

# Nuclear & Plasma Sciences

SOCIETY NEWS

Number 1 • March 2006

## CONFERENCES

### ICOPS 2006

## The 33rd IEEE International Conference on Plasma Science

### ICOPS 2006

Traverse City, Michigan, 4-8 June 2006

[www.icops2006.org](http://www.icops2006.org)

We cordially invite you to attend the 33rd IEEE International Conference on Plasma Science, sponsored by the Plasma Science and Applications Committee of the IEEE Nuclear and Plasma Sciences Society. ICOPS 2006 will be held near Traverse City, Michigan from June 4 through June 8, 2006. The conference venue is the Grand Traverse Resort and Spa located along the shores of Lake Michigan's East Grand Traverse Bay.

ICOPS 2006 will feature an exciting technical program with reports from around the globe about new and innovative developments in the fields of plasma science and engineering. Leading researchers will gather to explore basic plasma physics, high-energy-density plasmas, inertial-confinement fusion, magnetic fusion, plasma diagnostics, pulsed-power plasmas, microwave generation, lighting, micro- and nano-applications of plasmas, medical applications and plasma processing.

Conference Topics will be organized under the following categories:

- Basic Processes in Fully and Partially Ionized Plasmas
- Microwave Generation and Plasma Interactions
- Charged Particle Beams and Sources
- High Energy Density Plasmas and Applications
- Industrial, Commercial, and Medical Plasma Applications
- Plasma Diagnostics
- Pulsed Power and Other Plasma Applications

The conference will include four plenary talks relevant to the plasma physics community given by recognized leaders in their fields as well as oral and poster sessions. In addition, a special minicourse featuring Plasma Processing Technologies will be held as part of the conference on the 8th and 9th June.

We intend to ensure that the Technical Program

*continued on page 3*



**Jes Asmussen**  
Chair



**Timothy Grotjean**  
Co-chair



**Thomas Schuelke**  
Finance Chair



**Claire Rosser**  
Conference  
Coordinator

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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 by April 3, 2006.

### CONTRIBUTED ARTICLES

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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of ICOPS 2006 and your stay in the Grand Traverse area will be rewarding and enjoyable. We look forward to welcoming you at Grand Traverse, June 4-8, 2006.

For more information contact [info@icops2006.org](mailto:info@icops2006.org) or visit our website at [www.icops2006.org](http://www.icops2006.org).

Jes Asmussen Chair, ICOPS 2006  
Timothy Grotjohn Co-Chair, ICOPS 2006

### CONFERENCE LOCATION

The Grand Traverse Resort and Spa is the Midwest's largest full-service, year-round resort and conference center, ranked in the top 50 travel destinations and services worldwide by *Conde Nast Traveler*. Situated on 1,400 acres in the northwest corner of Michigan's Lower Peninsula along the shores of Lake Michigan's East Grand Traverse Bay, it is just 10 minutes from Traverse City's Cherry Capital Airport. Traverse City Airport has daily direct flights from many major cities such as Chicago, Minneapolis, New York, Cincinnati, Dallas and Detroit.

The Grand Traverse area is blessed with wonderful weather during summer and offers an abundance of recreational activities including beautiful beaches and parks, superb golf courses, hundreds of miles of scenic hiking and biking trails, first-rate fishing and countless sailing and water-sport pursuits. In addition, you can find unique gifts at fine shops, explore a museum, or visit award-winning restaurants and local wineries.

As for recreational activities, the resort itself boasts three exceptional golf courses, one of which was designed by Jack Nicklaus and is a *Golf Magazine* Silver Medal Resort.

There is also a state-of-the-art spa offering services that are totally dedicated to health, well-being and beauty.

### MINICOURSE

**Plasma Processing Technologies:** Industrial Plasma-Deposition Technologies, Reactive Ion Etching, Plasma-Induced Damage, and Carbon-based Materials Processing

A special two-day minicourse will be offered on Thursday and Friday, 8 and 9 June, at the end of the ICOPS conference. The course will be two full days and will tackle issues relevant in modern industry and research in the field of Plasma Processing Technologies. The instructors are highly accomplished plasma research

experts from industry, national laboratories, and universities who will relate their knowledge in the areas of thin film deposition, reactive ion etching, plasma-induced damage in ULSI manufacturing and the emerging field of carbon-based materials processing.

Industrial process engineers, graduate students and scientists researching the area of plasma-based thin film synthesis or anyone wishing to augment their knowledge in these areas is encouraged to attend.

### ICOPS 2006 TECHNICAL PROGRAM

- **Basic Processes in Fully and Partially Ionized Plasmas**
  - o Basic Phenomena
  - o Space Plasmas
  - o Partially Ionized Plasmas
  - o Computational Plasma Physics
  - o Dusty Plasmas
- **Microwave Generation and Plasma Interaction**
  - o Intense Beam Microwave Generation
  - o Fast-Wave Devices
  - o Slow-Wave Devices
  - o Vacuum Microelectronics
  - o Codes and Modeling
  - o Microwave Systems
  - o Microwave Plasma Interaction
- **Charged Particle Beams and Sources**
  - o Plasma, Ion and Electron Sources
  - o Intense Electron and Ion Beams
- **High Energy Density Plasmas and Applications**
  - o Fusion (Inertial, Magnetic and Alternate concepts)
  - o Ultrashort Pulse Lasers and Particle Acceleration
  - o Z-pinches and Radiation Sources
  - o High Energy Density Physics
- **Industrial, Commercial, and Medical Applications of Plasma**
  - o Low-pressure Nonequilibrium Plasma Processing
  - o Atmospheric-pressure Nonequilibrium Plasmas
  - o High Pressure and Thermal Plasma Processing
  - o Plasma Thrusters
  - o Plasmas for Lighting
  - o Microplasmas and Flat-panel Displays

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## Math lesson

There are two kinds of statistics, the kind you look up and the kind you make up.

*Rex Stout*

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## Encore

It is sometimes necessary to repeat what we know. All mapmakers should place the Mississippi in the same place and avoid originality.

*Saul Bellow*

## Human taxonomy

People can be divided into three groups: those who make things happen, those who watch things happen, and those who wondered what happened.

*John Newbern*



- o Medical, Biological and Environmental Applications
- **Plasma Diagnostics**
  - o Optical Diagnostics
  - o Particle Diagnostics
  - o X-ray Diagnostics
- **Pulsed Power and Other Plasma Applications**
  - o Pulsed Power Technology and Other Applications
  - o Pulsed Power Switching

### **SOCIAL EVENTS AND COMPANION ACTIVITIES**

There will be a welcome buffet reception on the evening of Sunday, 4 June and the Conference Banquet will be held Tuesday evening, 6 June.

In addition, Grand Traverse Resort and Spa will be happy to offer advice and make

arrangements for the numerous activities available in the Grand Traverse area. Recreational activities include superb golfing, sailing and water sports as well as scenic hiking and bicycling. A trip to the breathtaking and nationally acclaimed Sleeping Bear Dunes National Lakeshore is a must, and don't forget the 180 miles of sandy beaches. Grand Traverse is also famous for its delightful cherry orchards and wonderful wineries. Other attractions include shopping, museums and award winning restaurants. Companion activities and tours will be offered based on the possible activities described above.

### **GENERAL INFORMATION**

Information related to abstract submission, conference registration, hotel reservation and minicourse registration can all be found on the ICOPS 2006 website [www.icops2006.org](http://www.icops2006.org)

Questions regarding the technical program should be addressed to Jes Asmussen ([asmussen@egr.msu.edu](mailto:asmussen@egr.msu.edu)). Any other questions should be emailed to [info@icops2006.org](mailto:info@icops2006.org).

## 2006 IEEE NSREC is Planning for Ponte Vedra Beach, Florida July 17-21, 2006

The 2006 IEEE Nuclear and Space Radiation Effects Conference will be held July 17-21, 2006 in Ponte Vedra Beach, Florida, at the Sawgrass Marriott Resort and Spa. The conference features a Technical Program consisting of eight to ten sessions of contributed papers that describe the latest observations and research results in radiation effects, an up-to-date Short Course offered on July 17, a Radiation Effects Data Workshop, and an Industrial Exhibit. The Technical Program includes both oral and poster sessions. Janet Barth, NASA Goddard, is General Chair.

The conference hotel is located at Ponte Vedra Beach, Florida, which is on the Atlantic coast between Jacksonville and St. Augustine. A complete technical and social program is being planned to maximize opportunities for information exchange and networking in the areas of radiation effects on microelectronic and photonic devices, circuits, and systems. Supporters of the conference include the Defense Threat Reduction Agency, Sandia

National Laboratories, Air Force Research Laboratory, the NASA Electronic Parts and Packaging Program, NASA Living With a Star Program, and the Jet Propulsion Laboratory.

### **TECHNICAL PROGRAM**

Gary Lum, Lockheed Martin, the 2006 NSREC Technical Program Chairman, with the support of the technical committee, is assembling an outstanding technical program. The Session Chairs for 2006 include both highly experienced members of our community, as well as those who are newcomers to NSREC leadership.

The technical committee will meet in March 2006 for final paper selection. The papers and posters will present the very latest information on radiation effects. Although the deadline for submitting summaries has passed (February 2006), a few late-news papers will be accepted and will be presented in the poster session. The deadline for submission of late-news papers is June 2, 2006. Please submit late-news summaries, using the 4-page sum-



mary and 35-word abstract format, to Gary Lum. Additional information on submission of late-news summaries can be found at <http://www.nsrec.com>.

The technical committee is composed of the conference technical session chairs and the chairs for the Technical Poster Session and the Radiation Effects Data Workshop. Hugh Barnaby of Arizona State University is the chair of the Technical Poster Session, and Dave Hiemstra of MD Robotics is the chair for the Radiation Effects Data Workshop. The Technical Session chairs are Andrea Cester of the University of Padova, Kyle Miller of Ball Aerospace, Bharat Bhuvra of Vanderbilt University, Barbara Von Przewoski of the Indiana University Cyclotron Facility, Jacques Baggio of CEA, Jerry Gorelick of Boeing, John M. Baker of Lockheed Martin, Joe Mazur of Aerospace Corporation, and Jim Schwank of Sandia National Laboratories.

#### **RADIATION EFFECTS DATA WORKSHOP**

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

#### **SHORT COURSE**

Attendees will have the opportunity to participate in a one-day Short Course on Monday, July 17 entitled MODELING THE SPACE RADIATION ENVIRONMENT AND EFFECTS ON MICROELECTRONIC DEVICES AND CIRCUITS.

Chaired by Robert Reed, Vanderbilt, this one-day Short Course will provide a detailed discussion of the methods used by radiation-effects engineers to model the space radiation environment and some of its effects on modern devices and circuits. The remarkable advances in modern device technology offers specific challenges for high-fidelity radiation-effects modeling. These include the need for improved modeling of the variability of the space radiation, the transport of the environment through spacecraft structures and chip packaging, and detailed single-event effects modeling at the device and circuit level.

Four talks on different aspects of the problem will be presented. The first talk will be given by Mike Xapsos, NASA expert in radiation environment modeling, and will focus on methods used to predict the space radiation environment. The second talk of the morning, given by Giovanni Santin, ESA expert in radiation transport, will focus on modeling the basic interactions of radiation with matter. The afternoon session will provide two talks focused on Single Event Effects (SEE) modeling. The first one will focus on the use of Technology Computer Aided Design (TCAD) tools, and will be given by Mark Law, University of Florida, leader in TCAD tool development. Jeff Black, Senior Engineer at the Institute for Space and Defense Electronics, will team with Tim Holman to present the last talk of the day on modeling SEEs in integrated circuits.

#### **INDUSTRIAL EXHIBITS**

This year's Industrial Exhibit will feature the leading suppliers of radiation-hardened products, related materials, and services. The Industrial Exhibit permits one-on-one discussions between exhibitors and conference attendees on the latest in radiation-hardened electronic devices, radiation analysis and test services, and radiation test facilities and test equipment. If you would like to participate in the exhibit, or need more information on the exhibit, please visit <http://HYPERLINK> "<http://www.nsrec.com>" [www.nsrec.com](http://www.nsrec.com) or contact Richard Elmhurst, the 2006 NSREC Industrial Exhibits Chairman.

#### **PONTE VEDRA BEACH, FLORIDA**

NSREC - 2006 will be held at the Sawgrass Marriott Resort and Spa in Ponte Vedra Beach, just south of Jacksonville. Jacksonville and the Beaches are fabulous Florida at its best with a dash of Southern charm added. From expansive beaches and endless saltwater marshes to a modern downtown, exciting shopping and championship golf courses, there are activities to please everyone. Jacksonville is a city adorned with fountains, parks and plazas, with neighborhoods lined with hundred-year old oak trees draped with Spanish moss. St. Augustine is just a short drive away, and offers many attractions including Fort San Marcos, built to defend this oldest city in the United States against would-be invaders. Guided tours on buses and trams and scenic boat tours are a great way to see the city. To the

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**Liberty or ...**

**Marriage is an institution and I'm not yet ready for an institution.**

**Mae West**

---

**Self sufficiency**

**Left to himself he would have created his own opposition.**

**Katherine Frank**

## What's more important?

[She] didn't really care how [the program] was designed to work, as long as it worked as designed.

Jim Hart

North of Jacksonville is Amelia Island, with downtown Fernandina Beach offering antique shopping and fine dining. The Jacksonville area features numerous Florida state parks, including Guana State Park, the Timucuan Preserve and the Fort George historical site. The parks offer opportunities for hiking, fishing, water sports and bird watching. Other Florida attractions such as the Kennedy Space Center and the Orlando attractions are a few hours' drive away.

### CONFERENCE COMMITTEE

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*For further information, visit the conference web site, or contact any of the conference committee at the phone numbers given above.*

## 2006 SYMPOSIUM ON RADIATION MEASUREMENTS AND APPLICATIONS

On May 23-25, 2006, the 2006 Symposium on Radiation Measurements and Applications will be held on the University of Michigan campus in Ann Arbor. This Symposium is the eleventh in a series of technical meetings dealing with ionizing radiation and its applications that began in 1964 and subsequently held at intervals of every four to five years. The First Call for Papers has been issued and the Symposium proceedings will once again be published in *Nuclear Instruments and Methods*. Further details are available at the Symposium website: <http://rma-symposium.engin.umich.edu/call.php>.

## 21<sup>ST</sup> SYMPOSIUM ON FUSION ENGINEERING

### Successful Conference Grows as Interest in Fusion Increases

The 21st IEEE/Nuclear and Plasma Sciences Society Symposium on Fusion Engineering (SOFE05) took place September 26 - 29, 2005 in Knoxville, Tennessee. The Symposium is dedicated to the scientific, technological and engineering issues of fusion energy research. Approximately 240

(188 preregistered, 52+ at the door) participants - about 40% from 10 different countries, and about 15% students - attended the meeting which was hosted by Oak Ridge National Laboratory.

The ITER site decision had recently been announced and SOFE05 was the first interna-



**Nermin Uckan**  
Conference Chair

tional technical meeting to highlight this exciting future. A special Plenary session included presentations from two of the ITER Participant Teams, the deputy director of the ITER International Team and the leader of the U.S. Burning Plasma Organization.

This is a period of great activity in the worldwide fusion program and increased international participation and presentations at the meeting reflected a renewed enthusiasm in fusion research. Presentations on new experimental facilities included the EAST superconducting tokamak in China, the SST-1 superconducting tokamak in India, the KSTAR superconducting tokamak in South Korea, the W7X stellarator in Germany, and NCSX compact stellarator at PPPL (see article p. 35), the National Ignition Facility at LLNL, and upgrades to the Z-Accelerator at SNL.

Multiple invited paper sessions highlighted the progress on these devices. Additional invited paper sessions informed participants about the recent results and upgrades to major operating

inertial and magnetic fusion devices (ASDEX, C-Mod, DIII-D, JET, JT-60), and about developments in fusion-related technology research on materials, chamber technology, plasma technology, blanket technology, and power plant studies. Contributed oral and posted sessions provided an excellent opportunity for informed dialog and exchange of information.

Nermin Uckan was the SOFE05 conference General Chair and David Rasmussen was the Technical Program Chair. For more information, please visit the SOFE web site at <http://www.ornl.gov/fed/sofe05>.

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**David Rasmussen**  
Program Chair

## 2005 NUCLEAR SCIENCE SYMPOSIUM AND MEDICAL IMAGING CONFERENCE –

### Initial post meeting report

Wyndham El Conquistador

San Juan, Puerto Rico

October 23-29, 2005

The IEEE Nuclear Science Symposium (NSS) and Medical Imaging Conference (MIC) was held this year at the Wyndham El Conquistador resort in Las Croabas, Puerto Rico (just outside of San Juan). The meeting ran from October 23 with short courses and ended with the MIC conference dinner on the evening of October 29. The El Conquistador was a beautiful resort facility that allowed all of the conference activities in one location.

The conference was well attended with 1244 registrants from around the world. This response reflects the tremendous efforts made by the conference committee coupled with the success and additional publicity of the outstanding conference held last year in Rome, Italy – the second NSS/MIC confer-

ence held outside continental North America. A major challenge for the committee was the selection of the papers for presentation. When the conference site was selected several years ago, the projection was that about 850 papers would be submitted. Unfortunately, the space limitations of our site could not accommodate all of the many fine papers we received for 2005. Thus, many deserving papers could not be accepted. Even with this most difficult complication, the Program Committee put together an exceptional conference covering a broad area of interests to the community.

The conference included 300 oral presentations for NSS, 50 oral presentations for MIC, and 22 oral presentations in the joint NSS/MIC sessions. We were particularly



**Tom Lewellen**  
General Chair

## Reverse democracy

Would it not be simpler if the government dissolved the people and elected another.

*Bertholt Brecht*

pleased that we were able to allow all of the posters (both NSS and MIC) to remain in place throughout the conference. The poster sessions consisted of 284 NSS papers, 290 MIC papers, and 77 joint session papers. I am equally pleased to report that the posters were of exceptionally high quality and one could find attendees reading posters at just about any time of day (the poster areas were open 24 hours a day).

The Continuing Education Program this year consisted of six short courses in nuclear science and medical imaging – some of which were held over a two-day period. These courses provide an essential opportunity for the expert and newcomer alike to be taught by practicing experts. In addition, special emphasis sessions and workshops were organized to cover topics such as hydron therapy and the OpenGATE Monte Carlo simulation package. In all, there were 255 attendees to the short courses.

The El Conquistador facilities allowed the collocation of both the exhibition and the poster sessions in the same general area. The exhibit area was also well attended and included 42 booths. Continuing in the success of previous years, exhibitors also took part in a seminar to present technical briefings and product presentations. We also held a well-attended roundtable on knowledge transfer and management in the transfer process. This roundtable was organized by Uwe Bratzler and Jean-Marie Le Goff (Group Leader of Technology Transfer at CERN).

The use of computer facilities at the NSS/MIC meeting has steadily increased over the years. Taking full advantage of the number of attendees who bring laptop computers with WiFi capability, the conference this year covered the main conference areas of the hotel with a wireless network – including the entire commercial exhibit area and several seating areas near the poster displays. The efforts of our NSS/MIC technical team were extraordinarily successful. For this conference, our team brought, installed, and operated the entire wireless network. In fact, we had a single connection to the outside world. All of the conference computer access was through that one connection and our own networking equipment. As a general chair, I was most pleased with the use of the pool of equipment supplied via NPSS.

Given the unique venue for this conference,

the committee decided to split the sessions each day – with sessions running from 8 am to noon and then starting again at 3:30 pm and running to 6:30 or 8 pm depending on the evening activities. This format was selected to allow attendees and their guests to enjoy the relaxed, informal atmosphere of the hotel facilities for discussions as well as relaxation between sessions. The committee received very positive feedback on this format. It allowed attendees to relax between large blocks of sessions, continue discussions from the sessions, and enjoy the venue with friends and family members.

The enjoyments of the venue also led us to put in extra effort to provide an unusual and exciting Companion Program. Participants got the opportunity to experience a variety of exciting events including trips to Old San Juan, a tour of Ponce City and its art galleries, a full day exploring the Arecibo radio telescope and the Camuy Cave system, as well as cooking classes, rain forest tours, and even kayaking.

The tours were very well attended. We were fortunate that the tour company was very flexible and we were able to allow a large number of participants to register for tours on-site. A total of 580 attendees and family members took part in the companion program.

In addition to these organized tours, the El Conquistador offered the full range of water sports (scuba diving, snorkeling, wind surfing, etc) as well as golf, riding, and relaxing on the ocean or at one of the several pools. There were also programs for families and children at the hotel that our companion program chairs helped arrange.

While we cannot provide statistics of how many conference participants used the hotel facilities, an informal gathering of impressions indicates that essentially all used some aspect of the many facilities with considerable enjoyment.

The various conference-supported events were also well attended. The NSS luncheon included 325 attendees and the MIC dinner 390. The largest event, and one I was particularly pleased with, was the conference reception. We were able to hold an outdoor buffet with a large variety of excellent dishes reflective of Puerto Rico and the Caribbean. The area was large enough to allow tables and chairs for all – and all was over 1000 individuals.

The number of attendees and family members was a challenge in terms of the hotel



rooms available. When we first planned the meeting, we contracted for the traditional 2600 room nights we have used in past years for the size of conference we had planned for. Of course, this was before the highly successful Rome conference. After Rome, we increased our room blocks to over 3800 room nights. However, as the registrations came in, it was apparent we needed yet more and we were able to increase our contracted hotel blocks to 5491 room nights. In the end, the conference hotels sold 6333 room nights and that does not include all of those who made their own lodging arrangements independent of the contracted hotel room blocks.

Rather than recap the details of the scientific sessions, I invite anyone who is interested to go to the conference web site and peruse the program ([www.nss-mic.org/2005](http://www.nss-mic.org/2005)). Of particular note is that we were able to mail out the conference-paper CD by the end of December.

And that brings me to the long list of volunteers who made this meeting such a success. The CD being out on time is primarily due to the efforts of Bo Yu, our conference editor and web master. The meeting would not have happened at all without the outstanding efforts of our local arrangements chair, Tony Lavietes. Our technical team (who did such a great job with our network challenges) was headed up by Dora Merelli and Tony Maeda. Of course, the scientific program success was due to the efforts of Richard Lanza (NSS chair), Lorenzo Fabris (NSS deputy chair), Simon Cherry (MIC chair), and Ramsey Badawi (MIC deputy chair). The short course success was due to Steve Derenzo (chair) and Jennifer Huber (deputy chair). The success of the industrial program was due to our exhibit chair Ron Keyser and the efforts of our commercial

exhibit contractor (American Institute of Physics). The registration went very well indeed thanks again to Christina Sanders (registration chair) and good folks at TMG.

The arduous task of setting up, coordinating, and handling the inevitable challenges of the companion program were successfully taken care of by Barbara Lewellen (chair) and Carolyn Hoffman (deputy chair). The promotion of the meeting was also outstanding due to the efforts of the CIP committee and Uwe Bratzler (our publicity chair). Maxim Titov stepped in to assist in the day-to-day problem solving of the conference. While the list can go on and on (and even then, I am sure I will forget to mention someone who deserves recognition), I will end this list with Ed Lampo, the conference treasurer who is still hard at work getting all of the many after-conference financial tasks completed.

We are still working on getting the last numbers together, but we do expect to be within the budget projections we put forth to IEEE for the conference. While knowing that we will meet our fiscal obligations, the real success of the conference was the quality of the papers and the response of the participants. I have not yet seen the results of the conference surveys, but the individual comments I received were all very positive on both major metrics (quality of the papers and the value of the conference to the participants). Thus, my committee and I are satisfied that 2005 continued to carry on the high traditions of the NSS/MIC conference.

*Tom K. Lewellen, General Chair, 2005 NSS/MIC, can be reached at University of Washington, P.O. Box 356004, Seattle, WA USA 98195-6004; Phone: +1 206 598 6249; Fax: +1 206 598 4192; E-mail: [nss2005@u.washington.edu](mailto:nss2005@u.washington.edu).*

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## Square fact

Round numbers  
are always false.

Samuel Johnson

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## Governments too

NASA seems to  
be operating on  
the principle that  
nothing breeds  
success more  
effectively than  
lowered  
expectations.

Andreas Frew

## PRESIDENT'S REPORT



**Bill Moses**  
NPSS President

As I write this article a few days after New Year's Day, "out with the old and in with the new" seems to be a particularly appropriate theme. The terms of five elected AdCom members (Dennis Brown, Mounir Laroussi, Patrick LeDû, Patrick O'Shea, and myself) and three Technical Committee Chairs (Craig Woody, Magnus Dahlbom, and Phil Heitzenroeder) have just ended and eight new people have taken over their positions on AdCom (Richard Jacobsson, Sandra Biedron, Anthony Peratt, Bob Reinovsky, Dan Fleetwood, Craig Woody, Richard Lanza, and Tom Lewellen). I would like to thank the outgoing Members and Chairs for their years of hard work, and to welcome their replacements and let them know that I look forward to their contributions. I would like to thank the other AdCom members who are continuing. Managing the NPSS is not an easy job—the many different communities that are represented imply many different goals and viewpoints (herding cats?), but this group works very hard and is quite successful at finding sensible solutions. I would also like to thank Vern Price for 15 years of service as our Membership, Chapters and Distinguished Lecturers Chairman – who else could juggle all three jobs? He is gradually disentangling himself from these positions, and Patrick LeDû will be gradually taking up the reins of Membership, and Charles Neumeyer has made a good start in taking up those of Chapters and Distinguished Lecturers. I would also like to draw your attention to another article on page 25 of this Newsletter. We are forming a Conference Membership Booth Council and are actively looking for volunteers to serve on this Council. I think that this is a great opportunity for people who like to travel and would like to stay in touch with their technical community, but don't have the resources to do so.

In the rest of this column, I'll talk about the recent history and near-term future of the NPSS publications. If you read this column routinely, you are aware that the last year brought significant changes in the editorial

staff of *Transactions on Nuclear Science* (TNS). In the summer of 2004, the death of Ed Hoffman, who edited the papers submitted to the Medical Imaging Conference (MIC) portion of the NSS/MIC Meeting, coupled with John Valentine stepping down as the Editor for TNS manuscripts associated with the NSS, meant that we did not have Editors for approximately half of the papers that appear in TNS. In looking for replacements, we found that both Ed and John were doing far too much work (it takes the Editor approximately 1 hour to process each manuscript, and they were each processing ~250 manuscripts per year) and ended up replacing them in early 2005 with four Senior Editors and approximately 30 Associate Editors. These ~35 people, who were all new to the job and debugging a brand new editorial structure, were immediately greeted with a six-month backlog of papers plus a huge pulse of manuscripts arising from the 2004 NSS/MIC meeting (which drew over 1800 people—almost twice the "normal" number). Unfortunately, but perhaps not unexpectedly, the time to complete review for papers submitted to TNS in the last year has been much longer than we would like.

This publication delay led to a number of complaints and we are working hard to correct this. First, the initial backlog has been cleared and so we need only to process one year's worth of manuscripts (instead of one and a half years' worth) in 2006. The editors are more experienced now, and we have looked carefully into what has been causing delays and done what we can to reduce them. We also have hired a dedicated staff person within IEEE Publications to assist in the manuscript processing.

However, we cannot make any significant headway without your cooperation. The biggest single delay is the time that it takes reviewers to return their reviews! We rely very heavily on reviewers and I want to encourage all of our members to be both willing to review and to respond promptly. Each manuscript requires three independent reviews, so in order to maintain equilibrium each author should be willing to review three manuscripts for each

### I know!

Aging isn't for sissies.

Marian C. Diamond

manuscript that they submit. They also need to do these reviews promptly. I think that it is rather obvious that we are all best off if we treat other manuscripts the same way that we ask (demand?) that our own manuscripts be treated.

In the near future, *Transactions on Plasma Science* (TPS) will make a similar change its editorial structure. Steve Gitomer will remain Editor-in-Chief of TPS, but he too will be reducing his personal workload by adding several Senior Editors and Special Issue Editors. We expect the transition to be much smoother than it has been with TNS, as 1) TPS is learning from the TNS experience, and 2) TPS does not have the tremendous editorial vacuum and backlog that existed in TNS.

Finally, I would also like to say a few words about Impact Factor, which is an increasingly important measure of how “good” a journal is. In general terms, Impact Factor is defined as the average number of times a paper published in a journal is cited. For better or worse, many institutions are now basing important decisions (such as whether to grant tenure) on the

Impact Factor of the journals that one publishes in. This really increases the importance of good scholarship when you write an article—you really should include a significant number of citations to other work. It is also the right thing to do. It certainly lets readers know that you are well-versed in that field, it treats other people’s work the way you would like your own work to be treated (how often have you been annoyed that some other paper should have cited your work?), and it increases the Impact Factor of the journals that you publish in.

In short, if you would like to help your journals, you should: 1) return your reviews quickly, and 2) do a thorough job citing other work in the manuscripts that you submit. If you have any thoughts on these or any other issues, please feel free to contact me.

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**Watch your step!**

Toilet out of order. Please use floor below.

Sign in office building rest room

## SECRETARY’S REPORT

First, I confess to a major blooper in the last issue: Will the real Simon Cherry please stand up? This is Simon Cherry. I inadvertently placed the picture of Lorenzo Fabris of LLNL in Simon’s rightful place both as MIC Program Chair and as recipient of the first Edward Hoffman Memorial Award presented to Simon by the Society of Nuclear Medicine, for which I apologize profusely to Simon, his family, his friends and colleagues.



**Simon Cherry**

since he took office, as well as Christian Bohm of the University of Stockholm who chaired the Local Organizing Committee for the 2005 Real Time Conference, which was an outstanding meeting in every regard.

The Annual Meeting is always a bittersweet event because it is the time we say goodbye to people we’ve worked with for a number of years either as elected AdCom members (Dennis Brown,

Mounir Laroussi, Patrick LeDû and Patrick O’Shea who had to resign before completing his term) or as TC chairs (Magnus Dahlbom, Phil Heitzenroeder and Craig Woody) and at this meeting we also bade farewell to Vernon Price, our long-time Membership, Chapters and Distinguished Lecturers chair. AdCom without Vern will seem very strange as he has been a pillar and a resource for my entire AdCom memory. Bill Moses, whose elected term officially ended, remains as president and will carry on after that as immediate past pres-



**Albe Dawson  
Larsen**  
NPSS Secretary

AdCom met in Los Croabas, Puerto Rico, on October 23, 2005 for its 2005 Annual Meeting. The meeting was held in conjunction with NSS/MIC. On a purely editorial note, it was a beautiful venue, great for a family holiday, but for me much too isolated and incredibly expensive, especially for those living on government per diems.

Now that I’ve had my grumble, on to business: We were pleased to have Stuart Long, our Division IV Director, with us for the first time

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## Finicky

I preferred marrying a man who was too good rather than one who was not quite good enough.

*Mary Baird (Mrs. William Jennings Bryan)*

ident and then assume a functional committee chair so, thankfully, no farewells to Bill for some time to come. We are pleased that Craig will return as an elected AdCom member.

Ed Lampo, our treasurer, once again urges conference treasurers to get those conference books closed in a timely way. The penalties from IEEE become very steep after the first 12 months. Remember, conference treasurers, you can close your bank accounts and books without paying those last, late bills. These can be noted and paid directly from IEEE. Speak to Ed or to Tony Lavietes, our Associate Treasurer who now handles most conference business (lavietes1@lnl.gov). One of IEEE's strengths has been the ability to borrow money for short-term needs at extremely favorable rates. A backlog of unclosed conferences jeopardizes this position.

The conferences are doing better at meeting returns, and overall the Society did better than budget last year, recouping some of the very heavy hits over the past several years when IEEE was getting its fiscal house back in order. Overall, the Societies have 95% of the IEEE reserves, and it is important to remember that our reserves have bailed us out at times such as the Loma Prieta earthquake which had a major impact on that year's NSS/MIC conference and other times when conferences have lost money for other reasons. We are allowed to spend up to 3% of our reserves on initiatives, but these have to be included in the budget process. As the Society reserves ARE the IEEE reserves, fiscal conservatism is urged.

And there are major threats to IEEE finances. One of these is Open Access. One-third of IEEE income comes from publication sales, and it is completely unclear what the impacts of Open Access will be. It costs money to produce publications, just as it costs money to place documents on the web with proper indexing and linkages, and link maintenance, so we are in a wait, see, learn mode here.

Bill Moses, our President, reported the Archive Project – the project to get ALL our back journals into IEEE Xplore, is going forward but much more slowly than hoped. He also noted that conferences that publish conference records through publishers other than IEEE can still use PDF eXpress for formatting. Now the number of publications that are in noncompliant format is below 10%. There is also a change in the way the All Periodical Package income is distributed to societies. In prior years it was based

on the number of pages printed. Now it is based on the number of downloads, since these can be tracked very accurately. Income from TNS has dropped about 1.5% and from TPS about 4% due to this change.

There are also several new conference-related matters to consider. First, there will be no more conferences to be held “in cooperation.” The lowest level of cooperation with non-IEEE conferences is now “in technical cooperation,” which requires real input to the conference program by our members. And, conferences are now permitted a three-tier price structure with separate rates for Society members, IEEE members, and non-IEEE members. There has also been evidence of criminal mismanagement of certain (non-NPSS) IEEE conferences where illegal payments have been made using conference funds, and where funds have been kept off the books. The new auditors are looking very hard at conference business practices with the goals of safeguarding both IEEE and the Society volunteers who handle money and credit cards. There have also been problems with management companies. The only marketing allowable at conferences is IEEE and Society membership.

TMI, the second most highly ranked IEEE journal underwent its 5-year review. Ron Jaszczak is to be thanked for doing a great job.

Stuart Long introduced himself and outlined his long history of involvement with the IEEE in many capacities. He outlined IEEE's composition, ten Divisions (42 societies and councils, 8 in Division IV), 1446 chapters, 10 regions, and an annual budget of over \$242 million. Membership has dropped in the last two years, principally through loss of full U.S. members. The number of students has increased as has international membership. IEEE runs over 300 conferences and has over 200 conference proceedings. Over 30% of world-wide electrical and electronic engineering publications come from IEEE, and there are over a million subscriptions to its journals, with a similar number of papers in its digital library. IEEE has added a lot of member benefits including the “My IEEE” web option, greater Xplore options, and so on. This is a large, complex organization. Stuart will write more about it for a future issue of the Newsletter.

Tony Lavietes discussed the AV Equipment Pool experiences. Acquiring computers, LCD projectors, and networking hardware was a 2004 Society initiative. The 2004 and 2005



NSS/MIC, 2005 PAC, 2005 ICOPS and PP conferences have used the equipment, and Real Time used web access. The DOE classified 2004 Antennas and Propagation conference also used equipment. The equipment is stored and maintained in California. The biggest surprises have been shipping and insurance costs and customs issues. TSA has also destroyed equipment box locks. The hotel and local vendor competition has been fierce, but their low costs have reflected poor equipment. IEEE NPSS costs include support, maintenance, on-site aid. They do not compete with free computers, and are not a profit center. Bo Yu's registration software is easily adapted to other conferences, but Bo also has professional commitments!

### **TECHNICAL COMMITTEES**

**Computer Applications in Nuclear and Plasma Sciences:** Jean-Pierre Martin, the chair, reported that the 2003 RT conference documentation was sent from University of Montreal to IEEE HQ. The CANPS committee has developed a model for future conferences with an executive committee and Tony Laviertes providing financial oversight. The 2007 meeting, to be held at or near Fermilab, with Margaret Votava as chair, will follow the new executive committee scheme. The committee itself is undergoing reorganization with proposals for members, assignment of duties and terms of office. More eastern European members are being recruited. They are also working with ICALPCS toward a possible joint conference.

Christian Bohm reported on the 2005 RT conference in Stockholm. There were 167 presentations, higher attendance and lower expenses than projected. The conference was organized along the new model. Ed Barsotti was the Real Time Award recipient. The award will be presented in a small ceremony at Fermilab in the future. There were also two outstanding student paper awards given.

Sites for 2009 are being explored. Portugal, Russia and a site in Asia are possibilities.

**Fusion Technology:** Charles Neumeyer reported on behalf of Phil Heitzenroeder. The 21st Symposium on Fusion Technology was good technically and in terms of participation (See report under conferences). Charles Baker of UCSD and Brad Nelson were, respectively, recipients of the 2004 and 2005 Fusion Technology awards.

The 2007 conference will be held in Albuquerque, NM, collocated with the Pulsed Power Plasma Science joint conference. Craig Olsen will chair the 22nd SFE.

**Nuclear Medical and Imaging Sciences:** Magnus Dahlbom, committee chair, noted the 2004 conference (held in Rome) has closed its books. The 2005 conference was just beginning. It had higher than expected attendance, challenging the local hotel resources. Attendance seemed to be well over 1000, with a total of about 980 papers to be presented. The 2006 conference will be held in San Diego from September 29 through October 4 at the Town and Country Hotel. Their web site is up. Graham Smith of Brookhaven National Lab is General Chair and John Aarsvold of Emory University is MIC chair. The 3rd Nuclear Radiology of Breast Cancer workshop will be collocated again.

In 2007 the NSS/MIC will be held in Hawaii with Ben Tsui of Johns Hopkins as general chair and Magnus as MIC chair. The 2008 conference will be held in Germany with Uwe Bratzler as general chair. The venue remains to be determined.

**Particle Accelerator Science and Technology:** Ilan Ben-Zvi, PAST chair noted that PAC is large, international in attendance, and mainly organized by the national laboratories. There is good transfer of information from one conference to the next. The American Physical Society DPB has been a cosponsor since 1995. Bill Moses now acts as liaison to APS-DPB and communication has improved. The 2005 conference, held in Knoxville, was a great success with over 1400 registered attendees and 60 exhibit booths. Over half the attendees qualified for lower registration fees. Over 400 took a tour of the Spallation Neutron Source at Oak Ridge. Support was provided to 50 students.

As part of the UN International Year of Physics, commemorating the 100th anniversary of Einstein's theory of relativity, there were a number of events coordinated between Knoxville and the conference.

The 2007 conference, to be chaired by Stan Shriber and held in Albuquerque, NM will be helped by people at Los Alamos from their Professional Development and IT groups. There will be a tour of the LANL accelerator complex. The web site is up, and they are using the web-based system for abstract and

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## Catch 22

How can I know  
what I think till I  
see what I say.

*Old lady quoted  
by E.M. Forster*

## In a rut

The curious thing about human behaviour is that it goes on happening, despite everyone knowing better.

Elizabeth  
Buchan

paper submissions that has been used for the last several years. The Albuquerque Convention Center is available between the PAC and PPPST/SFE conferences and it is hoped that they will be able to develop a Science Weekend to have events for local high school students and science teachers, with a focus on IEEE and APS interests. Gerry Rogoff, our liaison to the Coalition for Plasma Sciences has offered help.

**Plasma Science and Applications:** Dan Jobe, the chair, noted that books from 2003 and 2004 ICOPS were closed. The ICOPS 2005 conference, held in Monterey in June, had 505 attendees. They used Webabstracts for abstract submission. There was a problem in distinguishing ICOPS and Pulsed Power papers.

The committee has selected Karlsruhe, Germany for the 2008 conference venue, with Manfred Thum as chair, and the San Diego Omni for 2009. The committee has also proposed an initiative, now under discussion by AdCom, to provide greater support to enable students to attend conferences. This may become a Society initiative and will be explored further at the Society retreat in late February.

**Pulsed Power Science and Technology:** The Pulsed Power conference was held in Monterey, CA the week before ICOPS. There were close to 600 attendees and 400 papers scheduled. Of these there were a large number of “no shows,” 75% of which were related to visa problems.

The Pulsed Power conference is biennial, so the next conference, joint with PSAC, will be in 2007. In 2006 many members of our Pulsed Power community will be involved with Megagauss 2006, to be held at Bishop’s Lodge, Santa Fe, NM from September 10th through 14th. Attendance is expected to be of order 150. There is a European Megagauss Conference that is organized independently.

Edl Schamiloglu will chair the joint PPPS Conference in 2007 and Frank Peterkin will be the Technical Program chair. He will chair the 2009 conference to be held in Washington, DC, most probably at the Mayflower hotel June 28-July 2.

The Pulsed Power special issue of TPS has had the extra page charges paid by Pulsed Power, Inc.

**Radiation Effects:** Joe Benedetto reported for Ron Schrimpf that the 2006 conference in Seattle, chaired by Fred Sexton, had about 600

attendees. See Ron Schrimpf and Teresa Farris’s reports.

Future conferences: 2006 - Pont Vedra, FL (see article); 2007 – Hawaii; 2008 – Tucson.

**Radiation Instrumentation:** Craig Woody introduced Alberto del Guerra, chair of the 2004 Rome conference, to give his final report. Many of these details were presented in the March 2005 newsletter. Alberto pointed out that there was good support from European scientific institutions, that there were many additional workshops incorporated, and that with companions and all exhibitors counted, there were over 2000 attendees, many more than anticipated when he ‘bid’ on the conference in 2000. Also for a European conference, it was unusual to find a venue attached to a hotel that did not charge for meeting space because of the very large number of guest rooms booked. There were in-kind INFN and NIH grants, too, to help support students. All-in-all it was a thoroughly successful conference, based on every metric, organized and run by a terrific committee. The big glitch came afterward in the very late production of the conference record, and the slow acceptance of papers submitted for review to TNS. Many papers were rejected by TNS, too, because of misunderstandings about technical scope of contents (principally gravitation wave workshop and nonnuclear medical imaging). With Tony Lavietes’ help, the books closed in 9 months.

Future conferences: 2006 – San Diego, CA, web up, posters out; 2007 – Hawaii, with lots of preparation already ongoing, committee chosen; 2008 – Germany, site TBD.

Ralph James of Brookhaven National Lab. is the recipient of the 2005 Outstanding Achievement Award. Congratulations!

Dick Lanza of MIT becomes the new committee chair in 2006, and Chuck Melcher becomes vice chair.

**TransNational Committee:** Uwe Bratzler, the chair, noted that there is a new, handsome web page. This committee represents all non-North American members of NPSS. At present its membership represents 14 countries. They meet by phone 3 weeks prior to each AdCom meeting. They have minutes, a deputy chair, a secretary and a coordinator. They are looking to a number of other countries for additional representation. One action they encourage is that half the site-selection committee for each meeting should come from the region in which

the meeting is to be held, to gain local expertise and input.

### **FUNCTIONAL COMMITTEES**

Most news from the Functional Committees appears in their reports below. See especially the requests for 2006 Award nominations, and the reports from Vernon Price and Jane Lehr concerning membership and the now-forming Conference Membership Booth Council. There are biographies of some of our new Fellows under Awards. These were selected from a pool of 19 nominees reviewed by our Fellow Evaluation Committee and forwarded to the IEEE Fellows Committee. NPSS has a large number of Fellows. Peter is proposing revisions to the committee to get rankings by subject-area experts rather than by the whole committee since many disciplines are covered by NPSS, and it is hard for a group of people with individual specialties to review this large number of applications with the degree of knowledge and thoroughness desired. It is also important that nominators do a good job on the applications to make them unique.

The Publications Committee has overseen a number of changes, principally to the editorial structure of TNS and TPS. Each journal now has an Editor-in-Chief supported by a number of Senior Editors who, in turn, have a body of associate editors supporting them. The hope is to streamline the paper review process and, in conjunction with IEEE Publications, work to get our publications out on time. Changes in the Pubs office have contributed to delays, and every time a manuscript is submitted late, the publication loses its slot in the publication queue. There are ways around this when IEEE Pubs have personnel available, but timeliness is a better solution. Both TNS and TPS will use Manuscript Central and will shortly be fully electronic in their review and submittal processes.

The Standards Committee has been pursuing reaffirmation of a number of NPSS standards that are up for renewal. The committee also reports the death of Ed Fairstein, a long-time committee member active in developing standards for radiation detectors. See Lou

Costrell's letter to Ed's sons under Other News below.

### **LIAISONS**

The Social Implications of Technology liaison, Ray Larsen, recommends checking out the web site of the Online Center for Issues in Engineering Ethics.

Gerry Rogoff, our liaison to the Coalition for Plasma Sciences, has updated us on their activities including a talk for Congress and staff by Sir Chris Llewellyn-Smith on fusion plasmas. They look for really good speakers for nontechnical audiences. They have a talk on lightning planned for the spring, as well as a retreat to explore new activities. They encourage the nuclear science people to launch a similar initiative.

Ben Tsui, the IEEE-USA Biotechnology Council (Medical Sciences) liaison reported on the structure of the council, the huge scope of their interests, and his frustration with being unable to be included in some of the conference call discussions on topics of interest to us.

### **ADCOM ACTIONS**

- It was moved, seconded and passed that a \$1000 administrative budget be provided for the TransNational Committee.
- It was moved, seconded and passed that the editorial structure of TPS be changed to the Editor-in-chief, senior editors, associate editors, guest editors model
- It was moved, seconded and passed that NPSS would, in principal, sponsor SCINT07. AdCom is now awaiting a response from the SCINT07 committee which requested sponsorship.

The next meeting of the AdCom, and a retreat, will be held in New Brunswick, NJ on February 24 and 25, 2006. The following meeting will be held on July 22, 2006 at the Sawgrass Marriott Resort, Ponte Vedra Beach, Florida following NSREC.

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**Where are you when...**

**Addiction is friendship without a friend.**

*Connie Palmen*

## Class of 2009

### The Newly Elected Members of AdCom

*Ed. note: In addition to the new AdCom members whose biographies appear below, Anthony Peratt was elected to represent Plasma Science and Applications. His biography appears on p. 38 of this Newsletter.*

### Sandra G. Biedron



**Sandra Biedron**  
Particle Accelerator  
Science and  
Technology

Sandra G. Biedron is an Applied Physicist and Project Manager in the Energy Systems Division of Argonne National Laboratory (ANL), where she pursues novel beam source research as well as unique analytical tools for applications such as detection. She also serves as the National Security Section Lead for Laser and Beam Technologies. She has worked at Argonne National Laboratory for 12 years. For almost five years, she was Chief of Operations of Accelerator Research and Development and the Scientific Liaison between the Operations Group and the Accelerator and FEL Physics Group at the Advanced Photon Source (APS). Before this, she had been a member of the Accelerator Physics Group at the APS and even earlier, a member of the Energy Systems Division at ANL. Her research interests include lasers, high-gain, single-pass, free-electron lasers; the combination of laser and electron-beam systems; the operation of user-driven accelerator facilities; applications of accelerators and lasers; the design, construction, upgrades and extensions to existing laser and accelerator facilities; coherence preservation in photon frequency upconversion; and analytical tool development. In addition, she started a successful international work group in 1998 (FEL Exotica) that searches to improve and develop viable, coherent, high-brightness, short-wavelength sources. This group of colleagues is continuously working on exotic, futuristic schemes. She obtained her Ph.D. in Accelerator Physics from the University of Lund in Sweden in conjunction with MAX-Laboratory. She is cross-trained in chemistry and biology at the Bachelor's level. Biedron has four invention disclosures to the United States Department of Energy; one patent; one patent pending;

forty papers in refereed journals (fifteen as first author); thirty-five papers in conference or workshop proceedings (fourteen as first author); over seventy formal presentations (over forty as invited).

Sandra is an active member of the IEEE, SPIE, and APS. She has served on the board of the Chicago Section of the Magnetics and Nuclear and Plasma Sciences Societies (1997-1999). She recently sat on the IEEE-NPSS/APS co-sponsored Particle Accelerator Conference Committee for 2003. She is also a Senior Member of the IEEE. She is an Awards Committee Member of the International Society for Optical Engineering (SPIE) (2003-present). Among other SPIE awards, this committee selects the recipient of the most elite SPIE award (Gold Award). She is Scholarship and Grant Awards Committee Member for the SPIE. She has served as a technical reviewer for a number of projects, the CRDF (U.S. Civilian Research & Development Foundation) that assists the Former Soviet States, and the National Science Foundation. She is also actively involved with the organization and programs of other conferences and workshops in beam science and technology and related fields and uses.

In her spare time she is the managing director of an aeronautical corporation, is a board member for a 25M USD not-for-profit that among other activities operates a retirement community, and is performing an historic rehabilitation to Department of Interior standards of a 1905 Chicago home.

Please ask Sandra if you require her publication list or CV.

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## Daniel M. Fleetwood

**D**an Fleetwood received B.S., M.S., and Ph.D. degrees from Purdue University in 1980, 1981, and 1984. He joined Sandia National Laboratories in 1984 as a Member of the Technical Staff. In 1990, he was named a Distinguished Member of the Technical Staff in the Radiation Technology and Assurance Department at Sandia. Dan accepted a position as Professor of Electrical Engineering at Vanderbilt University in 1999. In 2001-2003 he served as Associate Dean for Research in the School of Engineering. In 2003 he was named Chairman of Vanderbilt's Electrical Engineering and Computer Science Department. Dan is author or co-author of more than 270 papers on radiation effects and low frequency noise. He has served the IEEE Nuclear and Space Radiation Effects Conference (NSREC) as general chair (2004), short course chair and presenter, technical program chair, poster session chair, guest editor, and session chair; he has also been an invited speaker and short course presenter at the RADECS Conference. Dan was Vice-Chairman for Publications for the

Radiation Effects Steering Group, 1994-1997, and Guest Editor of the April 1996 issue of the *IEEE Transactions on Nuclear Science* on single event effects and the space radiation environment. Dan has received seven outstanding paper awards from the IEEE NSREC, as well as several meritorious conference paper awards. In addition, Dan was local arrangements chair, technical program chair, and general chair of the IEEE Semiconductor Interface Specialists Conference (1997-1999), is a member of the Editorial Advisory Board of *Microelectronics Reliability*, and presently serves as Chair of The American Physical Society's Forum on Industrial and Applied Physics (term expires March 2006). Dan is a Fellow of both the IEEE and the American Physical Society, and is also a Senior International Correspondence Chess Master.

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**Daniel Fleetwood**  
Radiation Effects

## Richard Jacobsson

**R**ichard Jacobsson is a Staff Physicist at the European Organization for Nuclear Research (CERN, Geneva, Switzerland) and has been, since 2000, working for the LHCb experiment at the Large Hadron Collider. In LHCb he is responsible for the development and commissioning of one of the three subsystems of the LHCb online system, the Timing and Fast Control system, as well as being involved in the implementation of the overall control and data acquisition systems. He is also a key member of the LHCb Commissioning Group.

Richard Jacobsson received a Ph.D. in Physics in 1996 and a B.Sc. in Physics in 1992 from the University of Stockholm, Sweden. Between 1991 and 2000 he worked on the DELPHI experiment at CERN. His major achievements were in the area of the search for the Higgs boson, the measurement of the ZZ production cross section, the upgrade of the entire DELPHI online system in 1996-1998

and the on-site responsibility for the DELPHI barrel electromagnetic calorimeter. In the search for the Higgs boson he was pioneering in the deployment of Neural Networks as a physics analysis method.

Richard Jacobsson is very active in the area of education and public outreach. He has been responsible, since 1992, for annual further training at CERN for Swedish senior high school teachers and is often solicited by the CERN Press Office and Visit Service. He has developed and co-authored an education CD-ROM which has been used in senior high schools in more than 20 countries. He is the outreach representative for the LHCb experiment.

Richard Jacobsson is a member of IEEE and was the general chair of the 2005 14th IEEE-NPSS Real Time conference. He also chaired the program committee for RT2005. He is the member of AdCom representing the CANPS Technical Committee.

As an avocation Richard Jacobsson has a keen interest in environmental research and



**Richard Jacobsson**  
Computer Applications in Nuclear and Plasma Sciences

paralleled his studies in physics with studies in biology. Combining long experience in photography, diving and autonomous travel, he has undertaken a number of expeditions to document the natural environment.

Richard Jacobsson was born in Stockholm,

Sweden, 1969. He speaks fluent Swedish, English, French and Italian.

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## Robert E. Reinovsky



**Robert E. Reinovsky**  
Pulse Power Science  
and Technology

Robert E. Reinovsky is Program Manager for Pulsed Power Hydrodynamics at Los Alamos National Laboratory where he focuses on applications of pulsed power to problems in hydrodynamics and material properties. At the same time Bob harbors a career-long, and not always well disguised, fascination with the physics and engineering of pulsed power systems that offer such enormous potential for manipulating and investigating the physical world in states ranging from condensed matter to plasmas.

Bob received his Master's degree in Electrical Engineering in 1971 and his Ph.D. in 1973, both from Rensselaer Polytechnic Institute in the Electrophysics Department where his dissertation work focused on ion beam diagnostics for magnetically confined fusion plasmas.

From 1974–1986, Bob worked at the Air Force Weapons Laboratory (now the AF Research Laboratory) in the areas of plasma and pulsed power physics. At the AFWL, his principal interests were high-density plasma z-pinch implosions, radiation processes, plasma diagnostics, and pulsed power physics. Bob was programmatically responsible for developing and building four generations of the world-class SHIVA family of high-current, low-impedance pulsed power systems, and for developing and demonstrating world-record, fuse-opening switches using these systems.

Techniques in ultra-high-current high-explosive pulsed power developed in Los Alamos, starting in the 1950s, caught his imagination because they offer access to even more exciting conditions of high energy density. Bob joined the Shock Wave Physics Group (M-6) at Los Alamos in 1986 to continue applying these techniques to problems in national defense,

plasmas and condensed matter; and to explore the engineering of compact pulsed power systems. Bob led the Group at Los Alamos from 1990 to 1993 and then joined the Los Alamos High Energy Density Physics Program as Project Leader for the Athena Pulsed Power Project and then as Chief Scientist and Deputy Program Manager. Since 1998 he has been the Program Manager for the Pulsed Power Hydrodynamics Program which sponsors the development and construction of the Atlas system and of the Atlas program of liner-driven hydrodynamics experiments.

The end of the Cold War and the dissolution of the Soviet Union in 1991 raised significant national security issues about the stability of the Russian nuclear weapons laboratories and about the future of the world-class scientific staff of those institutions. Bob joined with a few Los Alamos colleagues to establish an active program of unclassified, basic, joint scientific work with these scientists. These efforts, starting in 1992 with work in pulsed-power science, have grown into a vigorous DOE program of joint activities in the areas of pulsed power, material dynamics, and computational mathematics for the mutual benefit of both nations.

Bob is a Fellow of the IEEE, has been elected an Academician in the International Academy of Informatization, and has been awarded the Sakharov Medal by the All Russian Scientific Research Institute of Experimental Physics and the IEEE NPSS Peter Haas Award.

*Bob Reinovsky can be reached at Los Alamos National Laboratory, HEHD Program Office MS D420, Los Alamos, NM 87544 USA; Phone: +1 505 667 8214; Fax: +1 505 665 2828; E-mail: bobr@lanl.gov.*

## Craig L. Woody

Craig L. Woody is a Senior Physicist and Group Leader of the PHENIX Group at Brookhaven National Laboratory. He received his B.A., M.A. and Ph.D. from John Hopkins University in 1973, 1974 and 1978, respectively, having carried out his thesis research in high energy particle physics at the Stanford Linear Accelerator Center. After one year as a postdoctoral Research Associate at Stanford University, he joined Brookhaven Lab in 1979, where he has remained ever since. During his first three years at Brookhaven, he worked at CERN building detectors and doing experiments at the ISR. Upon returning to Brookhaven, he worked on particle physics and heavy ion experiments at the AGS, was spokesman for experiment E855, and is currently working on the PHENIX experiment at the Relativistic Heavy Ion Collider (RHIC). His interests are mainly in the development of particle detectors for nuclear and high energy physics, and he was elected a Fellow of the American Physical Society for his work on scintillating crystals. He is also working on several projects in medical imaging, including imaging the awake animal. He is a Senior Member of IEEE, and has been a regular attendee of the Nuclear Science Symposium (and more recently the Nuclear Science Symposium/Medical Imaging Conference) for the past thirty years. He was

General Chairman of the NSS/MIC conference in 1998 when the meeting was held in Toronto, Canada, and served as Deputy NSS Chair in 1997. He has also served many times on the program committee, paper selection and review committees, and as session organizer and session chair. He served on the Radiation Instrumentation Steering Committee (RISC) from 1999 to 2001, and was Chairman of the RISC from 2004 through 2005. During his time on the RISC, he served on several Site Selection Committees for the NSS/MIC conference, chaired a RITC Constitutional Amendments Subcommittee, and served on the RISC Awards Subcommittee.

With his long-term involvement with the NSS/MIC conference, as well as having served recently on AdCom as a Technical Committee Chair, Craig has a good understanding of the issues and problems currently faced by the NPSS. He looks forward to serving on AdCom again as an elected member from the RITC to help work to resolve these issues during the coming years.

*Craig Woody can be reached at the Brookhaven National Laboratory, Physics Department Building, 510C, Upton, NY 11973; Phone+1 631 344 2752; Fax: +1 631 344 3253; E-mail: woody@bnl.gov.*



**Craig Woody**  
Radiation  
Instrumentation

## TECHNICAL COMMITTEES

### COMPUTER APPLICATIONS IN NUCLEAR AND PLASMA SCIENCE TECHNICAL COMMITTEE

Since the September issue of the NPSS newsletter, the activity of our Technical Committee has concentrated around two important events.

First, Richard Jacobsson has been elected as the new voting AdCom member representing the CANPS Technical Committee. We deeply thank Patrick LeDù who has served very actively in this position since 2001 and who brought new life to the CANPS committee. Patrick LeDù, from C.E.A. Saclay in France, was the general chairman of the first NSS-

MIC conference ever held in Europe. This was in Lyon, in year 2000. Richard Jacobsson was the general chairman of the very successful RT2005 Real Time Conference held in Stockholm, in June 2005 (see the September 2005 newsletter).

Richard Jacobsson is a Staff Physicist at the European Organization for Nuclear Research (CERN) and since 2000 has worked for the LHCb experiment at the Large Hadron Collider. At the LHCb he is responsible for the development and commissioning of one of



**Jean-Pierre Martin**  
Chair, CANPS  
Technical Committee



the three subsystems of the LHCb online system, the Timing and Fast Control system, as well as being involved in the implementation of the overall control system. He is also the outreach representative for LHCb.

Richard Jacobsson received a Ph.D. in Physics in 1996 and a B.Sc. in Physics in 1992 from the University of Stockholm, Sweden. Between 1991 and 2000 he worked on the DELPHI experiment at CERN. His major achievements were the search for the Higgs boson, the measurement of the ZZ production cross section, the upgrade of the entire DELPHI data acquisition system in 1996-1998 and on-site responsibility for the DELPHI barrel electromagnetic calorimeter. In the search for the Higgs boson he pioneered the deployment of Neural Networks as an important physics analysis method.

Secondly, the preparation of the next Real Time conference is actively underway. The 2007 RT conference will be organized in late spring 2007 at Fermilab. Margaret Votava, member of the FNAL computing division, will be the general chairperson of the conference. Several adaptations of this "user friendly" small conference are foreseen and are under discussion amongst the CANPS committee members. For 2007, in addition to the stan-

dard Particle and Nuclear Physics real time aspects, we want to promote new fields. For example, Biomedical Imaging real time data acquisition and processing is becoming a real challenge for the future. There were a few presentations in this field at both the RT2003 and RT2005 conferences, and the synergy with our traditional activities was greatly appreciated. Also, the decision to build ITER, the next generation of experimental fusion reactors, will generate new challenges in real-time control systems. These two examples show how rich and exciting the Real Time field will be in the near future. In addition, we have a small work group under the guidance of Satish Dawan, from Yale, and Raymond Larsen, from SLAC, studying the applications of new industrial standards like ATCA. The RT conference is the perfect forum for exchanging and discussing early experiences with such standards, just as it was in the past for NIM, CAMAC, FASTBUS and VME.

*Jean-Pierre Martin, chair of the Computer Applications in Nuclear and Plasma Science Technical Committee, can be reached at the University of Montreal, RJA Lévesque Laboratory, Montreal (QC), Canada H3C 3J7. Phone +1 514 343 7340; E-mail: jpmartin@lps.umontreal.ca*



**Ronald D. Schrimpf**  
Chair, Radiation Effects Steering Group



**Teresa Farris**  
Vice Chairperson of Publicity, RESG

## NUCLEAR AND SPACE RADIATION EFFECTS NEWS

Submitted by

**Teresa Farris, Vice-Chairperson of Publicity**

### **FUTURE NSREC CONFERENCE PLANS**

by Ron Schrimpf, RESG Chairman

The 2007 NSREC will be held at the Hilton Hawaiian Village Hotel in Honolulu, Hawaii. Lloyd Massengill of Vanderbilt University, Conference General Chairman, is well along in organizing an excellent conference. This will be the first NSREC to be held in Hawaii and it will take place at the premier conference site on the island of Oahu.

NSREC 2008 Conference General Chair, Paul Dodd, Sandia National Laboratories, has selected the JW Marriott Starr Pass resort in Tucson, Arizona, a brand new resort which will be ideal for conference sessions, posters, exhibit and social activities.

The 2009 Conference General Chair will be Mark Hopkins of The Aerospace Corporation.

Mark is currently considering sites for the conference and will host the spring meeting of the RESG at the site he proposes.

### **RADIATION EFFECTS AWARD**

Nominations are currently being accepted for the 2006 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 \$2000 cash award and plaque will be presented at the IEEE NSREC in Ponte Vedra Beach, Florida, July 17-21, 2006. Nomination forms are available electronically at <http://www.nsrec.com/nominate.htm>. Nominations must be submitted by March 17, 2006.



Additional information can be obtained from Steve Clark, Senior Member-at-Large for the Radiation Effects Steering Group. Mr. Clark can be reached at 505-846-6067 or at [steven.clark@kirtland.af.mil](mailto:steven.clark@kirtland.af.mil).

### **PAUL PHELPS STUDENT AWARD**

University professors may nominate a graduate student for the prestigious Paul Phelps Continuing Education Grant for exceptional graduate students in the NPSS fields. Nominees must be a member of NPSS. The award is for \$500 to attend the 2006 NSREC Short Course in Ponte Vedra Beach, Florida, in July 2006. Submission deadline is May 15, 2006. Forms can be obtained at [www.nsrec.com/steeringcommittee](http://www.nsrec.com/steeringcommittee) and be sent to Member-at-Large, Veronique Ferlet-Cavrois at [veronique.ferlet@cea.fr](mailto:veronique.ferlet@cea.fr).

### **MEMBER-AT-LARGE ELECTED**

Wayne Abare was elected Junior-Member-at-Large of the Radiation Effects Steering Group during the annual Open Meeting at the 2005 Nuclear and Space Radiation Effects Conference (NSREC).

Wayne has over 35 years of experience in research and development related to radiation effects on semiconductor technologies. He joined Harris Corporation in 1969 as an Analog Design Engineer, then soon transitioned to work on natural and man-made radiation effects for military space and avionics platforms. Mr. Abare plans and controls the technical performance requirements for nuclear and space radiation effects on aerospace proposals and programs within Harris Government Communications System Division (GCSD). His technical work has encompassed both theoretical and experimental activities which have covered a wide

range of semiconductor technologies, including fiber optics, from the device physics level to the circuit and system implementation level. He graduated from the University of South Florida, BSEE, MSEE. He annually attends the IEEE Symposium on Nuclear and Space Radiation Effects (NSRE). He has published several papers at this Conference and in 1989 was a Short Course Instructor.

### **OUTSTANDING AND MERITORIOUS PAPERS AT THE 2005 NUCLEAR AND SPACE RADIATION EFFECTS CONFERENCE**

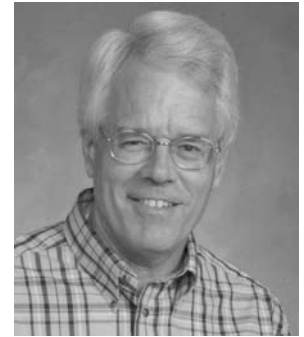
The Awards Committee for the 2005 Nuclear and Space Radiation Effects Conference, chaired by Jim Kinnison, JHU/APL, completed the evaluation of technical papers presented at the Conference, with the following results.

The Outstanding Conference Paper is:

*Effects of Particle Energy on Proton-Induced Single-Event Latchup*, James R. Schwank, Marty R. Shaneyfelt, Jacques Baggio, Paul E. Dodd, James A. Felix, Veronique Ferlet-Cavrois, Philippe Paillet, Damien Lambert, Fred W. Sexton, Gerald L. Hash, and Ewart Blackmore.

The NSREC Awards Committee has selected a Radiation Effects Data Workshop presentation for recognition. This year the paper selected as Outstanding Radiation Effects Data Workshop Presentation is: *Radiation Belt Modeling for Spacecraft Design: Model Comparisons for Common Orbits*, Jean-Marie Lauenstein and Janet L. Barth.

*Ronald Schrimpf, Chair of the Radiation Effects Technical Committee, can be reached at Vanderbilt University, Station B 351608, Nashville, TN 37235-1608; Phone: +1 615 343-0507; Fax: +1 615 343-0601; E-mail: [schrimpf@vuse.vanderbilt.edu](mailto:schrimpf@vuse.vanderbilt.edu)*



**Wayne Abare**  
Junior Member-at-Large

## **FUNCTIONAL COMMITTEES**

### **AWARDS COMMITTEE** Call for 2006 Award Nominations

**N**ominate your well – deserving colleagues for the IEEE Nuclear and Plasma Sciences Society and Committee awards **NOW!**

If you have any questions, e – mail or call me. The deadline is May 15, 2006.

The NPSS Awards comprise the following.

#### **THE RICHARD F. SHEA DISTINGUISHED MEMBER AWARD**

**Description:** To recognize outstanding contributions through leadership and service to the NPSS and to the fields of Nuclear and Plasma Sciences.

**Prize:** \$2,000, Plaque, and Certificate.

**Funding:** Funded by the IEEE Nuclear and



**Igor Alexeff**

## Acid test

If you can describe clearly without a diagram the way of making this or that knot, then you are a master of the English language.

*Hilaire Belloc*

Plasma Sciences Society.

**Eligibility:** Any member of the IEEE and NPSS who has contributed to the fields of nuclear and plasma sciences through leadership and service.

**Basis for Judging:** Selection criteria are:

- Leadership roles and leadership quality;
- Innovative and important contributions to Society activities;
- Service and dedication to the NPSS;
- Technical achievements.

**Presentation:** One award presented annually at Nuclear Science Symposium or at any other IEEE NPSS meeting that the awardee chooses.

### **THE NPSS MERIT AWARD**

**Description:** To recognize outstanding technical contributions to the fields of Nuclear and Plasma Sciences.

**Prize:** \$2,000, Plaque and Certificate.

**Funding:** Funded by the IEEE Nuclear and Plasma Sciences Society.

**Eligibility:** Any individual who has made technical contributions to the fields of Nuclear and Plasma Sciences.

**Basis for Judging:** Selection criteria, in order of importance are:

- Importance of individual technical contributions;
- Importance of technical contributions made by teams led by the candidate;
- Quality and significance of publications and patents;
- Years of technical distinction;
- Leadership and service within the fields of nuclear and plasma sciences and related disciplines.

**Presentation:** One award presented annually at Nuclear Science Symposium or at an NPSS sponsored meeting chosen by the nominee.

### **NPSS EARLY ACHIEVEMENT AWARD**

**Description:** To recognize outstanding contributions to any of the fields making up Nuclear and Plasma Sciences, within the first ten (10) years of an individual's career.

**Prize:** \$1,800, plaque, and certificate.

**Funding:** Funded by the IEEE Nuclear and Plasma Sciences Society.

**Eligibility:** Member of the IEEE NPSS who at the time of nomination is within the first ten (10) years of his or her career within the fields of interest of NPSS.

**Basis for Judging:** Three (3) letters of recom-

mendation, publications and/or reports, patents, etc. which demonstrate outstanding contributions early in the nominee's career.

**Presentation:** At any major NPSS sponsored conference chosen by the awardee.

### **NPSS GRADUATE SCHOLARSHIP AWARD**

**Description:** To recognize contributions to the fields of Nuclear and Plasma Sciences.

**Prize:** \$500, certificate, and one – year paid membership in the NPSS.

**Funding:** Funded by the IEEE Nuclear and Plasma Sciences Society.

**Eligibility:** Any graduate student in the fields of Nuclear and Plasma Sciences.

**Basis for Judging:** Evidence of scholarship such as academic record, reports, presentations, publications, research plans, related projects and related work experience, Participation in IEEE activities through presentations, publications, Student Chapter involvement, etc., will also be considered.

**Presentation:** Up to four (4) awards presented annually. Check and certificates sent to nominator to be presented at a special occasion at the winner's institution.

### **PAUL L. PHELPS**

#### **CONTINUING EDUCATION GRANT**

**Description:** The Paul L. Phelps award is different, in that its objective is to permit people to attend short courses at IEEE NPSS meetings by giving them travel grants.

**Prize:** Several travel grants per NPSS conference.

**Funding:** Funded by the IEEE Nuclear and Plasma Sciences Society.

**Eligibility:** Any graduate student in the fields of Nuclear and Plasma Sciences. Also members of the IEEE who are unemployed or have trouble obtaining travel funds. Each grantee must attend a short course.

**Basis for Judging:** Each conference shall have an appointed chairman to handle Phelps travel grants. The amount of funding per conference is determined by the short course attendance at the previous conference. (Consult the IEEE NPSS Treasurer.) This amount may then be subdivided at the discretion of the appointed chairman to accommodate several recipients. Application for the grant is by a letter to the appointed chairman or the conference chairman, who will forward it to the proper person, well in advance of the conference date. The letter will convey the need for the grant, as well as biographical and scientific information to

demonstrate the scientific capability of the potential grantee.

**Presentation:** A check will be sent to each grantee, preferably well before the conference, but as soon as possible in the case of late application.

### THE IEEE AWARDS PROGRAM

There are an abundance of high – level awards obtainable directly from the IEEE. In general, our society has ignored these awards. To my knowledge, the NPSS has only received TWO such awards in its 30 – year history.

**Prizes:** Download the IEEE Award Manual from the web at IEEE AWARDS and be amazed at what is available! And get to work!

### THE IEEE NPSS TECHNICAL COMMITTEE AWARDS:

**Description:** Most of the Technical Committees under the IEEE NPSS umbrella have their own awards. These awards are in general funded through the committee’s conference budgets. These awards are tabulated below. Details are obtainable from the IEEE Web page, IEEE.NPSS.

### Summary of Committee Awards:

- (1) Computer Applications in Nuclear and Plasma Sciences Award.
- (2) Radiation Effects Award.
- (3) Radiation Instrumentation Early Career Award.
- (4) Radiation Instrumentation Outstanding Achievements Award.
- (5) Fusion Technology Award.
- (6) Particle Accelerator Science and Technology Award (PAST Award).
- (7) Plasma Science and Applications Award.
- (8) Edward J. Hoffman Medical Imaging Scientist Award.
- (9) Young Investigator Medical Imaging Science Award.
- (10) Erwin Marx Award
- (11) Peter Haas Pulsed Power Award.
- (12) Outstanding Pulsed Power Student Award.
- (13) Best Student Paper Awards: All conferences at conference committee’s discretion.

*Igor Alexeff, the Awards Chairman, can be reached at Ferris Hall 315, Middle Drive, Knoxville, TN 37996-2100; Tel: +1 865-974-5467; Fax: +1 865-974-5483; E-mail: lexeff@utk.edu*

## Watch out

There is no extremism so firm as the disillusioned moderate.

John Buchan

## MEMBERSHIP COMMITTEE

To recruit new members, I participated in 2005 at the IEEE Membership desk during the following NPSS conferences:

- Particle Accelerator Conference (PAC 05) held in Knoxville, TN;
- 32nd International Conference on Plasma Science (ICOPS 05) held in Monterey CA
- 15th International Pulsed Power Conference (PPC05) held in Monterey, CA;
- Symposium on Fusion Engineering (SFE 05) held in Knoxville, TN;
- 42nd Nuclear and Space Radiation Effects Conference (NSREC 05) held in Seattle, WA;
- Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC 05) held in Fajardo, Puerto Rico.

In addition, Drs. Uwe Bratzler and Christoph Ilgner from CERN created an elegant NPSS membership booth for use in recruiting at those of our conferences held in Europe. Their booth mimics but also improves

upon the design of the booth created by Dr. Peter Clout for use in North American conferences. The first use of their booth occurred when Uwe and Christoph introduced RADECS attendees to IEEE and to NPSS at the following conference:

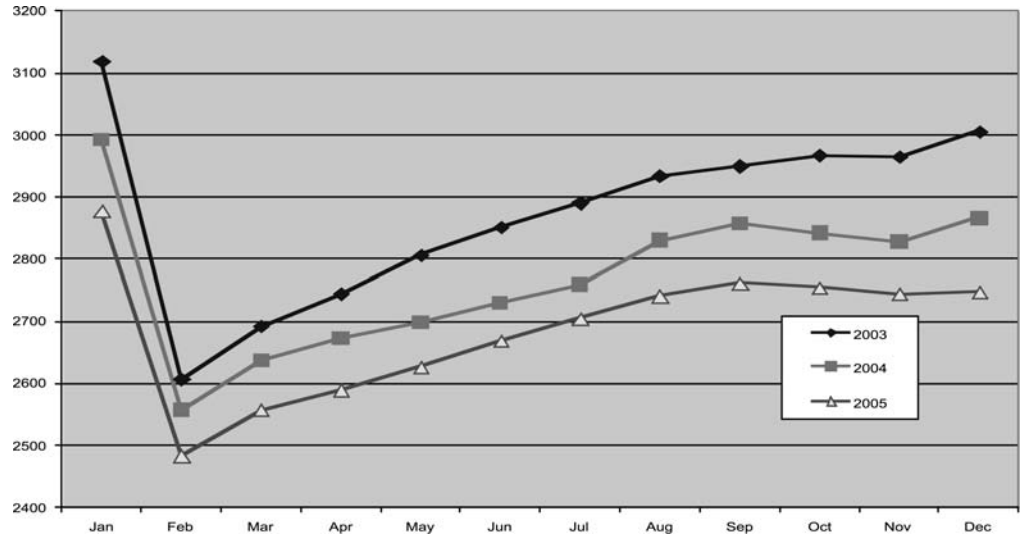
- Radiation and its Effects on Components and Systems (RADECS 05) held in Cap d’Agde, France.

Each of these conferences was well attended and was a high-quality scientific meeting. Attendees each received a crafted NPSS brochure along with flyers describing our society so that, in addition to the scientific program, the non-IEEE members became well aware of the benefits and values of membership in NPSS. Except for RADECS<sup>1</sup>, only about half of conference attendees typically are IEEE members. Beyond that, only about one-fourth of conference attendees are NPSS members. In spite of a strong effort to attract the non



Vernon G. Price

<sup>1</sup> Most attendees at RADECS come from Region 8 and a smaller fraction of them are IEEE members.



members<sup>2</sup>, fewer people were recruited in 2005 at the above conferences than has been my experience in similar conferences held in earlier years over more than a decade period. Why did this happen?

One observation is that fewer IEEE members as a whole are choosing to belong to IEEE societies as compared to choices in past years. It is possible that this is a result of the success of the Xplore program for Web-based IEEE periodicals. A steady decline in society participation by IEEE members has occurred over the past four years. Over 44% of IEEE members now do not belong to any of the IEEE societies. Following a trend that other IEEE societies are experiencing, membership in the Nuclear and Plasma Sciences Society has also fallen. This trend for our society may be illustrated in the plot above where one can see the results of reduced recruiting results in the November-December 2005 period.

Other observations from the above plot show that the extent of the drop-offs occurring in February (at the time when IEEE places those people who do not renew into 'lapsed member' status) has gradually reduced from the 512 lapsed members in February 2003 to 394 lapsed members in 2005. This decrease in our loss during the lapse period may show that fewer of the 'steady-state' members are leaving our ranks. Our average membership per year for the three year period is 2878 in 2003, 2773 in 2004 and now 2688 in 2005. We have lost 371 members since December 2002 and few of those are like-

ly to return. We see in the plot that the typical 'up-tick' in membership at the end of the year did not occur in 2005 because too few people were recruited at the NSS/MIC conference. Our 4.1% loss at the end of 2005 compared to the previous December, places our society at the highest loss among those societies classed in IEEE Division IV. Those are Antennas and Propagation, Broadcast Technology, Consumer Electronics, Electromagnetic Compatibility, Magnetics, Microwave Theory and Techniques and, finally, NPSS.

IEEE always has strongly encouraged the expansion of society memberships. But recently, some society membership chairs have begun to question that philosophy. It has also been debated off and on over the years within the NPSS AdCom as well. The society chairs have pointed out on the web that the fees charged for society members provide less income than the costs involved supporting the members. Why then should attempts be made to recruit new members if the result is to increase the losses? The discussions, still ongoing, recognize that members are essential for a society to be viable but that there may be an optimal number for a given society to flourish. Too many members may result in excessively high costs (primarily related to shipping journals to transnational members) and too few places heavy burdens on the volunteers. As members age and retire, they need to be replaced. The discussions note that not only economic factors need consideration but

<sup>2</sup> An exception is the NSREC conference where a higher fraction has NPSS membership has occurred as a consequence of considerable effort by the NSREC committee to support NPSS growth.

## Who was he?

He had the best manners in the kingdom - and the worst morals.

Marian Fowler



also social ones. People function best when they can interact with others whom they know. Some societies are developing decision analysis models to help to plan how much effort should be made to expand membership once the optimal number of members is known. As time goes by and the results of these studies are exchanged, I may be able to interpret their results for inclusion in some future Newsletter.

At the end of this past year, I ended my active participation in recruitment of NPSS members at our conferences. Over more than a decade, I have recruited more than a thousand new members for IEEE and for our society. At each con-

ference, I see many whom I recruited even years ago and it is always pleasurable for me to say 'Hello' to them. Further, I am grateful to members of our AdCom who have helped me so much since 1990 and to the many conference organizing committee members who have made it pleasant for me to be at their conferences. I will try to be helpful to any who follow me in carrying out this work. *Aufwiedersehen!*

*Vernon G. Price, the recently retired Membership, Chapters and Distinguished Lecturers chair, can be reached at 22151 Berkeley Ct., Los Altos, CA 94024-7452 USA; Phone: +1 408 737 0778; Fax: +1 408 737 1922; E-mail: v.price@ieee.org.*

## Volunteer Opportunity in NPSS Membership Booth

**D**o you like to travel for free? Do you want to stay in touch with the technical activities in your field? If so, joining the IEEE Nuclear and Plasma Sciences Society (NPSS) Conference Booth Council may be just the thing for you!

The NPSS operates a Membership Booth at each of the approximately seven conferences that NPSS sponsors each year. Volunteers at this booth promote IEEE and NPSS membership, answer IEEE-related questions, and generally act as the interface between NPSS members and their Society. The NPSS is now forming a Conference Booth Council and is actively looking for volunteers to serve on this Council. The main responsibility of the Council Members is to travel to conferences and man the booth at the conference (mostly during the conference

coffee breaks). There are also some lesser, but important duties, such as setting up and tearing down the booth, and doing some initial processing of and tracking membership applications. Council members will work closely with the NPSS Membership Chair both to receive training in membership procedures and to develop new strategies and practices. All conference fees and reasonable travel expenses will be paid by NPSS.

Because of the large number of conferences that NPSS sponsors, more than one candidate is sought. Conference dates are known several years in advance for planning purposes. Does this sound interesting to you? If so, please contact *Jane Lehr at Sandia National Laboratories, MS 1193, P.O. Box 5800, Albuquerque, NM 87185-1193, Phone: +1 505 844 8554; E-mail: jane.lehr@ieee.org.*



**Jane Lehr**  
NPSS Vice President

## LIAISONS

### IEEE-USA ENERGY POLICY LIAISONS

**C**harles Neumeyer and Dick Lanza, members of the NPSS AdCom, are serving as liaison representatives of NPSS on the IEEE/USA Energy Policy Committee. This committee reports to the IEEE-USA Board of Directors through the IEEE-USA Vice President, Technology Policy Activities, and is established as a focal point to bring the interests and capabilities of the Institute to bear on

United States policy issues in the areas of energy and environmental technology by interaction with the executive and legislative branches of the United States government at all levels. The responsibilities of Liaison Members are "bi-directional." First, they are responsible for seeking input from the societies and regions in all phases of issue identification and development of recommendations and messages. Second,

they are responsible for transmitting relevant information and products from the committees to the societies and regions; Liaison Members typically report on the activities of the committees at society AdCom meetings and regional meetings and through newsletters. In order to serve the NPSS in this capacity, inputs from the

NPSS community on energy and environmental policy issues are hereby sought. If you have opinions on matters related to issues such as energy supply, regulation, generation, transmission, reliability, conservation, etc., please feel free to communicate them via e-mail to [neumeyer@pppl.gov](mailto:neumeyer@pppl.gov) and/or to [lanza@mit.edu](mailto:lanza@mit.edu).

## AWARDS

### NEW IEEE FELLOWS

Each year the IEEE Board of Directors elects no more than 0.1% of the full membership to the grade of Fellow. Nominations are made by Senior Members and must be supported by at least six Fellows. After being reviewed and ranked by the appropriate IEEE Society, the nominations are forwarded to the Fellows Committee of the Board who then recommend a list of candidates for the Board's consideration. The NPSS is pleased that the following members were elected by the Board this year, and extends its congratulations to all of our new Fellows.

#### Paul A. Bernhardt



**Paul A. Bernhardt** in front of the antenna array used for the High Frequency Active Auroral Research Program (HAARP) in Alaska

Paul A. Bernhardt received his Bachelor's degree (1971) from the University of California at Santa Barbara in the Electrical Engineering Department. His Master's (1972) and Ph.D. (1976) degrees in Electrical Engineering are from Stanford University. From 1971 to 1973, he was a design engineer at the Naval Missile Center, Pt. Mugu, California. From 1976 to 1980, Dr. Bernhardt held the positions, respectively, of Post Doctorate Research Affiliate, Research Associate, and Senior Research Associate at Stanford University. Starting in 1981, he was a member of the technical staff of the Los Alamos National Laboratory. In 1987, Dr. Bernhardt left Los Alamos for the position of Research Physicist at the Naval Research Laboratory (NRL). In 1990, he was promoted to his current position, Senior Research Physicist, in the Plasma Physics Division at NRL. His research interests have been primarily in the areas of (1) ionospheric modification with high-power radio waves and chemical releases, and (2) satellite-based radio-beacon sensing of space plasmas. From 1985 to 1999, Dr. Bernhardt used the high-power High Frequency facility near Arecibo, Puerto Rico and Nizhny Novgorod, Russia to record the first CCD images of artificial aurora at mid latitudes. These images illuminated natural and artificial irregularities in the ionosphere. From 1992 to 1994, Dr.

Bernhardt served on the Arecibo Users and Science Advisory Council. Dr. Bernhardt is currently sponsored for ionospheric modification research by the High Frequency Active Auroral Research Program (HAARP) in Alaska.

Dr. Bernhardt has pioneered the use of chemical releases to modify the ionosphere. His ionospheric modification experiments have been monitored with Incoherent Scatter Radar (ISR) systems around the world and with in situ plasma probes provided to the Plasma Physics Division at NRL. The 1992 NRL Ionospheric Focused Heating (IFH) experiment combined chemical release and high-power radio wave technology to produce the highest level of plasma turbulence ever measured with the Arecibo ISR. From 1985 to the present, Dr. Bernhardt has conducted over eight experiments using the Space Shuttle Orbital Maneuver Subsystem (OMS) engines to modify the ionosphere with high-speed exhaust injections into the upper atmosphere. The results of these dedicated engine burns have been recorded using the VHF and UHF radars at Arecibo, Puerto Rico; Kwajalein, Marshall Islands; Millstone Hill, Massachusetts; and Jicamarca, Peru. Currently, Dr. Bernhardt is the Principal Investigator for the Charged Aerosol Release Experiment (CARE) to study the scattering of radar from electrons in the vicinity of

charged particulates that form artificial “dusty plasmas.”

The Coherent Electromagnetic Radio Tomography (CERTO) and Computerized Ionospheric Tomography Receiver in Space (CITRIS) programs were started at NRL by Dr. Bernhardt to provide global, satellite-based sensors of ionospheric space weather. In the next four years, ten CERTO beacons and one CITRIS receiver are scheduled to be launched on low-earth-orbit (LEO) satellites that will monitor both integrated electron densities and plasma irregularities. The data from these sensors will provide “now-casting” for navigation and communications system outages caused by the ionosphere with one-hundred times better resolution than are provided by GPS radio signals. The CERTO and CITRIS programs are supported by the Plasma Physics Division (Code 6700) and Naval Center for Space Technology (Code 8000) at NRL.

Dr. Bernhardt has published over one-hun-

dred papers in ionospheric and space physics. He holds patents for hyper-spectral imaging and radio beacon design. He is a Fellow of the American Physical Society (APS) and is a member of the American Geophysical Union (AGU). For AGU, he has been an associate Editor of the *Journal of Geophysical Research* (JGR) and the journal *Radio Science* as well as a member of the AGU Books Board Editor. He is also a member of the International Union of Radio Science (URSI) where he was Chairman of the U.S. Commission on Waves in Plasmas (1994-1997), and is currently Member-at-Large of the US National Commission of URSI.

*Citation: “for contributions to artificial modification of space plasmas with high power radio waves.”*

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## Christopher Deeney

Christopher Deeney was born on October 28th, 1963 in Bellshill, Scotland. In June 1984, he graduated with a First Class Honours B.Sc. in Physics from the University of Strathclyde, Glasgow. From October 1984 to October 1987, he completed his Ph.D. research on the formation of hotspots and electron beams in gas puff Z pinches and plasma focii at Imperial College in London. Dr. Deeney was a post-doctoral researcher at the University of Stuttgart, Germany until May 1988 when he joined Physics International Company, California. At Physics International he became the program manager for Z-pinch-based plasma radiation source development, for X-ray laser research and the application of pulsed corona technologies to pollution control. In 1991, he was promoted to be the Department Manager of the Plasma Physics Group. In February 1995, Dr Deeney joined Sandia National Laboratories where he has been one of the experimenters on the 8-MA Saturn and 20-MA Z pulsed-power generators. In 2000, he became a department manager at SNL with responsibilities in areas including Z-pinch development and applications of pulsed

power to material dynamics studies. To date, Dr. Deeney has published 97 journal papers on Z-pinch physics, X-ray lasers, spectroscopy, plasma focus research, X-ray diagnostics, and dynamic material properties. He is also an active member of the IEEE, having sat on the PSAC EXCOM and being the Chairperson for 1999 International Conference on Plasma Science, and was the co-chair for a Z-pinch Minicourse at ICOPS 2005 in Monterey. In 1999, he was awarded an APS Fellowship in the Division of Plasma Physics. In 2005, he became a Group Manager at Sandia responsible for Pulsed Power Technology development with five departments covering research in pulsed power, dynamic materials, and plasma physics plus support of various stockpile stewardship activities at Sandia and at the Nevada Test site.

*Citation: “for contributions to Z-pinch physics.”*

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## Eternal triangle

There are three sides to every story: my side, your side, and the truth. And no one is lying.

Robert Evans



Christopher Deeney

## Ronald M. Gilgenbach



**Ronald M. Gilgenbach**

Ronald Gilgenbach is a professor in the Nuclear Engineering and Radiological Sciences Department and also serves in the Applied Physics Program at the University of Michigan. He received his Ph.D. in Electrical Engineering from Columbia University in 1978. His B.S. (1972) and M.S. (1973) degrees were earned at the University of Wisconsin. In the early 1970s he spent several years as a Member of the Technical Staff at Bell Labs. From 1978 to 1980, he worked at the Naval Research Lab (NRL) where he played a key role in the development of the first high-power 35 GHz gyrotron, which was utilized to perform the first gyrotron plasma-heating experiment on a tokamak in the USA (at Oak Ridge National Laboratory). Dr. Gilgenbach joined the faculty of the University of Michigan in 1980 and became Director of the Plasma, Pulsed Power and Microwave Laboratory. In 2002 he founded the Bioelectromagnetism Laboratory, which he also directs. His research at Michigan has concentrated on the generation and applications of high-power microwave vacuum electron devices, including gyrotrons and magnetrons. He recently coauthored two U.S. patents granted on “magnetic priming” of magnetrons for fast start-up and low noise. His research has

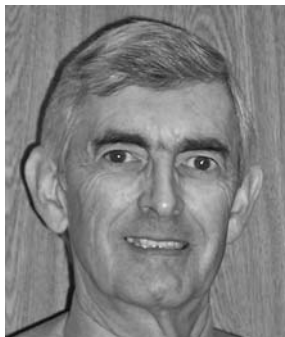
recently concerned applications of microwaves to biological interactions (rf-enhanced chemotherapy) and plasma propulsion for space. He has had research collaborations with scientists at the Air Force Research Lab, Sandia National Labs, NASA Glenn, Northrop-Grumman, L-3 Corp., General Motors Research Labs, Los Alamos National Lab, Fermilab, and the Naval Research Lab.

Dr. Gilgenbach received the IEEE Centennial Key Award for Young Engineers in 1984 and in 1997 he was awarded the IEEE Plasma Sciences and Applications Committee Award. He was elected Fellow of the American Physical Society in 1996. Prof. Gilgenbach is an Associate Editor of the *Physics of Plasmas*. He has served multiple terms on the ExCom and is currently Vice Chair of the IEEE Plasma Science and Applications Technical Committee. He has published some 125 articles in refereed journals and has supervised 36 graduated Ph.D. students.

*Citation: “for contributions to high power microwave vacuum-electron devices.”*

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## Ian R. McNab



**Ian R. McNab**

Ian McNab was born and educated in Britain and moved to the United States with his family in 1975. He holds a Ph.D. in Applied Science from the University of Reading (1974), and a B.Sc. (Honors Physics) from the University of Leeds (1960), both in the UK. He has been the Director of the Electromagnetic Systems Division at the Institute for Advanced Technology (IAT) at the University of Texas in Austin since 1995, where he is responsible for research programs in EM launchers, pulsed power, code development and analysis, and materials.

Since moving to the United States, Dr. McNab’s interests have been focused primarily, but not solely, in the areas of electromagnetic (EM) launchers and related pulsed-power technology. In 1978, while at the Westinghouse R&D Center in Pittsburgh, PA, Dr. McNab led Westinghouse efforts to design

and supply the first U.S. EM launcher system for DARPA and the U.S. Army – a 1.5 million ampere, 15 to 30 MJ pulsed homopolar-generator-powered system that operated at ARDEC, Picatinny from 1982 to 1998. At the Westinghouse Division in Sunnyvale, CA (now Northrop Grumman) from 1984 to 1990 he led programs to design, build and deliver a 1 million ampere, 12 MJ high-speed pulsed homopolar generator and cryogenic inductor system for electromagnetic launcher R&D to USAF-Eglin and initiated the fundamental design of a 40-MW long pulse (1.5 MA for 5 seconds) homopolar generator for the USAF power group at Wright Patterson AFB. Working with DNA (1986) he initiated the 32 MJ capacitively powered Thunderbolt EM launcher program for SDIO that was operated by Westinghouse and which subsequently achieved a muzzle velocity of 5.4 km/s. While



at Maxwell Laboratories (1990-94) he oversaw operation of DNA's Maxwell Green Farm 32 MJ EMG/ETC gun facility as well as programs to develop electrothermal gun technology and the development of pulsed power equipment for U.S. government and industrial customers. Since joining the IAT (1995) he has developed and directed a group of 35 scientists, engineers and technicians that undertakes leading R&D on EM launch and pulsed power technology for the U.S. Army, Navy, ONR, DARPA and USMC. The IAT is the Army's designated University Research Center for this technology, and operates the largest U.S. electric gun research facility at present. The U.S. Navy recently provided a \$10M, 5-year contract to the IAT with Dr. McNab as the Principal Investigator. He is also Chief Scientist for the U.S. Army's Advanced Development program (\$60M) to develop EM launchers and their associated 20-GW pulsed-power systems and is also PI on related R&D studies for DOD including for ONR, AFOSR and USMC.

Dr. McNab has published well over 100 papers (30 in IEEE Transactions; 4 in IEEE Pulsed Power Conferences) on R&D in electric guns, pulsed power, rotating machines, and related technologies, e.g., current collection. He has served on the Steering and Technical Committees for the International EM Launcher Symposium since 1982, and was Conference Chairman in 1996. In 1986 he was a founding member of Electromagnetic Launcher Association which recently had its 20th meeting. He has provided numerous reports and briefings to the U.S. Armed Services and has been instrumental in promoting interest for this technology in DOD. He was awarded the Peter Mark Medal for Outstanding Contributions to Electromagnetic Launch Technology in 1990 and was awarded the Lavrentyev Medal by the Russian Academy of Sciences Siberian Branch for Accomplishments in Electromagnetic Launch Technology in Academiyyorodok in 2003. In 1997 he was the Invited Keynote Speaker at the First South Korean Conference on Electric Guns and in 2004 he was one of two invited Keynote Speakers at the 2nd Chinese Electromagnetic Launch Society conference in Dalian.

In addition to his interests in EM launchers, Dr. McNab has worked in several other electrotechnology fields. He started his career

in the UK in 1960 by undertaking research on alkali-metal-seeded noble gas magnetoplasma-dynamic generator technology at the International Research and Development Company (now owned by Rolls Royce) - a topic on which he was awarded his Ph.D. He was then involved in the development of advanced metal-plated carbon fiber brush technology for superconducting generators in the late 1960s and early 1970s for the British Navy. His interests in this field continued on joining Westinghouse in 1975 and, as a result of undertaking a current collection development program in the late 1970s for DARPA and ONR, he organized an International Conference on Current Collection in 1982 and edited a book on Electrical Current Collection. He has also contributed definitive chapters to Handbooks on Wear, and on Space Science and Technology. In the late 1970s and early 1980s he was involved in the development of liquid-metal pump technology for the fast breeder nuclear reactor industry under contracts and awards from EPRI and NSF.

Since 1960, Dr. McNab has also served as consultant on defense topics for: the RAND Corporation, MITRE, the JASONs, DOE Argonne National Laboratory, U.S. Army, ARES Inc. (for SDIO), the Institute for Defense Analysis (MCTL), Physics International, JDI, Triton, Royal Ordnance (UK), FOA (Sweden), and FASAC. He has been scientific referee for NSF; U.S.-Israeli Bi-National NSF; the Holm Conference; DOE SBIR Office; IEEE pulsed power conferences; the International EML Symposia; as well as scientific journals such as the *Journal of Applied Physics* (U.S. and UK). He currently reviews proposals from Industry and Academia for the Army and Navy. Dr. McNab has 15 patents in the U.S. and UK on EM launchers and advanced brushes for electrical machines. He has served on the IEEE Nuclear and Plasma Sciences Pulsed Power Committee since 1998 and frequently provides briefings to Senior DOD management that have helped to obtain enhanced commitment to EML research.

*Citation: "for contributions to the development of electromagnetic launchers."*

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## Perfectly clear

I hope you believe you understand what you think I said, but I'm not sure you realize that what you've heard is not what I meant.

*Richard Nixon*

## William W. Moses



**William W. Moses**

**B**ill Moses has been an active researcher in instrumentation for nuclear medical imaging for many years. In 1978 he received a B.A. from Dartmouth College, majoring in Physics, and entered graduate school at the University of California, Berkeley the following fall. His thesis work was in subatomic particle physics as a member of the PEP-4 TPC collaboration. He worked on the electromagnetic barrel calorimeter for the project, which is where he first became interested in radiation detection. He received a Ph.D. in Physics from UCB in 1986, at which point he decided to do research in nuclear medical imaging. He was hired as a Post-Doctoral Fellow at the Center for Functional Imaging at Lawrence Berkeley National Laboratory, where he worked for Dr. Stephen E. Derenzo. He has worked in the same group ever since, and is presently a Senior Staff Scientist at LBNL.

Bill's research has centered on development of instrumentation for nuclear medical imaging, primarily for positron emission tomography (PET). He has been very involved in developing new dense inorganic scintillators for gamma ray detection. He has worked on novel pixellated photodiode arrays for measuring scintillation light, and developed electronics and custom integrated circuits tailored to reading out these photodiode arrays. He has designed new nuclear medical imaging detector modules that incorporate these new components, and created medical imaging devices optimized for imaging specific diseases (notably breast cancer and prostate cancer). These novel detector modules and imaging geometries require modification to the algorithms used to process the data, so he has also contributed to creating suitable tomographic reconstruction algorithms. Most recently he has been pursuing both hardware and software improvements necessary to realize time-

of-flight PET, which has the potential to substantially reduce the statistical noise in the reconstructed images. He has over 175 publications and three patents, been principal investigator on 20 research grants, supervised 14 graduate students, given over 35 invited presentations, and served on numerous grant review committees.

Bill has also been extremely active in the IEEE for a number of years, and is currently President of the NPSS. He began his "IEEE career" as the Assistant Guest Editor for papers submitted to the IEEE 1989 Nuclear Science Symposium. He has served in many roles for subsequent Nuclear Science Symposium (NSS) and Medical Imaging Conference (MIC) meetings, including Assistant Program Chairperson for the MIC in 1991, Program Chairperson for the NSS in 1993, organizing or teaching a Short Course (Fundamentals of Medical Imaging) six times, and serving as Chair of the Site Selection Committee several times. He served as Chairperson of the Radiation Instrumentation Steering Committee (RISC, whose major responsibility is the long-term organization of the NSS/MIC) for the first four years of its existence, and was an elected member of the NPSS AdCom representing the Nuclear Medical and Imaging Sciences Technical Committee from 1995–1999 and Radiation Instrumentation Technical Committee from 2001–2005. As President of NPSS he is also a member of the IEEE Technical Activities Board (TAB), where he also serves on a number of committees.

*Citation: "For the development and application of efficient, high resolution position tomography."*

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## Marek Moszynski



**Marek Moszynski**

**M**arek Moszynski received his M.S. degree from Warsaw Technical University, Poland in nuclear electronics in 1962. He began working at the Institute for Nuclear Research in Swierk (Poland). In 1969 he received his Ph.D. and in 1971 his D.Sc. (habilitation). In 1972 he

became an Associate Professor and in 1981 a Full Professor at the Institute of Nuclear Research in Swierk. After reorganization of the Institute in 1983, he became the Head of the Nuclear Electronics Department at the Soltan Institute for Nuclear Studies at Swierk until 1990 and then again in 1997. Since 1998 he

has been Deputy Director of the Institute.

In 1969 he spent a year at the Institute of Physics, University of Aarhus, Denmark; in 1975 he participated for one year in LETI CENG, Grenoble, France. In 1981-82 he returned to LETI CENG, Grenoble and in 1990-92 he was at Centre de Recherche Nucleaires in Strasbourg, France. He has been involved in a number of European collaborations in nuclear structure physics, including NORDBALL, DEMON, EUROGRAM, and EUROBALL. At present, he is involved in a realization of two European projects, supported by the Framework 6 of the European Community, and in another supported by the International Atomic Energy Agency in Vienna. Moreover, he provides scientific expertise to the nuclear industry in Europe (France, Germany, and Scotland).

His scientific activity is mainly devoted to nuclear radiation detection techniques and methods. He is an expert in fast timing and fast neutron detection, particularly with scintillation detectors. He was a member of the group that first developed time-of-flight PET at LETI Grenoble, France and discovered the fast component of the BaF<sub>2</sub> scintillator. At Brookhaven National Lab he has developed, with a group of physicists, a method for picosecond lifetime measurements of nuclear states. At present, he is involved in the study of new inorganic scin-

tillators, avalanche photodiodes, and different aspects of scintillation detectors with application to nuclear medicine and homeland security. He is the author of about 160 papers in refereed journals, mainly in *Nuclear Instruments and Methods* and the *IEEE Transactions on Nuclear Science*.

For many years he has been a referee of papers for *Nuclear Instruments and Methods* and *IEEE Transactions on Nuclear Science*. He is a member of the Advisory Editorial Board of Nuclear Instrument and Methods A, a member of the NPSS TransNational Committee and in 2002-2004 he was an elected member of the Radiation Instrumentation Steering Committee of IEEE/NPSS. He received the Von Hevesy Prize at the 3rd World Congress of Nuclear Medicine and Biology in Paris in 1982. In 2000, he received the IEEE/NPSS Merit Award with the citation "For outstanding contributions to the modern scintillation detector and its application in physics experiments, nuclear medicine and other field of use."

*Citation: "For contributions to scintillation detectors in nuclear physics and nuclear medicine."*

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## David W. Townsend

David W. Townsend joined the University of Tennessee in Knoxville in February 2003 as Professor of Medicine and Radiology, and Director of the Cancer Imaging and Tracer Development Program. He obtained his Ph.D. in Particle Physics from the University of London and worked for eight years at the European Centre for Nuclear Research in Geneva, Switzerland. In 1980, Dr. Townsend held a position at Geneva University Hospital, Geneva, Switzerland as a physicist in the Department of Nuclear Medicine. He has worked on PET instrumentation development since the early 1980s, and has been a senior consultant for CPS Innovations, Knoxville, Tennessee (now Siemens Molecular Imaging) since 1992. He initially participated in the development of 3D reconstruction and methodology for PET in

collaboration with Hammersmith Hospital, London, and later designed and built the first rotating partial ring PET scanner using BGO block detectors. The design was commercialized as the ECAT ART scanner by CPS Innovations in 1994.

In 1993, Dr. Townsend moved from Geneva to the University of Pittsburgh as an Associate Professor of Radiology and Senior PET Physicist. He was Co-Director of the Pittsburgh PET Facility from 1996-2002, and became Professor of Radiology in 2000. In 1995, Dr. Townsend was Principal Investigator on the first proposal to design and build a combined PET/CT scanner, and subsequently on the competing continuation grant that was active until 2003 to further develop PET/CT methodology. The PET/CT scanner, attributed to Dr. Townsend and Dr. Nutt, then President of CTI Molecular Imaging, Inc.,



**David Townsend**

## Not in this world

Man can embody truth but he cannot know it.

W. B. Yeats

was named by TIME Magazine as the medical invention of the year in 2000. From 1999-2001, Dr. Townsend collaborated with CPS Innovations on the development of the commercial PET/CT scanner, following the successful clinical evaluation of the first prototype at the University of Pittsburgh PET Facility. Dr. Townsend and Dr. Nutt also hold a patent on certain aspects of the PET/CT design.

Since 2002, Dr. Townsend has been funded by the National Cancer Institute to collaborate with Siemens Molecular Imaging to design and

build the next generation of high-performance, combined PET/CT scanners using LSO detectors. The \$3 million, NCI grant covers the period 2002-2006, representing a decade of NCI funding for the PET/CT program.

*Citation: "For contributions to positron emission tomography (PET)."*

David Townsend can be reached at the University of Tennessee Medical Center, 1924 Alcoa Highway, Knoxville, TN 37920; Tel: +1865-544-6181; Fax: +1 865-544-8694; E-mail: Dtownsend@mc.utmc.edu.

*Ed. note: An additional new Fellow nominated through NPSS, Edward Peterson, "for contributions to upset rate calculations for microelectronics in space environments," has not replied to requests for a biography. We have also not included three new Fellows, Douglass Post, Harrison Barrett and Jeffrey Fessler, who are NPSS members but who were nominated through other societies. We hope to include their biographies in the June Newsletter.*

## SOCIETY AWARDS

The following Society Awards were announced at the October 2005 AdCom meeting. Further information about these individuals and their awards will be included in the June Newsletter.

**NPSS Early Achievement Award:** Craig Edward Aalseth, Pacific Northwest National Laboratory: For contributions to the advancement of ultra-low-background radiation detection instrumentation and for the development of these instruments as a means of measuring the character and mass of the neutrino

**Merit Award:** Peter S. Winokur, National Nuclear Security Administration: For contributions to the development of radiation hardened microelectronics and radiation hardness assurance test methods.

**Richard F. Shea Award:** Alberta M. Dawson Larsen, Stanford Linear Accelerator Center: For outstanding service to the IEEE NPSS as secretary for 9 years and numerous other positions of importance including Chairman, Fusion Technology Technical Committee, Newsletter editor and yearbook co-editor.

### Graduate Scholarship Awards:

Caryl N. Bryzmiakiewicz, Duke University Medical Center

Rama R. Calaga, Stony Brook University  
Abdur Razzak, Nagoya University Graduate School of Engineering

Jianjun Shi, Loughborough University, UK.

*Congratulations to all!*



**Ilan Ben-Zvi**



**Vitaly Yakimenko**

## ARTICLES

### THE ATF ACCELERATOR

A Machine for Learning  
by

Ilan Ben-Zvi and Vitaly Yakimenko

The Accelerator Test Facility (ATF) at the Brookhaven National Laboratory is the first advanced accelerator facility designed and built to serve the community active in advanced accelerator research. A proposal-driven user facility, it is dedicated to long-

term R&D in the physics of particle and laser beams. The users, who come from universities, national laboratories and industry, carry out R&D on advanced accelerator physics, studying in particular the interactions of high-power electromagnetic radiation and high-brightness



electron beams, including laser and plasma accelerators of electrons and free-electron lasers. Other topics include the development of electron beams with extremely high brightness, photo-injectors, electron beam and radiation diagnostics and computer controls.

The core of the ATF consists of a high-brightness photoinjector electron gun, a 75 MeV linac, terawatt picoseconds CO<sub>2</sub> laser synchronized to the electron beam to a picosecond level, four beam lines (most equipped with energy spectrometers) and a sophisticated computer control system. The facility, which has been in operation since 1992, provides the best high-brightness electron beams up to an energy of 75 MeV, with, for example, a normalized rms emittance of 1 mm at a charge of 0.8 nC. The bunch length is variable from 1 to 8 ps, with a bunch compressor to extend the range down to 100 fs.

The users enjoy extensive support infrastructure, with a few tens of million dollars of investment, which is embedded in a large and highly capable national laboratory. The ATF staff provides the users with close support and expertise in electron-beam dynamics, lasers and optics, advanced diagnostics, energy spectrometers and computer control. These supports are free of charge, while the use of other resources at Brookhaven, as well as the dedicated equipment for experiments, are the responsibility of the users. The users' activities are reviewed by the ATF Program Advisory Committee, which includes members from various universities and national laboratories. The committee keeps the number of users relatively steady.

The publication rate from experiments at the ATF is high, with an average of more than three papers in *Physical Review* per year. The facility is also an excellent training ground for graduate students in accelerator physics and the physics of beams with, on-average, more than two graduations a year. While a large number of students come from nearby Stony Brook University, the majority come from universities across the U.S. and throughout the rest of the world. The ATF staff is proud of its contribution to graduate education in accelerator and beam physics, through education and support of the students.

The ATF receives steady support from the U.S. Department of Energy, which has enabled the facility to evolve not only in terms of hardware and the expertise of its staff, but also in terms of stability and in the superb per-

formance of the electron and laser beams. This environment is beneficial to the rather difficult, cutting-edge experiments in advanced accelerator and coherent source physics that are carried out by the users.

### **FROM PHOTOCATHODES TO PLASMA WAKE FIELDS**

The work of the ATF has pioneered metallic photocathodes such as copper, magnesium and, most recently, niobium, for robust, good quantum efficiency operation. These photocathodes are now found everywhere in the world and are also produced industrially. The same holds true for the rf guns, with the celebrated Brookhaven one-and-a-half cell S-band series of guns. The series now stands at Gun IV, while a new superconducting continuous-wave rf gun is being developed. Examples of advanced diagnostics undertaken at the ATF include the first slice-emittance measurement, the first pulse-length measurement using shot-noise-driven fluctuation in incoherent radiation, high-resolution phase-space tomography and more. The ATF is also developing high-performance plasma capillary channels that channel the carbon-dioxide laser beam and provide a convenient source of plasma for a variety of experiments. Most recently, R&D is being carried out on optical stochastic cooling of hadron beams.

By far the most important aspect of the ATF is the research carried out by its users. Milestone experiments in laser acceleration include the work on inverse Cherenkov acceleration and the inverse free-electron laser (IFEL). The Staged Electron Laser Acceleration experiment, STELLA, has successfully used two laser accelerators (both IFELs), demonstrating the steady production of 3 fs electron beam bunches. With this configuration, STELLA II has demonstrated monoenergetic laser acceleration for the first time (*CERN Courier*, March 2004, p 7).

Experiments on the development of laser-photocathode rf guns include the "Next Generation Photoinjector," or Gun III in the ATF series. Other experiments concern the generation of unique radiation sources, including the pioneering high-gain harmonic-generation free-electron laser (FEL) that set a new trend towards coherent, ultrashort-pulse X-ray FEL. The VISA experiment at the ATF, which served as a proof-of-principle experiment for the Linac Coherent Light Source project at

## Do you agree?

People do not always argue because they misunderstand one another; they argue because they have different goals.

*William H. Whyte*

**The spice of life  
- or death**

War without fire  
is like sausages  
without mustard.

King Henry V

SLAC (*CERN Courier*, March 2003, p 5), reached saturation at visible wavelengths and demonstrated the generation of harmonics, their growth and saturation properties and the relationship to microbunching.

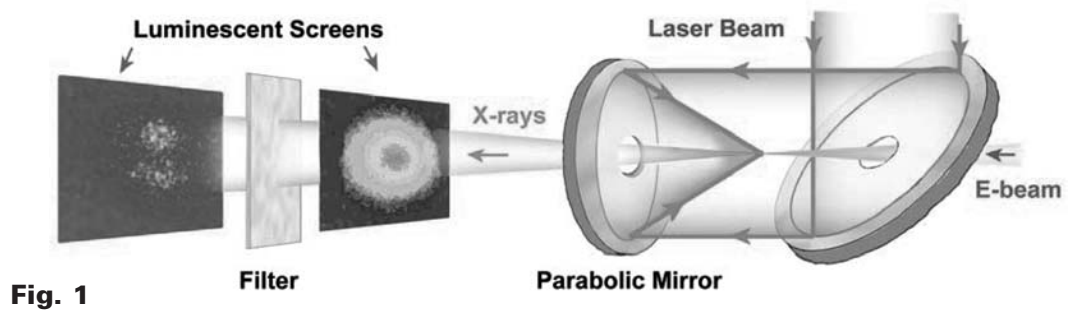
The Compton scattering experiment to investigate Compton scattering between energetic electrons and laser beams produces a record of about 108 hard X-ray photons per pulse of a few ps. Scattered photons of the laser light gain kinetic energy from the electrons and become Doppler-shifted into the X-ray region. This process is called linear Thomson scattering and normally results in a narrow X-ray beam directed exactly along the electron path. By elevating laser intensity and filtering out the linear component in Thomson scattered radiation, a nonlinear component that splits into two close-

ly separated beams of twice higher photon energy (Figure 1) was observed for the first time. The origin of these beams is a theoretically predicted but never previously demonstrated figure-eight oscillation of a relativistic electron (Figure 2). An electron acquires such a trajectory in ultra-intense EM field when its transverse velocity approaches the speed of light.

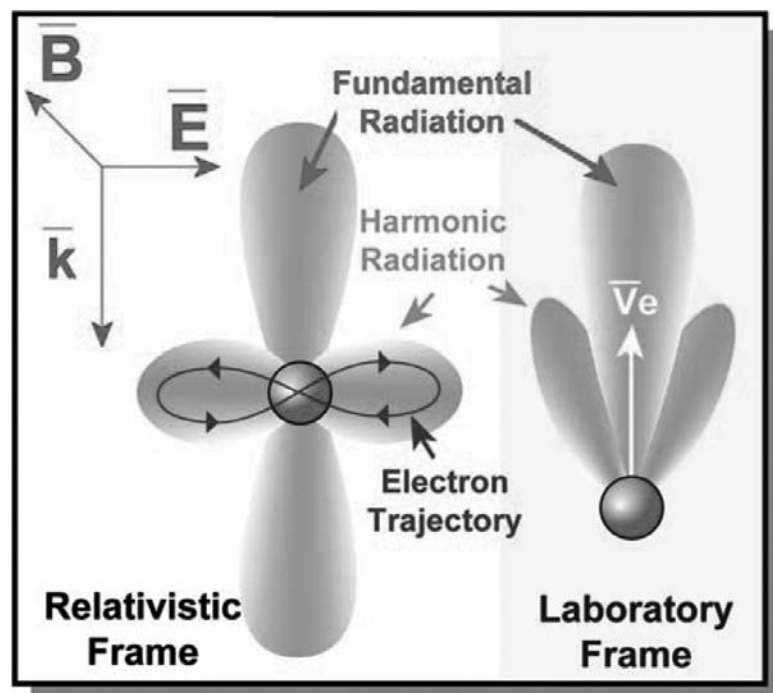
Recently, a plasma wake-field experiment demonstrated the phase relationship between the accelerating and focusing component of the plasma wake. This showed a 90 degree phase difference, thus allowing plasma wake accelerators to accelerate and focus the beam at the same phase.

**FURTHER READING:**

The web site of the ATF is at [www.atf.bnl.gov](http://www.atf.bnl.gov).



**Fig. 1**



**Fig. 2**

# Fusion Solutions through 3D Plasma Shaping<sup>1</sup>

by  
G. H. Neilson and J. F. Lyon

The National Compact Stellarator Experiment (NCSX) is a new fusion confinement experiment, currently being constructed at the Princeton Plasma Physics Laboratory (PPPL) in partnership with the Oak Ridge National Laboratory (ORNL). It will be used to acquire physics knowledge needed to evaluate the compact stellarator as a fusion concept and to advance the physics understanding of 3-D plasmas for fusion and basic science. In addition, technological developments made in the course of constructing NCSX, for example the design and manufacture of complex-shaped parts, are important contributions to fusion technology.

Among the family of toroidal magnetic plasma configurations, stellarators are of interest because they solve important problems for fusion energy — achieving steady-state operation and avoiding disruptions. Stellarators have unique flexibility to resolve scientific issues, for example the effects of 3D plasma shaping and of strong external control on confinement, that are important to all magnetic configurations. The compact stellarator shares the attractive properties of existing stellarators but has the additional advantages of lower aspect ratio and a quasi-symmetric magnetic field structure. In a quasi-axisymmetric stellarator (QAS) like NCSX [1,2,3], the charged particle trajectories and plasma flow damping are similar to those of its axisymmetric cousin, the tokamak, so a QAS is expected to share the tokamak's good confinement performance. This physics link with tokamaks means compact stellarators can advance rapidly and economically, building on advances in the more mature tokamak concept, including the expected future advances in burning plasma physics and technology from ITER.

The NCSX plasma is designed to have an aspect ratio of 4.4 instead of the more typical (for stellarators)  $\sim 10$ ; to have a quasi-axisymmetric magnetic field with an effective ripple less than 1.5%; to be MHD stable without active feedback control, current drive, or rotation drive; and to have good magnetic sur-



**Fig. 1 NCSX plasma and modular coils.**

faces; all at high beta (4%). The device size (major radius  $R = 1.4$  m), magnetic field range ( $B = 1.2$ - $2.0$  tesla), pulse length (0.3-1.2 s), and plasma heating power (1.5 – 12 MW) are set to produce the plasma conditions and profiles needed to test critical physics issues over a range of beta and collisionality values.

The compact stellarator's advantageous properties are due to its 3-D plasma geometry, but a complex magnetic field is required. In the case of NCSX, that field is generated by eighteen modular coils, six each of three different shapes (Fig. 1). Toroidal field coils, poloidal field coils, and helical-field trim coils complete the magnet system and ensure that the device has sufficient flexibility to vary the plasma configuration and test the physics. The engineering challenge in the construction of NCSX is the accurate realization of the complex geometries of the modular coils and other structures, primarily the vacuum vessel, which must conform to the shape of the plasma. [4]

Manufacturing solutions for the modular coils and vacuum vessel were developed through R&D. During the conceptual design of NCSX, industrial suppliers examined forming and welding methods for realizing the NCSX vacuum vessel geometry to a tolerance of  $\pm 3$  mm. Other suppliers studied the modular coil winding forms (MCWF), the steel castings which support the modular coils, key



**G. Hutch Neilson**



**James F. Lyon**

i. Research supported by the U.S. DOE under Contract No. DE-AC02-76CH03073 with Princeton University and No. DE-AC05-00OR22727 with UT-Battelle, LLC.

## Hooke's Law?

When you reach the end of your rope, tie a knot in it and hang on.

Thomas Jefferson



**Fig. 2 Vacuum vessel segment in manufacture.**

issues being alloy selection, deformation control, and machining of the complex-shaped coil winding surface to tight tolerances ( $\pm 0.25$  mm). During preliminary and final design, the project contracted with two suppliers each for the vacuum vessel and MCWF to, first, develop specific manufacturing, inspection, test, and quality assurance plans for these components and, then, to apply them by constructing prototypes. These R&D programs demonstrated viable industrial manufacturing processes and qualified suppliers to produce components for the machine. The three vacuum-vessel segments are being manufactured by Major Tool and Machine, Inc. One segment with its more than 30 ports being installed is shown in Fig. 2. The MCWFs (Fig. 3) are currently being manufactured by a team of companies led by Energy Industries of Ohio, Inc. Through December 2005, eleven of the eighteen winding forms have been cast; of these, nine are in process and two have been delivered to PPPL.

Modular coil manufacturing R&D by PPPL and by industrial conductor suppliers supported both the design and manufacturing development for the modular coil assemblies. A series of tests resolved both manufacturing and performance issues including conductor design, winding scheme, conductor installation, cooling scheme, insulation system, and epoxy impregnation materials and processes. An integrated manufacturing demonstration was performed by constructing and testing a prototypical coil, completing the manufacturing R&D for the modular coils. The modular coil R&D program supported the completion of the winding pack design and demonstrated manufacturing processes for the production coils capable of achieving the required geome-



**Fig. 3. Modular Coil Winding Form in manufacture.**

tries and tolerances. Two coils are currently in winding operations at PPPL.

The NCSX vacuum vessel segments will be delivered in 2006. Modular coil manufacture will continue through the end of 2007. Build-up of the three field-period subassemblies, each consisting of six modular coils, six toroidal field coils, and a vacuum vessel sector with associated ports and attachments, will start in 2007. Machine assembly and integrated system testing will be completed in 2009. First Plasma, signifying completion of the \$92M construction project, is scheduled for July 2009. Though still in progress, the NCSX construction project shows that the engineering realization of compact stellarator geometries is not an obstacle. The key engineering challenge, namely the accurate realization of the unusual geometries required of the magnets, vacuum vessel, and associated structures, is being met. If the expected physics benefits are confirmed by the research program, it will establish the compact stellarator as an attractive candidate fusion confinement system.

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## OTHER NEWS

### Edward Fairstein

1923 to 2005

#### Long-time NPSS Fellow Active in Standards Community

*The following letter was written by Lou Costrell, long-time chair of the NPSS Standards Committee, to the sons of Ed Fairstein and friend Liz Singley, after Ed's death last year. It is printed here with Lou's permission. Ed was an IEEE Life Fellow cited "for contributions to nuclear instrumentation, particularly in the technology of linear pulse amplification."*

I am writing to the three of you, John Fairstein, Joel Fairstein and Elizabeth Singley as the persons that rightfully meant the most to my late friend, Ed Fairstein. I am grateful to you for what you have done for Ed, especially in his last difficult days. Ed was very proud of his sons and spoke to me often of their accomplishments. Also, he was extremely fond of Liz who entered his life in a wonderful platonic relationship about two years ago. Ed told me that (in his words) she looked on him as a "father figure." He adored her and that fondness was reciprocated. Thank you, Liz.

Ed was a dear friend of mine for well over 50 years. He was exceptionally knowledgeable, intelligent and talented. He combined those characteristics with kindness and compassion. You are all well acquainted with what I write here but it will bear repeating.

I first met Ed in the late forties at the Oak Ridge National Laboratory, where he worked for Cas Borkowski, and I have known and admired him ever since. Since that time we met in many places around the country working on the development of standards for nuclear instruments, principally standards for radiation detectors and associated instruments. Ed was one of the world's foremost authorities on low-noise preamplifiers and was the principal author of the standard on that subject. Additionally he was a major contributor to numerous other standards that are currently in use nationally and internationally.

While at ORNL Ed designed numerous nuclear instruments that represented advances in the state of the art. In about 1959 (or per-

haps a few years earlier or later) while he was still at ORNL, Ed and I were working on somewhat different approaches to Williams Tube type analog to digital converters and we had numerous conversations about them. However, Ed is best known for the advances he made in low-noise preamplifiers and his analysis of pulse-shaping techniques utilized in such preamplifiers. He taught well received short courses on these subjects at IEEE Nuclear Science Symposia.

After Ed left ORNL he co-founded Fairport Instruments to produce commercial instruments for the nuclear and radiation physics fields. He later left that partnership and founded Tennelec. Under Ed's stewardship Tennelec became one of the most highly regarded producers of nuclear instruments.

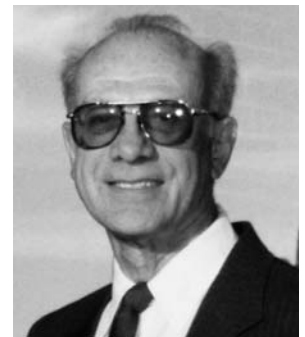
Many years later Tennelec went through changes in ownership and management, and still later Ed left the company while still continuing his interest in his contributions to the nuclear and radiation instrumentation fields. That continued for some time but in recent years he felt, to put it in his words, "burnt out." He therefore dropped technical work and became engaged in other things.

For several years Ed served as president of the Oak Ridge Library Association to which he devoted much time and effort. At the same time he became interested in the functioning of the human brain. He read and wrote voluminously on the subject as well as on the somewhat related subject of intelligence, becoming quite critical of IQ tests and the conclusions drawn from them. When Ed became interested in something he would

## And creativity?

Intelligence is evolution's answer to unpredictability.

Kate Douglas



**Edward Fairstein**  
(courtesy of John Fairstein)

## Self-contained

You can only be yourself. But you are good at that.

Frank Sinatra  
(to Tony Bennett)

research it and study it thoroughly until he became expert in the subject.

Sometime during his period of depression he met Liz and a relationship developed that was very pleasurable and very beneficial to Ed. They enjoyed many hikes and stimulating conversations together. Thank you again, Liz.

One of Ed's passions was his motorcycle; he enjoyed many lengthy motorcycle trips of several hundred miles each as well as countless shorter trips around town. One reason for his reluctance to undergo surgery until his situation deteriorated to the point that there was no

alternative was that it would interfere for too long a period with his beloved motorcycle activities.

I was flattered some time ago when he was driving me to the Knoxville Airport, as he had often done, he said that he wished that I lived in the Oak Ridge area. Though we have not been able to meet in recent years, I will miss our numerous e-mail and telephone conversations.

*Louis Costrell can be reached at the National Institute of Standards, 245/C229, Gaithersburg, MD 20899-0001; Phone: +1 301 975 5608; E-mail: louis.costrell@nist.gov.*

## Biography of Anthony L. Peratt



**Anthony Peratt**

**A**nthony L. Peratt (S'60, M'63, SM'85, F'99) received his Ph.D. in electrical engineering in 1971 from the University of Southern California, Los Angeles. Earlier degrees include the MSEE, USC, 1967; UCLA, 1963-1964, BSEE, California State Polytechnic University. He was a Staff Member at Lawrence Livermore National Laboratory (1972-1979); a Guest Physicist at Max Planck Institut für Plasmaphysik, Garching, Germany (1975-1977); a Guest Scientist, Alfvén Laboratory of the Royal Institute of Technology in Stockholm, Sweden (1985); and, at Los Alamos National Laboratory from 1981 to the present serving in the Applied Theoretical Physics Division, Physics Division, Associate Laboratory Directorate for Experimental Programs; and as Scientific Advisor to the United States Department of Energy (1995-1999) where he served a term as Acting Director, National Security, in the Nuclear Nonproliferation Directorate.

Dr. Peratt's research interests have included numerical and experimental contributions to high-energy density plasmas and intense particle beams; explosively-driven pulsed power generators; lasers; intense-power-microwave sources; particles; high energy density phenomena, Z-pinches, and inertially driven fusion target designs.

He has served as session organizer for space plasmas, IEEE International Conference on

Plasma Science 1987-1989; Guest Editor, Transactions on Plasma Science, special issues on Space Plasmas 1986, 89, 90, 92, 2000, 2003; Organizer, IEEE International Workshops on Space Plasmas, 1989, 1991, 1993, 1995, 1996, 1997, 1998, 2003; Associate Editor, Transactions on Plasma Science, 1989-; Elected member of IEEE Nuclear and Plasma Science Society (NPSS) Executive Committee (ExCom), 1987-1989; 1995- 1997; GENERAL CHAIRMAN, IEEE International Conference on Plasma Science, Santa Fe, New Mexico, 1994. IEEE NPSS ExCom Vice Chairman 1997; Elected to the IEEE NPSS Administrative Committee, 1997, named an IEEE Fellow, 1999.

He holds memberships in the American Physical Society, American Astronomical Society, Eta Kappa Nu and has earned the United States Department of Energy Distinguished Performance Award, 1987, 1999; IEEE Distinguished Lecturer Award, 1993; Norwegian Academy of Science and Letters, University of Oslo Physics Department, and Norsk Hydro Kristian Birkeland Lecturer, 1995. Dr. Peratt is Author, Physics of the Plasma Universe, Springer-Verlag (1992); Editor, Plasma Astrophysics and Cosmology, Kluwer Academic Publishers (1995); Editor, Advanced Topics in Space and Astrophysical Plasmas, Kluwer Academic Publishers (1997). *Anthony Peratt can be reached at alp@ieeetps.org*



# The IEEE Nuclear & Plasma Sciences Society is there...



## INVESTIGATING THE FUNDAMENTAL NATURE OF MATTER

The community of physicists and engineers represented by the Particle Accelerator Conference and the Particle Accelerator Science and Technology Committee provide the beams of particles that the nuclear and high-energy physics experiments need for their research. Attendees of the Nuclear Science Symposium, organized by the Radiation Instrumentation Committee, develop the detectors that are used to detect and characterize the particles resulting from the interactions, leaving the analysis to the nuclear and high-energy physicists.

## DEVELOPING ENERGY SOURCES AND THE EFFICIENT USE OF ENERGY

No one can question the importance of a reliable and low-cost energy supply. Sessions in the Nuclear Science Symposium are devoted to nuclear power systems and the Symposium on Fusion Engineering and the Fusion Technology Committee are devoted to the development of Fusion Power. The International Conference on Plasma Science and the Plasma Science and Applications Committee are devoted to all aspects of plasmas including efficient lighting, material processing, and many other applications. Power sources for many applications, including particle accelerator, fusion, plasma, and hydrodynamics systems are the focus of the Pulsed Power Conference and the Pulsed Power Science and Technology Committee.

## HEALTH CARE

The Medical Imaging Conference, organized by the Nuclear Medical and Imaging Sciences Technical Committee, provides a forum for the presentation of new concepts and developments in nuclear medical technology. This has significantly impacted new developments in medical diagnosis. The technology has evolved

into health care systems using positron emission tomography (PET), single photon emission computed tomography (SPECT), X-ray computed tomography (CT), mammography, and digital radiography systems, all of which are based on radiation detection systems and reconstruction algorithms developed by the community of the NPSS Medical Imaging Conference (MIC). Cancer treatment with particle beams requires particle accelerators, the subject of the Particle Accelerator Conference community. The International Conference on Plasma Science also has sessions on medical and biological applications.

## PROBING THE UNIVERSE AND EXPLOITING SPACE

The extreme reliability required of electronics in a high radiation environment is the reason for the Nuclear and Space Radiation Effects Conference, organized by the Radiation Effects Committee, the European Conference on Radiation and its Effects on Components and Systems. In addition, the Nuclear Science Symposium has astrophysics detector sessions.

## DATA HANDLING AND SEMICONDUCTOR DEVELOPMENT

New technologies in all these areas need the highest performance data capture and processing involving electronics and specialized computer hardware and software. The Real-Time Conference organized by the Computer Applications in Nuclear and Plasma Science Technical Committee covers all these aspects as well as the International Conference on Accelerator and Large Experimental Physics Control Systems. The work of the community of researchers represented by the Nuclear and Space Radiation Effects Conference adds to the reliability of semiconductors for everyone; for example, making semiconductor memory errors almost a distant memory.

Join Us! FOR FURTHER INFORMATION VISIT: [www.ieee-npss.org](http://www.ieee-npss.org)





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