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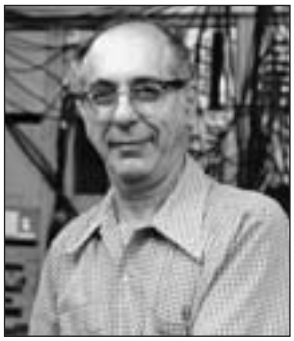
NUCLEAR & PLASMA SCIENCES SOCIETY

Nuclear & Plasma Sciences SOCIETY NEWS

Number 3 • September 2009

LOUIS COSTRELL
June 26, 1915 – June 8, 2009[1]



Many years ago, even before Lou was born, a group of blind men were each asked to describe an elephant after having touched the animal in one place only. The blind man who grabbed the elephant's tail had an entirely different impression of the appearance of the whole animal than the one who felt its ears. And so it was for all the other blind men encountering different parts of the elephant's anatomy. None of their impressions was wrong. Each was correct but incomplete. By adding up all the different impressions a good and true picture of the noble animal was formed.

So it is when it comes to trying to assess the career and accomplishments of Lou Costrell. Over his long and productive career Lou was involved in many grand enterprises, often in a ground-breaking, leadership role. The products of these enterprises have certainly changed in profound ways how most of us go about carrying out our jobs in electronics and physics. Without these products our experiments would have become prohibitively expensive, excessively time-consuming and, in many cases, impossible.

Of course, Lou did not do all this alone. Lou put together like-minded, capable and motivated electrical engineers (with the odd physicist thrown in!) who shared his goals and were thankful for his initiative and leadership. He ran us into the ground, and we enjoyed every moment of it!

An article on Lou's engineering career that does not mention his concern for his fellow man would be a disservice both to Lou and the high principles he stood for. Lou did not impose his views on others but his strong social conscience showed through in both conversation and action. He was passionately upset about justice being subverted by money; about nations, including his own, rushing to war with needless killing of innocents rather than using diplomatic skills to avoid bloodshed; and about the injustices of racial, religious and political persecution. He and Esther along with two of their sons joined the famous August 28, 1963 Martin Luther King March on Washington for Jobs and Freedom which was followed almost immediately by the terrible dark years of the assassinations of JFK, of Reverend King four years later, and of Bobby Kennedy just two months after King. Happily Lou lived to see great progress in civil and human rights, but he also realized it is a fight that has no end. His example was a model to his many friends who admired his studied awareness of the important issues of the times and willingness to speak out and, if necessary, take to the streets in a show of solidarity and force for human justice.

After this important excursion, on to Lou's long and productive engineering career.

BEFORE NBS

Lou's first job after graduating in 1939 with a B.S. degree in Electrical Engineering from the University of Maine was at the Ridgeway Company, a manufacturer of electric motors and generators. Within a few months after starting there he received an offer from Westinghouse Corporation in Pittsburg which he accepted with some guilt because he enjoyed the job and liked his boss. However the small town of Ridgeway was not much to his liking and Pittsburgh beckoned, so he went. There he was assigned to the department that designed large direct current motors and generators. Initially he was involved in testing this equipment then, according to plan, six months later he was assigned to the design group.

By early 1941 the United States was making preparations for possibly being heavily involved, either directly

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[1]Editorial note: This special issue of the newsletter commemorates one of NPSS's founding fathers. Conference information starts a few pages on, and the next issue will return to the familiar format.

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is published four times per year by The Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08855.

NEWSLETTER EDITOR:
Albe Dawson Larsen
Stanford Linear Accelerator Center
MS-66
2575 Sand Hill Road
Menlo Park, CA 94025
Tel: +1 650 926 2748
Fax: +1 650 926 5124
E-mail: amlarsen@slac.stanford.edu

EDITOR EMERITUS:
W. Kenneth Dawson
TRIUMF, 4004 Wesbrook Mall
Vancouver, British Columbia
Canada, V6T-2A3.
Tel: +1 604 222 7455
Fax: +1 604 222 7309
E-mail: k.dawson@ieee.org

IEEE MAGAZINES AND NEWSLETTERS:
Peter Tuohy, Production Manager
Theresa L. Smith, Production Coordinator

Contributors to the September 2009 issue in alphabetical order: Farhat Beg, Robert Barker, Sandra Biedron, Peter Clout, Jamie Darling, W. Kenneth Dawson, Teresa Farris, Gregory Fridman, Raffaella Geomentrante, Steven Gitomer, Christoph Ilgner, Richard Kouzes, Richard Lanza, Raymond S. Larsen, Patrick LeDû, Jean-Luc Leray, John Maenchen, Jean-Pierre Martin, Stephen Milton, William W. Moses, Thomas Naff, Bibi Palantini, Giulia Quondam, Edl Schamiloglu, Stan Schriber, Mark Tillack, Charles Watson, Craig Woody, Andrew Young

Publicity releases for forthcoming meetings, items of interest from local chapters, committee reports, announcements, awards, or other materials requiring society publicity or relevant to NPSS should be submitted to the Newsletter Editor by October 10, 2009 for publication in the December 2009 Newsletter.

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.

or indirectly, in the war in Europe. As a consequence, and consequential for Lou, the Navy Department made an urgent request to Westinghouse for engineers to work in the Electrical Department of the Navy Department of Ships in Washington, D.C. Lou was told that he would be welcomed back whenever his services were no longer needed by the Navy. Washington was certainly a more attractive place than Pittsburgh so Lou went to find out what the job was all about.

He was interviewed by Commander H.G. Rickover and was offered a position in the Electrical Section which Lou found interesting. So, on March 15, 1941 Lou became a civilian employee of the Bureau of Ships. His first assignment was not with motors and generators where his experience lay, but with signal and fire-control searchlights.

Rickover was not the easiest of bosses. Lou's descriptions of his actions reminds me of a cross between the Queen of Hearts, "Off with his head!", and Admiral Ernest King, also of the U.S. Navy, whose daughter said, "He is the most even-tempered man in the Navy. He is always in a rage." Fortunately, Lou was well down the chain of command so was well insulated – Lou's bosses bore the brunt. Except once.

After receiving his draft questionnaire from the Pittsburgh draft board Lou went to the Washington Naval Office recruitment center, took the physical, and was handed some enlistment papers to sign and return. Next day, when Lou told Rickover what he had done, Rickover blew his top. Lou was informed in no uncertain terms that even if he filed his enlistment papers Rickover would ensure that he would stay exactly where he now was. Upon reflection, Lou was not surprised as he had recently noted that another employee who had enlisted in the Army without Rickover's knowledge was back at his desk within a week in a GI uniform and at the much lower GI pay. Other than this chap who defied Rickover's wishes, not one of his 600 staff members was drafted. Lou remained with the Bureau of Ships until the end of the war and a bit beyond.

EARLY NBS YEARS

Lou joined the National Bureau of Standards in the fall of 1946, becoming a member of the Radioactivity Section of the Optics Division. This division was headed by Dr. Leon F. Curtis whom Lou and many others rightly admired both as an outstanding scientist and as a great person. It was he who mentored Lou in the fine points of radioactivity and its measurement for which Lou remained eternally grateful. Lou's first assignment was in nuclear instrumentation where he worked on a variety of detectors: Geiger-Mueller tubes, thin-window proportional counters, and 2π and 4π-counters. Concurrently Lou did a lot of independent studying which included getting his master's degree in Electrical Engineering from the University of Maryland. He also took physics courses there on topics such as x-rays and nuclear physics. In addition he taught a nuclear instrumentation course at NBS and one on electronics at Howard University. At the same time Lou was helping the love of his life, Esther, raise a small and growing family. He was, as he wrote of that time, "a pretty busy guy." Lou was not prone to exaggeration.

Circumstances prevented Lou from continuing, as he had planned, to a PhD. For a very practical reason Lou intended to get this degree in Physics, not Electrical Engineering. Physics would require less class time because of the courses he had taken, his work at NBS and his independent studying. Among the circumstances was a six-month assignment to the Nevada Test Site where he headed a crew that installed, calibrated, and tested detector systems. Then there were the major reorganizations (Lou called them shenanigans) taking place at NBS. Lou, astute as ever in such goings-on, was able to continue doing his work and finally obtained official recognition in 1949 for what he had been doing for some time by being named Chief of the Instrument Section.

In 1955 Lou was asked by the Atomic Energy Commission to be a delegate to the upcoming Atoms for Peace conference in Geneva. He was given responsibility for some of the U.S. Exhibits there. Lou's activity on the exhibit hall floor was nothing compared to his activity outside it.

The number of delegates attending the conference far exceeded the ability of Geneva hotels to accommodate them, even with two assigned to a room. Some delegates had to be bussed in on a daily basis from nearby hotels in France. Lou's first room, which he shared with an AEC staff person, was noisy, being near the railroad station and the bathroom was down the hall. Luckily for Lou, but not for his roommate, the roommate got sick and had to be moved. Rather than finding another roommate for Lou, the powers that be moved him to a room in the luxurious Hôtel du Rhône on the floor reserved for AEC and other top brass. Now he had a private bath, a companionable roommate, and limousine service to and from the conference site.

Realized too late

In this age which believes that there is a shortcut to everything, the greatest lesson to be learned is that the most difficult way is, in the long run, the easiest.

Henry Miller

He's so disillusioned
It is hard for the ape to believe he descended from man.

H. L. Mencken

But there were clouds on the horizon. A Washington VIP and his wife were expected at the conference. Of course a suitable room had to be found for the distinguished visitors and Lou's was chosen. On the day of the VIP visitor's planned arrival Lou went into action. First he went to the AEC desk at the hotel since they controlled the room assignments on Lou's floor. On telling them that nothing in his room was to be moved no matter what, they replied that, like it or not, he would be moved. Next he went to the hotel registration desk and told them that under no circumstances was anything to be moved out of his room. To complete his actions that morning he had signs printed in English and, with the help of a bellboy, French saying that nothing was to be moved from the room and placed them prominently on the room door. Insouciantly Lou then left for a day in the mountains.

On his return from his jaunt in the mountains, Lou found that the Washington VIP had arrived. He also found, on going up to his room, that his roommate was sound asleep and everything just as he had left it. Later Lou learned that his stubbornness had resulted in the AEC Assistant General Manager losing his room. Not long after Lou met the evicted gentleman who said, "I admire your guts, but I was more vulnerable." Lou was not an AEC employee, but an NBS one who could better, and successfully, resist AEC diktats.

To me, this story encapsulates better than any other, how Lou went about solving problems and why it was both rewarding and fun to work with him. At the right time he acted quickly and decisively, covering all possible angles, making it difficult, if not impossible, for any outcome other than the one he desired.

Now on to some of the projects in which Lou got involved, and got us involved.

NIM COMMITTEE

Instrumentation designs changed relatively infrequently in the vacuum tube days. Each instrument was large and power hungry. All that was required in the form of standardization was that the instruments be mountable in the standard 19" rack and be powered from the mains. There was no difficulty in designing systems that consisted of instruments from different manufacturers. The advent of transistors radically changed this state of affairs.

Instruments now became much smaller and less power hungry, and design changes became more frequent as newer and better transistors became available. Many instrumentation manufacturers and national laboratories quickly realized that the economical way to go was to have a number of instrumentation modules all obtaining their power from one power supply. Modules could then be constructed to slide into slots in a crate. At the back of the crate was a set of identical connectors, one to each slot supplying the power to the plugged-in modules. Manufacturers and national laboratories on both sides of the Atlantic started building such systems.

For many there was a great disadvantage in this. Module specifications for the different systems differed; hence, modules were not interchangeable between systems. For others this was an advantage. Once a particular system was chosen users were stuck with only the modules from that vendor, some good and some bad.

Lou clearly was unhappy with the situation and in late 1963 he acted. He wrote to the AEC suggesting they start a standard module program so that the national labs would have the advantage of interchangeable modules thus reducing both the design effort and overall cost to AEC. Less than three months later the AEC Committee on Nuclear Instrumentation Modules was formed with Lou as its chairman. Lou was fortunate to have a group of highly able, cooperative, and strongly motivated electrical engineers from the major U.S. national labs on his committee. (This was a characteristic of all Lou's committees; I continually marvelled at how he managed to do it.) In another four months the committee had produced a prototype of the system to make sure that the specification worked and in July 1964 issued the first version of the specification, AEC Report TID-208943. Two years later over 70% of the total modular nuclear instrumentation produced in the U.S. used the NIM system. Talk about a roaring success, and the system is still in use today.

By late in the 1960s digital computers were playing an increasingly important role in nuclear instrumentation. Harry Bisby's group at Harwell started developing a modular, computer-oriented, instrumentation system, CAMAC. Many European laboratories were interested in the system so Bisby turned its development and specification over to the ESONE Committee of the European Laboratories with the recommendation that they collaborate with the NIM Committee who knew how to make things happen.

It was at this juncture that I met Lou. TRIUMF, the 500 MeV isochronous, negative-ion cyclotron

in Vancouver, had just been funded. The director had found out about the existence of CAMAC and had phoned Lou to learn more and was impressed by what Lou told him. He also named me as the person for Lou to get in touch with. The next day I was phoned by Lou (he's a man of action, remember) and invited to attend the NIM meeting which was to take place in a few weeks' time where the proposal for NIM to join with ESONE in developing the CAMAC specifications was to be made, debated, and voted upon.

On arrival at the hotel I got in touch with Lou who immediately invited me to supper with the representatives from Harwell, CERN, Hahn Meitner Institute and Saclay. There Lou outlined some concerns that the NIM committee might have so that when the ESONE people made their pitch the following day they would be prepared. At the meeting next day the presentations were made, all questions answered satisfactorily, and CAMAC unanimously became a joint NIM-ESONE effort. And I found myself, a bit to my bewilderment, an official member of the NIM committee. Need I say that Lou could be very persuasive!

CAMAC went on to be another roaring success. Like the NIM system it is still in use.

By the mid-1980s Fermilab and SLAC were constructing new, higher energy accelerators which would produce experimental data at rates and amounts far exceeding the capabilities of CAMAC. Lou was approached by representatives from these laboratories and from the AEC and asked if NIM would devise a new standard instrumentation system that would satisfy their needs. Initially NIM committee members concluded that there were ways to cope with the problem without devising a whole new scheme. However further meetings with physicists at these laboratories gave a much better understanding of the magnitude of the problem. NIM then agreed to proceed with devising an appropriate standard.

The first action Lou took was to ask ESONE to participate in the project. Together NIM and ESONE produced in 1986 the complex instrumentation system called FASTBUS which satisfied the needs of the new round of experiments. This system did not become widespread simply because only high energy particle physics experiments, such as those carried out at CERN, Fermilab and SLAC, required its capabilities. But its use in these environments was essential to the success of experiments.

Our frequent meetings were multi-day affairs. Each evening a group of us would head out for

supper at a restaurant. When the single bill came Lou would ask our waiter for a menu and take out one of the many crinkled blank pieces of paper he always had in his coat pocket. On the paper he drew a spreadsheet with the number of columns equal to the number at the table. He would then ask each of us what we had. Lou would look up the price on the menu and enter the amount under our names. When his data taking was complete Lou would add things up to make sure that everything on the bill had been accounted for. After adding in an appropriate percentage to each of our totals for the tip Lou would tell us what we owed. He wanted to make sure that, for example, those who drank only water did not subsidize those who had several glasses of wine. Lou was showing another aspect of his character. He wanted to be fair to everybody and he acted accordingly.

NPSS

The IEEE was formed in 1963 by the merger of the American Institute of Electrical Engineers and the Institute of Radio Engineers. Both Institutes contained groups specializing in nuclear science. The AIEE had several including the Nucleonics Committee and the Committee on Nucleonic and Radiation Instrumentation, while the IRE had its Professional Group on Nuclear Science. Lou was a member of the IRE group, becoming its president in 1960. As such he was heavily involved in the discussions that led to the formation of the IEEE Nuclear Science Group in late 1963. In 1972 the group's scope was widened to include plasma science and the group was given society status becoming the IEEE Nuclear and Plasma Sciences Society. Hence Lou was one of the founders of our society.

In 1963 Robert Livingston of the Oak Ridge National Laboratory, who was then president of the IEEE Nuclear Science Group, phoned Lou to discuss the feasibility of initiating an

Peacemeal!!??
The surprise is half the battle. Many things are half the battle; losing is half the battle. Let's think about the whole battle.

David Mamet

Really?
The person portrayed and the portrait are two entirely different things.

José Ortega y Gasset

IEEE/NSS series of conferences on particle accelerator engineering. They concluded that it was indeed feasible and proceeded to organize the first Particle Accelerator Conference which took place in 1965 in Washington. Lou's role in initiating this highly successful series and his important role in the organizing of subsequent PACs has been recognized by naming the PAC conference session in which awards are distributed "The Louis Costrell Honorary Session."

Prior to 1972 there were two annual conferences of great interest to society members. The Scintillation and Semiconductor Counter Symposia which started in 1948, initially without Semiconductors, and the society's annual meeting which included technical sessions. Lou noted the large overlap between the two and in 1972 proposed that they merge. This merger, which Lou helped engineer, led to what we now know as the Nuclear Science Symposium.

Lou was the long-time, almost eternal, secretary of the NPSS NIDCOM, the Nuclear Instruments and Detectors Committee, which proposed many standards which later became IEEE, ANSI, and IEC ones. A large portion of these standards specified testing procedures for nuclear devices. When manufacturers followed these procedures for characterizing their devices, potential purchasers knew exactly what each manufacturer measured and could confidently compare specifications from different manufacturers.

Lou was involved in many other NPSS activities and his beneficial influence is still being felt despite the fact that he ceased active involvement in Society affairs in 1992.

AND THAT'S NOT ALL!

There are several other standards committees on which Lou played a major role. Lou was the long-term chairman of the American National Standards Institute Committee on Nuclear Instruments. He also played a prominent role in the International Electrotechnical Commission where he was Chief U.S. delegate to Technical Committee 45 (Committee on Nuclear Instrumentation) and chair of its Working Group on Nuclear Radiation Detectors. His contributions to the IEC were recognized about two years ago when the IEC Immediate Past President, Renzo Tani, presented Lou with a commemorative certificate of appreciation for his valuable contributions over four decades. I was not a member of either of these committees hence my information is rather sketchy.

THE ICING

One of Lou's hobbies was a life-long study of polar exploration. He could talk almost endlessly and entertainingly about the famous explorers and the not so famous ones. Our conversations (monologues, really, with my encouraging interjections) on the topic were supplemented by many letters and notes. Once I pointed out to Lou that the St Roch was in the maritime museum in Vancouver. This was the ship, captained by Sergeant Henry Larsen of the Royal Canadian Mounted Police, which made the first west to east traversal of the Northwest Passage in 1940–1942. Lou responded with a 5-page hand-written letter, written somewhere over the Atlantic, about previous attempts by, among others, Franklin who failed and Amundsen who succeeded in 1903–1905 making the traversal in the opposite direction.

The role of lies in determining the course of polar exploration was a topic that interested Lou greatly. Claims of reaching either the north or south pole were impossible to verify independently. Only the assertions of the explorers were available. They, like their backers, were motivated by money and prestige – a poisonous combination that often led to lying. Lou believed that had Peary not lied about reaching the north pole, Scott would have succeeded in returning from the south pole. He backed up this assertion with solid logic. I found it very interesting, and perhaps revealing, that somebody as straightforward as Lou was so deeply interested in such a topic.

ADIEU

Lou was the one who made all the pieces hang together for us. Who else but Lou, the connector expert, could make square-pin committee members fit into round sockets yet still make

lasting, low-resistance connections. Or Lou, the equipment cooling expert, who was able to transform the heat and chaos of highly animated discussions into cool, logical conclusions of which we were all proud. Or Lou, the power supply expert, who always had a new adaptable filter algorithm to reduce the noise and ripple of electric discussions. Or Lou, the mentor, who showed us all that in order to lead one had to work harder than anybody else – which he did.

Above all Lou was a good friend. His phone calls and emails asking me to do something new will be missed. His phone calls and email messages asking why I hadn't yet done something will be missed. His insistence that I use more commas will be missed. His occasional refurbishment of the comma supply will be missed. His scary car driving will be missed. His wry sense of humour will be missed. His infectious chuckle will be missed. His guidance will be missed. There's a lot to be missed.

This remembrance was prepared by Lou's good friend and long-time colleague, Ken Dawson (with moral support from Ray Larsen). Ken can be reached at TRIUMF, 4004 Wesbrook Mall, Vancouver, BC, CANADA, V6T 2A3; Phone: +1 604-222-7455; Fax: +1 604-222-7309; E-mail: k.dawson@ieee.org

And I'm happy
Since I no longer expect anything from mankind, except madness, meanness, and mendacity; egotism, cowardice, and self-delusion, I have stopped being a misanthrope.

Irving Layton

LOU COSTRELL'S RECOGNITIONS, DISTINCTIONS AND AWARDS

* NBS Edward Bennett Rosa Award
* Department of Commerce Distinguished Achievement Gold Medal Award
* Department of Commerce Meritorious Service Silver Medal Award
* NBS Outstanding Achievement Award (for designing instrumentation for measurement of gyromagnetic ratio of the proton)
* Fellow, Washington Academy of Science
* IEEE Fellow Grade
* IEEE Harry Diamond Award
* IEEE Centennial Award
* IEEE Standards Medallion IEEE A Century of Honors Award
* IEEE Third Millennium Medal
* IEEE Nuclear & Plasma Sciences Society Merit Award
* IEEE Nuclear & Plasma Sciences Society Distinguished Member Award
* IEEE Nuclear & Plasma Sciences Society 1993 Computer Applications in Nuclear and Plasma Physics Award

This compilation was provided by Mike Unterweger and Lisa Karam, colleagues and friends at NIST.

LOU'S MUSES[1]

LIFE IS BEAUTIFUL
I sit on my balcony and gaze at the light blue sky
Pocked with small white clouds drifting slowly eastward
And I see the wind as the leafless trees sway gracefully to and fro
And a bit beyond the ponds trying to ice over
And I confine my sight and my thoughts
To what lies before me and to the instant
Fleeting yet fixed in time
And I shut out the rest of the world.
And I am at peace
I smile and am happy
And life in beautiful

[1]Lou provided his family and friends with periodic updates to what he called "Louis Costrell Muses." The many topics mused upon ranged all the way from family events to politics. We chose these three because they represent Lou's own last days of contentment, his passion for polar exploration, and things we all deal with. Are we consistent and error free?

And opening one's mind
The only real voyage of discovery consists not in seeking new landscapes, but in having new eyes.

Marcel Proust

WHAT ELSE IS ONE TO DO?
(Thinking of polar explorers)
When burning ambition
Falls short of fruition
There is a temptation
Born of frustration
To seek compensation
In exaggeration

WHAT ELSE IS ONE TO DO?
And so, concluding – We all lie, whether to others or
To ourselves and lies like all actions and inactions, like all words, spoken or unspoken, have consequences and who is to say whether they are good or bad, except for the guy on the golf course

ABIDE MY FAULTS

Allow my inconsistencies
Allow my contradictions
It cost you naught
And so you aught
Abide those minor faults of mine
As humans we are not divine
To help even up the scores
I do the same with all of yours

With faults galore and more to come
We manage to get things done
At times we seem to do quite well
At other times it's hard to tell

As humans all, we manage yet
So do not worry not, do not fret
The human race with all its flaws
Races forward without pause

Abide Those Minor Faaaults Of Mine
This is an exact copy of what Lou wrote and shows his sly sense of humor.

MIKE UNTERWEGER REMEMBRANCE

I knew Lou and worked with him over the last years and I miss him and his camaraderie and wit. He was the "professor emeritus" for the standards work being done for ANSI and IEC. He could defuse unpleasant situations with a remarkable ability to keep everyone happy. One of his best pieces of advice was "Give in on the little things so that when you don't give in on the big one, the other party thinks he's won more than you have." Works wonders for consensus standards.

RANDY BRILL REMEMBRANCE

Lou was a kind and generous person who reached out to and involved many of us in his important journey. He was much more than an organization man, but he was surely that. His efforts pioneered and fostered the development of hardware and software standards and devices by which modular instrumentation became the dominant reality. They provided the reliable versatile elements needed to design, test and run accelerators at National and International labs. They also made it possible for small users like myself to develop and test new ideas quickly and cheaply. It was this aspect of his work that attracted me and others in Medicine and other applied fields to the NPSS. Lou got me involved with ANSI Standards Committees which he spear headed. I will be long indebted to Lou for his friendship and guidance in the many years we travelled together. Those of us who had the privilege to know and work with him will surely miss him.

CONFERENCES

2009 IEEE NUCLEAR SCIENCE SYMPOSIUM AND MEDICAL IMAGING CONFERENCE

Hilton Hotel in Disney World Resort, Orlando, Florida

October 25–31, 2009

http://www.nss-mic.org/2009

Welcome From the General Chairs

We would like to personally invite you to attend the 2009 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), to be held from October 25–31 in Orlando, Florida at the beautiful Hilton Hotel in the Walt Disney World Resort. This meeting offers a great opportunity to exchange new knowledge and ideas in nuclear science and medical imaging with friends and colleagues from across the world. It had its origins more than 60 years ago, when the first Scintillation Symposium was held to explore the then new technology of scintillators and photomultipliers. That small Symposium has since grown to the point where it has become the single conference with the broadest coverage of the field of radiation instrumentation and applications.

The Organizing Committee is focused on creating a truly joint, integrated conference to facilitate and encourage attendees to expand their knowledge in related topical areas and participate in all aspects of the meeting. Even if your interests lean towards one area, we strongly encourage you to explore the entirety of the meeting to take advantage of the breadth of the program. We are offering a strong program of relevant short courses before the meeting that address topics of particular interest in these fields, all of which are self-contained tutorials by design. There is also an integrated program of highly focused Workshops and Special Sessions to acquaint attendees with the state-of-the-art in new and emerging technologies. Self-contained sessions and workshops will include subjects such as Computing Beyond the LHC, Nuclear Forensics, Nuclear Techniques in the Well-logging Industry, and the use of graphics processors for high speed computing and imaging. We will continue the Special Session on Women in Engineering, which was so well attended in Dresden. Check the conference web site regularly for the latest information on these workshops, short courses, and special sessions.

Dick Lanza
General Chair

In addition to being an excellent venue for our professional meeting, this location is ideal for attendees who are able to bring their families. The exceptional location of the conference gives us the opportunity to offer an exciting and unique Companion Program that will include tours to many exciting locations in the Orlando area, as well as a visit to the NASA Space

Tony Lavietes
Deputy General Chair

Lorenzo Fabris
NSS Program Chair

Ramsey Badawi
MIC Program Chair

Ed Lampo
Treasurer

Center at Cape Kennedy. Of course, the Hilton is conveniently located adjacent to the entire Disney World site making this world-class attraction easily accessible for both individual and organized exploration.

For the latest information concerning Program details, conference registration, special events, schedules, transportation and housing, or any other relevant issue, please visit the conference website: http://www.nss-mic.org/2009.

On behalf of the Organizing Committee and the IEEE Nuclear and Plasma Sciences Society, we encourage you to make plans now to attend this year's Nuclear Science Symposium and Medical Imaging Conference and look forward to welcoming you to Orlando.

CONFERENCE PROGRAM

Nuclear Science Symposium (NSS)
October 26–29, 2009

William Craig
NSS Deputy Program Chair

The NSS program emphasizes the latest developments in technology and instrumentation and their implementation in experiments for space, accelerators, other radiation environments, and homeland security. Authors are invited to submit papers describing original unpublished works in the topics areas listed below:

- Accelerators and Beam Line Instrumentation
- Analog and Digital Circuits
- Astrophysics and Space Instrumentation
- Computing and Software for Experiments
- Data Acquisition and Analysis Systems
- Gamma-ray Imaging
- Gaseous Detectors
- High Energy Physics Instrumentation
- Instrumentation for Homeland Security
- Instrumentation for Medical and Biological Research
- Neutron Imaging and Radiography
- New Detector Concepts and Instrumentation
- Nuclear Measurements and Monitoring Techniques
- Nuclear Physics Instrumentation
- Nuclear Power
- Photodetectors and Scintillation Detectors
- Radiation Damage Effects
- Semiconductor Detectors
- Synchrotron Radiation Instrumentation
- Trigger and Front-End Systems

Medical Imaging Conference
October 27–31, 2009

Craig Levin
MIC Deputy Program Chair

The Medical Imaging Conference (MIC) is the foremost international scientific meeting on the physics, engineering and mathematical aspects of nuclear medicine based imaging. Authors are invited to submit papers describing original and innovative contributions to the field of medical imaging in the topics listed below:

- Emission Tomography Instrumentation (PET, SPECT)
- Multi-modality Systems
- High Resolution & Animal Imaging Instrumentation and Techniques
- Application Specific Imaging Instrumentation and Techniques
- Imaging Instrumentation and Techniques for Precision Radiotherapy
- Intraoperative Probes & Portable Imaging Systems
- Image Reconstruction Methods
- Simulation and Modeling of Medical Imaging Systems
- Signal Processing and Data Acquisition
- Reconstruction Methods
- Image Processing and Evaluation
- Tracer Kinetic Modeling
- Quantitative Imaging Techniques
- New Detector Materials/Technologies for Medical Imaging
- X-ray Imaging & X-ray Computed Tomography
- Synchrotron Radiation
- Nonnuclear Technologies for Molecular Imaging (CT, MR, Optical Imaging)

SPECIAL EVENTS

Special Session: Women in Engineering (WIE) Fostering Better Use of the Talent Pool of Women in Science and Engineering

The Women in Engineering (WIE) Session is meant to provide an opportunity for participants to exchange ideas and information on topics specific to women in the engineering field. Session topics include:

- How to prepare high school girls to make an unprejudiced choice regarding their study and careers in science and engineering.
- How to address and minimize the academic "pipe leakage" phenomena.
- How to overcome barriers for the advancement of women already working in science and engineering.
- How to combine a career with family life.

We hope that the WIE Session will help foster efforts to strengthen and increase the interest of women in science and engineering fields. We encourage all members of the IEEE NSS and MIC communities to attend.

What's the difference?
There are two classes of people who tell what is going to happen in the future: Those who don't know and those who don't know they don't know.

John Kenneth Galbraith

Special Session on the Management and Dissemination of Intellectual Property

Intellectual Property (IP) in public research is not limited to patents and to the dissemination of technologies through licenses. It has an important role in particular in multipartner research projects where proper IP management is considered by funding agencies as a prerequisite for financing.

Today, IP is considered as an important asset of a public research organization. The value of IP as an asset strongly depends on a common understanding of its usage and on the way it is managed in public research organizations and industry.

Open to scientists and researchers involved in scientific programs aiming at developing new technologies, the objective of this seminar is to raise awareness on the importance of IP, to review best practices of IP management in particular in collaborative R&D between public research organizations and industry and to present cross-organizational approaches in the management and the dissemination of IP.

Stephen E. Derenzo
NSS Short Course Chair

SHORT COURSE PROGRAM

An excellent program of short courses will be offered at the beginning of the NSS/MIC program covering a wide range of nuclear and medical imaging technologies. All courses are one day in length. A continental breakfast will be provided for participants of short courses before the first lecture scheduled to begin at 08:30. Lunch, refreshments, lecture notes, and a certification of completion are also provided as part of the short course registration fee.

Jennifer Huber
MIC Short Course Chair

Short Course Fees and Schedule

$250 EACH (EARLY REGISTRATION)
$300 EACH (LATE OR ON-SITE REGISTRATION)
IEEE MEMBERS RECEIVE A $25 DISCOUNT

	Short Course	Date	Location
SC1	Integrated Circuit Front Ends for Nuclear Pulse Processing	Sat., 24 Oct.	Lily/Kahili
SC2	Nuclear Science for Security Applications	Sat., 24 Oct.	Azalea
SC3	Nuclear Power and Other Environmentally Clean Alternatives	Sun., 25 Oct.	Grand Ballroom Salon 1
SC4	Medical Imaging Fundamentals	Sun., 25 Oct.	Grand Ballroom Salon 2
SC5	Physics and Design of Detectors for SPECT and PET	Sun., 25 Oct.	Grand Ballroom Salon 3
SC6	Statistical Methods for Image Reconstruction	Mon., 26 Oct.	Grand Ballroom Salon 2
SC7	Programming and Medical Applications Using Graphics Hardware	Mon., 26 Oct.	Grand Ballroom Salon 3

SPECIAL FOCUS WORKSHOPS

Maxim Titov
NSS Workshop Chair

Seven topical Workshops highlighting state-of-the-art scientific and technological advances are offered and include experts in these interdisciplinary topics. The workshop program consists of invited talks with plenty of opportunities for discussion. The Special Focus Workshops being offered include:

- Nuclear Technology in the Oil Well Logging Industry
- Data Intensive Computing Beyond the LHC
- Nuclear Forensics - From Mutually Assured Destruction to Mutually Assured Detection
- Contrast in Neutron Imaging
- Workshop on High Performance Medical Imaging (HPMI) 2009
- Nuclear Techniques Applied to Cultural Heritage
- New Technologies in Hadron Therapy
- GATE Software for Monte Carlo Simulations in SPECT, PET, CT and Radiotherapy

The details for each workshop can be found on the conference web site.

INDUSTRIAL PROGRAM

Ronald M. Keyser
Industrial Program Chair

The IEEE NSS/MIC Industrial Program provides conference attendees with ample opportunities to meet a broad range of exhibitors on Tuesday, Wednesday, and Thursday, 27 to 29 October. The opening hours will follow the hours of the conference. More than 40 companies from around the world will be present to meet conference attendees and to demonstrate their latest products. These represent state-of-the-art in detectors, pulse processing instrumentation, imaging, software, and other relevant technologies. The exhibition area is located in the Palm Ballroom, collocated with the poster sessions. The exhibits will remain open until 6 PM on Thursday to provide additional time for MIC attendees.

COMPANION PROGRAM

We have taken advantage of the meeting location to offer special tours that are both traditional to Orlando and specific to the Disney facilities. This is an exciting program and we look forward to seeing you in Orlando. Please visit the conference web site for additional information.

Tour Name	Date	By Oct 9
1. Shopping in Orlando	Sun., Oct. 25	$30.00
2. Truffles & Trifles Cooking Class	Mon., Oct. 26	$75.00
3. Disney by Design (Disney program)	Mon., Oct. 26	$70.00
4. Kennedy Space Center	Tue., Oct. 27	$75.00
5. Historic Bok Sanctuary	Tue., Oct. 27	$70.00
6. Innovation In Actions (Disney program)	Wed., Oct. 28	$70.00
7. Winter Park Cultural Tour	Wed., Oct. 28	$70.00
8. Dolphins, Manatees and Gators, Oh My!	Thur., Oct. 29	$80.00
9. Hidden Treasures of the World Showcase (Disney program)	Thur., Oct. 29	$45.00
10. Kennedy Space Center (same as #4)	Fri., Oct. 30	$75.00
11. Gardens of the World (Disney program)	Fri., Oct. 30	$45.00
12. Shopping in Orlando (same as #1)	Sat., Oct. 31	$30.00
13. Behind the Seeds – This includes an all day ticket for the park (Epcot) (Disney program)	Sat., Oct. 31	$70.00

Barb Lewellen
Companion Program Chair

HOTEL INFORMATION

Hilton at DisneyWorld
1751 Hotel Plaza Boulevard
Lake Buena Vista, Florida
USA 32830
Tel: +1-407-827-4000
Fax: +1-407-827-3890

A block of rooms has been reserved for October 24, 2009 – October 31, 2009. Booking a reservation from our site is simple. To begin the process, visit the conference web site and follow the Hotel Reservation link to receive our group's preferred rate.

Conference Rate: From $175/night + local tax for up to two individuals per room. Each additional adult per room requires an additional $20/night. Each room includes complementary internet and coffee. For those who wish to use the hotel health club and have up to 60 minutes of complementary local telephone calls, there is an optional $8 resort fee. The hotel will charge your credit card for one night of your stay at the time you make the reservation. Government rates are also available upon request.

We are not amused
The art of medicine consists in amusing the patient while nature cures the disease.

Voltaire

Tom Lewellen
Local Arrangements

Jean-Francois Pratte
Conference Promotion

Christina Sanders
Registration Chair

By the light of day
It doesn't signify whom one marries, for one is sure to find next moring that it was someone else.

Samuel Rogers

2010 IEEE NSREC IS PLANNING FOR DENVER, COLORADO

The 2010 IEEE Nuclear and Space Radiation Effects Conference will be held July 19–23, 2010, in Denver, Colorado, at the Sheraton Denver Downtown Hotel. The conference will feature a Technical Program consisting of nine sessions of contributed papers (both oral and poster) that describe the latest observations and research results in radiation effects, an up-to-date Short Course offered on July 19, a Radiation Effects Data Workshop, and an Industrial Exhibit.

The conference hotel will be the Sheraton Denver Downtown Hotel. Located on the 16th Street Pedestrian Mall in the heart of downtown Denver, you will be near lots of great shopping, restaurants, and activities. The hotel is near the Colorado Convention Center, within walking distance of the Denver Art Museum and the State Capitol, and just minutes from the Pepsi Center and Coors Field. The Sheraton Denver's $70 million renovation will be completed for NSREC! Denver, established in 1858 when gold was discovered, is the perfect blend of outdoor adventure and urban sophistication. With snowcapped peaks providing a spectacular backdrop, Denver is as refined as it is laid-back. And with 300 days of sunshine per year, bring your sunscreen! Known as the Mile High City (altitude 5,280 feet), a round brass cap embedded in the western entrance stairs of the State Capitol marks the spot.

Supporters of the conference include the Defense Threat Reduction Agency, Sandia National Laboratories, Air Force Research Laboratory, NASA Electronic Parts and Packaging Program, Jet Propulsion Laboratory, Aeroflex Colorado Springs, Boeing, BAE Systems, Honeywell, Micro-RDC, and Northrup Grumman.

TECHNICAL PROGRAM

Chaired by Jeff Black, Vanderbilt University, papers to be presented at this meeting will describe the effects of space, terrestrial, or nuclear radiation on electronic or photonic devices, circuits, sensors, materials and systems, as well as semiconductor processing technology and techniques for producing radiation-tolerant devices and integrated circuits. The conference will be attended by engineers, scientists, and managers who are concerned with radiation effects. International participation in the conference is strongly encouraged.

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

- Basic Mechanisms of Radiation Effects in Electronic Materials and Devices

Radiation Effects on Electronic and Photonic Devices and Circuits

- Space, Atmospheric and Terrestrial Radiation Effects
- Hardness Assurance Technology and Radiation Testing
- New Developments of Interest to the Radiation Effects Community

RADIATION EFFECTS DATA WORKSHOP

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

PAPER SUBMITTAL

Information on the submission of summaries to the 2010 NSREC for either the Technical Sessions or the Data Workshop can be found at www.nsrec.com. The deadline for submitting summaries is February 5, 2010.

SHORT COURSE

Attendees will have the opportunity to participate in a one-day Short Course on Monday, July 19. The theme for the 2010 short course is: "Custom Integrated Circuits and Memories: Design, Basic Mechanisms and Qualification" and is being organized by Ron Lacoe, Aerospace Corporation. The course will be of interest both to radiation effects specialists and newcomers to the field alike.

NOTE: All short course attendees will receive a special CD-ROM containing the complete notes from all previous NSREC short courses (1980–2010). The notes will be electronically searchable and will include all figures and text.

INDUSTRIAL EXHIBIT

An Industrial Exhibit will be included as an integral part of the conference and chaired by Kirby

Kruckmeyer, National Semiconductor. The exhibit will be held on Tuesday and Wednesday. It will include exhibits from 35–40 exhibitors that represent companies or agencies involved in manufacturing electronic devices or systems for applications in space or nuclear environments, modeling and analysis of radiation effects at the device and system level, and radiation testing.

CONFERENCE COMMITTEE

General Chair
Joseph Benedetto
Radiation Assured Devices
719-321-0367

Technical Program
Jeffrey Black
Vanderbilt University
615-322-3758

Local Arrangements
Hugh Barnaby
Arizona State University
480-727-0289

Short Course
Ron Lacoe
The Aerospace Corporation
310-336-0118

Publicity
Teresa Farris
Aeroflex Colorado Springs
719-594-8035

Finance
Dennis Thompson
ITT Space Systems
585-269-6522

Awards
Lew Cohn
NRL
202-404-4488

Industrial Exhibits
Kirby Kruckmeyer
National Semiconductor
408-721-3548

And makes a deeper hole for himself
He who slings mud generally loses ground.

Adlai Stevenson

CONFERENCE REPORT

FINAL REPORT

36th International Conference on Plasma Science and the 23rd Symposium on Fusion Engineering

Farhat Beg
General Chair
ICOPS

Mark Tillack
General Chair
SOFE

The combined IEEE NPSS 36th International Conference on Plasma Science and 23rd Symposium on Fusion Engineering took place at the Omni hotel in downtown San Diego from May 31–June 5, 2009. It was the first time that the two conferences were combined with single technical and social programs. Both conferences had a single budget and a single local organizing committee. The General Chair of ICOPS was Professor Farhat Beg from the Department of Mechanical and Aerospace Engineering and Center for Energy Research, University of California San Diego. The General Chair for SOFE was Dr. Mark Tillack, Center for Energy Research, University of California San Diego. Dr. Dan Goodin of General Atomics chaired the local organizing committee.

The combined conference was a great success! There were about 700 registrants from 31 countries. The distribution of registrants was as follows: United States (483), France (34), Germany (31), South Korea (29), Japan (24), United Kingdom (20) and Italy (18) with the balance from various other countries. Concern over the A(H1N1) flu virus led to a significant number of withdrawals from the SOFE program, especially from Japan and the EU. However, the overall impact on the conference was small.

542 abstracts were submitted to ICOPS with 222 oral and 314 poster presentations. There were 72 presentations from students. There were three ICOPS/SOFE joint plenary talks and three ICOPS-only plenary talks. 308 abstracts were submitted to SOFE from 20 countries, including 18 from students. SOFE was divided into 12 oral sessions, 12 poster sessions and 4 plenary sessions with 8 plenary speakers. The combined ICOPS and SOFE joint plenary speakers were Guenter Janeschitz (ITER IO), John Sethian (NRL) and Ed Moses (LLNL). Three ICOPS plenary speakers were Dr. Michael

But not the meal
Bad taste makes the day go by faster.

Andy Warhol

Kong (Loughborough University, UK), Mark Herrmann (Sandia National Laboratories) and Dr. Bob Barker (Air Force Office of the Scientific Research). A special talk on the NIF Users program was given by Dr. Chris Keane of the Lawrence Livermore National Laboratory. The ICOPS technical program was organized by Dr. Christine Coverdale (Committee Chair) of Sandia National Laboratories with assistance from technical area coordinators and session area organizers. Dr. René Raffray chaired the SOFE technical program committee. Details about the technical program and committees can be found on the conference web page, http://cer.ucsd.edu/icopssofe09.

The conference chairs made special efforts to encourage student participation, enabling over 100 students to attend the conference. ICOPS/SOFE offered a Student Travel Grant program to encourage student participation. The Chair of the Student Travel Grant Committee was Ryan Umstattd of the Air Force Research Laboratory. Travel grants were awarded to 20 students (15 from the U.S. and 5 from overseas) assisting their attendance to ICOPS/SOFE 2009.

A full social program was provided, including a welcome reception on Sunday evening with a brief address from Linden Blue, Vice-Chairman of General Atomics. On Monday morning, a companion breakfast was held on the Palm Terrace with a speaker from the San Diego Tourism Bureau. A special reception for IEEE members and Women in Engineering and Science took place on Monday evening with entertainment by Flamenco artists. A night at the ballpark was held on Tuesday. The Omni hotel is located adjacent to Petco Park, home of the San Diego Padres; attendees were able to enter the park through a private skybridge and enjoy a reserved block of seats. Unfortunately, the Padres lost to the 2008 world series champion Phillies. The conference awards banquet was held on Wednesday evening. It started with a cocktail hour followed by the award banquet. After the award banquet, there was a live concert by the fabulous "Mar Dels." The band played songs from the 1950's and 1960's.

ICOPS award winners this year included Dr. Bob Barker of the Air Force Office of Scientific Research, the winner of the Plasma Science

and Application award *For leadership in plasma technology and applications.* The award for the outstanding student in Plasma Science went to Greg Fridman *To recognize outstanding contributions to the field of plasma science and technology.* The ICOPS best student paper award was given to Atif Ali of the University of Alberta, Canada for *Comparison of K-alpha x-ray source from different metal targets using sub-mJ kilo-Hertz femto-second laser pulses.*

SOFE awards were as follows: Mai Ichinose from Kyoto University, who won the best student paper award for her presentation *Preliminary Design of High Temperature Lithium-Lead Blanket with SiC Cooling Panel*, and A. René Raffray who won the 2009 Fusion Technology Award *for his internationally recognized expertise in fusion engineering and his outstanding contributions to fusion technology, especially in the area of thermal hydraulics, high heat flux components and power plant design for both magnetic and inertial fusion energy.*

Fourteen companies participated in the exhibitor program organized by Kelly Kaiser of General Atomics. Vendors from the U.S., Europe and Asia participated in this program.

ICOPS/SOFE 2009 gratefully acknowledges the generous support of a number of organizations including: the Center for Energy Research and Department of Mechanical and Aerospace Engineering, University of California San Diego, General Atomics, Department of Energy, U.S. Air Force Office of Scientific Research, Los Alamos National Laboratory, National Science Foundation, Naval Research Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories and Princeton Plasma Laboratory.

An IEEE membership recruitment booth was staffed by Dan Jobe of Ktech Inc. and Filimon Roukoutakis of the University of Athens. They did an excellent job and recruited 121 new IEEE members, keeping the record established at the ICOPS 2008.

A minicourse entitled "Target Fabrication and the Physics of High-Energy-Density-Physics Experiments" associated with the ICOPS 2009 was organized by Dr. Rich Stephens of General Atomics. Morning lectures concentrated on considerations faced in building targets: to avoid (or enhance) instabilities (Dr. Mauldin, General Atomics), creating high-density plasmas (Professor R. Betti, University of Rochester), validating the targets as made (Dr. H. Huang, General Atomics) and probing the HED dynamics (Dr. K. Akli, General Atomics). The focus of afternoon lectures was the range of low-density materials that can be built for HEDP experiments (Dr. J. Hund, General Atomics). These targets then can be used for various physics topics studies including lab astrophysics (Dr. B. Blue, General Atomics) and shock propagation (Dr. T. Back, General Atomics). The last session focused on developing capability for campaigns on rep-rated lasers (Dr. N. Alexander, General Atomics). The course ended with an open discussion and addressed the specific interests of the participants.

This year a one-day mini-course was offered in conjunction with SOFE on "The Basics of Fusion Engineering and Design". Lectures were provided by experts in the fusion engineering field, including Don Steiner (RPI), Lee Cadwallader (INL), Neil Morley (UCLA), Farrokh Najmabadi (UC San Diego) and Dave Rasmussen (USIPO/ORNL). The minicourse was organized by Don Steiner and René Raffray.

A Special Issue of *IEEE Transactions on Plasma Science* (TPS) will be published to document ICOPS 2009. The Special Issue is devoted to Plenary and Invited Talks from ICOPS 2009. The Guest Editors are Farhat Beg (University of California, San Diego), Monica Blank (Communications and Power Industries, USA), and Michael Kong (University of Loughborgouh, UK). They are overseeing this special Issue together with Steve Gitomer, Editor-in-Chief.

Shot which way?

I ask people why they have deer heads on their walls. They always say because it is such a beautiful animal. Well, I think my mother is attractive, but i just keep photographs of her.

Ellen DeGeneres

The proceedings of the 23rd SOFE are now in preparation, for posting at the IEEE Xplore web site and distribution on a CD to all registered attendees of SOFE. In addition, for the first time ever, all SOFE authors were invited to submit extended versions of their conference manuscripts for peer review and publication in the IEEE *Transactions on Plasma Science*. David Ruzic from the University of Illinois and Jean Paul Allain from Purdue University will serve as guest editors.

For more information on ICOPS/SOFE 2009 and associated events, please contact Farhat Beg, General Chair ICOPS, Mark Tillack, General Chair SOFE or please visit the joint ICOPS/SOFE web site at http://cer.ucsd.edu/icopssofe09/.

17th IEEE INTERNATIONAL PULSED POWER CONFERENCE 2009

June 28–July 2, 2009
Renaissance Mayflower Hotel
Washington, DC

Frank Peterkin
General Chair

Randy Curry
Technical Program Chair

Washington, D.C., was the focal point of the international Pulsed Power community from June 28th through July 2nd, 2009, when nearly 550 scientists and engineers converged on the U.S. National Capital for the 17th IEEE International Pulsed Power Conference (PPC2009). The conference is held biennially and serves as the principal forum for the exchange of information on pulsed power science, technology, engineering, and applications. The setting for the technical and social events of PPC2009 was the Renaissance Mayflower Hotel, a historic site in the heart of downtown Washington.

The conference got a great start on Sunday evening with a well-attended welcome reception that promoted early check-in and offered the first chance to interact with 20 industrial and academic exhibitors showing off their wares and expertise. The technical program kicked off Monday morning with the first of four plenary sessions held each morning in the elegant atmosphere of the Grand Ballroom, the site of many presidential inaugural celebrations. Monday plenary speakers from the Office of Naval Research, Mr. Chester Petry and Dr. John Pazik, discussed the U.S. Navy's Electromagnetic Rail Gun and Power Systems programs. Dr. Weihua Jiang from Nagaoka University of Technology followed with details of compact pulsed power research in Japan. Tuesday's plenary speakers were Mr. Richard Gullickson from the Defense Threat Reduction Agency and Dr. Christopher Deeney from the National Nuclear Security Administration. Both of Tuesday's plenary speakers spoke of the important role for pulsed power in weapon stockpile stewardship programs.

Traditionally the Wednesday and Thursday plenary sessions at the Pulsed Power Conference are reserved for presentations by the recipients of the major IEEE NPSS Pulsed Power Science and Technology Committee awards. This year the Erwin Marx Award was given to Mr. John T. Naff and the Peter Haas Award recipient was Dr. John Maenchen. Edl Schamiloglu, past chair of the 2007 Conference and current chair of the PPS&T Committee, spoke of the history of these awards and this year's recipients: *"The list of past Erwin Marx and Peter Haas award recipients represent the giants of the Pulsed Power community. Tom Naff and John Maenchen certainly deserve being on that list."* Their biographies and photographs appear below in the AWARDS section.

In addition to the daily plenary sessions, there were parallel oral and poster technical sessions each day of the conference, with more than 400 presentations in total. Major technical topics included dielectrics and energy storage, charged particle beams and sources, high energy density plasmas, and more. All authors are invited to submit manuscripts for publication in the conference technical digest, which historically has served as the major archival resource of papers published in this field. Registered attendees will receive a DVD copy of the proceedings and additional copies will be available for purchase by those who did not attend. Publication of the PPC2009 conference record is expected to occur by the end of calendar year 2009.

One of the new highlight events of PPC2009 was a panel discussion focusing on the evolving role of women as leaders of science and engineering organizations. Featured speakers were Ms. Mary Lacey, Deputy Program Director of Aegis Ballistic Missile Defense, Missile Defense Agency; Anh Duong, Director, Borders and Maritime Security Division Department of Homeland Security S&T Directorate; Linda Estepa, Strategic Development Manager, Program Executive Office, Littoral and Mine Warfare; and Susan Hudson, Head of the Electromagnetic and Sensor Systems Department, Naval Surface Warfare Center, Dahlgren Division. The panel members related their personal stories and emphasized the major influence that mentorship relationships have had on their careers. A post-panel reception offered conference attendees the opportunity to speak with the panel members on a one-on-one basis.

The attendee level for PPC2009 was slightly lower than the conference historical average but exceeded expectations given the current worldwide economic circumstances and ongoing issues with timely issuance of visas to the United States. About 25% of the attendees came from 22 non-U.S. countries, with Japan leading the way for international participation. More than half of the attendees were already IEEE members and as part of a conference promotion more than 100 new IEEE members were "signed-up" for 6-month trial memberships that were included in the registration fee.

Student involvement in the technical program was also significant, with students representing more than 20% of the overall conference attendance. PPC2009 budgeted generously for grants to offset student travel costs, providing 12 competitively determined awards of $750 each to students from 6 different universities. The PPS&T Committee also rewards student technical achievement with the Arthur H. Guenther Pulsed Power Student Award. The 2008 Guenther Award was given to Jamie Darling of the University of Oxford and the 2009 Guenther award was given to Andrew J. Young of Texas Tech University. Both recipients were recognized at the conference banquet and received a plaque and a cash award.

PPC2009 General Chair Dr. Frank Peterkin, a Principal Engineer at the Naval Surface Warfare Center in Dahlgren, Virginia, expressed his thoughts to sum up the 17th meeting. *"It's been gratifying to serve the pulsed power community in this capacity. On behalf of the conference committee I want to thank everybody who participated in PPC2009. We worked hard to continue many conference traditions, start a few new ones, and provide opportunities for rewarding professional interactions in an enjoyable and memorable setting. Based on the feedback I heard from many attendees I think it was a very successful event and I'm sure the next one will only be better."*

The 18th IEEE International Pulsed Power Conference will be held in Chicago, Illinois from June 19th–24th, 2011. Per conference tradition the current Technical Chair, Dr. Randy Curry (University of Missouri-Columbia), will be the General Chair for PPC2011, with Dr. Bryan Oliver (Sandia National Laboratories) leading the technical program.

Matt McQuage
Finance Chair

Keisha Hersey
IEEE Meeting Coordinator

ANIMMA 2009 CONFERENCE A BIG SUCCESS

The scientific conference on "Advancements in Nuclear Instrumentation Measurement Methods and their Applications (ANIMMA 2009)" was held from June 7–10 at the Palais des Congrès in Marseille, France. The conference was cosponsored by the IEEE NPSS as part of the initiative to reintroduce nuclear-energy-related topics back into NPSS meetings. The conference was attended by about 430 participants from 35 countries on

Christoph Ilgner

Richard Kouzes

Patrick LeDû

Jean-Luc Leray

five continents. Almost 90 oral presentations were given and over 150 posters were shown.

The conference received the active support of the IEEE NPSS, the European Nuclear Society, and the French Nuclear Energy Society, and the support of the Provence Alpes Cote d'Azur Region, the city of Marseille and many industrial partners.

The ANIMMA conference was opened by Catherine Cesarsky, High Commissioner for Atomic Energy, Professor Jean-Paul Caverni, President of the University of Provence, Loïck Martin-Deidier, Deputy Director of the Nuclear Energy Directorate, Professor Franck Deconinck, President of the Belgian Nuclear Research Center SCK-CEN, and Jorgen Kjems, Chairman of the European Strategy Forum on Research Infrastructures.

This conference was initiated and organized by CEA, the French Atomic Energy Commission, in close partnership, with the University of Provence and the Belgian Nuclear Research Centre SCK-CEN, all aware of the importance of instrumentation and measurement at the heart of nuclear activities and aware of the considerable impact of these sciences on many other fields.

Three objectives had been established for the ANIMMA conference:

- To be an international conference of high scientific quality oriented towards innovation.
- To be a multidisciplinary conference concerning the instrumentation and measurement methods carried out and implemented in specifically nuclear fields, such as fundamental physics and nuclear energy, but also concerning instrumentation using radiation developed and implemented in fields as varied as security, the environment and medical sciences.
- To constitute the meeting place of all communities concerned by instrumentation and measurement, to unite, consolidate and organize an international network of scientific and industrial experts, to share expressed needs, knowledge and experience, and to establish the most innovative collaborations with scientists and effective partnerships with industrial firms.

These objectives were met during the conference with a wide international participation, and notably that of many internationally recognized scientists and experts in all fields covered by ANIMMA.

There were actions taken to interest young generations of scientists in instrumentation and measurements sciences with the participation of the Instrumentation Department of the University of Provence and the INSTN. About 50 students from INSTN and the Instrumentation Department took part in the ANIMMA conference. This enabled them to meet researchers and industrial firms.

An exhibition of twenty-five booths represented research laboratories, industrial partners, and many specialized companies that make specific, high-performance instrumentation related to the conference.

To close the conference, a visit to the CEA-Cadarache Centre was organized on June11, 2009. It enabled ANIMMA participants to visit the CEA facilities particularly devoted to the development or implementation of instrumentation and advanced measurement methods, and to have an overview of the large facilities under construction in Cadarache, notably the Jules Horowitz research reactor and the ITER fusion energy project.

The success of ANIMMA 2009 has confirmed the real interest in this conference and the justification for its objectives. Thus ANIMMA will be a permanent biennial conference. The next conference will take place in 2011 and will be organized by the Belgian Nuclear Research Centre.

The authors can be reached as follows: Richard Kouzes: Pacific Northwest National Laboratory, PO Box 999, MS K7-36, Richland, WA 99352; Phone: +1 509-372-4858; Fax: 509-372-4969; E-mail: richard.kouzes@pnl.gov; Christoph Ilgner: Technische Universität Dortmund, Experimentelle Physik 5, 44221 Dortmund, Germany; Phone: +41-22-76-72969; Fax: +41-22-76-79080; E-mail: Christoph.Ilgner@cern.ch; Patrick LeDû: Groupe CAS, Institut de Physique Nucleaire, Bât. Paul Dirac, 4 rue Enrico Fermi, 69100 Villeurbanne cedex, France; Jean-Luc Leray: CEA, bat 447, 91191 Gif-sur-Yvette cedex, France; Tel +33 1 64 50 20 41 (A: 22 64); E-mail: jean-luc.leray@cea.fr.

PRESIDENT'S REPORT

Craig Woody
NPSS President

It's always a pleasure to report good news, and I'm happy to say that I have some good news to report. One of our long standing members and a former Society President, Hal Flescher, received the IEEE Emberson Award at the IEEE 125th Anniversary Honors Ceremony held in Los Angeles, California last month. This is one of IEEE's most prestigious awards for service to the entire organization, which he received in honor of his contributions in making IEEE more fiscally sound during difficult economic times. Hal has also done a great service to our Society, and is currently the Vice President of the IEEE Technical Activities Board. We all congratulate Hal on this notable recognition, and thank him for all that he has done for both NPSS and IEEE.

There are also several other notable NPSS members who are taking on some new functions within IEEE. Bill Moses was elected to the IEEE Conference Committee, and Peter Clout is a candidate for Division IV Director in an election that will take place later this year. Both Bill and Peter are past Society Presidents and have been active in TAB and other IEEE activities for a number of years. We wish Peter good luck in the election and Bill success in his new job on the Conference Committee. I have also appointed Rob Reinovsky, our Society's Vice President, as our Strategic Planning Representative to TAB. Bob will be helping to develop a strategic plan for our Society's future activities, and is also heading up a committee to review our Constitution and Bylaws. I would like to thank Bob for taking on these important duties that will help forge our plans for the future.

It looks as if some of Hal's financial strategy has paid off since, although the economy is still struggling, our Society, as well as all of IEEE, is holding up rather well in terms of its finances. While we have lost about a third of our reserves due to the economic downturn, we are still quite viable and healthy, thanks to our many successful conferences and publications. This conclusion was echoed in the report of the Society Review Committee, which praised us on being an efficient and well run organization. Our membership is also growing. We recruited 250 new NPSS members at the 2009 Particle Accelerator Conference held in Vancouver in May, and more at several of our other conferences. I'd like to thank Uwe Bratzler, our Membership Chair, Vernon Price who has been of extraordinary help in processing new applications, and all those others who helped him, in their highly successful membership efforts. We would like to encourage even more new membership, and also find ways of retaining these new members. One possibility we have been discussing is to hold certain "Members Only" events at some of our conferences. This would be an excellent way to meet fellow members, and would be one more thing to add to the list of the benefits of membership.

The results are now in on our latest membership survey which was carried out for the first time electronically using a web-based program called *Survey Monkey*. This was really a great success, due mainly to the efforts of Eric Frey who set up and conducted the survey for us. We received 1335 responses out of more than 3000 survey requests that were sent out by E-mail, which is an excellent response ratio. The results not only provide the data we require to allocate the proper number of AdCom seats based on the technical interests of our members, but also give us valuable feedback on how our members feel our Society is working. The results have just come in, and a detailed report will appear in a future Newsletter. I should also note that we plan to carry out future AdCom elections using electronic means, so it looks as if paper ballots and survey forms are becoming a thing of the past.

I would also like to announce the formation of a new NPSS Chapter in Seoul, Korea. This effort was spearheaded by Prof. Hee-Joung Kim from Younsei University, and the Chapter received formal approval in June of this year. We would like to thank Prof. Kim for his efforts to form this Chapter and extend our presence into this part of the world, and we look forward to more NPSS activities there in the future.

As I mentioned in the last Newsletter, we decided that we would remain a member of the Biometrics Council, and that David Abe would be our representative. The change in our representation on the Council is related to the rapid development of terahertz technology which is of increasing interest to our Plasma Science and Applications community.

Also, TAB approved the W.R.G. Baker Award, which is presented annually for what is deemed to be the best paper within all of IEEE in a given year. This presents an opportunity for NPSS members to achieve a high level of

That makes sense!
Only an intellectual could say something so stupid.

George Orwell

Ride to walk
In America, a pedestrian is somebody who has just parked their car.

Tom Vanderbilt

notoriety for work that is recognized throughout IEEE. We certainly produce some highly regarded publications in our Society, and I hope that some of our members will be candidates for this award.

A number of NPSS members recently attended the IEEE Panel of Conference Organizers (POCO) Conference in Prague in the Czech Republic. This was a meeting dedicated to virtually all aspects of holding conferences, which is a major activity of our Society. There were a number of important issues discussed there, including holding conferences outside the U.S. (and particularly in China), the upsurge of requests for Technically Co-sponsored conferences, VAT and financial issues, and many more. We currently sponsor 11 major conferences, either annually or biennially, and co-sponsor many more. We take pride in the fact that these are some of the most highly regarded conferences in our fields. We wish to strive to maintain that high level of quality for both our members and nonmembers. Keeping up with today's rapidly changing world of networking, communication and modern technology in terms of holding conferences will help us do that.

Finally, it is with deep regret that I note the passing of our dearly beloved member, Lou Costrell who was one of the founding fathers of the NPSS and spent more that 40 years working within our Society and serving its members. He made enormous contributions to the establishment of standards within IEEE, particularly in the area of NIM, CAMAC, and other forms of electronics and readout systems. He also led the effort to organize the first Nuclear Science Symposium back in the early 1960s. This is one of our flagship conferences today. This issue of the Newsletter is dedicated to him, and he has been well eulogized in Ken Dawson's opening article. We will surely miss Lou, and we greatly appreciate all that he has done for us.

Craig Woody, NPSS President, can be reached at the Physics Dept. Bldg. 510C, Brookhaven National Lab, Upton, NY 11973, Phone: +1 631-344-2752; Fax: +1 631-344-3253; E-mail: woody@bnl.gov.

Peter Clout
Candidate for Division IV Director Elect for 2010

Peter Clout
Div. IV Director Candidate

I am standing for Division Director Elect of Division IV this year and asking for your vote. This position is for next year, as a year in training, and then in the following two years the successful candidate will be serving on the Board of the IEEE primarily representing the interests and views of the members of the seven societies and one council that make up our Division. In addition, the Division Director serves on TAB (Technical Activities Board) and the IEEE Assembly.

Apart from the President of the IEEE, there are two ways that members' voices are heard at the IEEE Board: by voting for Division Director and by voting for Region Director. We are members of one of the technical divisions, Division IV, which consists of seven smaller societies and one council. Each society has a style of its own but the important thing is those society members' technical needs and interests are satisfied. For this the volunteers in NPSS need good support and that is what I will strive to do.

Why am I standing, why am I offering my time to this position? I firmly believe that strong technical communities are fostered by good publications, good meetings and good communications generally. All these require support from volunteers and I have happily given my time over the many years of involvement to support all our members.

Of course, all these activities require a good business model which is one way of saying that the funding for activities has to come from somewhere. There are always activities that have a cost to IEEE and other activities that generate revenue and in general, it is the societies, with the support of IEEE corporate, that generate much of the revenue from conferences and publications.

It is important to not only maintain but improve the value of the conferences and publications as the IEEE is not only highly respected but also in a competitive environment. However, with good leadership and continuing good support, our work for the growth of our respective communities can be even more effective. I want excellent and well-attended meetings and highly valued publications – this is the core of the IEEE and this is what I will support.

Ways I have been helping with this have been in preparing and distributing brochures and leaflets about all the activities of NPSS. This, along with membership booths and volunteers manning the booth at conferences, generates new memberships and ensures that all the members of the communities that NPSS serves are fully aware of all the opportunities we offer them. Each two years this job includes responsibility for creating and distributing over two tons of literature to over 16 conferences as well as membership mailings.

I currently serve on the TAB Society Review Committee, discussing with societies their operations and hearing about and documenting their innovations to share with other societies and offering help and advice where needed. While both society leaders and committee members put a lot of work into this review process, the benefits are well recognized and appreciated. It makes for stronger societies in a stronger IEEE.

Of course, we are in uncertain times and very few people recently have been looking at financial statements with a smile. These are times where prudent financial management and careful expenditure are essential. NPSS has been very successful here because the volunteers directly organizing meetings and running the publications have been well supported by the core NPSS leadership. I will be looking carefully at these aspects in the broader sense of the IEEE support of smaller societies such as make up the societies of our Division IV.

If elected I will report to you, the volunteers and members in the Division's societies and I will always be happy to hear from you.

Please visit my election web site at www.peterclout.com or send me email at p.clout@ieee.org. Please also vote in the election – I am asking for your vote.

Only there?
The climate of Edinburgh is such that the weak die young and the… strong envy them.

Samuel Johnson

TECHNICAL COMMITTEES

COMPUTER APPLICATIONS IN NUCLEAR AND PLASMA SCIENCE

Jean-Pierre Martin
Chair, CANPS

The 16th IEEE NPSS Real Time Conference (RTC) was held at the Institute of High Energy Physics (IHEP) of Beijing, China, from May 10th to May 15th 2009. This is the first NPSS conference to be held in this country. The conference was chaired by Professor Yifang Wang, associate director of the Institute. Professor Yantai Shu, from the nearby Tianjin University was the co-chair of the conference, while Professor Zhen'An Liu, from IHEP, was the local chair. There were 188 registered participants, which is close to the maximum number manageable for a 5-day conference without parallel sessions, which is the Real Time Conferences tradition. More than one third of the participants came from China. As expected, there was a large representation from the four major CERN experiments, reflecting the exceptional activity associated with the startup of the LHC.

The first day of the conference was devoted to a workshop and a short course. The workshop, lasting all day, was an introduction to the ATCA standard (Advanced Telecom Computing Architecture) and how it could be adapted to the needs of large physics infrastructures and experiments. This ATCA standard from the telecom industry has been designed for both for high performance and "high availability," meaning high-speed serial links, redundancy, built-in failure detection, and hot swap features for low down time. The workshop was organized by Ray Larsen, from SLAC, and Zhen'An Liu, from IHEP Beijing. The presentations were by various speakers from the telecom industry, as well as scientists from the physics community sharing their experience with ATCA compatible modules as part of their DAQ system. The topic for the half day short course was how to use FPGA's in real time data front-end processing. It was organized by Stefan Ritt, from PSI Zurich, and presented jointly by Marc André Tétrault, from "Université de Sherbrooke" and Jin-Yuan Wu, from Fermilab.

The traditional highlight of the Real Time conference is the presentation of the CANPS award. This award is given in recognition of someone who has made a significant contribution to the fields of interest represented by CANPS. This year, the CANPS prize was presented to a prestigious scientist in the field of data acquisition: Sergio Cittolin, for *outstanding*

Sergio Cittolin
CANPS Award Recipient

Andre Neto

Lei Zhao

Quan Sun

Charles C. Watson
Chair, Nuclear Medical and Imaging Sciences

vision and achievements in trigger and DAQ architectures for Physics experiments over the last 30 years. Sergio Cittolin has been a CERN applied physicist for the last 40 years. He was responsible for many experiments as the trigger and Data Acquisition team leader (PS, ISR), UA1 and now as project manager of the CMS LHC experiment. He was responsible for major contributions in the days of CAMAC, introduced the VME standard in large physics experiments (UA1), and his vision of Trigger/DAQ architectures and event building schemes has now been accepted in most of the modern large physics experiments.

There were also 4 awards presented for "outstanding student poster or oral papers." The two best papers receive both a cash award and a certificate from IEEE. The runners up receive a certificate. The committee evaluating the papers was composed of Christian Bohm, from the Alba Nova University, Stockholm, Réjean Fontaine, from Université de Sherbrooke, Canada Michael Levine, from the Brookhaven National Laboratory and Yantai Shu, from the University of Tianjin, China.

The first award was granted to André Neto, from EURATOM-IST, Lisbon, Portugal for a paper entitled: "MARTe: a Multi-Platform Real-Time Framework."

The second award went to Lei Zhao, from the Key Laboratory of Technologies of Particle Detection & Electronics, Chinese Academy of Sciences, Hefei City, Anhui Province, China, and Modern Physics Department, University of Science and Technology of China, Hefei City, Anhui Province, China, for a paper entitled: "The Design and Initial Testing of the Beam Phase and Energy Test System for DTL in the Proton Accelerator of CSNS."

The third prize was presented to Quan Sun, from DRS, Institut Pluridisciplinaire Hubert-Curien, Strasbourg, France, and School of Electronic and Information Engineering, Beihang University, Beijing, P. R. China, for a paper entitled: "A Serial Link Transmitter in MAPS."

The fourth prize was given to Louis Arpin, from the Department of Electrical and Computer Engineering, Universite de Sherbrooke, Sherbrooke, Quebec, Canada, and Department of Nuclear Medicine and Radiobiology, Universite de Sherbrooke, Sherbrooke, Quebec, Canada for a paper entitled:"Nanosecond Edge Detection System Using Embedded FPGA Fabrics."

As usual, the CANPS committee met to discuss the organization of the next RT conference. Normally, the Real Time Conference is held every other year, in the spring of odd numbered years. For various reasons, it was decided to change to even numbered years. So the next Real Time Conference will be in 2010, rather than 2011. It will be in Lisboa, Portugal, May 24 to May 28, and will be chaired by Carlos Varandas, from the Instituto de Plasmas e Fusão Nuclear (IPFN). The Conference will be organized jointly by (IPFN) and the "Laboratório de Instrumentação e Partículas" (LIP).

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.

NUCLEAR MEDICAL AND IMAGING SCIENCES NEWS

After several years of dedicated service as Secretary of the NMISC, Steven Meikle is stepping down. I am pleased to announce that Giorgos Kontaxakis has accepted the position of NMISC Secretary and Chair of the Nominations Sub-Committee in Steve's place. I thank George for volunteering to assume these responsibilities and Steve for his many past contributions in this position.

The NMISC has been working on a minor revision of the NMISTC Bylaws, mainly concerning the operation of the NSS/MIC Oversight Subcommittee, which does the long-term planning and site selection for the NSS and MIC. This is a joint Subcommittee of the RISC and NMISC, and consequently the RITC and NMISTC Bylaws must be consistent with respect to its operation. The revision is intended to accomplish this. The new Bylaws will take effect if they are approved by NPSS AdCom, and will be published in a future Newsletter.

The 2009 NSS/MIC will be held 25–31 October in Orlando, Florida, in the Hilton Hotel near Downtown Disney. Richard Lanza is the

General Chair, Ramsey Badawi is the MIC Program Chair and Craig Levin will be the Deputy MIC Program Chair. This year's MIC will have the theme "Translating Scientific Concepts into Practical Reality." Plenary sessions during the meeting will include contributions from medical practitioners and from workers in industry, with a view to provoking discussion on how novel developments presented at the conference can be translated into devices and methods that will have a clinical impact. Additional details can be found at http://www.nss-mic.org/2009/.

Knoxville, Tennessee is the venue for the 2010 NSS/MIC. Ron Keyser is the General Chair and David Townsend will serve as the MIC Program Chair. The meeting will be held in the Knoxville Convention Center, with housing shared among several downtown hotels. The organizing committee is working on the first Call for Papers, which will be distributed at the Orlando meeting.

The 2011 NSS/MIC will be in Valencia, Spain. Valencia is Spain's third largest city, beautifully situated on the eastern Mediterranean coast, with many cultural and recreational attractions. The meeting space will be in the Valencia Conference Center and the neighboring Sorollo and Hilton Hotels. David Townsend will be the General Chair.

The Disney Hotel in Anaheim, California will host the 2012 NSS/MIC meeting. Tom Lewellen will be General Chair of this meeting, and he is currently putting together his organizing committee.

Planning for the 2013 meeting is underway. The RITC/NMISC Joint Oversight Subcommittee is currently reviewing three site location proposals: one for Beijing, China, one for Seoul, Korea, and one for Cairns, Australia. The growing interest from our Asia-Pacific community in hosting the meeting is a strong motivating factor for holding the 2013 NSS/MIC in that region.

You can find more information on the NMIS Technical Committee and Council, including current Council membership, information on NMISTC-sponsored awards, and a copy of our constitution and bylaws, at our web site: http://ewh.ieee.org/soc/nps/nmisc/. Five new members are elected to NMISC each year, and we always welcome new candidates. If you are interested in standing for election, please contact me.

Charles Watson can be reached at Siemens Molecular Imaging, 810 Innovation Drive, Knoxville, TN, 37932-2562 USA; Phone: +1 865-218-2419; Fax: +1 865-218-3000; E-mail: charles.c.watson@siemens.com.

What?
Much learning does not teach understanding.

Heraclitus

PARTICLE ACCELERATOR SCIENCE AND TECHNOLOGY NEWS

Stan Schriber continues as PAST Chair until January 2013.

ORGANIZATION

The PAST TC has been organized with the following responsibilities. As the past PAST Chair, Ilan Ben-Zvi (BNL) will be in charge of the Fellows and Awards subcommittee; responsible for nominating our PAST award candidates and fellows. As the former past PAST Chair, Bruce Brown (FNAL) will be in charge of our Web and Communications subcommittee; responsible in part for our PAST TC web site. Our elected PAST TC member for IEEE-NPSS AdCom, Sandra Biedron (ANL), is chair of our Nominating, Education and Outreach (includes our interests in Women in Science and Engineering) subcommittee; responsible in part for nominating members who could be elected to serve on the IEEE-NPSS AdCom. And finally, Paul Schmor (TRIUMF) is chair of our Conferences subcommittee.

CONFERENCES

PAC'09

PAC'09, the 23rd Particle Accelerator Conference, organized by the TRIUMF laboratory under the auspices of the APS-DPB and IEEE-NPSS was held in Vancouver B.C. Canada, 4th–8th May 2009. The conference opened Sunday with a well-attended student poster session and reception for delegates followed by opening remarks on Monday from TRIUMF director Nigel Lockyer and Program chairman Shane Koscielniak. The meeting closed on Friday with concluding remarks from LOC chairman Yuri Bylinsky and a pre-recorded farewell from the conference chairman Paul Schmor. Tragically, Paul suffered a serious and debilitating illness, Guillain-Barre syndrome, a week before the meeting and was unable to share in its success.

PAC'09 was an outstanding conference by any measure: 1327 participants, 74 industrial exhibits, 148 students, 197 orals, 1570 posters, and 23 satellite meetings. Making all that

Stan Shriber
PAST Chair

Born 30 years too soon?
You know, sometimes when they say you're ahead of your time, it's just a polite way of saying you have a real bad sense of timing.

George McGovern

run smoothly and confidently is an achievement TRIUMF and its conference coordinator, Sandi Miller, can be proud of. What the statistics cannot capture was the vitality of the meeting: several standing-room-only orals sessions, the throng of the enthusiastic and energetic poster sessions, the myriad technical conversations. An important component was the presence of students about to enter our field as apprentice accelerator physicists and engineers. Fifty-one students received travel grants thanks to generous support from PAC'09, the APS and IEEE, U.S. laboratories ANL, BNL, TJNAF, LLNL, and industry sponsors AAPS, Diversified and MDS Nordion. Incidentally, registrations were slightly higher than is conveyed by the numbers above; the WHO-recognized global H1N1-influenza epidemic announced 30th April led to about 60 cancellations, many of them from Japan where laboratory restrictions were imposed on foreign travel.

Particularly memorable were the packed rooms for four talks: Richard York's *FRIB: A New Accelerator facility for the Production of Radioactive Beams,* Mark Hogan's *Road to a Plasma Wakefield Accelerator based Linear Collider*, both on Tuesday; Paul Emma's *Commissioning Status of the LCLS X-Ray FEL*, and Thomas Haberer's *Commissioning of Hadrontherapy Synchrotrons HIT and CNAO*, both on Thursday. These talks cement the opinion that particle accelerators are key to every frontier, be it astrophysics, high-energy physics, materials science, or nuclear medicine. This same thought was echoed at the opening plenary by Michael Turner's *400 Years of Discovery with Telescopes and Microscopes*, Alan Shotter's *Radioactive Beams for Astrophysics,* and at the closing plenary with Stefan Karsch's remarkable account of *Single Particle Diffraction at FLASH*, Thomas Mason's *New Generation of Neutron Sources*, and Nicholas Walker's rallying call *Progress Toward the International Linear Collider*. For our community, this sense of scope and achievement for our craft more than made up for the disappointment over the too-short-lived *Large Hadron Collider Commissioning*, as reported by Jorg Weninger. A unifying theme of the opening plenary, the International Year of Astronomy, was alluded to directly by Turner and Shotter: both recognized the convergence of astronomy/cosmology and nuclear/high-energy-particle physics, and both marveled that accelerators provide the means for studying the "heavenly laboratory" under controlled conditions.

Behind the scenes the proceedings office toiled away, starting to produce the permanent conference record formed of papers and speakers slides. By 8th May all 1591 of the received contributions had begun processing, and of these 1329 were completed and ready for the final stage, Quality Assurance. As of June 12th, 1491 contributions were ready for publication. The proceedings team, led by Martin Comyn, is owed a vote of thanks. The conference organizers wish also to express their thanks to the speakers, the session chairmen and the delegates for making PAC'09 a resounding success.

Finally, PAC'09 wishes a similar good fortune to the three following conferences: PAC'11 the next in the continuing North American series, to be hosted by Brookhaven National Laboratory in New York City, the IPAC'10 in Kyoto Japan, the first of the 3-year international cycle, and the IPAC'11 in San Sabastien Spain.

PAC'11

Planning is underway for the next conference in the PAC series, PAC'11, which will be held at the New York Marriott Marquis in downtown New York, NY, 2011 March 28 – April 1. This conference will be the first PAC conference in North America being held between the three-year cycle IPAC conferences: the first, IPAC'10, being held in Kyoto, Japan 2010 May 24 – 28 and the second, IPAC'11, being held in Spain 2011 September. The chair of our PAC'11 conference is Thomas Roser, BNL, who is busy putting his conference team and budget together.

IPAC'12

Planning is also underway for the first IPAC conference, IPAC'12, to be held in North America, the third in this new series and for us the 25th in the series of xPAC conferences in North America. It will be held in New Orleans, LA, 2012 May 20 – 26 at the New Orleans Convention Center with Vic Suller, LSU, the conference chair; Jeff Corbett, SLAC, the science program chair; and Kevin Morris, LSU, the local organizing committee chair. Vic is busy putting his conference team and budget together.

PAC'13

The North American Particle Accelerator Conference for 2013 (PAC'13) will be organized jointly by the Lawrence Berkeley National Laboratory (LBNL) and the SLAC National Accelerator Laboratory (SLAC). The conference will take place in the fall somewhere on the

U.S. West Coast. The conference management team is being organized. Steve Gourlay, LBNL, is the acting conference Chair and the Scientific Program Chair, to be named at a later date, will be from SLAC.

IPAC'15

A search subcommittee chaired by Derek Lowenstein, BNL, has completed its task naming Andrew Hutton, JLab, as the conference chair for an international particle accelerator conference that will be held in Richmond, VA in the Spring of 2015, to be hosted by JLab with assistance from a few other institutions.

Stan Schriber can be reached at his home in Eagle, ID 83616 USA; Phone: +1-208-631-8208, E-mail: schriber@nscl.msu.edu

Generally true
As often as a study is cultivated by narrow minds, they will draw from it narrow conclusions.

John Stuart Mill

NPSS PULSED POWER SCIENCE AND TECHNOLOGY TECHNICAL COMMITTEE REPORT

Edl Schamiloglu
Chair, PPST

The 17th IEEE International Pulsed Power Conference was held in Washington, DC at the historic Mayflower Hotel June 28–July 2, 2009. The conference was a success and we thank Drs. Frank Peterkin and Randy Curry for organizing an excellent technical program, an excellent social program, and arranging for pleasant weather in DC! The organizers' report appeared in the conference reports section above.

I am pleased to introduce the newest appointed PPST committee members (a complete list of the committee members can be found on the committee's website: http://www.ece.unm.edu/ppst/: Ms. Laura Tully (Lawrence Livermore National Laboratory) and Dr. Stephen Bayne (Texas Tech University). (Their photos and bios appear at the end of this report.) I would like to thank the members of the committee who have completed their terms: James Degnan (AFRL, Kirtland AFB), Charles Gilman (SAIC, Albuquerque), John Maenchen (Sandia National Laboratories) and Rick Spielman (Ktech Corp.).

The 18th IEEE International Pulsed Power Conference will be held at the McCormick Place Hyatt Regency in Chicago, IL from June 19–23, 2011. Dr. Randy Curry (University of Missouri-Columbia) is the General Chair and Dr. Bryan Oliver (Sandia National Laboratories) is the Technical Program Chair. This conference will be followed by the 38th IEEE International Conference on Plasma Science, which will be held June 26–30 in the same venue, combined with the 24th IEEE NPSS Symposium on Fusion Engineering.

In 2013 the 19th IEEE International Pulsed Power Conference will be combined with the 40th IEEE ICOPS conference (as it had done so in 2001 and 2007 previously) and will be held at the Hyatt Regency San Francisco. Dr. Bryan Oliver will be the General Chair, Dr. Mark Crawford (IAT, UT Austin) will be the Technical Program Chair, and Mr. Pat Corcoran (L3-Pulse Sciences Div.) will be the Local Arrangements Chair.

In 2015, Dr. Mark Crawford will be planning on hosting the 20th IEEE International Pulsed Power Conference in Austin, TX.

IEEE NPSS will be technically co-sponsoring EML-2010, the 15th International Symposium on Electromagnetic Launch Technology, to be held in Brussels, Belgium May 17–20, 2010. The conference website is http://www.emlsymposium.org/. A Special Issue of the *IEEE Transactions on Plasma Science* will be devoted to papers presented at this symposium.

Finally, the Pulsed Power Science and Technology Committee is preparing a revision of its Constitution and By-Laws and plans on releasing it in early 2010.

BIOGRAPHIES OF NEW COMMITTEE MEMBERS

Laura K. Tully received the B.S. degrees in electrical engineering, computer engineering, and computer science with a minor in mathematics from the University of Missouri, Columbia in 2002. She received the M.S. in electrical engineering from the University of Missouri, Columbia in 2005. Her graduate study involved multi-megavolt Marx generator and pulse-forming network development. She is currently a pulsed power engineer at Lawrence Livermore National Laboratory in Livermore,

Laura Tully

Stephen Bayne

California working in explosive pulsed power, electromagnetic launch, lightning safety, and linear induction accelerators.

Dr. Stephen B. Bayne received his Ph.D., M.S. and B.S. degrees in Electrical Engineering from Texas Tech University. After completing his Doctorial studies, he was an electronics engineer at the Naval Research Lab (NRL) where he designed advanced power electronics systems for space power applications. After two and a half years at NRL, Dr. Bayne transferred to the Army Research Lab (ARL) where he was instrumental in developing a high temperature power electronic program. Dr. Bayne was promoted to Team Lead at ARL where he led the power components team of five engineers. As the Team Leader, Dr. Bayne was responsible for advanced research in high temperature and advance power devices for Army applications. In addition, he developed internal research and also generated Small Business Initiative Research (SBIR) topics and worked as the Contracting Officer Representative (COR) on several contracts. After one and a half years as Team Lead, Dr. Bayne was promoted to Branch Chief of the Directed Energy Branch where he managed 16 engineers, technicians and support staff. Dr. Bayne managed a multimillion dollar budget, and was responsible for recruiting, development, and performance evaluation of members in the branch. After 8 years at the ARL, Dr. Bayne transitioned to academia where he is an Associate Professor at Texas Tech University. His research interests at Texas Tech are Power Electronics, Pulse Power and Renewable Energy.

Dr. Bayne won the Army Research Lab Achievement Award for Human Resources Development, the Army Research Lab Achievement Award for Engineering, and the Army Research and Development Award. He is also a senior member of IEEE, and was inducted into Marquis Who's Who in America 2005. Dr. Bayne has several publications in journals and conference proceedings, and co-authored a chapter in the book *Advances in Silicon Carbide Processing and Applications*. Dr. Bayne is also served as an Adjunct Professor at and Morgan State University, and taught a graduate Electrical Engineering course at Howard University. Dr. Bayne is a veteran of the Air Force, where he served four years.

Laura Tully can be reached at Lawrence Livermore National Laboratory, 7000 East Ave, L-153, Livermore, CA 94110; Phone: +1 925 424-2235; Fax: +1 925 423-5080; E-mail: tully2@llnl.gov.

Stephen Bayne can be reached at Texas Tech University, Whitacre College of Engineering, Electrical and Computer Engineering, Rm. 111 EE, Box 43102, Lubbock, TX 79409-3102; Phone: +1 806 742-0526; Fax: +1 806 742-1281; E-mail: stepehen.Bayne@ttu.edu.

Edl Schamiloglu, Chair of the Pulsed Power Science and Technology TC, can be reached at the Department of Electrical and Computer Engineering, MSC01 11001, Univ. of New Mexico, Albuquerque, NM 87131-0001; Phone: +1 505-277-4423; Fax: +1 505-277-1439; E-mail: edl@ece.unm.edu.

Population inversion
Already middle-aged people in the USA have, on average, more living grandparents (yes, grandparents) than children,

Raymond Tallis

FUNCTIONAL COMMITTEES

Steven J. Gitomer

IEEE TRANSACTIONS ON PLASMA SCIENCE

List of Currently Scheduled Special Issues

August 2009, *Special Issue on Electrical Discharges in Vacuum* – Guest Editors: Kenneth Struve (Sandia National Laboratories, Albuquerque, NM, USA); Rene Smeets (KEMA, Arnheim, The Netherlands)

September 2009, *Special Issue on Advances in Plasma Processing for Semiconductor Manufacturing* – Guest Editors: Steven Shannon (North Carolina State University, Raleigh, NC, USA), Shahid Rauf (Applied Materials Inc., Sunnyvale, CA USA), Alex Paterson (Lam Research Corporation, Fremont, CA USA), Ron Kinder (Novellus Systems, Inc., San Jose CA USA), & Peter L.G. Ventzek (Tokyo Electron, Austin, TX USA)

October 2009, *Special Issue on High Power Particle Beams* – Guest Editors: Weihua Jiang (Tsinghua University, Beijing, China), Bruce Weber (Naval Research Laboratory, Washington DC USA) & John Mankowski (Texas Tech University, Lubbock, TX USA)

December 2009, *Special Issue on Plasma Assisted Combustion* – Guest Editors: Louis Rosocha (Los Alamos National Laboratory [retired], Los Alamos, NM USA) and Igor Matveev (Applied Plasma Technologies, Falls Church, VA USA)

February 2010, *Special Issue on Z-Pinch Physics* – Guest Editors: Simon Bott (University of California, San Diego, CA USA), Jerry Chittenden (Imperial College, London, UK), John Giuliani (Naval Research Laboratory, Washington, DC USA), & Christine Coverdale (Sandia National Laboratories, Albuquerque, NM USA)

February 2010, *Special Issue of Selected Papers from SOFE '09* – Guest Editors: David Ruzic (University of Illinois, Champaign-Urbana. IL USA) and Jean Paul Allain (Purdue University, West Lafayette, IN USA)

April 2010, *Special Issue on Plenary and Invited papers from ICOPS-2009* – Guest Editors: Farhat Beg (University of California, San Diego, CA USA), Monica Blank (CPII, Microwave Products Division, Palo Alto, CA USA) and Michael Kong (Loughborough University, Loughborough UK)

April 2010, *Special Issue on Physics of Dusty Plasmas* – Guest Editors: Mihaly Horanyi (University of Colorado, Boulder, CO USA), Scott Robertson (University of Colorado, Boulder, CO USA), & Zoltan Sternovsky (University of Colorado, Boulder, CO USA)

June 2010, *Special Issue on High Power Microwave Generation* – Guest Editors: Stefano Alberti (Swiss Institute of Technology, Lausanne, Switzerland), Minh Quang Tran (Swiss Institute of Technology, Lausanne, Switzerland), and David R. Whaley (L-3 Communications – Electron Devices Division, San Carlos, CA USA)

July 2010, *Special Issue on Megagauss Magnetic Fields and Their Applications* – Co-Guest Editors: James Degnan (Air Force Research Labs, Albuquerque, NM USA) & Kenneth Struve (Sandia National Labs, Albuquerque, NM USA)

August 2010, *Special Issue on Numerical Simulation of Plasmas* – Guest Editors: Ricardo Fonseca (Instituto Superior Tecnico, Lisbon, Portugal), Luis Alves (Instituto Superior Tecnico, Lisbon, Portugal), & Joao Bizarro (Instituto Superior Tecnico, Lisbon, Portugal)

August 2010, *Special Issue on Nonthermal Medical/Biological Treatments Using Ionized Gases and Electromagnetic Fields* – Guest Editors: Gregory Fridman (Drexel University, Philadelphia, PA USA) and Xinpei Lu (HuaZhong University, WuHan, China)

October 2010, *Special Issue on Pulsed Power Science and Technology* – Guest Editors: Randy Curry (University of Missouri-Columbia, Columbia MO USA), Larry Altgilbers (US Army Space and Missile Defense Command/ Army Forces Strategic Command, Huntsville, AL USA), Paul W. Smith (Pembroke College, Oxford, UK) & Weihua Jiang (Tsinghua University, Beijing, China)

October 2010, *Special Issue on High Power Glow Discharges* – Guest Editors: Ken Yukimura (Doshisha University, Kyotanabe, Japan) and Arutiun Ehiasarian (Sheffield Hallam University, Sheffield, United Kingdom)

December 2010, *Special Issue on Plasma Assisted Combustion* – Guest Editors: Louis Rosocha (Los Alamos National Laboratory [retired], Los Alamos, NM USA) and Igor Matveev (Applied Plasma Technologies, Falls Church, VA USA)

January 2011, *Special Issue on Electromagnetic Launchers* – Guest Editor: Harry Fair (University of Texas, Austin, TX USA)

April 2011, *Special Issue on Plenary and Invited papers from ICOPS-2009* – Guest Editors: Ravindra Joshi (Old Dominion University, Norfolk VA USA), Xinpei Lu (HuaZhong University, WuHan China), & Yukinori Sakyama (University of California, Berkeley, CA USA)

For further information, please contact Steven J. Gitomer, PhD, Editor-in-Chief, IEEE Transactions on Plasma Science, Senior Scientist, U.S. Civilian Research & Development Foundation Guest Scientist, Los Alamos National Laboratory, 1428 Miracerros Loop South, Santa Fe, NM 87505 USA; Phone: +1 505 988-5751; Fax: +1 505 988-5751 (call first); E-mail: (use all) sgitomer@aol.com; sgitomer@crdf.org; sgitomer@lanl.gov; tps-editor@ieee.org

Raising the bar
Success redefines what counts as failure.

Raymond Tallis

AWARDS

Bill Moses
Awards Chair

The NPSS gives four Society level awards each year—awards for which all NPSS members are eligible. The awards are the Merit Award, which is for scientific and technical achievement; the Early Achievement Award, which is for scientific and technical achievement within the first decade of the career; the Richard F. Shea Award, which is for service to the NPSS, and the Graduate Scholarship Award. Please consider nominating a mentor, a colleague, or a student for one of these prestigious awards – surely you know *somebody* who deserves one! Nominations for all of these are due on January 31.

More information on these and other relevant Awards, including submission information, is available at http://ewh.ieee.org/soc/nps/awards.htm.

Harold Flescher Receives Emberson Award

Hal Flescher was named as the recipient of the Richard M. Emberson Award, which is a high level award, open to all IEEE members, for service to the IEEE. As many of you know, Hal has been very active within the Technical Activities Board of IEEE (TAB), and has served as TAB Treasurer, Vice-President of TAB, and IEEE Treasurer. The citation was, "For contributions to understanding and reorganizing the financial structure of TAB and the IEEE to better serve IEEE members and the broader technical community." Congratulations to Hal for this well-deserved honor.

Bill Moses, Awards Chair, attended the 125th IEEE Awards Ceremony and witnessed this well-deserved award presentation.

Hal Flescher (on right) being presented the IEEE Richard M. Emberson Award for service to the IEEE by John Vig, the President of IEEE.

Robert J. Barker
Plasma Science And Applications Awards

Robert J. Barker
Award Recipient

Robert J. Barker is the IEEE NPSS Plasma Science and Applications Award winner for 2009. Bob, a Fellow of the IEEE (1997), as well as a Fellow of the Air Force Research Laboratory (AFRL) (1998), is the program manager for Electro-Energetic Physics in the Directorate of Physics and Electronics of the Air Force Office of Scientific Research (AFOSR). He received his Ph.D. in Applied Physics from Stanford University in 1978 and his B.S. in Physics from Stevens Institute of Technology in 1971. Educated under Oscar Buneman in plasma theory and computation at Stanford, he has established himself as a world leader in a broad range of subdisciplines of plasma science. During his 24 years as Program Manager at AFOSR, he has been an untiring advocate for plasma science and its many applications. He has been a principal architect of programs in a number of key areas. For more than 15 years, Dr. Barker has provided the single largest fraction of federal grant funding for the study of novel and promising HPM sources. Working closely with the

HPM division of AFRL's Directed Energy Directorate (AFRL/RDH), Bob has been at the forefront of a broad range of source technologies, including plasma-filled microwave sources (e.g., – the PASOTRON), relativistic magnetrons, multiple-beam klystrons (MBKs), higher-harmonic amplifiers, frequency-multiplying gyro devices, and others. He was a leader in the U.S. R&D community in recognizing the importance of a modest plasma background density in an HPM source to help neutralize the electric self-repulsion of the driving electron-beam. Another key contribution to this technology has been Bob's successful campaign to create ties of collaboration between the HPM field and the vacuum electronics field. He co-edited (with E. Schamiloglu) the landmark 2001 IEEE/Wiley Press book, *High Power Microwave Sources and Technologies* that provided the internationally expanding community with a superbly referenced in-depth technical overview of the entire field. Bob has also remained the leader over the past two decades in providing federal basic research funding in the field of vacuum electronics. Working closely with the Vacuum Electronics Branch of the Naval Research Laboratory he has been instrumental in connecting the vacuum electronics and HPM research communities. Just as the vacuum electronics community has educated researchers in HPM on techniques for minimizing vacuum pressures, HPM researchers helped to familiarize the vacuum electronics engineers with the physics of ultra-intense electron-beams, cold-cathode options, and elevated internal electric fields. Such familiarity has proven invaluable as vacuum electronics researchers, in steadily compressing the size of their devices to achieve even moderate power levels at frequencies of 100 GHz and above, encounter the same surface power densities that have plagued the HPM research community from its inception. A principal thrust of Bob's leadership in this field has been to push toward ever-higher frequency sources through selective sponsorship of such novel concepts as Stanford's "klystrino" that held the promise of kilowatt power levels of 94 GHz radiation in an extremely compact (few cm) package that could be made man-portable. Such AFOSR-sponsored projects stimulated further related research on "micro-sources" using MEMS fabrication technology. Bob has personally championed this key trend through presentations he has made to leading international conferences over the past six years. Dr. Barker invented (under an Air Force patent) the concept of a smart, adaptive e-beam-driven microwave source whose subcomponents are outfitted with sensor and actuator arrays that can sense real-time operating parameters and adjust them in response in order to maintain optimum performance. He served as Managing Editor (with co-editors J. Booske, N.C. Luhmann, Jr., and G. Nusinovich) of the landmark 2005 IEEE/Wiley Press book, *Modern Microwave and Millimeter-Wave Power Electronics* that now serves as the central reference work for the field of vacuum electronics. Dr. Barker provided crucial initial strong support and funding to the pioneering scientific studies of Professor Karl H. Schoenbach of Old Dominion University examining the profound subcellular effects of nanosecond pulses of megavolt/meter electric fields on human cells. To foster this new area, he encouraged relevant new technical sessions be added to existing annual conferences and also helped establish and organize the "ElectroMed" conferences that were held biannually starting in 1999 through 2005. New research groups have now been established worldwide to explore this promising new field. In helping to shepherd this field, Bob focused attention on the critical discovery that the ultra-short bursts directly triggered the release of calcium ions from the endoplasmic reticulum of cells thereby resulting in specific modifications to the behavior of neurotransmitters. In the mid-1980s Bob was among the first to recognize the importance (and future practicality) of moving simulation codes off the room-sized computers of the day and onto the newly emerging personal computers (PCs). At the same time he helped champion the creation of graphical user interfaces (GUIs) for the powerful modeling codes thereby making their use accessible to all plasma researchers, not just professional modelers. In the early 1990s, Bob had the vision to launch AFOSR's "Object-Oriented Particle-in-Cell (OOPIC)" plasma modeling program whose objective was to bring the benefits of the emerging object-oriented programming revolution to the world of plasma simulation. The fruits of this effort carry on today in UC-Berkeley's highly successful "XOOPIC" code that continues to be applied to a variety of plasma simulation study areas. Dr. Barker was the driving force behind and continues to sponsor the "MAGIC Users' Group" as an ongoing scientific collaboration between university researchers funded under his AFOSR program and the proven modeling power of the Mission Research branch of ATK

What are they saying about me?

[The reputation of mathematicians] stands for posterity largely not on what they did, but on what their contemporaries attributed to them.

Karl Pearson

Progress
First they ignore you, then they laugh at you, then they fight you, then you win.

Mahatma Gandhi

through their world-class MAGIC suite of multidimensional relativistic parallel-capable electromagnetic particle-in-cell (PIC) simulation codes. Over its lifetime of more than a decade, this group has provided AFOSR researchers with crucial scientific results that have helped form the basis for literally hundreds of refereed journal articles and conference publications. In addition to providing leadership and support to the HPM source development community, Dr. Barker also recognized that advances in pulsed power technology would be required in order for military applications of such sources to be realized. He has advocated and provided support for pioneering work in high-voltage insulator breakdown phenomenology, fast switches in liquid phases, novel ultra-wideband source and antenna technology, explosively driven flux compression generators, as well as research aimed at improved breakdown tolerance in HPM systems. His MURIs in compact pulsed power and explosively driven pulsed power were particularly successful in advancing these important areas. His continued leadership in this area is evidenced by the fact that he was recently named by the AGED panel as Co-chair of the "Special Technology Area Review" on compact, portable Pulse Power. In addition, he served as a member of the organizing committee for the 2008 IEEE Power Modulator Conference. While serving as Chair of NPSS' PSAC in 1994–5, he personally spearheaded efforts to get the group Pulsed Power, Inc., which organized the highly successful biannual Pulsed Power Conferences (PPCs), to join IEEE's Nuclear and Plasma Sciences Society (NPSS) as a full new Technical Committee. As part of this new arrangement, Barker personally championed the holding of periodic joint conferences that combined PSAC's annual International Conference on Plasma Science (ICOPS) with the PPC in order to save participant travel funds and also to encourage further mingling of technical interests. This began with the highly successful 2001 Pulsed Power Plasma Science (PPPS) conference held in Las Vegas and then again in Albuquerque in 2007. Since the mid-1980s, Dr. Barker's AFOSR program has fostered research into the efficient generation and sustainment of lightly ionized plasma in the earth's ambient atmosphere. The ability of air with free electron densities as low as 10(8) per cc to absorb/refract broadband microwave radiation formed a compelling applications argument from the start of that work. The impact of this work proved much broader, however. The ten-year AFOSR program in this area led to significant spin-off of cold plasma applications in materials surface modification, engine ignition sustainment, emissions control, and biological decontamination/sterilization. This latter application has made significant commercial industrial inroads. A major scientific accomplishment of these AFOSR programs has been the use of short-pulse electric fields to sustain air plasmas; that has become a worldwide methodology of interest. Bob co-edited (with K. Becker, U. Kogelschatz, and K. Schoenbach) the important 2006 CRC Press review text *Non-Equilibrium Air Plasmas at Atmospheric Pressures.* This book summarizes the state-of-the-art and highlights the most promising avenues for research and applications. Dr. Barker has long been concerned with the low numbers of U.S. citizen students seeking PhDs in science and engineering, particularly in fields related to his AFOSR programmatic interest areas. Since arriving at AFOSR in the mid-1980s, he has sponsored various types of programs to help foster such enrollment. In particular, he has supplemented regular research grants in order to permit principal investigators to hire undergraduates to work in their labs full-time during the summer and part-time during the academic year. In fact, all of the royalties flowing from his three books go directly into funding such student conference participation. In addition to the achievements described above, Dr. Barker was also a highly decorated full colonel in the Air Force Reserves assigned for several years as HPM Special Projects Manager to AFRL's Directed Energy Weapons Directorate at Kirtland AFB, NM. He retired from the Reserves in 2001. Prior to that, Colonel Barker also served as Senior Reservist for Armstrong Laboratory, AFOSR, and the Geophysics Laboratory for successive periods since 1986. He is a graduate of both the Air War College and the Industrial College of the Armed Forces. He served as an AF Academy Admissions Liaison Officer before joining the AF Systems Command reserve program in 1979.

Dr. Barker's PSAC Award citation reads: *For more than two decades of visionary leadership in the fields of non-equilibrium air plasmas, compact pulsed power, and high power microwave/millimeter-wave electronics.*

Bob Barker can be reached by phone at +! 703-696-8574; Fax:+1 703-696-8481, E-mail: robert.barker@afosr.af.mil.

Gregory Fridman
Outstanding Student in Plasma Science

Gregory Fridman
PSAC Best Student Award

Gregory Fridman was born in Chkalovsk, USSR in 1978. Greg received a B.S. in Mathematics, Statistics, and Computer Science from the College of Liberal Arts and Sciences, University of Illinois at Chicago, an M.S. in Biomedical Science, and a Ph.D. in Biomedical Engineering from the School of Biomedical Engineering, Science, and Health Systems, Drexel University (Philadelphia, Pennsylvania). Greg's research interests primarily focus on integration of nonequilibrium open air electric plasma discharges into biology and medicine; especially in preoperative, postoperative, and intra-operative sterilization of living human tissue, blood coagulation, wound healing, tissue regeneration, and treatment of diseases (both on skin, *e.g.*, Melanoma; under the skin, *e.g.,* Cutaneous Leishmaniasis, and deep in the body, *e.g.*, Deep vein thrombophlebitis).

Greg Fridman can be reached by phone at his lab +1 215.895.0576 or cell phone: +1 312.371.7947

Atif Ali
Best Student Presentation

Atif Ali
PSAC Student Award Recipient

The interaction of high power femtosecond laser pulses with matter is now becoming a powerful tool for generating short intense X-ray pulses. In femtosecond laser plasma interactions, collisional absorption becomes less significant as an absorption mechanism compared to the nanosecond regime. A number of other collisionless absorption mechanism including resonance absorption and vacuum heating accelerate hot electrons to kinetic energies much higher than the bulk plasma temperature. These hot electrons generate X-rays via bremsstrahlung, recombination radiation in the plasma and penetrate into solid behind the plasma where they emit K_α and bremsstrahlung X-rays. These hot electrons lose their energy to the solid in a few tens of femtosecond limiting the durations of the emitted K_α pulse.

We have investigated the generation of hot electrons and K_α radiation using Ti:sapphire laser (120fs, 800 nm, 260 μJ) pulses focused with a 10X microscope objective to obtain an intensity of 2×10^{16} W/cm^2 on Cu, Fe and Ag wire targets. The emission energy and spectra have been characterized using three different detector systems which include a filtered PIN diode detector, pulse height spectrometer using a CdTe detector together with a multichannel analyzer and a single hit CCD camera used in pulse height analysis mode. The copper wire target had a measured hot electron temperature of 9 keV and a conversion efficiency into K_α line radiation at 8.05 keV of approximately 4×10^{-5} using 1 kHz laser pulses. A similar conversion efficiency of about 6×10^{-5} is obtained using the Fe K_α X-ray Source. The silver K_α source gave about 20 times lower conversion efficiency than Cu and Fe. Higher intensities are probably required to increase and optimize the silver source emission. The measured emission spot size was ~8μm and such micro K_α Sources are of interest for high precision X-ray microscopy, phase contrast imaging and also for time resolved studies of molecular and phase transition processes using X-ray diffraction. Phase contrast microscopy is one important application for biological samples where the tissue is fairly transparent to

Figure 1. Phase Contrast Image of Mosquito recorded for an exposure of 10 minutes using Fe X-ray Source.

Me too!
The older I grow, the more I distrust the familiar doctrine that age brings wisdom.

H. L. Mencken

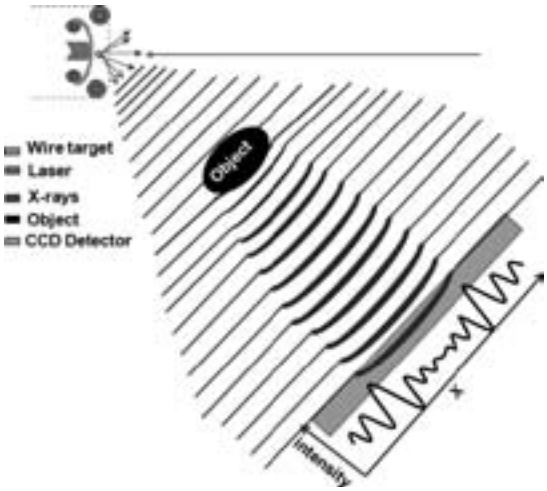

Figure 2. Schematic of principle of phase-contrast imaging.

X-rays. The phase shift at the edges of object gives greatly enhanced contrast of edge features due to near field Fresnel diffraction fringes. The principle is as shown in Fig. 1. Edge enhancement is quite pronounced in real biological specimens such as the head of a mosquito shown in Fig. 2 using the laser produced Fe K_α X-ray source. We observed stronger enhancement with Fe K_α than Cu K_α source.

BACKGROUND

Atif Ali is a graduate student in the Department of Electrical and Computer Engineering at University of Alberta. He works with the Laser Plasma Group under the supervision of Dr. Robert Fedosejevs. He is currently working on Femtosecond Laser-produced K_α Sources at the University of Alberta and on Laser Wakefield Acceleration Experiment at the Advanced Laser Light Source (ALLS), INRS, Montreal. He completed his Bachelor's degree at Government Faridia Degree College Pakpattan Sharif (affiliated with Bahauddin Zakariya University) and then a Master of Physics from the Department of Physics, University of Engineering and Technology (UET) Lahore Pakistan. During his Master's program he worked on Laser-generated X-ray diagnostics at the Applied Physics Lab. UET Lahore.

Atif Ali can be reached at the Department of Electrical and Computer Engineering, University of Alberta Edmonton, Alberta, Canada T6G2V4; E-mail: atif1@ece.ualberta.ca.

PULSED POWER SCIENCE AND TECHNOLOGY AWARDS

John T. (Tom) Naff
Erwin Marx Award

John T. (Tom) Naff

Tom Naff was born in Monroe, Louisiana in 1934. He earned a Bachelor's Degree in Physics (cum laude) from Louisiana Polytechnic Institute (now Louisiana Tech University) in 1956. He attended graduate school in Physics at the University of California, Berkeley.

At Lockheed Missiles and Space Division he designed and assembled his first capacitor bank in the summer of 1956. The bank was a 10 kJ, 15 kV bank used to drive a shock wave in a tube. The plasma formed by an electric discharge in a tube was magnetically accelerated forming a high velocity shock wave.

At MHD Research, Inc. in 1963, Mr. Naff designed and delivered an arc heated, high-pressure helium driver, shock tube. The shock tube was powered by a 1 MJ, 20 kV capacitor bank and used for space re-entry research.

At Maxwell, Mr. Naff designed and supervised the successful construction of five closely coupled, parallel connected, 30-stage Marx generators simulating the Maxwell approach to the AURORA Marx generator.

At Pulsar Associates in 1972, Mr. Naff, with partners Walter Crewson and Carleton Jones, designed and delivered the Empress I EMP Pulser and the HPD EMP Pulser. He also designed and delivered EMP Direct Drive pulsers. He was the principal designer of low jitter, commercially available trigger generators.

At L-3 Communications, PSD, Mr. Naff originated the design concept and participated in the development of the LINK Pulser, a 3.2 MJ, 400 kV, high current, high action system. The LINK Pulser was used in SREMP Tests sponsored by DNA (now DTRA) involving

the generation of electric arcs in the earth. He originated the concept and participated in the design and development of the high coulomb, high action switches, used in the LINK Pulser and other high action capacitor banks.

Mr. Naff provided the conceptual design, and technical direction of the production, of multi-megajoule, high voltage capacitor banks for use in electric gun development and research.

Mr. Naff designed the FEMPS Pulser, the first megavolt class, nanosecond risetime EMP pulser. Mr. Naff was a principal designer of the 2 MV, fast risetime, FEMP-2000 Pulser delivered to the French Government.

Mr. Naff has contributed to the design of recent EMP Simulators for the Navy and for the Army.

Mr. Naff has more than 15 patents. He has a large number of publications for government organizations as well as in the open literature. He has many publications that are classified.

Mr. Naff specializes in low jitter spark gap switches for high voltage pulsers of all energy levels.

John Maenchen
Peter Haas Award

John Maenchen is the Manager, Science and Technology Strategic Directions Department, Sandia National Laboratories, Albuquerque, New Mexico. B.S. (Physics and Mathematics) University of California, Santa Cruz 1974; Ph.D. (Electrophysics) Cornell University 1983.

Dr. Maenchen has contributed to and led programs in fundamental pulsed power technology development and intense particle beam sources for over thirty years. For the past 25 years at Sandia National Laboratories he has contributed to the design and construction of pulsed power accelerators, to the invention and development of new electron- and ion-beam and z-pinch loads, to the modeling and theory of their operation, to the invention and application of new diagnostic approaches to investigate their performance, and to the invention and development of new government and commercial applications for these capabilities. He has worked as an independent scientist, as a team member, as a team leader, and for 16 years as a program and line manager in pulsed power science and technology development and applications, building and maintaining relationships with the Departments of Energy and Defense, industry, and international partners. He is a Senior Member of the IEEE, serves on the IEEE Nuclear and Plasma Sciences Society Pulsed Power Science and Technology Committee, and was the General Chair of the 2005 Pulsed Power Conference. He has coauthored over 130 publications.

John Maenchen

Arthur H. Gunther Pulsed Power Student Awards

Jamie Darling – 2008

Jamie D. C. Darling was born in Taunton, Somerset, UK, in March 1984. He received the M.Eng. degree with 1st class honours in engineering science from the University of Oxford in 2006. His final year work on developing a transmission line transformer switched mode power supply was awarded the electronics fourth year project prize. Since then he has been engaged in research on pulse burst generation via nonlinear lumped element transmission line technology with an interest in high power RF applications. Currently working in the Pulsed Power and Plasma Physics group at the University of Oxford, he is due to complete the D.Phil degree towards the end of 2009.

Jamie Darling

Andrew Young – 2009

Andrew Young

Andrew Young is a Ph.D. candidate at Texas Tech University, conducting research at the Center for Pulsed Power and Power Electronics. He received a Bachelor's degree in mathematics from West Texas A&M University in 2005, and a Master's degree in electrical engineering from Texas Tech University in 2008. His research interests include explosively-driven pulsed power, compact pulsed power, high power microwaves, electron microscopy and radiating structures.

LIAISON REPORTS

IEEE Humanitarian Technology Challenge Washington, DC

June 1–2, 2009

After several telephone conferences earlier this year, the IEEE Humanitarian Technology Challenge (HTC) held its first face-to-face meeting on June 1–2, 2009, attended by roughly equal numbers of interested IEEE "Challenge Volunteers" and a healthy representation from NGO's (Non-Government Organizations), Universities and business people engaged in humanitarian work. The meetings were held in the National Academy of Engineering facilities. The main organizers were the HTC staff led by Howard Tepper, Project Manager, and Rich Baseil, special consultant to the PM.

In the two-day meeting the HTC team leaders explained the genesis of the effort as a collaboration of IEEE and IEEE Foundation with the UN Foundation, broadly framed to address the UN Millennium Development Goals (MDG's). The HTC currently is designed as a pilot program to determine the feasibility of joint programs in which technologies represented by IEEE could be brought to bear on eliminating the worst of world poverty through economic development in two stages covering the periods from now to 2015 and 2015–2025. The technologies could be new innovative developments or new methods of application of existing technologies. Successful development and application requires collaboration with the intended recipients as well as NGO's and relevant business entities that have on-the-ground familiarity with the local social structures and good working relations with the responsible governmental bodies. This early phase is naturally focused on understanding the local needs and trying to identify appropriate technologies that could be brought to bear.

Throughout the meeting a range of speakers from the NGO side showed examples of ongoing work in the field. Examples included the UNICEF technology development program showing how a low cost messaging communications system drastically reduced response time for medical decisions in scattered rural areas; a business consulting firm explaining necessary conditions for a sustainable business model in the developing world; a medical doctor showing how a small individual technology effort involving lighting and stable electricity for sterilization immensely improved community surgical clinics in an inner city in India; and many examples of how people currently cope with a lack of electricity in homes (such as using car batteries for home power that are recharged for a fee by an entrepreneur with access to the grid); how clean water can be had with electricity for simple low cost purification equipment; how much disease and early death is related to lack of basic power and clean water infrastructure, etc.

The meeting then separated into smaller workshops of the three main HTC Challenges that were identified to focus the project teams, namely *Reliable Electricity*, *Data Connectivity of Rural District Health Offices*, and *Individual ID Tied to Health Records*. These workshop sessions attempted to follow a business model of trying to identify solutions to the most likely "points of pain" of the potential "customers" for the technology-based services that were

being proposed. This in itself was a fire-hose learning process. Groups then reassembled after these exercises to discuss their conclusions.

I represented NPSS as a member of the *Reliable Electricity* team so the following are my personal impressions, interests and opinions not necessarily shared by all members of the committee.

When asked to develop innovative technology to help very poor people and communities, most people automatically think of a household situation in isolation which leads to family-unit sized solutions. Ideas for power generation in a presumed remote agrarian area are the predictable ones involving small units for solar, wind and water power generation along with chargers for batteries or water pumps for irrigation. All these technologies are in reality relatively expensive on a per-kWh basis, and they are feasible only for lighting, and running small appliances like TV's, charging cell phones, water pumps etc. Small solar or wind units cannot support heavy appliances like cook-stoves or washers. In developing countries NGO's reported that the most sought-after resources were lighting, refrigeration and a TV. One experienced hand noted that the very common solution of power from car batteries that get recharged for a small daily fee actually costs about $3.50 per kWh, compared with the 10–20 cents that we pay on the grid. To me this argues for larger capacity community solutions as mandatory for progress toward true growth of industry, infrastructure and sustainability.

In other words, we need more consideration of community solutions to provide much higher levels of more affordable power to support not only homes but industries that could create employment for the community, enable the building of infrastructure, pay for the infrastructure and return a profit for the community to build up its self-sustainability. Solar and wind power are both very interesting if they have a grid to absorb their power during the times they are able to generate it, so the grid can reduce consumption of stored fossil, nuclear or water (hydroelectric) fuels on demand whenever the sun is shining and the winds are blowing or the tides are flowing and ebbing.

Subsequent to the meeting I further investigated a half dozen or more new development initiatives for small nuclear plants of a few MW up to 120 MW (thermal) and learned that these are projected to deliver for about 20 cents per kWh, with caveats that much depends on the efficiency of conversion from thermal, and that distribution adds "about $1M per mile." Still these units are very interesting because they are small enough to be transported by truck to a remote area and they advertise fuel lifetimes in a sealed self-regulating unit from 5 to as much as 30 years before refueling. Assuming materials handling and safety concerns can be solved (which the new Department of Energy Secretary Stephen Chu seems to think can be overcome) these units could become a boon to developing countries (as well as to the suppliers), especially when combined in a hybrid system with various types of renewable generation.

The true spirit of the MDG's however should always consider the developing country as the potential *provider* of the technology to at least its own use if not beyond, which means licensing and security issues must be solved on a grand scale. We should not thinking of just households and small communities here, but a market of 1.5-2B people; and not just of a few scattered power modules but tens or hundreds of thousands that can be organized and scaled to serve arbitrarily larger areas. Interestingly some technology solutions such as plasma water purifiers based on a for-profit model are already shown to be affordable for people earning $1–2 per day *U.S. equivalent,* i.e. for a person earning that amount living in the US. In other words even the very poor can afford to pay small amounts for a reasonable amount of household energy (e.g. 0.5–1 kW peak power) providing the cost is similar to what we currently pay, which requires at least a community-sized generator and grid. Generating smaller amounts of home energy at much higher per unit cost is purely an emergency stopgap, very wasteful in fact, not a solution to sustainable development.

Three examples of very relevant and hopeful initiatives I have encountered in this new journey are as follows:

1) *Hyperion* is one of the micro-nuclear power unit offerings that spun off from Los Alamos lab, first brought to my attention by Peter Clout. President of Vista Systems and Past President of the IEEE-NPSS who used to work at the lab and lives in the city of Los Alamos. This is one of a number of units that are looking strongly to markets in the developing world. This is a city-sized unit and one would ideally want to employ a cluster of them for a small city grid. Such units could be initially purchased by the UN MDG program funds and a model built whereby local private and publicly owned industry would

Like many things these days
The Christian ideal has not been tried and found wanting: it has been found difficult and left untried.

G. K. Chesterton

And the dust jacket about neither

A good novel tells us the truth about its hero; but a bad novel tells us the truth about its author.

G. K. Chesterton

thrive toward self sustainability. We are leaving out a myriad of details of what kinds of industry will work in which parts of the developing world, but we know that affordable energy is absolutely foundational to economic development. Each 27MWe power unit costs about U.S.$25M which doubles when the electrical turbines are added, and adds some more when the $1M per mile distribution is added. The initial capital cost must come from the developed nations under the MDG plan but subsequent units should be replaced when fuel runs out and maintained by profits from operations.

2) *Driptech* in Palo Alto California is a small startup company at the opposite end of the spectrum. Designed by a Mechanical Engineer under a Stanford Business School program called *Design for Extreme Affordability*, it is marketing an irrigation drip system of the simplest possible design that can be delivered anywhere in the world for a starting price of about $30. Its market theme is that in water-scare areas huge quantities of water are wasted during the wet season by flood irrigation when in fact that water can be stored and metered out to the roots of the plants over a much longer growing period. Field tests are being conducted in Ethiopia, India and China. I have contacted the Driptech President who is currently in China to discuss how the IEEE HTC program could partner with the energy requirements for pumping and storage systems and a meeting in late August is promised.

3) *Denver University Master of Development Practice Program* in Denver CO is a degree program being launched in 2010 to train interdisciplinary leaders; all with links to partner institutions, to help conceive, plan, launch and manage MDG programs in cooperation with the vast range of global community resources needed to execute such a massive effort. Moreover the innovative program partners initially with university campuses and NGO's in nine other countries. To quote from a note from our young colleague who will head up this program, "All the training programs will be online, open-source, global in nature and perspectives, and cross-sector (natural sciences, health science, social sciences, and management/ policy-making)."

The HTC has a Spigit website for communications among members, http://ieee.spigit.com; however as we all know from experience, although a website can be great for collecting opinions and ideas, it cannot avoid the hard work of organizing data, creating consensus among a very complex sociology of people and developing action plans. Also a reasonable amount of "face-time" is needed to make real progress in team building and inculcating shared knowledge and skills. The HTC is planning another workshop in October and likely another in the early spring. Meanwhile, we Challenged Ones are invited to pour forth ideas and sift them into a useful and applicable format for future planning. Unfortunately we realized at the meeting that we know far too little about the larger picture, as to what technology is already in play, how much of it exists, where we in IEEE can focus new efforts for both short and long-range benefits, etc. Apart from the mere availability of good technology, it is a very complex system engineering, technology and social management problem to bring projects to fruition that will have a major impact in the economic and human growth in under-developed countries. We are taking the first baby steps, but fortunately there are many who are already "walking the talk" from whom we can learn.

In summary, HTC is off to an encouraging start but has a huge building job ahead if it is to graduate from pilot status and become a major force. Although the initial turnout of about 125 people, about half from the 400,000 member IEEE, was modest, the quality of experience of personnel on NGO, academic and IEEE sides was very impressive. If IEEE can quickly learn where it can best contribute, articulate to its members where they can best engage, and focus its efforts, it can definitely have a major impact on the entire program. IEEE has many innovators, but it also represents core technologies and technology applications of vital interest to developing countries. The ultimate MDG goal is to make those countries not just practitioners but *owners of a fair share of the world's technologies;* so they too can become innovators who can drive economies to profitability and give their citizens good jobs, health care and living standards so they can earn a place in the practically limitless wealth of peaceful global enterprise.

Interestingly, the IEEE HTC seems somewhat derelict in mentioning the underlying ties to the UN MDG program. Several IEEE people I talked to at the meeting knew nothing about MDG's, while all of the NGO's seemed

instantly aware of it and felt they were already a part of it. To anyone scratching their head over the MDG's I recommend Jeffrey Sachs' book *The End of Poverty (2005) and Common Wealth, Economics for a Crowded Planet (2008),* which describes the genesis of the MDG economic model developed by Sachs and colleagues when he was a distinguished Professor of Economics at Harvard University. His theories were put into practice in the emergence of several countries into independence after the breakup of the Eastern Europe dominance by the USSR and the transformation stories are dramatic and remarkable. After convincing the UN to adopt the program as a worldwide effort Sachs has now taken a position as head of the new Earth Institute at Columbia University, newly established specifically as a leadership and technology development organization for the MDG's. It is a remarkable and most hopeful enterprise, perhaps the major hopeful sign in a world that seems destined to fall into division and warfare at the slightest provocation, always at the cost of those already least able to bear it. Sachs' final word is, "We *can* fix this. It is not a matter of resources; the developed world has the resources, and we *can* afford this. *It is a matter of the will.*"

Ray Larsen, IEEE NPSS liaison to the IEEE Humanitarian Technology Challenge, can be reached at the SLAC National Accelerator Center, 2575 Sand Hill Road, Menlo {ark, CA 94025; Phone: +1 650 926-4907; Fax: +1 650 926-5124; E-mail: Larsen@slac.stanford.edu.

And red too!
I believe in getting into hot water. It keeps you clean.

G. K. Chesterton

FERMI: Free Electron Laser for Multidisciplinary Investigations

Stephen Milton[1,2], Sandra Biedron[1,2] (IEEE Senior Member), Bibi Palatini[1], Giulia Quondam[1], and Raffaella Geomentrante[1]

Sincrotrone Trieste[1], Basovizza Italy and Argonne National Laboratory[2], Argonne, Illinois USA

Stephen Milton

Sandra Biedron

Bibi Palatini

Raffaella Geomentrante

Free-electron lasers are permitting rapid progress in the study of matter by providing new sources of ultra-short (femtoseconds), high-brightness, coherent pulses spanning the vacuum ultraviolet to X-ray wavelength range. Figure 1 illustrates the peak brightness versus pulse duration of several genres of short wavelength light sources. Recently, a few, new FEL-based machines have been providing light to users, many others are coming on line, and many more are planned. Some examples include DESY's FLASH soft X-ray source that has been in operation since 2005, the Linac Coherent Light Source at the SLAC Accelerator Center that is in its commissioning stages and has observed lasing at 1.5 Å. The SCSS at Spring-8 Japan is in operation, FERMI in Trieste, Italy is set to produce light in 2010, and the European XFEL in Hamburg, Germany is scheduled to go on-line in 2015.

FERMI@Elettra is a single-pass FEL user-facility covering the wavelength range from 100 nm (12 eV) to 3 nm (300 eV) with the potential to provide a significant number of photons down to 1 nm (1.2 keV) via use of harmonics. FERMI is located next to the third-generation synchrotron radiation facility ELETTRA in Trieste, Italy and will be operated by Sincrotrone Trieste S.C.p.A. It employs a normal-conducting, 1.7-GeV, 3-GHz (S-band) linear accelerator with beam supplied by a laser-driven photocathode radio-frequency (RF) electron gun. The linac uses two magnetic bunch compressors to increase the peak electron bunch current as well as one so-called laser heater device, recently demonstrated at the LCLS, that serves to reduce the micro-bunching instability. The FERMI@Elettra linear accelerator layout is illustrated in Figure 2. Actual installation is presently ongoing.

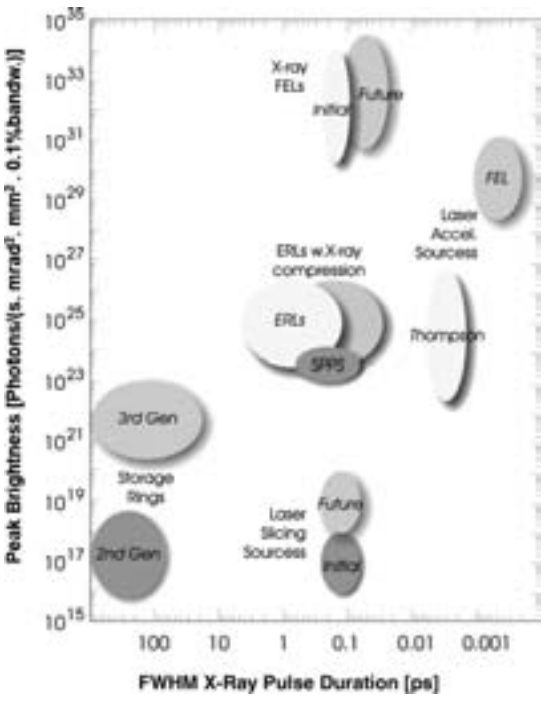

Figure 1. High brightness light source comparisons: peak brightness versus pulse duration.

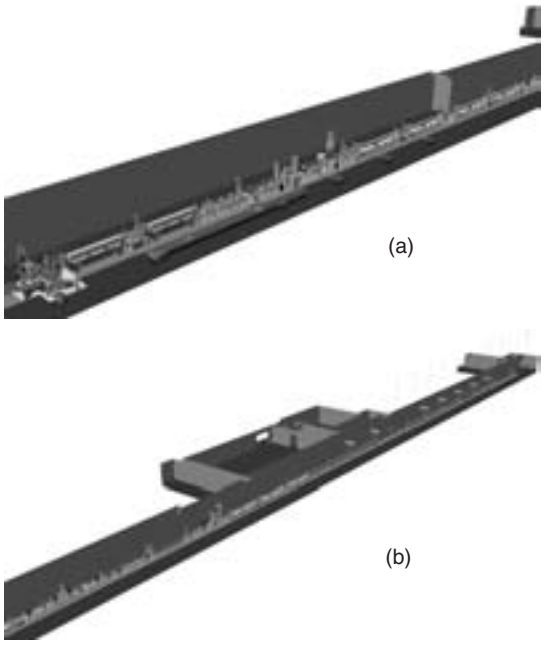

Figure 2. FERMI@Elettra linear accelerator layout: (a) photocathode-RF gun to first bunch compressor and (b) second bunch compressor to the linac's end.

Table 1. FERMI@Elettra FEL-1 and FEL-2 parameters.

Parameter	FEL-1	FEL-2
HGHG Stages	1	2 ("fresh bunch" in 2nd stage)
Fundamental Wavelength range [nm]	100 to 20	20 to 3 (1 at 3rd harm.)
Output pulse length (rms) [fs]	< 100	20 –100 (<10 future goal)
Bandwidth (rms) [meV]	17 (at 40 nm)	100 (at 4.2 nm)
Polarization	Fully Variable	Fully Variable
Repetition rate [Hz]	50	50
Peak power [GW]	1 to > 5	0.5 to 2
Harmonic peak power [GW]	(% of fundamental) ~2	~0.2 (at 4.2 nm)
Photons per pulse	10^{14} (at 40 nm)	2×10^{12} (at 4.2 nm)
Pulse-to-pulse stability	≥30 %	~40 %
Pointing stability [μrad]	<20	<20
Virtual waist size [μm]	250 (at 40 nm)	120
Divergence (rms, intensity) [μrad]	50 (at 40 nm)	10 (at 4.2 nm)

The FERMI@Elettra FEL will make use of two undulator magnet strings or FEL lines designed to deliver photons to multiple experimental beamlines that serve three genres of scientific disciplines. The two FEL lines utilize the high-gain harmonic generation (HGHG) FEL process developed at Brookhaven National Laboratory and first demonstrated at 5.3-μm in a joint Brookhaven and Argonne National Laboratory collaboration. In HGHG a fully coherent (transverse and temporal) seed laser at a longer wavelength than the eventual FEL output is used to imprint the full coherence properties on the radiating electron beam and ultimately produce a short wavelength FEL pulse. The properties of the two FEL lines are listed in Table 1. Note that FEL-1 utilizes one HGHG FEL module while FEL-2 utilizes a cascade of two HGHG modules. The entire site layout of the FERMI@Elettra, co-located with the third-generation machine Elettra, is illustrated in Figure 3.

Following generation the FEL photons are delivered to the experimental stations via the PADReS (Photon Analysis, Delivery, and Reduction System) beamline system. For each FEL line PADReS includes (from FEL toward experimental hall) a Front-End section (x-ray slits, shutter and radiation stopper), a Gas Monitor Detector 1 (GMD1) (combination ionization chamber and photon beam position monitor), a Gas Attenuator (GA), a Gas Monitor Detector 2 (GMD2), a Radiation Absorption Mirror (RAM), an X-ray spectrometer and a common Switching Chamber (SC) that directs the light to the various beamlines leading to the experimental stations.

Figure 3. FERMI@Elettra and Elettra overview.

Three separate user end stations are dedicated to the following scientific research areas: Low Density Matter (LDM), Elastic and Inelastic Scattering (EIS) and Diffraction and Projection Imaging (DiProI). The LDM and EIS beamlines share the monochromatization system and are divided by a Refocusing Switching Mirror (RSM), while the DiProI beamline stands separate from the other two.

The advent of femtosecond lasers has revolutionized many areas of science from solid state physics to biology. FELs

Like Hooke's law

It is easier to resist at the beginning than at the end.

Leonardo Da Vinci

continue to extend this new ultra-short research frontier by providing similar high-power, ultra-short, coherent photon pulses into wavelengths from VUV to X-ray. The FERMI@Elettra is of this new generation of synchrotron light sources that will enable science by providing femtosecond, high peak power (~GW) pulses with femotosecond synchronization to external laser sources. Also, because of its use of undulators capable of switching over the full range of polarization, planar through circular, it can and will enable new science in areas such as magnetic dynamics. And finally, due to its implementation of a seeded harmonic cascade FEL scheme it should provide a stable, fully coherent pulse over the entire wavelength range to be explored. The FERMI@Elettra team looks forward to updating the IEEE NPSS once first photons are achieved.

New Instrumentation Standards Effort Gets Underway

Raymond S. Larsen

Raymond S. Larsen
Coordinating Committee Chair

The PCI Industrial Computing Manufacturer's Group (PICMG), the consortium that developed the Advanced Telecommunications Computing Architecture (ATCA) standard, on May 5, 2009 announced the formation of a new Technical Committee for Large-Scale Physics Applications. See: http://www.picmg.org/v2internal/news.htm#pr050509.

The Physics community has been exploring the ATCA standard for at least the past five years, when it became of interest to the International Linear Collider program because of its design for high availability and serial gigabit backplane architecture. A second PICMG standard applies to small mezzanine cards called AMCs which can be used on ATCA boards for I/O or combined into a small crate (shelf) packaging options called MicroTCA, or MTCA. The three specifications ATCA, AMC and MTCA combine to form PICMG's xTCA line of specifications.

The Physics community quickly observed that PICMG's xTCA standards are defined for telecom applications and had shortcomings for large physics machine and experimental applications, such as lack of designated analog IO connections; rear IO entry space to facilitate hot-swap; timing and synchronization clocks and triggers; mezzanine card form factors to facilitate analog-digital high performance designs; and fast low-latency architectures and communication protocols for real time controls and feedbacks. The physics community therefore was presented with an opportunity to agree on solutions that would enable subsequent module hardware and software designs to be more highly compatible and *interoperable* than if each lab went off on its own directions. Without such collaboration, the market for different functional modules would become highly fragmented and not nearly so attractive for industry to support. Achieving *interoperability* in both hardware and software systems is a chief goal of the PICMG xTCA organization, which speeds industry time-to-market as well as gives customers more choices among like-competitors.

The committee was formed following strong community interest shown at two workshops, the first at the 2007 IEEE NPSS Real Time Conference at Fermilab and the second at the 2008 NPSS NSS/MIC/RTSD Conference in Dresden. Upon invitation from PICMG the committee was formalized on March 10, 2009 under the sponsorship of four laboratories, SLAC, DESY, FNAL and IHEP, and two companies, Cypress Point Systems of Monterey, California and Performance Technologies of Rochester, NY. The initial organization was named the *PICMG xTCA for Physics Coordinating Committee*, a standing Technical Subcommittee which then initiated separate standards Technical Subcommittees for Hardware and Software in late May and early June. These groups all have formal Statements of Work that were approved by the PICMG Executive Committee and which aim to produce extensions to the specifications to address the concerns of the sponsoring laboratories, which are attempting to represent the requirements of the broader community in not just high energy physics controls and experiments but also in fusion, nuclear medical and imaging sciences, advanced light sources, astrophysics and other fields. One of the prime movers is the DESY XFEL machine under design

in which both ATCA and MTCA solutions are being developed for Low Level RF and RF Interlocks and Controls subsystems respectively. A number of labs are either investigating or already investing in ATCA including SLAC and IHEP for generic high throughput, high bandwidth processor systems for experiments; BNL and the U.S. ATLAS detector for the future Large Hadron Collider Luminosity Upgrade; and the International Thermonuclear Experimental Reactor (ITER) fusion energy project in France for fast experimental plasma controls.

Currently the PICMG Physics xTCA Coordinating Committee has 44 corporate and 67 individual members; the Hardware Working Group 26 corporate and 35 individual members; and the Software Working Group 17 corporate and 24 individual members. Besides SLAC, DESY, FNAL and IHEP other labs that have joined the subcommittees are Forschungzentrum Juelich in Germany and IPFN in Lisbon, Portugal (involved with ITER and other plasma fusion projects).

To date the Subcommittees are making rapid progress in exploring the issues and focusing on narrowing potential solutions. PICMG Technical Subcommittees (TS's) are expected to execute their promised SOW's in a timely manner and then if there is no further expansion of the scope, to disband. As new needs arise, new TS's are formed. Each time a new TS is formed membership is opened to the entire ~250 member PICMG consortium. In the same spirit new specifications developed in subcommittees are voted on by the entire PICMG membership. The current goal is to develop the most important extensions for both ATCA and MTCA by Q4 of the calendar year and with industry cooperation develop first prototypes in parallel by the end of 2009.

The Coordinating Committee has a role to review work products from the Technical Subcommittees before they are submitted to PICMG for general vote, but in principle all three committees independently report to the PICMG Technical Officer. The main difference is that the Coordinating Committee role will continue as long as there appears to be usefulness in pursuing consensus in the physics community to address new goals; otherwise it too will disband and the work of maintaining and promulgating specifications already approved will be carried on as routine PICMG business.

For further information on how to participate contact any of the following:

Ray Larsen, Chair Physics Coordinating Committee, larsen@slac.stanford.edu

Robert Downing, Chair Hardware Working Group, rwd4@mindspring.com

Stefan Simrock, Interim Chair, Software Working Group, Stefan.simrock@desy.de

Jockey or Boxer

Men want the same thing from their underwear that they want from a woman. A little bit of support, and a little bit of freedom.

Jerry Seinfeld

The Institute of Electrical & Electronic Engineers, Inc.
445 Hoes Lane • Piscataway, NJ 08854