A New Wave of Optical Engineering

Frank Wyrowski, with his work in wave-optical engineering and photon management, is a trendsetter in non-imaging optics and optical engineering.

Like many active SPIE members, Frank Wyrowski keeps very busy. Between teaching at the Friedrich-Schiller-Universität (FSU; Jena, Germany) and consulting at LightTrans (Jena, Germany), the company he co-founded, Wyrowski somehow manages to play an active role at SPIE and still find time to spend with his sons Patrick and Alexander.

Early in life Wyrowski realized he had an aptitude for mathematics and, in fact, didn’t develop an interest in physics until college. “Because of a lack of mathematics, the beauty of general physics and optics were not obvious to me,” he explains. Focusing first on theoretical physics, he sought out a professor with a penchant for applied physics using theoretical physics and computers. The search led him to his future doctoral advisor, Olof Bryngdahl. “From him I learned a lot about the science and beauty of optics. Since then, I have loved optics,” Wyrowski says.

At the beginning of his career in optics, Wyrowski focused on computer-generated holograms and the burgeoning field of diffractive optics. As one of the first researchers to use the term, Wyrowski’s contributions to diffractive optics include the introduction of new encoding theories and various iterative and non-iterative encoding and design algorithms, in addition to research in picture halftoning and general algorithms for the manipulation of complex fields.

After a few years in industry, Wyrowski began teaching at FSU in 1997. His first project at the university focused on the use of diffractive optics in laser resonators. “However, the search for a better understanding of the role of diffractive optics in a larger context preoccupied me,” he says.

This preoccupation soon turned into a realization for Wyrowski. He came to believe that for optical design, ray optics just wasn’t enough to model systems for general light transformations. Thus, he began to focus on developing a better understanding of wave optics in optical engineering. “I became convinced that a wave-optical generalization of optical engineering is essential for the innovative potential of optics and photonics.”

With this conviction, he founded LightTrans in 1999 with his wife Petra. The aim of the company is to incorporate innovations in wave-optical engineering into engineering services, products, and software to help customers create their own innovative photonics and optics products.

Wyrowski is now a technical consultant with LightTrans so that he can continue his work at the university. “I enjoy the freedom at universities to take the time to sort your thoughts and to refine your concepts. Moreover, it is very satisfying to teach young people. I am glad to work in both surroundings at the same time.”

In the last few years, Wyrowski has focused on wave-optical engineering for photon management, which, he says, emphasizes the trend toward a flexible control of electromagnetic radiation and stresses the need for optical systems that realize optical functions beyond image forming. As it turns out, wave-optical engineering is the modeling base of photon management.

In fact, Wyrowski is the chair of the upcoming SPIE conference Photon Management, part of Photonics Europe in Strasbourg, France, this April. “I decided that a conference with the title Photon Management could serve to bring people from different fields of photonics and optics together who are all interested in understanding optical engineering beyond image-forming optics,” Wyrowski says.
It seems it will bring together many people, as Wyrowski has received 60 submissions for this new conference. “That shows that there is a need to give a generalized understanding of optical engineering a space for information exchange and discussion,” he says. “After Strasbourg and the experience there, I will consider how to strengthen and develop this information exchange and discussion in the optics community.”

Along with this upcoming conference, Wyrowski also has been a chair or committee member for many SPIE conferences in the areas of holography, diffractive optics, and wave-optical design, including chairing the conferences Wave-Optical Systems Engineering I and II. In addition to writing journal articles and book chapters, often with his friend Jari Turunen, he has written numerous papers for SPIE proceedings in those same fields and teaches the SPIE short course “Introduction to Wave-Optical Engineering.”

Wyrowski also is a member of the Board of Directors (2003–2005) and the Symposia, Membership, and Engineering, Science, and Technology Policy committees. “SPIE gives me a platform to influence the development of optics and photonics myself. I also feel responsible to contribute to a continuous improvement of SPIE’s services for our community,” he says.

But as busy as he is, Wyrowski still finds time to relax and enjoy life. He enjoys various sports, working out, power walking, and dancing. “It has turned out to be very important that in my free time I have ideally no link to my business,” he says. “There are a lot of other things than optics and photonics making life as beautiful as it is.”

SPIE Press Launches New Series

Guides promise focused information at readers’ fingertips.

SPIE Press has introduced a new series of books this year— the Field Guide Series. These guides are designed to be handy desk or pocket references for practicing engineers, scientists, and experienced students.

“The aim of the SPIE Field Guides is to provide users basic, essential information about optical principles, techniques, or phenomena, including definitions and descriptions, key equations, illustrations, application examples, design considerations, and additional resources,” explains SPIE Fellow John Greivenkamp, editor of the new series.

Each book in the Field Guide Series addresses a major field of optical science and technology in a 5 × 8 in., spiral-bound format, optimal for use in the lab or in the field. The guides center on their format— figures and equations supplemented by concise explanations.

“The guide aims to provide you with the information and insights you need when you need them,” Greivenkamp says. “There isn’t a great deal of text in the guides— just enough to supplement and clarify the information presented in graphic or equation form on each page.”

The books also include highlights, insights, tips, and rules of thumb in sidebars to the main text. Each guide includes appendices and additional information such as related material outside the main scope of the volume, key mathematical relationships, and alternative methods.

Greivenkamp also is the author of the first book in the series, Field Guide to Geometrical Optics, which has just been published. Larry Andrews’s Field Guide to Atmospheric Optics is now in print as well, and Field Guide to Adaptive Optics by Robert K. Tyson will be published soon. Other topics in the works are visual optics, microlithography, remote sensing, infrared systems, and digital halftoning.

“Eventually we plan to cover as many of the technical areas represented by the SPIE membership as possible. Some guides will be of a more general nature, while others will target a specific technology. I am certainly looking for suggestions for topics for the series, and continue to add Field Guide authors to our lineup,” says Greivenkamp.

For more information on available Field Guides, go to spie.org/publications.
Photonics Europe Attracts 1000 Submissions

The rooms of the Strasbourg Convention Center (Palais de la Musique et des Congrès de Strasbourg) will be full every day of the week 26–30 April as researchers from around the world join Europe's technical leaders to showcase the optics/photonics developments happening in Europe. One thousand abstracts have been submitted for papers to be presented at Photonics Europe.

The week will start out with Hot Topics 2004, which will focus on research funding in Europe and a long-term view of the future of key optics and optoelectronics technologies.

In addition to research conferences, there will be short courses, business programs, optics cluster meetings, a session on how to do business in North America, a reception at Louis Pasteur University, a large poster session, the Young Innovators Village, and, of course, the exhibition. Unlike other exhibits in Europe, which are located in large exhibition centers, the Photonics Europe exhibit is limited to 140 companies, and they are located right in the middle of all the activity. The goal is to allow for a much closer interaction between attendees and exhibitors.

Another goal of this event is to bring together leaders from a variety of technologies and to create a casual atmosphere that encourages interaction and cross-fertilization of ideas during the week. No conference-wide activities are planned for Wednesday night, and instead people are encouraged to take a colleague to an old-fashioned Alsacean dinner downtown.

The three general chairs: Hugo Thienpont, Vrije Universiteit Brussel (Belgium); Giancarlo C. Righini, Istituto di Fisica Applicata (Firenze, Italy); and Patrick Meyrueis, Université Louis Pasteur (Strasbourg, France) have been working with colleagues for more than a year, not only to make the conferences valuable, but also to establish forums and discussions relating to funding and to highlight programs that are working well in Europe.

For more details, see the Photonics Europe advance program online at spie.org/info/epe.

DeM aria Joins UConn Engineering Faculty

Past President and SPIE Fellow Anthony DeM aria has joined the University of Connecticut (UConn; Storrs, CT) School of Engineering as a professor-in-residence associated with the electrical and computer engineering department.

He currently is a chief scientist in the Laser Division of Coherent-DEOS of Bloomfield, CT, and will remain active in that role while a professor-in-residence.

DeM aria earned both his BS in electrical engineering (1956) and PhD in engineering physics (1965) from the UConn School of Engineering. And in previous collaboration with the UConn School of Engineering (1994–1998), he helped to establish the UConn Photonics Research Center.

He devoted 37 years of his career to the Hamilton Standard (now Hamilton Sundstrand) division of United Technologies Corporation (Hartford, CT) and to the United Technologies Research Center. In 1994 DeM aria purchased the intellectual property of the CO₂ laser unit of Hamilton Sundstrand to start DeM aria Electro-Optics Systems, Inc. (DEOS). After building this small business into a success, DEOS was purchased in 2001 by Coherent, Inc. (Santa Clara, CA) to become Coherent-DEOS.

DeM aria has taught college-level coursework in electrical engineering and physics at several institutions. He holds 45 U.S. patents and is a member of both the National Academy of Engineering (since 1976) and the National Academy of Sciences (since 1997). He is also a former president and councilor of the Connecticut Academy of Science and Engineering.

In Memoriam: Alfred Sommer

Alfred Sommer, 94, died on 8 December in Longmeadow, MA. He was born in Frankfurt, Germany in 1909. He completed his PhD in chemistry at the University of Berlin in 1934. Forced out of Germany by the Nazis, he found work in England in the emerging field of television, first at Baird TV, then at EMI. He immigrated to the United States in 1953, where he continued his career at the David Sarnoff Research Labs in Princeton, NJ. Following his retirement in 1974, he served for 15 years as a consultant to Thermo Electron Corp. in Waltham, MA.

He devoted 37 years of his career to the Hamilton Standard (now Hamilton Sundstrand) division of United Technologies Corporation (Hartford, CT) and to the United Technologies Research Center. In 1994 DeM aria purchased the intellectual property of the CO₂ laser unit of Hamilton Sundstrand to start DeM aria Electro-Optics Systems, Inc. (DEOS). After building this small business into a success, DEOS was purchased in 2001 by Coherent, Inc. (Santa Clara, CA) to become Coherent-DEOS.

DeM aria has taught college-level coursework in electrical engineering and physics at several institutions. He holds 45 U.S. patents and is a member of both the National Academy of Engineering (since 1976) and the National Academy of Sciences (since 1997). He is also a former president and councilor of the Connecticut Academy of Science and Engineering.

Sommer received SPIE’s Gold Medal in 1993. He was honored for his pioneering work in the production of the first high-sensitivity panchromatic photocathode, essential to the development of black-and-white and early color television. Throughout his career he was repeatedly recognized for his seminal contributions to the field of photoemissive materials. His inventions were considered of crucial importance in the fields of high energy physics, medicine, biology, astronomy, night vision, and television.

Sommer was a dedicated piano player and lover of classical music, as well as an enthusiastic traveler and walker, all interests he shared with his wife of 61 years, Rosemary, who died in 2000.