20 years.

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Ida Henrietta Hyde and The Micro-Electrode

by Nathan Brewer, IEEE History Center, reprinted from InSight, 15 Nov 2021

Ida Henrietta Hyde was born in Davenport, Iowa, on 8 September 1857 to Meyer and Babette Heidenheimer, who had changed their name to "Hyde" after immigrating to the United States from Germany. From an early age, Hyde took a great interest in education, attending classes at the Chicago Athenaeum at age sixteen. While working long weeks, she was able to save up enough money to attend one year of college in 1881, passed the county and Chicago teachers' exams, and taught in the Chicago area until 1889. Inspired by a teachers seminar at Martha's Vineyard, she wanted to pursue a career in science, and applied to Cornell, where she graduated in 1891 with an AB in Zoological Science. Shortly afterwards, she was awarded a scholarship to Bryn Mawr, where she conducted research at the U.S. Fish Commission at Woods Hole, Massachusetts.

Hyde was awarded an Association of Collegiate Alumnae fellowship to study in Europe, initially studying at the University of Strassburg. She was advised by Professor Alexander Goette, director of the zoology department, to petition the Reichstag for the privilege of being allowed to work for her doctorate, and eventually withdrew the petition after the idea was strongly contested by several members of the Strassburg (modern-day Strasbourg) faculty. Afterwards, she later applied to the University of Heidelberg, and while she was permitted to take the examination for the doctorate, she was not permitted to attend lecture or laboratory classes, and had to work independently from loaned books and lecture notes taken by the professor's assistant. Despite these setbacks, she earned her doctorate in 1896.

After returning to the United States, she was hired under William Townsend Porter in the Department of Physiology at Harvard University in 1896, and co-founded the Naples Table Association for Promoting Scientific Research by Women in 1897. Hyde founded the physiology department at the University of Kansas in Lawrence in 1899. At the time, it was a rarity for a woman to be employed as faculty at a coeducational college. In 1902, she was the first woman elected to the American Society of Physiologists. She taught at the University of Kansas until she was forced out of her position in 1916. In 1918, she took a leave of absence for wartime duties, and extensively traveled for three years, formally retiring in 1920.

In 1918 and 1919, Hyde conducted experiments on unicellular organisms and echinoderm eggs, and found it necessary to construct a micro-pipette that was more accurate than the existing Barber or Chamber apparatuses. Barber's apparatus was developed in 1912, and building on his work, she invented a micro-electrode, which consisted of a Barber pipette modified for unipolar stimulation. This consisted of glass tubes about twelve centimeters long and six millimeters in diameter, drawn out to a bent tip, with pipettes containing mercury or an electrolytic solution, or a fine wire that would allow current from a battery to manipulate the meniscus of the mercury. The observations of the behavior of mercury led to the idea that the micro-electrode could be adapted for the injection or extraction of minute quantities of substances from unicellular structures while transmitting electrical stimulation to an individual cell. This ability was an improvement over the Barber and Pratt designs, which could not simultaneously stimulate the interior of a cell while drawing from or injecting material into the cell.

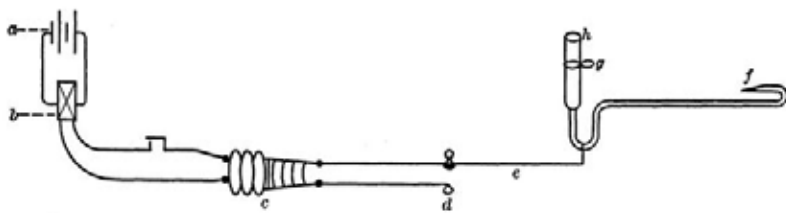


FIG. 1. a, battery; b, commutator; c, induction coil; d, clamp; e, platinum wire; f, tip of pipette; g, clamp; h, rubber tubing.

Illustration of Hyde's micro-electrode from her paper "A Micro-Electrode and Unicellular Stimulation," *Biological Bulletin*, Vol. 40, No. 3, March 1921

While Hyde's electrode is the earliest known micro-electrode for intracellular work, her experiments in this area were not widely published, and she received little recognition for the invention in her lifetime. Hyde only published a single paper on the subject in *Biological Bulletin*, and similar principles were independently rediscovered in the 1940s by Judith Graham and later Ralph Gerard, who was nominated for a Nobel prize in the 1950s for his work on the micro-electrode.

During her retirement, Hyde was still active in research and publishing until her death on 22 August 1945. She published her paper on the micro-electrode in 1921, and established a scholarship fund at the University of Kansas to benefit women pursuing careers in the sciences, which has been awarded to more than one hundred women. Hyde's broad research career made her a pioneer in many areas related to physiology, her micro-electrode research in particular being an early achievement in engineering in medicine and biology.

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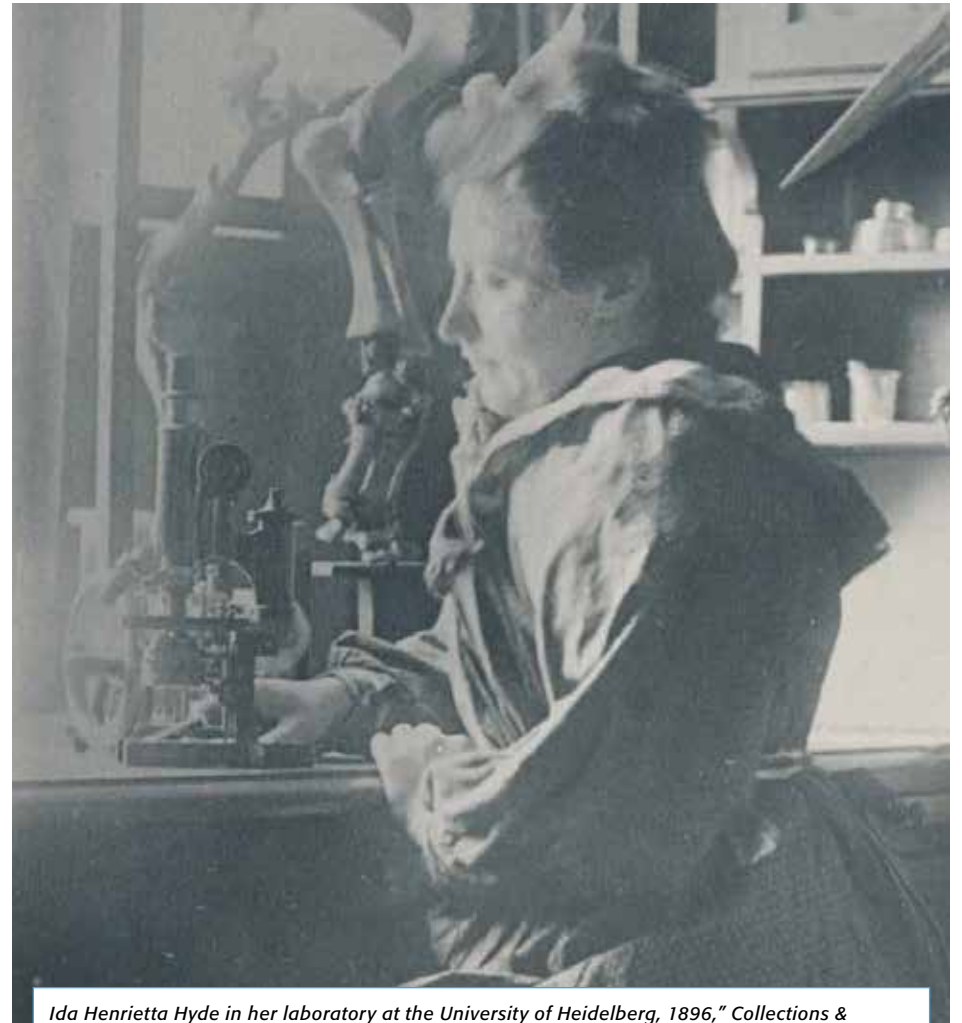
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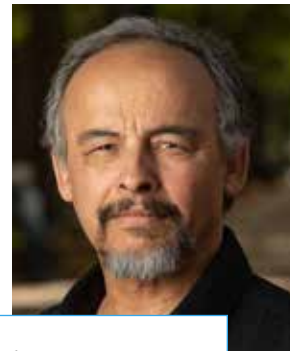
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Ida Henrietta Hyde in her laboratory at the University of Heidelberg, 1896," *Collections & Exhibits*, accessed 15 October 2021.

Never Give Up on Your Ideas

By Mounir Laroussi



Mounir Laroussi

I was recently reading an article on the Pfizer and Moderna COVID-19 vaccines and how scientists of global origins and different backgrounds are behind their development. These include Dr. Moncef Slaoui, a Moroccan-born scientist, who was the US administration's point man in charge of operation Warp Speed, Dr. Noubar Afeyan (the Chairman of Moderna), an Armenian inventor, biotechnologist, and entrepreneur born in Beirut, Lebanon, and Drs. Ugur Sahin and Ozlem Tureci the Turkish/German founders of BioNTech (which makes the Pfizer/BioNTech vaccine). But what attracted my attention the most was the Hungarian-born biochemist who is one of

the pioneers of messenger RNA based vaccine. Her name is Dr. Katalin Kariko and she is senior vice-president of BioNTech RNA Pharmaceuticals. Early on in her career little interest was shown to her groundbreaking work on mRNA mediated therapies. When she worked in academia no funding agency was interested in funding her research and ultimately, she ended up being demoted from her university position. This dramatic saga of the development of mRNA-based therapy reminded me of the difficulties experienced during the early emergence of low temperature plasma for biomedical applications. In the early 1990s sources of low temperature atmospheric pressure plasmas were developed by a few research groups, mostly to be used for material processing applications such as modifying the surface properties of plastics and non-woven fabrics. Around 1994 it occurred to me that what the plasma was doing to the surface of an inanimate material could also do to the surface of a living organism, like a biological cell. That was when I carried out my first experiments on using non-equilibrium atmospheric pressure plasma for biological applications. This quickly got me in some unexpected trouble. First, no one was pleased with me conducting "biology-related" work in an Engineering Department. Second, as a junior faculty member I was not supposed to stray too far from the main staples of the laboratory where I conducted my experiments. But more discouraging was the fact that no funding agency seemed interested in supporting my research. The first reason given to me was that there was no easy way for the reviewers to determine if this was a viable idea as there was no peer reviewed prior literature to support it. Afterwards, the reasons took more practical nuances such as "we do not fund biomedical related work" or "we do not fund plasma physics related work", depending on which funding agency I was talking to. In other words, this line of research did not fit anywhere within existing well-defined programs. I eventually got my first funding from AFOSR, thanks to a visionary and bold program director by the name of Robert J. Barker. In addition, the editor-in-chief of the IEEE Transactions on Plasma Science (TPS), Steven Gitomer, was receptive to the idea of giving an opportunity for work on such a promising multidisciplinary application of plasma to be published. This helped change things and allowed this emerging research to be widely disseminated. Today, the field of the biological and medical applications of plasma has reached some remarkable milestones thanks to outstanding contributions from many scientists from around the world. Low temperature plasma is now used for wound healing and in dermatology and work is in progress to develop plasma-based cancer therapies. Another fascinating line of research is the use of low temperature plasma in agriculture. In this application, plasma is used to the treat/decontaminate fruits, vegetables, and legumes for longer shelf life, to modify the wettability of the surfaces of seeds, to enhance the germination speed and yield of plant seeds, and to produce fertilizers on site.

The lesson to draw from the above-described experiences, especially for young researchers, is that innovation often comes with a heavy toll to those who pursue it. However, if you believe in your ideas and if you persevere, the reward can be more than you ever imagined, and sometimes as spectacular and impactful as that experienced by Dr. Katalin Kariko.

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Dr. Eiichi Tanaka



Dr. Eiichi Tanaka

Dr. Eiichi Tanaka, a great pioneer in nuclear medical physics, passed away on August 21st, 2021, at the age of 93. He was born in Himeji, Japan in 1927, considered to be the birth year of nuclear medicine instrumentation when, for the first time, H. L. Blumgart measured the blood circulation time between both arms of a human being using RaC (Bi-214). As a high school student, Dr. Tanaka was in Hiroshima on August 6th, 1945, at a distance of about 6 kilometers from the hypocenter of the atomic bomb. This momentous event marked his first involvement with radiation. In 1957, he joined the National Institute of Radiological Sciences (NIRS),

which was established in the same year. At that time in the Cold War, the world's military powers were rushing to develop nuclear bombs and weapons, and he started the development of a whole-body radioactivity measurement system to monitor radioactivity contamination due to radioactive fallout.

The 1960s were the decade of development of gamma cameras following the first invention by Dr. Anger. Dr. Tanaka presented a theory to maximize the resolution performance of Anger-type cameras, and he successfully verified this theory using his own original idea of the delay line method. The 1970s were the decade of tomographic imaging, and the commercialization of X-ray CT by EMI made a big impact. Dr. Tanaka was one of the chasers in a very active competition to find an ideal filter for the filtered backprojection method. He found his own answer to this problem, but when it was reported, Dr. Tanaka noticed that he was the second to have made the discovery. With a practical image reconstruction algorithm, PET became a hot topic and was being studied worldwide. Dr. Tanaka developed Japan's first PET, Positologica I, in 1979, which was only 4 years after the emergence of the world's first practical

PET introduced by Dr. Ter-Pogossian and co-workers. The 1980s were the decade of the development of high-resolution detectors, and Dr. Tanaka realized the world's first small animal PET system, Positologica IV in 1983.

In addition to these developments of PET systems, Dr. Tanaka dedicated himself to carrying out many fundamental studies, on such topics as the variable sampling-time technique used in scintillation detectors, the line-writing method for time-of-flight PET imaging, the evaluation of multi-ring PET systems and the theoretical analysis of statistical noise in PET. He also took up the challenge of solving the attenuation correction problem in SPECT, and proposed the weighted back-projection method and the radial post-correction method as solutions.

After retiring from NIRS in 1988, Dr. Tanaka transferred the place of his research activities to Hamamatsu Photonics, where he facilitated the company's business expansion into developing devices for PET applications until his retirement in 2014. The 1990s were the decade of the technology transformation from 2D-PET to 3D-PET,

and Dr. Tanaka's work contributed to image reconstruction theory. He proposed a new variation of iterative reconstruction methods, Dynamic RAMLA (DRAMA), in 2003, and he reported the performance analysis of DRAMA in 2010 on Physics in Medicine and Biology, which became his last journal publication.

He gave an impressive invited talk in Tokyo in 2018, which was published in "2018 Reports on PET Imaging Physics Research". He dedicated his professional life to the peaceful uses of atomic energy. His attitude to pursue the essence of a problem and realize its solution was an inspiration to us all.

This remembrance was written by Taiga Yamaya, National Institutes for Quantum Science and Technology (formerly NIRS), and Hideo Murayama, NIRS (retired).

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CONTRIBUTED ARTICLES

Publicity releases for forthcoming meetings, items of interest from local chapters, committee reports, announcements, awards, or other materials requiring society publicity or relevant to NPSS should be submitted to the Newsletter Editor no later than January 5, 2021, for inclusion in the March 2022 Newsletter.

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

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

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