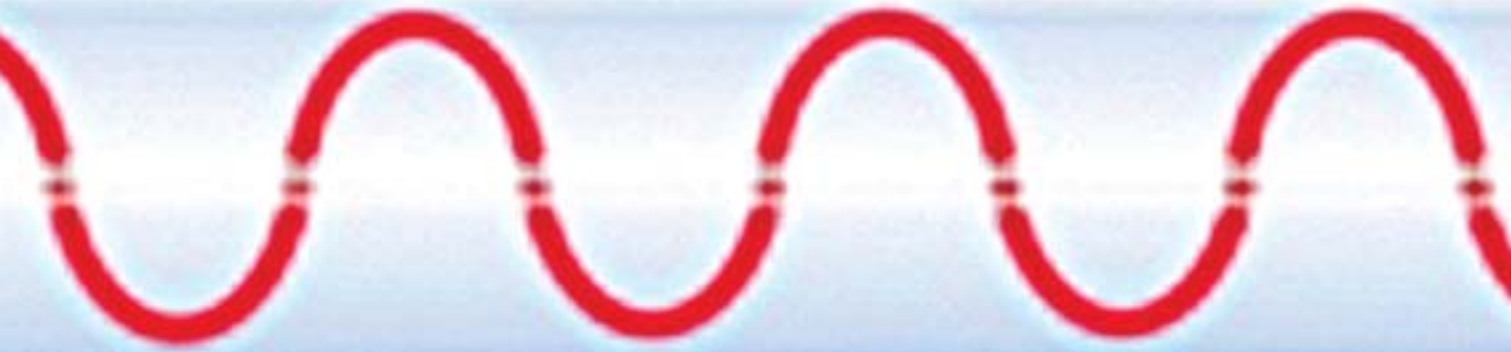


October 2009
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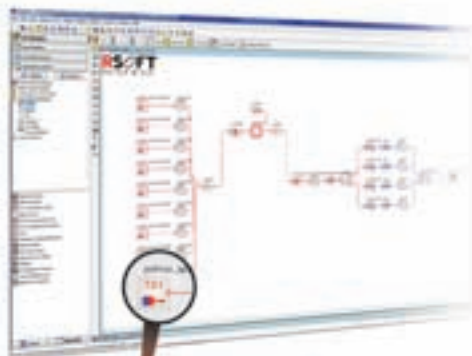
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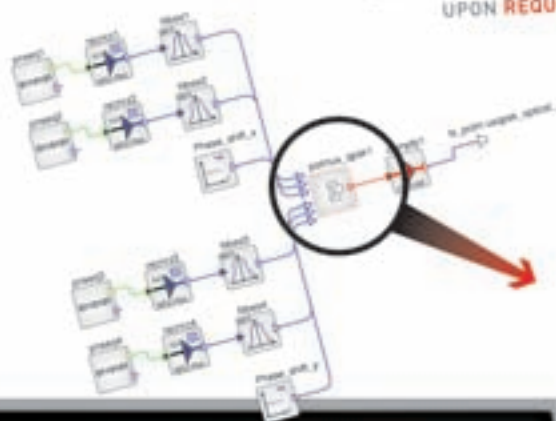
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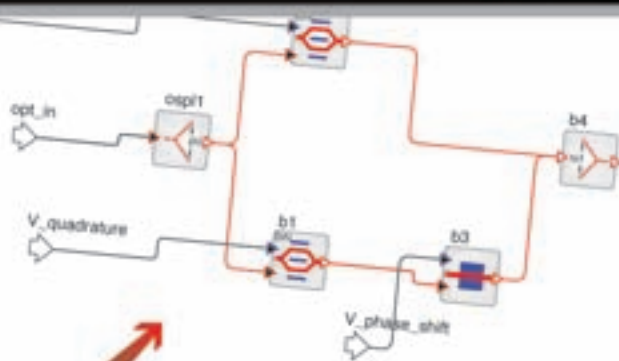
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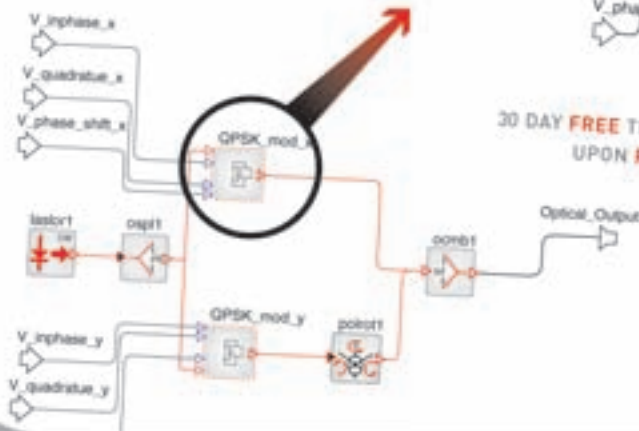
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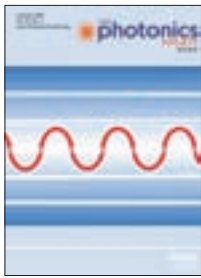
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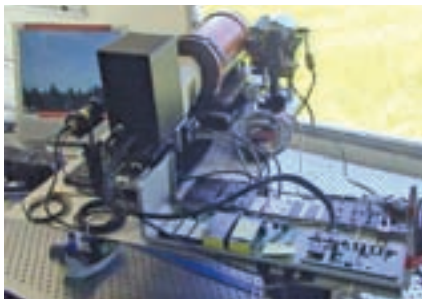
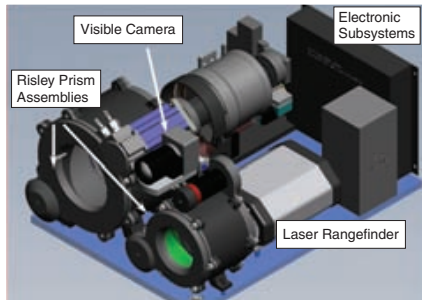
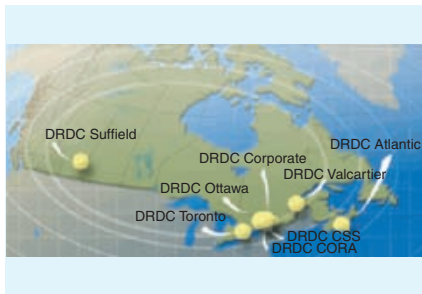
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Editor's Column

KRISHNAN PARAMESWARAN

Welcome to the October Photonics Society Newsletter! As our members have come to expect, we strive to cover research and development work done in academic, industrial, and laboratory environments worldwide. This month, we have an article by Dominik Pudo, Marc Châteauneuf, and Jean Fortin of Defence Research & Development Canada Valcartier, one of several National Laboratories in Canada. Photonics work has been going on there for over 60 years, with many important breakthroughs occurring over that time. I am sure that you will enjoy reading this article.

We received many responses to our Newsletter Reader Survey. Please reply with your responses if you have not already done so, as your opinions and thoughts are very important to us. Results will be published in the December issue.

As always, please send any comments and suggestions to k.parameswaran@ieee.org.

Regards,
Krishnan Parameswaran

IEEE Photonics Society

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President's Column

JOHN H. MARSH

In this column I would like to focus on Membership. The Membership Vice-Presidential area perhaps enjoys a less high profile than conferences or publications, but it is served by an outstanding team of volunteers. Last year the structure of the Membership area was reorganized, and it is now appropriate to review the success of the reorganization.

You will recall that the old 'LEOS' had three Vice Presidents for Membership and Regional Activities covering the Americas; Asia and Pacific Rim; and Europe, Middle-East and Africa. This structure served the Society well, particularly in building a presence in new countries and forming Chapters. It was, however, recognized that it was less good at identifying and building member benefits across the Society. The new Photonics Society structure has a single Vice President for Membership and Regional Activities supported by three Associate Vice Presidents for Regional Activities who cover the same geographic areas as before. Because the web portal and Newsletter are the primary media for communicating with members, these were moved from being the responsibility of Publications to being that of the Membership VP. In addition services in education and for new graduates lie within 'membership'. The Membership VP area therefore has both a geographical structure that works predominantly through chapters and a functional structure that delivers services.

Geographical Structure

Our Vice-President for Membership and Regional Activities is Amr Helmy (University of Toronto). In the geographically focused structure he is supported by the Associate Vice Presidents (AVPs) for Regional Activities as follows:

- AVP Americas: Mario Dagenais (University of Maryland)
- AVP Pacific Rim: Hon Tsang (Chinese University of Hong Kong)
- AVP Europe, Middle East and Africa: Roel Baets (University of Gent)

We are also, on an ongoing basis, appointing enthusiastic volunteers as additional AVPs to support membership growth in key countries where the photonics field is expanding, whether in industry or academia. At present Ajoy Kar (Heriot-Watt University) is supporting targeted activities in India and Lianshan Yan (Southwest Jiatong University) in China. There is significant membership growth in both countries, new chapters are being formed and existing chapters are among the most active in the Society. Volunteers to work in other countries would be welcomed.

The Society now has 75 chapters broken down as follows

- Americas: 38 (United States 34; Canada 3; Mexico 1)
- Europe Middle East and Arica: 17
- Pacific Rim: 15 (Asia 11; Australia 4)
- Student Chapters: 5

Our chapters are a real strength of the Society and I would particularly like to congratulate this year's Chapter award winners

- Chapter of the Year – Hong Kong Chapter
- Largest Membership Increase – Lehigh University Student Chapter
- Most Improved – Calcutta Chapter
- Most Innovative – Ukraine Chapter
- Senior Member Initiative – Santa Clara Valley Chapter

Functional Structure

The functional structure addresses benefits that cut across the whole Society.

The primary routes through which the Society communicates with its members are the Newsletter and web portal. Under its current Editor, Krishnan Parameswaran, the *Photonics Society News* continues to grow in stature and quality, and is in reality a valuable magazine rather than simply a newsletter.

The web portal has been a less successful story over the last year. The current portal was developed several years ago and is now rather dated in its capabilities. Last year we set aside a significant budget to develop a new portal and established a Portal Committee chaired by Matthew Emsley (Boston University) to oversee development of the new site. Unfortunately, the timing coincided with the financial crisis at the start of the year and as a consequence there have been delays in placing the contract and starting work. However, the contract was finally put in place 2 months ago and development of an exciting new portal is underway. The content needs considerable updating before being transferred to the new portal and this will be led by the newly appointed Portal Editor, Shane Eaton (Politecnico di Milano), who is also a member of the Portal Committee.

The Society has not addressed educational activities in a systematic way for more than 15 years. We have now appointed Emanuel Istrate (University of Toronto) as AVP for Education. He is developing a strategy that will eventually enable the Society to offer Training Courses around the world and will address how we work with other societies in activities such as the series of workshops on *Education and Training in Optics and Photonics (ETOP)*.

Graduates of the Last Decade (GOLD)

The IEEE's GOLD initiative is intended to support engineers in the early stages of their careers. The Society has had a GOLD Committee for a few years and early this year Ju Han Lee (University of Seoul) accepted the post of AVP for GOLD. Although the Society has held events targeted at early careers at our Annual Meeting for several years, this year for the first time there

(continued on page 11)

Research Highlights

Photonics Work at Defence Research & Development Canada – Valcartier



Dominik Pudo, Marc Châteauneuf, Jean Fortin

Introduction

Defence R&D Canada Valcartier is one of seven research centers of Defence R&D Canada (DRDC), an agency of the Canadian Department of National Defence that responds to the scientific and technological needs of the Canadian Forces. It has world-leading expertise in optronic, information, and combat systems. The scope of activities includes spectral and geospatial exploitation, tactical surveillance and reconnaissance, command and control decision support systems, intelligence and information, energetic materials, precision weapons, weapons effects and protection, and electro-optical warfare. These research activities result in innovative applications and meaningful impact in the defence and security environment.

DRDC Valcartier brings together multidisciplinary teams to offer the Canadian Forces state-of-the-art scientific expertise, world class facilities and turnkey project management. Its mission is to support the various operational needs of the Canadian Forces is achieved in collaboration with industry and numerous partners from the regional, national and international scientific communities.

History

The intention of the Canadian Government in authorizing the formation of the Canadian Armament Research and Development Establishment (CARDE) by Order-in-Council in 1945 was to preserve the main elements of the military technological complex which had been developed in Valcartier during the Second World War. In reality, it gave way to more than 60 years of major technological discoveries in Defence science.

At the end of the 1960's fundamental work on the transverse excitation technique using many parallel pin electrodes distributed along the laser tube was undertaken. This work

allowed scientists to gain new knowledge on the physics of electrical stimulation in gas lasers. The CARDE researchers were the first in the world to use CO₂ lasers at atmospheric pressure to simultaneously produce high peak power and repetition rates unparalleled in the field of lasers. It thus became possible to design modules of small physical dimensions that would produce laser peak pulse powers of several megawatts, ideal for laser radar applications. For a while, due to the efforts of CARDE scientists and despite limited resources, Canada was a leader amongst world nations in laser research.

Closer collaboration between military and scientific staffs resulted in a greater number of studies and projects in electro-optics to exploit the advances made in laser and infrared technologies. Surveillance, including night vision, is one of the major areas which have received considerable funding over the past twenty years. Optical and infrared countermeasures may also be regarded as a major project, encompassing activities related to obscurants, decoys, signature reduction, camouflage, and laser countermeasures. Between 1950 and 1974, CARDE—which by then became Defence Research Establishment Valcartier (DREV) employees have been awarded 366 patents in Canada and in 14 other countries, mainly the United States, Japan, Australia as well as the former USSR.

The late 1990s marked a new shift for the center, which took its present name of DRDC Valcartier as a vital link in the network of Defence R&D Canada—an agency within the Department of National Defence. Previously, DRDC Valcartier had helped build up local firms in the optics/photonics industry as their main contractor. Now, it was emerging as an ideal partner for businesses looking for opportunities to become more competitive on world markets. The Centre has become a leader in standoff detection of chemical vapours



Figure 1. Locations of DRDC research centres across Canada.



Figure 2. Aerial view of DRDC Valcartier.

and bioagents, and in the studies of hyperspectral properties of targets.

Currently, DRDC Valcartier in collaboration with Canadian industry is ideally positioned for the development and field testing of a wide range of technological prototypes catering to the panoply of tasks and missions of the Canadian Forces. As shown with two project examples described below, DRDC Valcartier focuses both on fundamental, leading-edge research as well as on the development of technologies and solutions responding to real-time needs of the Canadian Forces.

Canadian Portable Terawatt Femtosecond Laser

Many of the projects at DRDC Valcartier involve a portable Terawatt laser system mounted in a container referred to as the Terawatt & Terahertz (T&T). This unique laser system is built around a compact Titanium:Sapphire (Ti:Sa) oscillator and a chain of Ti:Sa amplifiers. The measured pulse energy at the output of the compressor is 250 mJ with a pulse duration < 50 fs, resulting in a peak power of greater than 5 TW at a repetition rate of 10 Hz. In order to allow the utilization and deployment of the laser in a vast array of environmental conditions, the laser system has been integrated into a standard sea container into which a modular clean room of class 100,000 was inserted. The clean room occupies about half of the container, the remaining part being used as a control room. A photograph of the finalized terawatt laboratory is shown in Fig. 3. The air pressure in the clean room is slightly higher than the adjacent room and the temperature is kept to $20^{\circ} \pm 1^{\circ}$ Celsius. These conditions can be maintained with exterior temperature ranging from -30° to 30° Celsius and with an opening in the clean room of 7.5-cm diameter to allow the propagation of the laser beam towards an exterior target with minimum distortion.

The special characteristics of the terawatt femtosecond laser make it an ideal candidate for directed countermeasures applications, such as atmospheric ionization for guided electric discharges, wideband dazzle, damaging optics and generation of bursts of light at distance. Lasers with such very high power densities have the potential of ionizing gas molecules in the atmosphere (through the generation of a plasma column in the wake of the self-guided pulse) and so providing a source of charged particles that can serve as charge carriers. With such carriers, a current can be induced by applying a voltage between two points in the laser beam. As a result, the laser beam allows to instantaneously create a wireless electrical conductor, which can then be used to neutralize a nearby electronic system by simple means of a disrupting voltage signal, as depicted in Fig. 4.

Laser-induced filamentation is also studied to create a microwave waveguide in air. This feature is especially interesting as the divergence of microwave signals from common emitters is rather high, which then requires significant emission powers in order to achieve the required power density at the destination point. Using a laser-induced waveguide on the other hand allows for a much more directional microwave beam, thereby allowing to use substantially lower (and thereby safer) power levels. Indeed, a hollow cylinder formed by multiple filaments

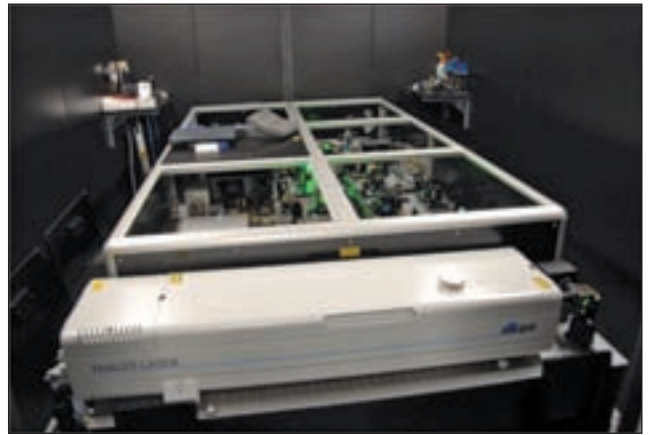


Figure 3. Photograph of the interior of the DRDC portable TW laser T&T.



Figure 4. Neutralization of the electronic circuits of an incoming threat by creating an electric conductor.

can confine the microwave radiations within a very specific radius, and avoid the natural divergence. The feasibility of the so-called V-Wave for virtual waveguide was recently proven over a short distance in collaboration with the Institut National de Recherche Scientifique (INRS Varennes, QC, Canada) [1]. A diagram of the setup along with laser beam profiles is depicted in Fig. 5.

Gated Laser Retro-Reflection Scanner for Urban Operations

Another aspect of photonic research at DRDC Valcartier involves the design, implementation, and deployment of optical systems for surveillance and situational awareness. For example, the UGLARES (Gated Laser Retro-Reflection Scanner For Urban Operations) project specifically focuses on detecting optical systems in urban environments. The main challenge is to be able to localize and identify various optical components present in the surroundings, such as scopes, binoculars, or other surveillance equipment based on their particular retro-reflective properties.

The operator in a vehicle observes the scene using a visible high-resolution panoramic camera. The zones of interest are automatically proposed based on the appearance of the images and the system interrogates them in sequence. The areas of interest are illuminated using a pulsed laser source operating in bursts. The system uses counter-rotating prisms

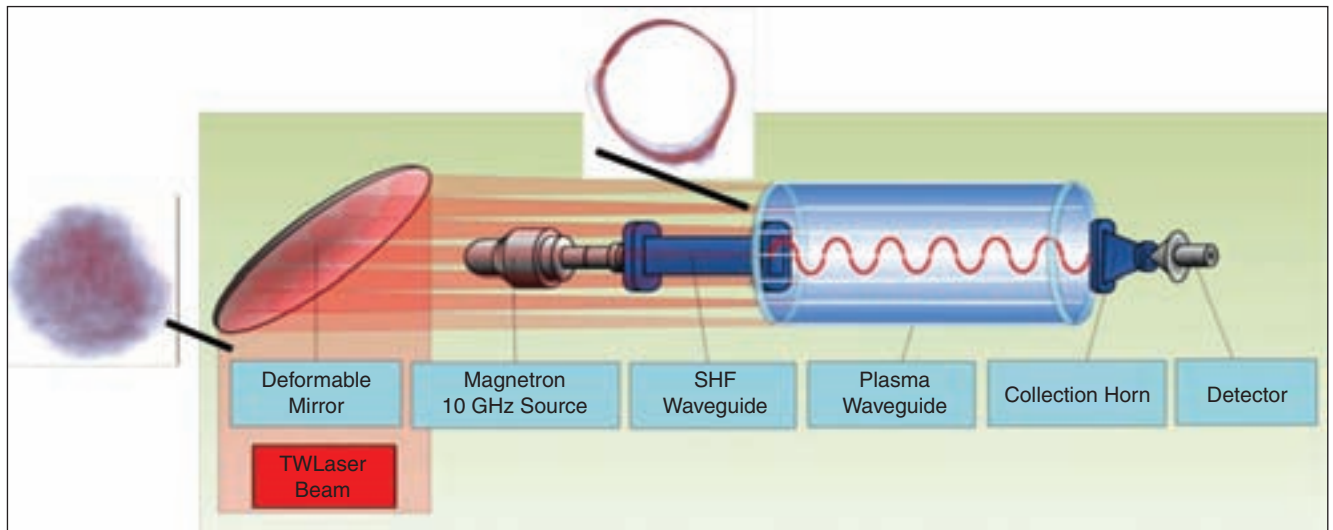


Figure 5. TW laser-driven plasma waveguide for microwave transmission. Insets depict spatial laser beam patterns.

to compensate for vehicle's movement and maintain aiming with sufficient resolution to keep the beam directed at the target during the acquisition time. Next, a laser rangefinder is activated to estimate the distance of an object belonging

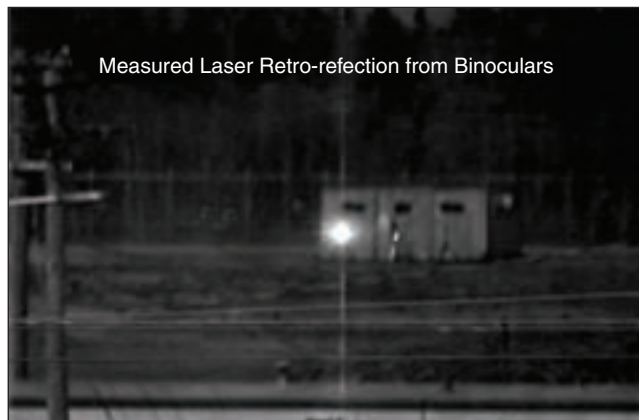


Figure 6. Infrared photo of laser retro-reflection from a pair of binoculars.

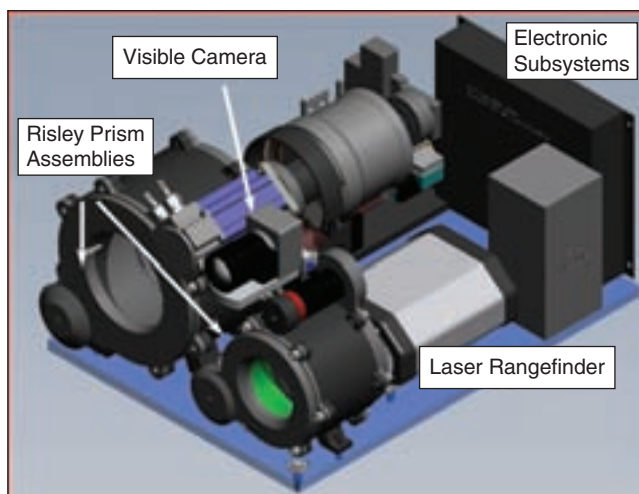


Figure 7. Schematic of the UGLARES system.

to a selected area. It is used to determine the initial timing parameters required to synchronize the camera and the laser source; the camera shutter opens based on the time it takes for the pulses to travel to the target and back. This time-gated approach increases the signal-to-noise-ratio by limiting the detection of the backscattered light caused by aerosols, as well as background and blooming effects caused by bright light sources. A schematic of the optical system is depicted in Fig. 7.

Once appropriately synchronized, sophisticated algorithms take over to automatically adjust the depth of field and optimize the detection probabilities. After the system has interrogated the scene and the images have been analyzed, the interface displays symbols at the target's location. A database to store the characteristics of the targets detected (geolocalization, alarm level and type, etc.) is also developed and the system automatically follows-up on false alarms so that they are not revisited. The system is also able to operate in bright ambient light conditions thanks to a narrowband interference filter centred on the laser's operating frequency that greatly reduce

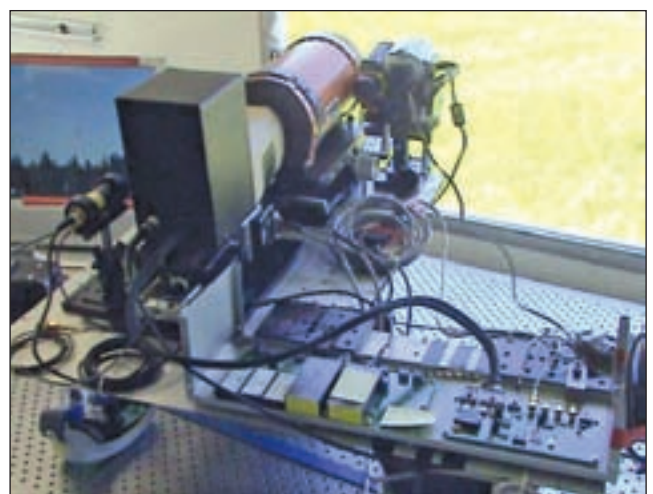


Figure 8. A prototype of the UGLARES system.

the signal background. The system has been demonstrated to successfully detect a range of optical devices. Fig.8 shows a laboratory prototype.


Summary

We provided here a brief history and examples of photonic research at Defence R&D Canada Valcartier, one of seven research centers of the Canadian Department of National Defence. The mission of DRDC Valcartier is to support the various operational needs of the Canadian Forces in collaboration with industry and numerous partners from the regional, national and international scientific communities. It is pursued by a continuous effort in conducting research, development and analysis to contribute to new

and improved defence capabilities. Projects range from fundamental research, such as exploring the possibility to optically generate microwave waveguides in air, to the design and development of state-of-the-art technologies allowing detecting a vast array of optical threats under any environmental conditions. With a broad scientific program, Defence R&D Canada actively collaborates with industry, international allies, academia, other government departments, and the national security community.

Reference

1. M. Châteauneuf, S. Payeur, J. Dubois, and J. C. Kieffer, "Wave guiding in air by a cylindrical filament array waveguide," *Appl. Phys. Lett.* 92, 091104 (2008).




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10G VCSEL Link Eye Diagram



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IEEE PHOTONICS SOCIETY 2009 Chapter Award Winners

The IEEE Photonics Society announced the winners of the five (5) Photonics Society Chapter Awards for 2009. The Chapters will be recognized during the Awards Banquet at the Photonics Society Annual Meeting to:

The Chapter of the Year Award – **Hong Kong Chapter**

The Largest Membership Increase Award – **Lehigh University Student Chapter**

The Most Improved Chapter Award – **Calcutta Chapter**

The Most Innovative Chapter Award – **Ukraine Chapter**

The Photonics Society Chapter Senior Member Initiative Award – **Santa Clara Valley Chapter**

Call for IEEE PHOTONICS SOCIETY Award Nominations:

Nominations for 2010 IEEE Photonics Society Quantum Electronics Award and IEEE Photonics Society Distinguished Lecturer Awards are now being solicited for submission to the Photonics Society Executive Office. The deadline for nominations is 16 February. In order to

facilitate the nomination procedure, nomination forms are found on pages 9 and 10.

A list of previous winners and awards information is available on the Photonics Society web site: www.Photonics-Society.org.

IEEE Photonics Society Quantum Electronics Award

The Quantum Electronics Award is given for exceptional and outstanding technical contributions that have had a major impact in the fields of quantum electronics and lasers and electro-optics. This award is given for truly excellent and time-tested work

in any of the fields of interest of the Photonics Society. It may be given to an individual or to a group for a single outstanding contribution or for a long history of significant technical work in the field. No candidate shall have previously received a major IEEE

award for the same work. Candidates need not be members of the IEEE or the Photonics Society. The award will be presented at the Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference (CLEO/QELS 2010).

IEEE Photonics Society Distinguished Lecturer Awards

The Distinguished Lecturer Awards are presented to honor interesting speakers who have made recent significant contributions to the field of lasers and electro-optics, or who have industrial or entrepreneurial experience at a senior level in the fields of interest to the Photonics

Society. The program is designed to honor excellent speakers who have made technical, industrial or entrepreneurial contributions of high quality and to enhance the technical programs of the Photonics Society chapters. Consideration is given to having a balance of speakers who

can address a wide range of topics of current interest in the fields covered by the Photonics Society. The term for the Lecturers is July 1 of the year of election until June 30 for the following year. Candidates need not be members of the IEEE or Photonics Society.

Nomination Form for IEEE Photonics Society Awards

Please check the appropriate award category:

- Quantum Electronics (16 Feb deadline) Streifer Scientific Achievement (30 April deadline)
 Engineering Achievement (30 April deadline) Aron Kressel (30 April deadline)

Separate forms are available for the Distinguished Lecturer, Distinguished Service, Young Investigator, and John Tyndall Awards

1. Name of Nominee (for joint nominations, give the names, address information of the co-workers on a second sheet.)

2. Nominee's Address _____

3. Nominee's Phone: _____ Fax: _____

Email: _____

4. Proposed Award Citation (20 words or less)

5. On separate sheets attach:

- a. Statement of specific contribution(s) that qualify Nominee for Award, as well as other related accomplishments (**maximum of two pages**).
- b. Nominee's curriculum vita
- c. Endorsers: List the names, affiliations, addresses, and emails of individuals who have agreed to write letters of support. (Minimum of three supporting letters required; maximum of five permitted. No more than five letters will be reviewed by the Committee. Letters may accompany nomination or be submitted directly to IEEE Photonics Society prior to the nomination deadline.) Letters of recommendation are to be considered confidential and are not to be released to anyone other than IEEE-Photonics Society awards staff.

6. Your name: _____

Phone: _____ Fax: _____

Email: _____

Send nomination information with supporting material to:
IEEE Photonics Society Awards Committee; 445 Hoes Lane; Piscataway, NJ 08854
Fax: +1 732-562-8434; email: soc.leo@ieee.org

Nomination Form for IEEE PHOTONICS SOCIETY Distinguished Lecturer Award

Deadline: 16 February

1. Name of Nominee:

2. Nominee's Address

3. Nominee's Phone:

Fax:

Email:

4. Suggested Topic of Nominee's Lecture:

5. On separate sheets attach:

- a. List the nominee's most significant contributions that qualify the Nominee for this award as well as other related accomplishments. Include invited talks that the Nominee has given on his/her research. (maximum of two pages).
- b. Nominee's curriculum vita
- c. Endorsers: List the names, affiliations, addresses, and emails of individuals who have agreed to write letters of support (**Three supporting letters required**; no more than three letters will be reviewed by the Committee. Letters may accompany nomination or be submitted directly to IEEE Photonics Society prior to the nomination deadline.) Letters of recommendation are to be considered confidential and are not to be released to anyone other than IEEE Photonics Society awards staff.

6. Your name:

Phone:

Fax:

Email:

Send nomination information with supporting material to:
IEEE Photonics Society Awards Committee; 445 Hoes Lane; Piscataway, NJ 08854
Fax: +1 732-562-8434; email: soc.leo@ieee.org

11-07

Photonics Society Candidates for 2010–2012 Board of Governors

Ballots for the election of candidates to the Board of Governors will be mailed soon to all voting members. This year's candidates are:

Yasuhiko Arakawa
The University of Tokyo

Amr S. Helmy
University of Toronto

Lynn E. Nelson
AT&T Labs – Research

Jose Capmany
Universidad Politécnic de Valencia

Sander L. Jansen
Nokia Siemens Networks

Krishnan Parameswaran
Physical Sciences Inc

Madeleine Glick
Intel Labs Pittsburgh

Sanjay Krishna
University of New Mexico

President's Column

(continued from page 3)

will be an event organized by the GOLD committee. It is scheduled to run on Tuesday October 6 and will include an invited talk by Theodore Schmidt (Opnext Subsystems) on *Navigating a Career in Industry* and poster presentations by the 12 winners of the 2009 IEEE Photonics Society Graduate Fellowships:

- Can Bayram - Northwestern University
- Pierre-yves Delaunay - Northwestern University
- Umit Demirbas - Massachusetts Institute of Technology
- Qiaoqiang Gan - Lehigh University
- Zubin Jacob - Purdue University
- Meizi Jiao - University of Central Florida
- Chao Wang - University of Ottawa
- Xiaoxia Wu - University of Southern California
- S.M. Abdur Razzak - University of the Ryukyus
- Lendert Gelens - Vrije Universiteit Brussel
- Sedat Nizamoglu - Bilkent University
- Evgeny Shumakher - Israel Institute of Technology

Membership Growth

Of course membership is ultimately linked to all the services the Society offers, particularly conferences and publications. As an example, I have just returned from the *International Symposium on Photonics and Optoelectronics (SOPO)* in Wuhan, China, where the Photonics Society was a technical co-sponsor. I was extremely impressed by the quality of the event and was proud that the Photonics Society was able to give its support. The proceedings will be published in Xplore and this is seen by the participants as a valuable benefit of technical co-sponsorship. I also believe publications taken as whole are an important factor in engaging new members. The *IEEE Photonics Journal*, which recently published its third issue, has no page charges for regular articles (although open access articles do incur a charge) and this policy will remove a further barrier to engagement with the Society.

Only two months ago I reported that our membership was growing at 2.3% year on year. The latest figures show an increase of 4%, with growth in all categories increasing but particularly strongly in student and affiliate membership. This is a real achievement of all our staff and volunteers!

IEEE PHOTONICS SOCIETY 2009 Distinguished Service Award recipient: Giok-Djan Khoe

The IEEE Photonics Society Distinguished Service Award was established to recognize an exceptional individual contribution of service which has had significant benefit to the membership of the IEEE Photonics Society as a whole. This level of service will often include serving the Society in several capacities or in positions of significant responsibility. Candidates should be members of the Society. The deadline for nominations is 30 April.

The IEEE Photonics Society Distinguished Service Award will be presented to Giok-Djan Khoe, "for exemplary vision and leadership enabling sustained growth and broadened involvement of Photonics Society, particularly student members and international activities." The presentation will be made during the Awards Banquet at the 2009 Photonics Society Annual, 4th–8th October at the Ela Quality Resort in Belek-Antalya, Turkey.



Giok-Djan Khoe

Giok-Djan Khoe was born in Magelang, Indonesia, on July 22, 1946. He received the degree of Elektrotechnisch Ingenieur, cum laude, from the Eindhoven University of Technology, Eindhoven, The Netherlands, in 1971.

He started research at the Dutch Foundation for Fundamental Research on Matter (FOM) Laboratory on Plasma Physics, Rijnhuizen.

In 1973 he moved to the Philips Research Laboratories in Eindhoven to start pioneering work in the area of optical fiber communication systems. In 1983, he was appointed as part time professor at Eindhoven University of Technology. He became a full professor at the same University in 1994 and has served as chairman of the Department of Telecommunication Technology and Electromagnetics (TTE) until 2008. Most of his work has been devoted to single-mode fiber systems and components. Currently

his research programs are centered on ultrafast all-optical signal processing, high capacity transport systems and systems in the environment of the users. He has 41 United States Patents and has authored and co-authored more than 350 papers, including 75 invited papers and chapters in 6 books. His professional activities include many conferences, where he has served in technical committees, management committees and advisory committees as a member or chairman. Recently, he was general co-chair of the ECOC in 2008. His journal activities include involvements as associate editor, as a member of the advisory board or as reviewer. For example, he served as associate editor for the *Journal of Lightwave Technologies* and the *Journal of Quantum Electronics*. In Europe, he was closely involved in Research Programs of the European Community and in Dutch national research programs, as participant, evaluator, auditor and program committee member.

He is one of the founders of the Dutch COBRA University Research Institute and one of the three recipients of the prestigious "Top Research Institute Photonics" grant that is awarded to COBRA in 1998 by the Netherlands Ministry of Education, Culture and Science. In 2001, he brought 4 groups together to start a new international alliance called the European Institute on Telecommunication Technologies (eiTT).

He was President of The Institute of Electrical and Electronics Engineers (IEEE) Photonics Society in 2003. He has served in the IEEE Photonic Society organisation as European Representative in the Board of Governors, VP Finance & Administration, Board of Governors Elected Member and Member of the Executive Committee of the IEEE Benelux Section. He was the founder of the IEEE Photonic Society Benelux Chapter. He has been an IEEE Fellow since 1991 and received the MOC/GRIN award in 1997. He is an invited member of the Netherlands Academy of Engineering and Innovation (AcTI-nl) since 1999 and became a Fellow of the Optical Society of America (OSA) in 2007.

IEEE PHOTONICS SOCIETY 2009 Aron Kressel Award recipients: Larry Coldren and Jack Jewell

The Aron Kressel Award is given to recognize those individuals who have made important contributions to optoelectronic device technology. The device technology cited is to have had a significant impact on their applications in major practical systems. The intent is to recognize key contributors to the field for developments of critical components, which lead to the development of systems enabling major new services or capabilities. These achievements should have been accomplished in a prior time frame sufficient to permit evaluation of their lasting impact. The work cited could have appeared in the form of publications, patents, products, or simply general recognition by the professional community that the individual cited is the agreed upon originator of the advance up which the award decision is based. The award may be given to an individual or group, up to three in number. The deadline for nominations is 30 April.

The IEEE Photonics Society Aron Kressel Award will be presented to Larry Coldren and Jack Jewell, "for original contributions enabling low threshold, manufacturable VCSELs." The presentation will be made during the Awards Banquet at the 2009 Photonics Society Annual, 4th–8th October at the Ela Quality Resort in Belek-Antalya, Turkey.



Larry A. Coldren

Larry A. Coldren is the Fred Kavli Professor of Optoelectronics and Sensors at the University of California, Santa Barbara, CA. He received the Ph.D. degree in Electrical Engineering from Stanford University in 1972. After 13 years in the research area at Bell Laboratories, he joined UC-Santa Barbara in 1984 where he now holds appointments in Materials

and Electrical & Computer Engineering, and is Director of the Optoelectronics Technology Center. In 1990 he co-founded Optical Concepts, later acquired as Gore Photonics, to develop novel VCSEL technology; and in 1998 he co-founded Agility Communications, later acquired by JDSU, to develop widely-tunable integrated transmitters.

At Bell Labs Coldren initially worked on waveguided surface-acoustic-wave signal processing devices and coupled-resonator filters. He later developed tunable coupled-cavity lasers using novel reactive-ion etching (RIE) technology that he created for the then new InP-based materials. At UCSB he continued work on multiple-section

tunable lasers, in 1988 inventing the widely-tunable multi-element mirror concept, which is now used in some JDSU products. During the late eighties he also developed efficient vertical-cavity multiple-quantum-well modulators, which led to novel vertical-cavity surface-emitting laser (VCSEL) designs that provided unparalleled levels of performance. Prof. Coldren continues to be active in developing new photonic integrated circuit (PIC) and VCSEL technology, including the underlying materials growth and fabrication techniques. In recent years, for example, he has been involved in the creation of efficient all-epitaxial InP-based and high-modulation speed GaAs-based VCSELs as well as a variety of InP-based PICs incorporating numerous optical elements for widely-tunable integrated transmitters, receivers, and wavelength converters operating up to 40 Gb/s.

Professor Coldren has authored or co-authored over 1000 journal and conference papers, 7 book chapters, 1 textbook, and has been issued 63 patents. He has presented dozens of invited and plenary talks at major conferences, he is a Fellow of the IEEE, OSA, and IEE, the recipient of the 2004 John Tyndall Award, and a member of the National Academy of Engineering.



Jack Jewell

Jack Jewell led a BellLabs/Bellcore collaboration that sparked international industrial VCSEL development by demonstrating over 1 million VCSELs on a single chip in 1989. The devices incorporated several key features introduced by Jewell, which are still part of today's devices, and which enabled the performance, manufacturability and reliability essential for commercial-

ization. Later, Jewell patented practical versions of "oxide VCSELs," 1310 nm VCSELs, thermally-more-stable VCSELs and novel optical coupling mechanisms. VCSELs are now used daily by billions of people in datacommunications and computer mouse applications, and are poised to enable more products. The power-hungry communications industry consumes less power due to its use of VCSELs for short-reach communications.

In 1991, Dr. Jewell co-founded Vixel Corp, the first company committed to VCSEL commercialization, which went public in 1999 and was later acquired by Emulex. Jewell founded Picolight Inc. in 1995, quickly establishing it as a leader in intellectual property, then in commercialization

of oxide VCSELs, small-form factor transceivers, parallel optical interconnects, 10 Gb/s transceivers, and 1310 nm VCSEL transceivers. Jewell was principal investigator on U.S. Government R&D contracts totaling > \$10M, and was key to raising venture capital. With its world-leading

VCSEL operation, Picolight was acquired by JDSU in 2007 for \$115M. Jewell received his Ph.D. in Optical Sciences from the University of Arizona in 1984. He has 67 U.S. Patents and over 250 publications. Recently, Jewell co-founded Tru-Ray Cable Corp.

2009 IEEE PHOTONICS SOCIETY Graduate Student Fellowship recipients:

The IEEE Photonics Society established the Graduate Student Fellowship Program to provide Graduate Fellowships to outstanding Photonics Society student members pursuing graduate education within the Photonics Society field of interest. Applicants are normally in their penultimate year of study and receive the award for their final year and must be a Photonics Society student member. Recipients are apportioned geographically in approximate proportion to the numbers of student members in each of the main geographical regions (Americas, Europe/Mid-East/Africa, Asia/Pacific). There are 12 Fellows per year. The deadline for nominations is 30 May.

The presentation will be made during the Awards Banquet at the 2009 Photonics Society Annual, 4th–8th October at the Ela Quality Resort in Belek-Antalya, Turkey.

The IEEE Photonics Society is proud to present profiles of our 2009 Graduate Student Fellows:

Can Bayram	Meizi Jiao
Pierre-yves Delaunay	Sedat Nizamoglu
Umit Demirbas	S.M. Abdur Razzak
Qiaoqiang Gan	Evgeny Shumakher
Lendert Gelens	Chao Wang
Zubin Jacob	Xiaoxia Wu



Can Bayram

Can Bayram was born on 6 September 1983 in Izmir, Turkey. He received the B.S. degree in 2005 from Bilkent University, Turkey in Electrical Engineering. He is currently a Ph.D. candidate at the Center for Quantum Devices under the supervision of Walter P. Murphy Professor and Director, Manijeh Razeghi, in the Electrical Engineering and Computer Science Department at

Northwestern University, IL.

Mr. Bayram's Ph.D. research area is wide bandgap semiconductor devices including III-N materials (AlGaInN) and II-VI materials (ZnO). His research interests include

semiconductor device design/simulation, material growth/characterization, device processing/packaging/measurement with a focus on optoelectronic devices.

He has performed more than 2000 metalorganic chemical vapor deposition growths up-to-date. He has improved $\text{Al}_x\text{Ga}_y\text{In}_{(1-x-y)}\text{N}$ layers (where $[0,0] < [x, y] < [1,1]$), and integrated them into self-designed nitride optoelectronic devices. By using state of the art material characterization techniques such as atomic force microscopy, scanning electron microscopy, photoluminescence measurements, X-ray diffraction, and Hall effect measurements, he has correlated the material growth, characterization and (structural (surface, crystallographic), optical, electrical) material quality that led to world's first and world's highest performance nitride optoelectronic devices.

By using conventional and state-of-the-art semiconductor fabrication techniques and equipments (such as rapid thermal annealing, electron cyclotron resonance reactive ion etching, electron beam metal evaporator, plasma-enhanced chemical vapor deposition, photo- and e-beam-lithography systems), he has fabricated more than 300 wide bandgap semiconductor devices ranging from UV avalanche and single photon photodiodes to blue and green light emitting diodes. Combining the device performance with the material growth, a unique blend of semiconductor knowledge is gathered in-house, and being implemented. His works have become multiple-times most downloaded in high-impact journals (such as Applied Physics Letters), and have been highlighted in the mainstream of the press (such as Laser Focus World, CompoundSemiconductor.net, ScienceDaily, SPIE Newsroom) many times.

His current research interests include avalanche and single photon detection in UV spectral region, and high power blue-green-white light emitting diodes. He is currently developing high quality Al(Ga)N/GaN superlattices for intersubband devices operating in near-, mid-, far-infrared, and terahertz regime.

He has published 15 articles in high impact SCI journals, and 16 international conference papers & presentations. He is a member of the IEEE, IEEE-Photonics and Electron Devices Society, SPIE, OSA, MRS and APS. He is the winner

Career Section (cont'd)

of 2009 *Dow Sustainability Innovation Award* (including a \$10,000 honorarium), 2009 *SPIE Laser Technology, Engineering, and Applications Scholarship* (including a \$6,000 honorarium), and 2009 *IEEE Photonics Society Graduate Student Fellowship* (including a \$5,000 honorarium).



Pierre-Yves Delaunay

Pierre-Yves Delaunay was born in Versailles, France in 1982. He received his B.Sc. degree in Engineering from Ecole Polytechnique, Palaiseau, France, in 2004. Majoring in Applied Physics and Solid State Engineering, he obtained the M.Sc. degree in Electrical Engineering in 2005 and he was honored with the X-Fondation Award for his Master's thesis. Since 2005,

Pierre-Yves is working toward a PhD degree at Northwestern University, USA, under the supervision of Pr. Manijeh Razeghi.

His research focuses on the fabrication and testing of infrared cameras based on Type-II InAs/GaSb superlattices. In 2007, he introduced a new device design that reduced the dark current of Type-II detectors by several orders of magnitude. This breakthrough, associated with other key improvements in the fabrication process, led to the demonstration of the first long wavelength camera based on this novel material platform. The array of detectors was able to measure temperature differences as low as 20 mK, with a photon to electron conversion efficiency up to 89%. His work showed the potential of this technology for infrared imaging.

Over the past 4 years, he authored or co-authored over 25 papers in peer-reviewed journal such as *Applied Physics Letters* and *IEEE Journal of Quantum Electronics*. One of them was selected for the cover of the May-June 2008 issue of the *IEEE Journal of Quantum Electronics*. Pierre-Yves also serves as an active reviewer for the *Journal of Electronic Materials*.



Umit Demirbas

Umit Demirbas was born in Egirdir (Turkey) in 1979. He received his BS degrees in Physics (2004) and Electrical Engineering (2004), and his MS degree in Materials Science (2006) from Koc University. In July 2006, he entered Electrical Engineering department of MIT, where he is currently working towards his PhD degree.

During his undergraduate and MS years, Mr. Demirbas was with the Koc University Laser Research Laboratory, where he mainly worked on development of broadly-tunable Cr:ZnSe lasers. Currently, he is a

member of the Optics and Quantum Electronics Group at the Research Laboratory of Electronics of MIT. He is continuing his studies under the supervision of Prof. James Fujimoto and Prof. Franz X. Kärtner, in strong collaboration with Prof. Alphan Sennaroglu. His current research interests include solid-state laser development, ultrafast pulse generation and multiphoton microscopy. In particular, he is trying to develop low-cost broadly-tunable femtosecond laser technology based on Cr:Colquiriite (Cr:LiCAF, Cr:LiSAF and Cr:LiSGAF) gain media.

Mr. Demirbas is an author and coauthor of more than 15 journal papers. He serves as reviewer for *Optics Letters* and *Optics Express* journals. He is a student member of Institute of Electrical and Electronics Engineers (IEEE) Photonics Society, Optical Society of America (OSA), The International Society for Optical Engineering (SPIE), and Optical Committee of Turkey (OCT). He is a IEEE Photonics Society Graduate Student Fellow (2009) and one of the finalists of OSA New Focus/Bookham Student Award (2008).



Qiaoqiang Gan

Qiaoqiang Gan was born in JiangSu Province, China, in 1980. He received the Bachelor's degree at Fudan University in 2003 and his Master's degree in the Institute of Semiconductors at the Chinese Academy of Sciences in 2006. He is now a Ph. D student at Electrical and Computer Engineering Department of Lehigh University, pursuing research as a member of

Prof. Filbert Bartoli's research group. His current research interests include nano-photonics, plasmonics, and bio-photonics. Mr. Gan has served as an active reviewer for several journals, including the *IEEE Journal of Quantum Electronics*, the *IEEE Journal of Photonics Technology Letters*, the *IEEE Journal of Lightwave Technology*, *Nano Letters* and *Optics Letters*. He is a student member of the IEEE Photonic Society, OSA and SPIE.



Lendert Gelens

Lendert Gelens was born in Zoersel, Belgium in 1983. He received his B. Sc. and M. Sc. degree in Electrotechnical Engineering, *summa cum laude*, from the Vrije Universiteit Brussel, Brussels, Belgium, in 2003 and 2006, respectively. He also obtained a M. Sc. degree in Physics, *summa cum laude*, in 2006 at the same university. For his Master's thesis work, he was awarded the Barco/FWO prize 2006.

Career Section (cont'd)

Since October 2006, he is working towards a PhD at the Department of Applied Physics and Photonics (TONA) at the Vrije Universiteit Brussel as a PhD fellow of the Research Foundation Flanders (FWO-Vlaanderen). His research, under the supervision of Prof. Jan Danckaert, is focused on nonlinear dynamical behavior in complex systems. More specifically, he has done research on the modeling of the nonlinear dynamics in Semiconductor Ring Lasers. The work on these semiconductor lasers where the laser cavity is defined by a ring-shaped waveguide is organized in the European STREP-project IOLOS. Furthermore, he has active collaborations with researchers from the Institut IFISC of the Universitat de les Illes Balears, Spain, and the Physics department of the University of California, Berkeley, USA, on the topic of extended and localized spatial structures. He has currently published 9 papers in international peer-reviewed journals and more than 20 contributions in conference proceedings. For his PhD work he has been awarded the IEEE Photonics Society Graduate Student Fellowship in 2009.



Zubin Jacob

Zubin Jacob completed his B.Tech in Electrical Engineering (2004) from the Indian Institute of Technology – Bombay, M.A.E.E (2006) and M.S.E.E (2007) from Princeton University and is currently a Ph.D candidate in the ECE department at Purdue University.

He works with Prof. Evgenii Narimanov in the field of Metamaterials and Nano-Optics. His initial research culminated into the optical hyperlens, the device based on hyperbolic metamaterials which can solve the long standing problem of the far-field diffraction limit. The hyperlens exhibits unique spiralling ray trajectories and supports interesting surface states called Dyakonov plasmons. Currently, his work focusses on the spontaneous emission modification properties of hyperbolic metamaterials which can lead to a single photon source.

He has authored/co-authored 10 international conference papers, 7 peer-reviewed journal articles and a book chapter during the course of his graduate work. He serves as a reviewer for Optics Letters, Optics Express, JOSA B and Applied Physics B. Zubin is a student member of IEEE Photonics Society, OSA, SPIE and APS. He is the recipient of the Princeton Graduate Fellowship (2004), Best Student Paper/Poster Presentation Prize at ETOPIM 7 (2006), the SPIE Graduate Fellowship Award (2008) and was the finalist for the Theodor Maiman Best Student Paper Award at CLEO-IQEC (2009).



Meizi Jiao

Meizi Jiao received her B. S. degree in Optical Engineering from Zhejiang University, Hangzhou, China in Jun. 2006 and M. S. degree in Optics from University of Central Florida (UCF), Orlando, USA in Jan. 2009. She is currently working towards her Ph. D. degree under the supervision of Prof. Shin-Tson Wu, in College of Optics and Photonics, University of Central Florida.

Meizi's Ph. D. study is focused on fast response and wide view liquid crystal displays, and novel blue phase liquid crystal displays. From Aug. 2006 to May 2009, she participated in the novel liquid crystal display development project contracted by Chi-Mei Electronics Corp., Taiwan. From May 2009 to Aug. 2009, she worked as an intern in Apple Computer Inc., USA. She has authored and coauthored around 20 papers in technical journals and conferences and filed 1 US patent. One of her papers has won the "Journal of the Society for Information Display Outstanding Student Paper of the Year Award" in 2008.

Meizi is also active in academic services. She was Chair of Society of Information Display UCF Student Branch from 2007 to 2008. She is a reviewer for IEEE/OSA Journal of Display Technology, Optics Express, Liquid Crystals and Journal of the Society for Information Display.

She is one of the recipients of 2009 IEEE Photonics Society Graduate Student Fellowship. In addition, she received SPIE Educational Scholarship in Optical Science & Engineering in 2008 and Chu Kechen Scholarship which is the highest honor of Zhejiang University in 2005.



Sedat Nizamoglu

Sedat Nizamoglu received his BS and MS degrees in Electrical and Electronics Engineering and Physics from Bilkent University in 2005 and 2007, respectively. He is currently a Ph.D. candidate in Electrical and Electronics Engineering under the supervision of Prof. H. V. Demir at Bilkent University. His research interests include nanocrystal integrated light emitting diodes, light-matter interaction of quantum dots and nano-optics. He has co-authored 59 publications that include 23 SCI (Science Scitation Index) journal papers, 24 international conference papers, 7 national conference papers, and 5 national popular science articles.

Career Section (cont'd)

He is a co-inventor of 2 pending patents. In 2009 Mr. Nizamoglu is awarded with SPIE Scholarship Award in Optical Science and Engineering (by the International Society for Optics and Photonics of SPIE) and IEEE Photonics Society (formerly LEOS) Graduate Student Fellowships Award. His work on "White light generation using CdSe/ZnS core-shell nanocrystals hybridized with InGaN/GaN light emitting diodes" is highlighted as a featured article on the hard cover of the journal *Nanotechnology* by Institute of Physics (vol. 18, no. 6 in the issue of 14 February 2007). He has been supported with EURYI (European Young Investigator) Graduate Fellowship between 2007 and 2009 and TUBITAK (The Scientific and Technological Research Council of Turkey) National Graduate Fellowship (2006–2007). He is a reviewer of various journals including *Applied Physics Letters* and *Journal of Applied Physics*. He is a student member of IEEE, Optical Society of America (OSA), the International Society for Optical Engineering (SPIE).



S. M. Abdur Razzak

S. M. Abdur Razzak (Student member of IEEE since 2007) was born in the Vill: Bhulbaria, P.O.: Patisar, P.S.: Singra, Dist. Natore, Bangladesh on December 31, 1974. He obtained a B.Sc. and a M.Sc. both in Electrical and Electronic Engineering from the Rajshahi University of Engineering & Technology (Erstwhile B. I. T. Rajshahi)

in 1998, and 2005 respectively. Later he obtained an M.Eng degree also in Electrical and Electronics Engineering from the University of the Ryukyus, Japan in 2007. Presently he is a doctoral course student of the University of the Ryukyus, Japan and expecting a PhD in March 2010.

Mr. Razzak is doing research on design and characterization of microstructure optical fibers. His research outcomes appear in many internationally reputed journals and conference proceedings including the *IEEE Journal of Lightwave Technology* and the *IEEE Photonics Technology Letters*. In recognition of his works, he has been awarded a number of awards including the 2009 Marubun Research Promotion Award, Japan, 2008 Excellent Student Award of the IEEE Fukuoka Section, Japan, the 2007 President's Honorary Award of the University of the Ryukyus, Japan, the 2000 Gold Medal award of the B. I. T. Rajshahi, Bangladesh, and the 1996 Zoynal Memorial Award of the B. I. T. Rajshahi, Bangladesh.



Evgeny Shumakher

Evgeny Shumakher received his B.Sc. in Electrical Engineering from the Technion – Israel Institute of Technology, Haifa in 2002. In 2004 he received his M.Sc. in Electrical Engineering in the field of Ultra-Fast Optoelectronics from the same university. His Master's research, supervised by Prof. Gadi Eisenstein, is titled "Fundamental characteristics of locked electro-optic loops". It involves numerical modeling of noise characteristics of injection inter-locked oscillators together with experimental confirmation of the model by opto-electronic oscillator topologies. He is currently pursuing his Ph.D. in the same field expecting to graduate in 2010. His current research interests lay in the newly formed field of optoelectronics termed "slow and fast light" propagation which encompasses all opto-electronic phenomena that allow continuous control of the group velocity of light. He is particularly interested in applying those mechanisms to concepts belonging to the realm of microwave photonics.

He is an author or co-author of 14 journal papers in several esteemed IEEE and OSA publications in which he also serves as an active reviewer. He is also a co-author of a chapter in "Slow Light: Science and Applications" from CRC press. There are 11 peer-reviewed conference papers to his credit, all orally presented with several being invited talks.

He is a two times recipient of the E. I. Jury award for excellent graduate students in the area of systems theory and a student member of IEEE and OSA.



Chao Wang

Chao Wang received the B. Eng degree in Opto-Electrical Engineering from Tianjin University, Tianjin, China, in 2002, and the M. Sc degree in Optics from Nankai University, Tianjin, China, in 2005, respectively. He is currently with the School of Information Technology and Engineering, University of Ottawa, Ottawa, Canada, working toward the Ph. D degree in Electrical Engineering under the supervision of Prof. Jianping Yao.

He is also a research assistant in the Microwave Photonics Research Laboratory at University of Ottawa.

Mr. Wang's research topic, Microwave Photonics, is an interdisciplinary field that studies the interactions between microwave and optical signals. His current research interests include all-optical microwave signal generation and processing, radio-over-fiber systems, coherent optical pulse shaping, fiber Bragg gratings and their applications in microwave photonics

Career Section (cont'd)

systems. His research has applications for broadband wireless access systems, broadband sensor networks, modern radar systems, satellite communications, and even biomedical imaging.

Mr. Wang is an author and coauthor of 15 peer-reviewed journal articles and 15 conference papers, including one invited paper presented at the 2008 LEOS Annual Meeting. Recently, he has received the 2008 SPIE Graduate Scholarship in Optical Science and Engineering, the 2008 Ontario Graduate Scholarship, the Best Student Paper Award at 2009 Asia-Pacific Microwave Photonics Conference, the 2009 Chinese Government Award for Outstanding Self-Financed Students Abroad, the 2009 Vanier Canada Graduate Scholarship, the 2009 University of Ottawa National Excellence Scholarship, the 2009 IEEE Photonics Society Graduate Student Travel Grant, and the 2009 IEEE Photonics Society Graduate Student Fellowship.

It is my great honor to receive the 2009 IEEE Photonics Society Graduate Student Fellowship. This recognition strongly encourages me to pursue my future career in the field of photonics. I would like to appreciate IEEE Photonics Society for the establishment of the student fellowships. I would also like to take this opportunity to thank my Ph.D thesis advisor, Prof. Jianping Yao, for his always support and valuable directions throughout my study.



Xiaoxia Wu

Xiaoxia Wu received the B.E. degree in Optical Information Science and Technology from Jilin University, Changchun, China, in 2004, and the M.E degree in Physical Electronics from Beijing University of Posts and Telecommunications (BUPT), Beijing, China, in 2006. She is currently working towards the Ph.D. degree

under the supervision of Prof. Alan Willner in Electrical Engineering at University of Southern California (USC), Los Angeles, California. She was a visiting student at Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Pisa, Italy, in Sept. 2008. Her current research interests include high-speed optical/electronic signal processing, optical performance monitoring and advanced optical modulation formats. She has authored/coauthored more than 70 papers in prestigious international journals and conferences.

Ms. Wu is a student member of the IEEE Photonics Society, the Optical Society of America (OSA) and the International Society for Optical Engineering (SPIE). She serves as a reviewer for IEEE Photonics Technology Letters, Optics Letters, Optics Express and Optical Engineering.

Ms. Wu was one of the 6 recipients of Yangtze Scholarship at Jilin University in 2002, sponsored by Yangtze Optical Fiber and Cable Company Ltd., Wuhan, China. She won the 2nd prize in China Undergraduate Mathematical Contest in Modeling (CUMCM) in 2002, and the 1st prize in Jilin University Research Opportunity Program for Undergraduates in 2004. She got the Excellent Undergraduate Thesis Award in 2004 and the Excellent Graduate Thesis Award in 2006. Her awarded travel grants for attending international conferences include: 2008 IEEE Photonics Society Student Travel Grant for attending ECOC in Brussels, Belgium; 2009 OSA Incubic/Milton Chang Travel Award for attending CLEO in Baltimore, Maryland; 2009 USC WiSE Travel Grant for attending Photonics in Switching in Pisa, Italy. She is one of the recipients of 2009 IEEE Photonics Society Graduate Student Fellowship Award.

"The honor truly belongs to people who give me continuous support and who I have been working with, especially Dr. Tingye Li and Prof. Alan Willner."

"Nick" Cartoon Series by Christopher Doerr



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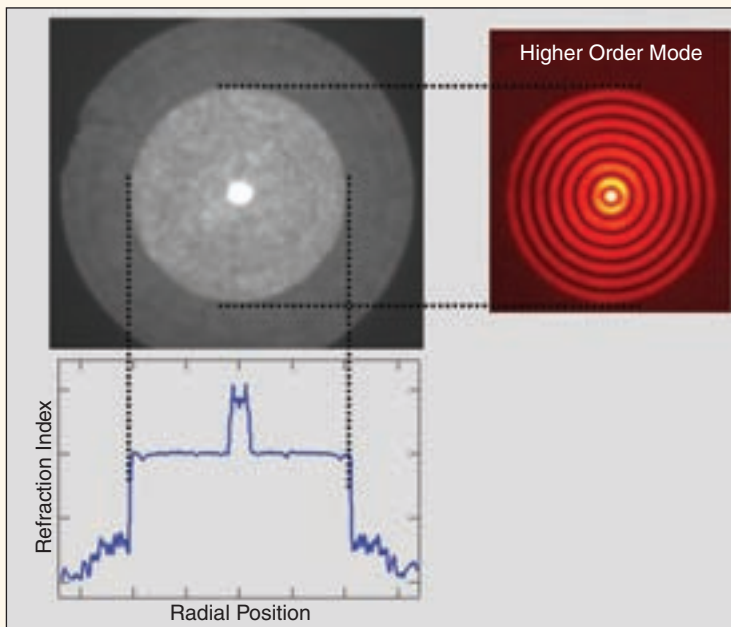
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Reprint Figures from PHOTONICS SOCIETY Newsletter June 2009 issue

In the June 2009 Newsletter, we printed three figures from the Figure Contest held last year. Those figures did not include captions and acknowledgments, so we include them this month.

Cover art shows an experimentally recorded mode image from the facet of an optical fiber. This mode is a close approximation of Bessel beams that have intriguingly counter-intuitive properties such as diffraction-resistant propagation, and the ability to self-heal [1]. They were believed to be unstable and hence not easy to generate in optical fibers,

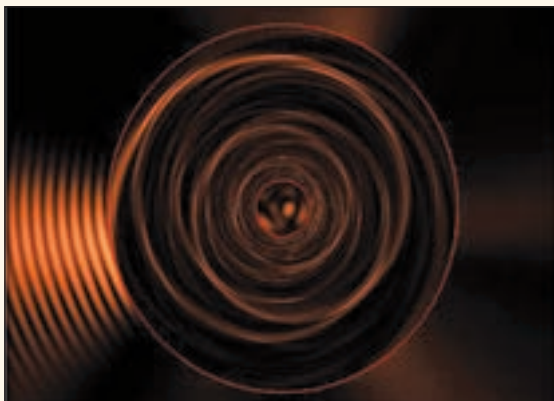
since they are not ground-state solutions. Ramachandran and coworkers have shown that, for fiber lengths up to 10s of meters, contrary to long-standing conventional wisdom, mode stability actually increases with mode order in optical fibers [2]. One ramification of this discovery is the prospect of scaling mode areas in fibers, thereby enabling scaling of the power achievable by fiber lasers. Bessel beams from fibers, of the kind shown in this picture, have resulted in single-mode, stable propagation of light with mode areas exceeding 3200 mm^2 over fiber lengths as much as 50 meters [3].



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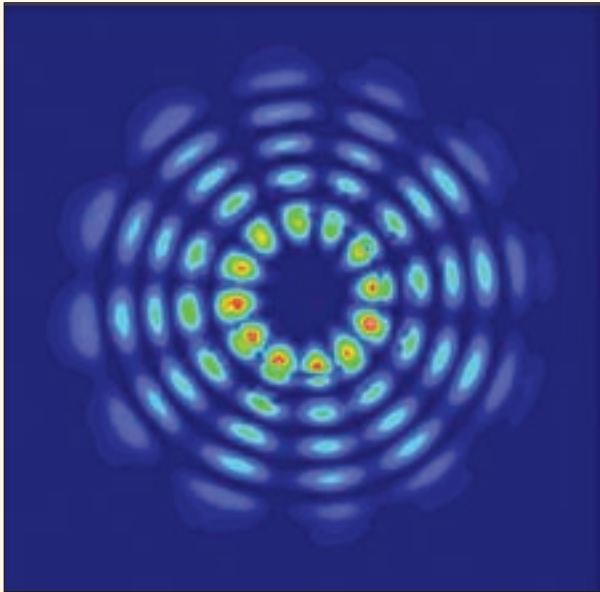
Siddharth Ramachandran
Professor, Institut for Fotonik
Technical University of Denmark



This figure shows the simulated plot of a Gaussian beam impinging on an "optical hyperlens", a metamaterial device that can break the well-known far-field diffraction limit. The hyperlens gives rise to unique spiraling ray trajectories that are exhibited in the Gaussian beam that spirals towards the core. The surprising agreement between ray and wave optics for this nano scale device is due to wavelength compression.

Zubin Jacob
Graduate Research Assistant
Department of Electrical Engineering
Purdue University

Membership Section (cont'd)



The image shows the LP₆₅ mode of a large-mode-area optical fiber. The fiber used here was specifically designed

to propagate light in a higher-order mode, in this case the LP₀₈ mode, which had an effective area of 1800 μm^2 . (For comparison, a standard, single mode fiber has an effective area of less than 100 μm^2). However, because the fiber is multi-moded, residual light can propagate in other, unwanted modes. S² imaging is a recently developed measurement technique, based on spatially resolved, spectral interferometry, to measure what fraction of power of the light in optical fibers is propagating in unwanted modes. Here the measurement showed that along with the LP₀₈ mode, the LP₁₈, LP₁₇, and the LP₆₅, along with other modes, were also propagating in the fiber. Still, at the output of the fiber the light was primarily in the LP₀₈ mode. After 20 m of propagation length, the power in the LP₀₈ mode accounted for 99% of the light in the fiber, and the LP₆₅ mode was over 25000 times weaker than the LP₀₈ mode.

Jeff Nicholson
Member of Technical Staff
OFS Laboratories

IEEE Photonics Society Kansai Chapter

The Photonics Society Kansai Chapter founded on April 19, 2007 provides many chances for activities and discussions for the Photonics Society members in Kansai Section, which covers western area of Japan including Kyoto,

Osaka, and Kobe. Kyoto is the Japanese ancient capital where there are lots of history and cultures. Osaka is the business center of western Japan, and Kobe is the port city recovered from the big earthquake in 1995. These cities



Membership Section (cont'd)

are closely connected with well-organized public transportation within 1–2 hours, and form traditional and present Japanese circumstances. Photonics Society Kansai Chapter consists of about 120 members and it is the second Photonics Society Chapter in Japan, following the Tokyo Chapter. Approximately half of the members belong to academia, and the other half mainly works in industries. Photonics Society Kansai Chapter actively holds more than 10 technical meetings every year, collaborating with universities and other technical societies for the purpose of gathering non-members, who might be possible members. For example, many technical meetings and lectures are organized in Kyoto University by inviting excellent speakers from all over the world in collaboration with the Kyoto University global center of excellent program on photonics and electronics science and engineering. At Kobe University, Photonics Society Kansai Chapter supports 2-day international symposium on information, photonics and nano-technology in

November every year. The Chapter also holds 2-day technical meeting with societies in the Institute of Electronics, Information and Communication Engineers (IEICE), Japan. At the meeting, there are about 30 technical talks and reception dinner for all the participants in order to discuss frankly with each other. Approximately every year, the Photonics Society Kansai Chapter invites Photonics Society Distinguished Lecturers. In 2009, Dr. Weng Chow from Sandia National Laboratories (US) presented “Introduction to a Many-Body Description of Semiconductor Lasers.”

Photonics Society Kansai Chapter welcomes all the Photonics Society members not only from Kansai area but also from over the world for technical discussion with traditional and present Japan circumstances.

Please contact Susumu Noda (snoda@kuee.kyoto-u.ac.jp), Chair of Kansai Section or Atsushi Sugitatsu (sugitatsu.atsushi@ap.mitsubishielectric.co.jp), Secretary, for additional information.

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The following individuals were elevated to Senior Membership Grade thru July–August:

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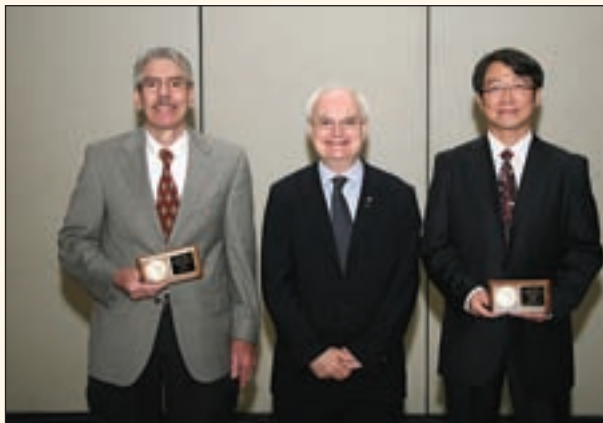
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Conference Section

Recognition at CLEO/IQEC 2009



John H. Marsb, Photonics Society President, recognized two Photonics Society members who have been elevated to the grade of IEEE Fellows: (From left to right) Gary Carter, John Marsb, and Chi Sun.



Robert L. Byer received the 2009 IEEE Photonics Award, "for seminal contributions to nonlinear optics and solid-state lasers for commercial applications from precision measurement and manufacturing." The award is sponsored by Photonics Society.



The Quantum Electronics Award was presented to Atac Imamoglu, "for field opening contributions to electromagnetically induced transparency and to quantum dot based information processing." The award is given to honor an individual (or group of individuals) for outstanding technical contributions to quantum electronics, either in fundamentals or application or both.



Aydogan Ozcan received the 2009 IEEE Photonics Society Young Investigator Award, "for field opening contributions to electromagnetically induced transparency and to quantum dot based information processing." The award is given to honor an individual who has made outstanding technical contributions to photonics prior to his or her 35th birthday. Funding is provided by General Photonics Corporation.



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Publication Section

Call for Papers

Announcing an Issue of the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS on Next-Generation Organic and Hybrid Solar Cells

Submission Deadline: November 14, 2009

IEEE Journal of Selected Topics in Quantum Electronics invites manuscript submissions in the area of solar cells that make use of organic molecules and polymers. The field of organic photovoltaics has been expanding rapidly, driven largely by the promise of a low-cost, large area, flexible source of renewable energy. The purpose of this issue of JSTQE is to highlight the recent progress and future trends in the various approaches that have been and are being developed for producing highly efficient, stable organic solar cells.

Broad technical areas include but are not limited to the following topics:

- Organic solar cells based on small molecules and/or polymers
- Dye-sensitized photo-electrochemical solar cells
- Hybrid organic-inorganic solar cells
- Device performance and efficiency
- Device lifetime and reliability
- Device physics and chemistry
- Device modeling
- Novel processing methods
- Fundamental studies relevant to charge carriers, excitons, and interfaces
- Low-cost fabrication techniques for large area deposition including roll-to-roll printing processes
- Flexible substrates and barrier films for printable organic solar cells

The Guest Editors for this issue are: **Zakya Kafafi**, National Science Foundation – Virginia, USA; **René Janssen**, Eindhoven University of Technology – Eindhoven, The Netherlands; **Kwanghee Lee**, Gwangju Institute of Science & Technology (GIST) – Gwangju, Korea; **Barry P. Rand**, IMEC – Leuven, Belgium.

The deadline for submission of manuscripts is **November 14, 2009**; electronic publication will appear as soon as the

manuscripts are accepted; publication of the entire special issue is scheduled for November/December of 2010.

Online Submission is Mandatory at: <http://mc.manuscript-central.com/pho-ieee> Please select the Journal of Selected Topics Of Quantum Electronics Journal from the drop down menu.

For inquiries please contact directly at:

Chin Tan-yan

IEEE/Photonics Society

Publications Coordinator

445 Hoes Lane, Piscataway, NJ 08854 USA

Phone: 732-465-5813, Email: c.tan-yan@ieee.org

For all papers published in *JSTQE*, there are voluntary page charges of \$110.00 per page for each page up to eight pages. Invited papers can be twelve pages and Contributed papers should be 8 pages in length before overlength page charges of \$220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper. Additional charges will apply if color figures are required.

The following supporting documents are required during manuscript submission:

- 1) .doc manuscript (double columned, 12 pages for an Invited Paper. Contributed paper should be double columned, 8 pages in length.) Bios of ALL authors are mandatory, photos are optional. You may find the Tools for Authors link useful: <http://www.ieee.org/web/publications/authors/transjnl/index.html>
- 2) Completed the IEEE Copyright Form. Copy and paste the link below: <http://www.ieee.org/web/publications/rights/copyrightmain.html>
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- 4) .doc list of ALL Authors FULL Contact information as stated below: Last name (Family name): /First name: Suffix (Dr/Prof./Ms./Mr):/Affiliation:/Dept:/Address:/Telephone:/Fax:/Email:/Alternative Email:

Call for Papers

Announcing a Special Issue of the IEEE/OSA Journal of display Technology on LCOS Technology

Submission Deadline: December 31, 2009

The *IEEE/OSA Journal of Display Technology* (JDT) invites submission of manuscripts for a special issue. The purpose of this special issue is to document the current status of the Liquid Crystal on Silicon (LCOS) technology through a collection of original papers. Contributed papers on all aspects of this technology are welcome; from issues concerning the drivers and electronic interface, signal processing aspects, chip design, design of the liquid crystal pixels, modeling, development of special materials, associated optical systems to applications in projection displays, pico-projectors, diffractive displays, holograms and communication devices.

The Primary Guest Editors for this issue are **Dr F. Anibal Fernandez** and **Dr Sally E. Day**, University College London, London, UK. Associate Guest Editors are **Dr Mike Robinson**, RealD, USA, **Dr Herbert de Smet**, IMEC and University of Ghent, Ghent, Belgium and **Dr Atsutaka Manabe**, Merck KGaA, Darmstadt, Germany.

The deadline for submission of manuscripts is **31 December 2009** and publication is tentatively scheduled for the **September 2010** issue. Manuscripts should conform to requirements for regular papers (up to 8 double-column, single-spaced journal pages in length, keywords, biographies, etc.). All submissions will be reviewed in accordance with the normal procedures of the Journal. The IEEE Copyright

Form should be submitted after acceptance. The form will appear online in the Author Center in Manuscript Central after an acceptance decision has been rendered.

For all papers published in JDT, there are voluntary page charges of \$110.00 per page for each page up to eight pages. Invited papers can be twelve pages in length before mandatory overlength page charges of \$220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper.

Authors may opt to have figures displayed in color on IEEE Xplore at no extra cost, even if they are printed in black and white in the hardcopy edition. Additional charges will apply if figures appear in color in the hardcopy edition of the Journal.

Manuscripts should be submitted electronically through IEEE's Manuscript Central:

<http://mc.manuscriptcentral.com/jdt-ieee>. Be sure to select "2010 LCOS Technology Special Issue" as the Manuscript Type, rather than "Original Paper." This will ensure that your paper is directed to the special issue editors. IEEE Tools for Authors are available online at: <http://www.ieee.org/organizations/pubs/transactions/information.htm>

Inquiries can be directed to Lisa Jess, Publications Administrative Assistant, IEEE Photonics Society Editorial Office, l.jess@ieee.org (phone +1-732-465-6617; fax +1 732 981 1138).

Call for Papers

Announcing the Joint Special Issue of the IEEE Transactions on Microwave Theory and Techniques and the IEEE/OSA Journal of Lightwave Technology on Microwave Photonics

Submission Deadline: January 1, 2010

The *Transactions on Microwave Theory and Techniques* and the *IEEE/OSA Journal of Lightwave Technology* invite manuscript submissions in the area of Microwave Photonics. This special joint issue will focus on the diverse, multidisciplinary field of microwave photonics and will be sent to subscribers of both journals. Microwave photonics focuses on interactions between the optical and the micro-

wave portions of the electromagnetic spectrum, where here the term "microwave" encompasses all frequencies from 10 MHz to 10 THz. This Special Issue will treat recent progress in microwave photonics including experimental studies, theoretical investigations, numerical modeling, and applications. Topics to be covered include, but are not limited to:

- 1) Devices, Components and Sub-systems
 - High-speed, wideband and linear photonic devices & optically controlled microwave devices
 - Integration and packaging of photonic and microwave components and circuits

Publication Section (cont'd)

- Microwave bandwidth optical transmitter, receiver, and signal processing subsystems

2) Techniques and Links

- Photonic generation, distribution, sensing, detection, processing, filtering, and control of microwave signals
- High-speed photonic analog-to-digital and digital-to-analog conversion
- Analog, digital and subcarrier multiplexed microwave photonic links
- Optical frequency metrology and control

3) Systems and Applications

- Photonic technology for phased array antenna systems and antenna remoting
- Broadband wireless over fiber systems and networks
- Ultra-fast optical probing, imaging, and measurements

- Technologies for emerging applications (biomedical, ultrawideband, terahertz, quantum communications, etc.)

The deadline for submission of manuscripts is January 1st, 2010 and publication is scheduled for the November 2010 issue.

Authors may contact Dalma Novak [d.novak@ieee.org] for more information. Instructions for submission of papers can be found at <http://www.mtt.org/publications/Transactions/transactions.htm>. In addition, authors must add "(T-MTT/JLT Special Issue)" to the subject line of the e-mail submission.

Guest Editors

- Prof. José Capmany
Universidad Politécnica de Valencia
- Prof. Ampalavanapillai Nirmalathas
The University of Melbourne
- Dr Dalma Novak
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Call for Papers

IEEE Sensors Journal Special Issue on Cognitive Sensor Networks

The objective of this special issue is to bring together state-of-art research in sensors, information processing, and communication with the perspective of cognitive sensor networks. The contributed papers will specifically address issues related to information centric sensor networks, regarding them as a multi-component system consisting of sensors, platforms, models, and communication infrastructures, that can collectively behave as a single dynamically adaptive system. Context aware sensing and communication give rise to additional challenges. Addition of new nodes and the demand for network scalability given a limited communication bandwidth, warrant the need for adaptive and optimal spectrum sharing protocols. Information relevance cannot be established without evaluating the sensor data against network objectives, therefore warranting the need for in-network information processing. The data centric nature of such networks warrants the need to simultaneously manage information and network topology through the cross layer design of the sensor nodes. The growing use and ubiquitous nature of sensor networks pose issues when networks deployed for multiple applications need to be combined or need to exchange information at the network level.

Cognitive sensor networks intersect with trends in information fusion, intelligent sensors, sensing grids, communication protocols, network routing, and complex event processing architectures. This special issue will focus on all aspects of design, development, implementation, operation, and applications of cognitive sensors and sensor networks. Topics of interest include (but are not limited to):

- Architectures for cognitive sensor networks • Detection, classification, and tracking
- Signal processing for cognitive sensor networks • Autonomous computing
- Cognitive routing metrics • Pattern analysis and situation awareness
- Sensor aided cognitive networks • Intelligent sensors
- Cognitive mesh networks • High level information fusion
- Localization and synchronization • Simulation tools, benchmarks and testbeds
- Self organization and reconfiguration • Performance evaluation and modelling
- Resource management • Distributed algorithms and reasoning
- Spectrum sensing • Machine learning for sensor networks
- Channel and context aware information fusion • Sensor tasking, control, and actuation

Publication Section (cont'd)

- Information fusion under communication
- Semantics in cognitive sensor networks constraints
- Applications

Notes for Prospective Authors: Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Expanded, archival versions of papers delivered at technical conferences are welcomed. All papers are refereed through a web-based peer review process. A guide for authors, sample copies and other relevant information for submitting papers are available at <http://mc.manuscriptcentral.com/sensors> under the heading "Information for Authors."

Important Dates

Manuscript submission: 15th January 2010

Reviewer reports: 15th May 2010

Revised paper submission: 15th July 2010

Final manuscript submission to publisher: 30th July 2010

Guest Editors:

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Photonics Society Mission Statement

Photonics Society shall advance the interests of its members and the laser, optoelectronics, and photonics professional community by:

- providing opportunities for information exchange, continuing education, and professional growth;
- publishing journals, sponsoring conferences, and supporting local chapter and student activities;
- formally recognizing the professional contributions of members;
- representing the laser, optoelectronics, and photonics community and serving as its advocate within the IEEE, the broader scientific and technical community, and society at large.

Photonics Society Field of Interest

The Field of Interest of the Society shall be lasers, optical devices, optical fibers, and associated lightwave technology and their applications in systems and subsystems in which quantum electronic devices are key elements. The Society is concerned with the research, development, design, manufacture, and applications of materials, devices and systems, and with the various scientific and technological activities which contribute to the useful expansion of the field of quantum electronics and applications.

The Society shall aid in promoting close cooperation with other IEEE groups and societies in the form of joint publications, sponsorship of meetings, and other forms of information exchange. Appropriate cooperative efforts will also be undertaken with non-IEEE societies.

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Alternatively, the controller can automatically adjust and maintain the input SOP using the feedback from the rear polarimeter to either minimize or maximize the output DOP for each PMD setting. Minimizing the output DOP enables testing of the worst-case total PMD effect, while maximizing the DOP turns the PMDPro™ into a PMD compensator, allowing the user to estimate the PMD values of an active fiber link and compare its performance with and without PMD compensation.. PMDPro™ can also perform PMD emulation by generating statistical PMD distributions. Finally, the polarization controller and polarimeters enable variable rate polarization scrambling and deterministic polarization control functions, including trace generation and polarization stabilization at any SOP. PMDPro™ makes your PMD related systems testing simple, fast and professional.

UNIQUE FEATURES:

- 1st and 2nd order PMD source
- 1st order PMD emulation
- Automatic polarization alignment
- Polarization scrambling
- PMD compensation
- PMD determination for live fiber links
- Rapid PMD switching: ~ 1 ms

APPLICATIONS:

- System PMD tolerance test
- PMD compensator evaluation
- PMD estimation for live fiber links
- Diagnosis of system impairments
- PMD measurement instrument calibration

