Probably María is the most respected person working in optics in Spain,” says SPIE member Juan Campos, a former PhD student and current colleague of María Yzuel.

Yzuel has been teaching optics for 40 years and has influenced the science community in Spain in innumerable ways. “She is very well respected and loved by the Spanish optics and physics community,” says SPIE Fellow Carmiña Londoño, National Institute of Standards and Technology (Gaithersburg, MD).

This respect for Yzuel extends beyond Spain and into the optics community around the world as well. Mention Yzuel’s name to anyone who has met her, and you are sure to hear a story of her kindness and generosity.

education of an educator
Growing up in a small town in the Pyrenees Mountains, Yzuel found she enjoyed mathematics and physics in secondary school. “At that time, in a small town rather far from a university, it was not easy to know the contents of the different degrees,” says Yzuel. “Besides, a degree in science was not considered very adequate for a woman, and very few women studied engineering.” So, she traveled to Zaragoza, Spain, finished her last year of secondary school there, and then enrolled in the physics program at the University of Zaragoza (UZ) in 1957. “It was clear for me and for my teachers that I should study a degree in science. My parents encouraged me to follow the degree I preferred.”

After earning her MSc degree, Yzuel stayed at UZ and completed her PhD thesis in optics. At UZ in 1971, Yzuel became the first woman to obtain a permanent position as a professor of physics in Spain.

Now a professor at the Universidad Autónoma de Barcelona in Spain, Yzuel says she enjoys the combination of teaching and research that the university affords her, but what she enjoys most is supervising PhD students. In fact she has supervised or co-supervised 20 thesis students in her career.

investigative research
“What makes me passionate about optics is the numerous applications in other sciences and engineering and the high advances produced in other sciences thanks to the advances in optics and in optical instruments,” says Yzuel. Indeed, she has explored many of these applications in different fields of research through the years.

“In the ‘70s I worked on the quality parameters of gamma-graphic and radiographic images in medical diagnosis. These works were the first in Spain to apply optics knowledge to medicine especially for gammagraphy,” she explains.

Yzuel has worked the last 15 years in image processing. “In this field I and my research group have created new approaches that introduce the color information of objects in pattern recognition. Also we have built a real-time correlator for pattern recognition working with liquid crystal panels. In this field we have obtained spatial light modulators working in only-amplitude or only-phase modulation, which can also be applied to diffractive optics.”

In addition, Yzuel and her team have investigated the use of
liquid crystal panels to generate apodizers with optical systems and have proposed filters to improve the resolution.

**progress in Spanish optics**

In her 40 years of research and activity in the optics community, Yzuel has seen change in the Spanish optics scene.

"The field has grown very much in [the amount of] research and in the number of professors and research groups. When I started my career in the '60s, there were people working in optics in only two universities, at the Institute of Optics, and a few government institutions. Nowadays there are more than 20 universities with a degree in physics, in all of them there is at least an optics group." And she mentions there are several other institutes in Spain focused on optics research.

However, Yzuel stresses there is still room for improvement. "The funding of research by the government in Spain is much less than in other countries in Europe. In general, promotion from the government would help if a special research program for photonics were introduced," she says.

Another area that has changed in Spain is the role of women in physics and optics.

"In general the climate for women in optics and physics has improved over time. Nevertheless, there still exits a glass ceiling for women in the profession," says Yzuel. According to statistics, the number of female professors in physics in Spanish universities remained unchanged at about 20% from 1990 to 2001. But in that same time period, the number of women full professors in physics increased from 1.7% to 7.1%. And in optics, women constitute 11% of the full professors. According to Yzuel, most of the female physicists are teachers and few are in industry.

**extracurricular activities**

Besides her research and teaching, Yzuel currently is or has been active with the International Commission for Optics, the Spanish Optical Society, the European Optical Society, and the Spanish Physical Society. She is also a fellow of the Optical Society of America and the Institute of Physics. And earlier this year she became the first person in Spain to become an SPIE Fellow.

Her work with SPIE is extensive. Just this year alone she served on the Board of Directors, the Publications Committee, the Awards Committee, and the Women in Optics Core. And, of course, she has been integral to several SPIE conferences. In fact, she is a member of the steering committee for the upcoming Photonics Europe in Strasbourg, France, in April.

Campos speaks for many when he says, "Everybody knows María and appreciates her; it is a privilege to work with her and to be one of her friends."

Please see oemagazine.com for an extended version of this profile.

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**student spotlight**

**UC Davis student chapter thrives**

The optical science and engineering undergraduate program at the University of California, Davis (UCD) is one of only a handful offered in the United States. UCD also has the distinction of hosting the largest SPIE student chapter. The chapter didn't start big, though.

The UCD chapter was founded by 10 students during the 2001–2002 school year. To recruit new members, twice a year the chapter’s officers give a short presentation to each of the many undergraduate optical science classes, “telling the prospective members what the club stands for, the benefits, and, of course, inviting them to a new members barbecue later that week,” explains Vice President David Woolf. “At the barbecue they get a chance to meet current members and to get in contact with people in our major. As a club, we want to make sure the members are going to be active, so we aim for quality over quantity.”

However, they’ve managed to combine both quality and student spotlight continued on page 30
In addition to Woolf, the 2003–2004 officers are Kerry Krauter, president; Christina Wing, treasurer; and Leila Fadavi, secretary.

The students meet every two weeks to discuss undergraduate research opportunities and social events for the chapter. They also host guest speakers who lecture on graduate school, research, and industry opportunities. And with outreach programs like the Laser Maze, UCD students have taken the initiative to share their interest in optics with other students at UCD and with the community.

“Our largest and most successful activity has been the Laser Maze, which consists of a hallway lined with mirrors reflecting a laser beam back and forth across the hall and carrying information from a compact disk player to a receiver, so when the beam is interrupted, the music is also interrupted,” says Woolf. The group has held this activity for elementary students and as a part of UC Davis’s Picnic Day, which typically has 50,000 to 60,000 visitors. The chapter would like to create a portable Laser Maze that could be taken to local elementary schools and other locations.

“One thing that stands out is the camaraderie between the members. We strongly believe that the friendship shared within the club is directly responsible for the club’s success,” says Woolf. In fact, the chapter holds social functions throughout the year, including an annual trip students can take to Lake Tahoe.

In addition, the UCD chapter has a unique advantage—the close proximity of three national laboratories. Lawrence Livermore National Laboratory (LLNL; Livermore, CA), Sandia National Laboratories (Livermore, CA), and Lawrence Berkeley National Laboratory (Berkeley, CA) are all in the area.

The graduate program of applied science actually has a satellite site adjacent to LLNL and Sandia. The student chapter takes an annual tour of the LLNL facilities and many students have worked summer internships at the lab. “More than anything else, it has given firsthand insight into the opportunities in the field of optics,” says Woolf.

DeMaria says farewell as SPIE president
By Anthony J. DeMaria, 2003 SPIE President

Now that my presidential year is coming to a close, I will have to decide what to do with all my free time! The time went by quickly because of how much I enjoyed working with SPIE staff, our executive director, the Board of Directors, and the numerous committees, symposia chairs, and members who donate their time to serve the goals of SPIE.

The president gets to be a part of many satisfying activities, such as giving out awards, fellowships, and scholarships. This year, I also had the pleasure of announcing the launch of the Digital Library and the transition of our Journal of Biomedical Optics from quarterly to bimonthly, welcoming members of our worldwide chapters at our Annual Meeting in San Diego, and witnessing the great performance of the staff in turning a predicted financial deficit for 2003 into a surplus after I pleaded “not to have a deficit on my watch.” The development of an excellent strategic planning process along with a more vigorous and active Symposia Committee were also highlights of the past year.

Though my travels were not as extensive as those of my two predecessors, I greatly enjoyed my trip to Laser Munich 2003. There I met with numerous captains of European optics and photonics industries, European researchers, and several European society presidents. I do regret that I was not able to make a trip to Asia where SPIE is also very active.

I am confident that the future leadership of SPIE will continue to be nimble and select new areas to serve, as well as strengthen the Society’s foundation to continue to improve our services for the development and dissemination of new knowledge in optics and photonics.

To my successor, James Bilbro, I offer my best wishes and an offer to assist in any way I can.
Congressional Fellow focuses on homeland security
By Christopher Beck

Christopher Beck is the 2003 SPIE-OSA Congressional Fellow. This is his final report for OE magazine.

With less than three months left in my fellowship year at this writing, it has been one of the greatest experiences of my life. As I reported in an earlier article, I currently work in the office of Rep. Loretta Sanchez, from the 47th district of California, who sits on the House Select Committee on Homeland Security. For the first half of my fellowship year, I was one of two staff focusing mainly on homeland security, although I also worked on health and social welfare policy. My colleague has since moved to another department, and I have taken up all duties of the homeland security staffer myself. House members' confidence in this program is such that they are quite willing to let me and other fellows function as fully participating members of the staff. I write and review legislation, propose and staff hearings, and have all the responsibilities of a senior legislative assistant.

An illustration of the impact of the government focus on homeland security on the scientific community is the BioShield Project, which will, when passed, be overseen by the Department of Health and Human Services. This $5.6 billion project provides for medical countermeasures to protect the public in the case of a biological, chemical, or radiological attack. Most of the funds are for incentives to private-sector companies to develop vaccines, a market that is normally neglected due to liability exposure and the one-shot use of the vaccine. However, there is room for non-vaccine medical countermeasures, as well as prevention and detection technologies, in the authorization.

The National Science Foundation, National Institutes of Health, National Institute for Standards and Technology, Department of Energy, the national laboratories, and universities will all find new grants available both for basic and applied science and technology research projects.

While the Department of Homeland Security is having its share of difficulties getting off the ground to date, there is much interest in creating partnerships with and leveraging the abilities and capacity of the university system, the national laboratories, and the private sector. The Science and Technology Directorate is looking for ideas, products, and organizing grants to support these efforts. Also, they are trying to grow their own capacity via the Homeland Security Advanced Research Projects Agency modeled after DARPA.

I have thoroughly enjoyed my time here, and my future plans include remaining in the policy arena for at least a while longer. I have been privy to a one-year immersion course in U.S. government, and my office has been pleased when I have elucidated and explained technical aspects of bills or funding projects that they would not have understood otherwise. I hope that many more scientists will move into the policy arena. The analytical problem-solving skills that my formal scientific training equipped me with have been invaluable in policy planning and analysis, and the crafting of policy with the prospect of positively impacting millions of lives is an incredibly rewarding experience.

Koehler selected as 2003–2004 Congressional Fellow


"The Fellowship seems like a wonderful opportunity to apply my technical background to societal issues that I care about," explains Koehler. "I am looking forward to meeting and learning from people of diverse political, cultural, religious, and geographical backgrounds, and working on issues of national importance."

Koehler earned her BA in optical engineering from the University of Rochester (Rochester, NY) and both her MA and PhD degrees in optical sciences from the University of Arizona (Tucson, AZ). She was a laser systems engineer at NASA Langley Research Center (Hampton, AZ) and is currently on leave from her position as senior optical systems engineer at Raytheon Systems Company (Tucson, AZ).

"I hope to bring a scientific perspective to the Hill, and take back with me a deeper understanding of how policy is made and how to work effectively with decision makers," says Koehler.
SPIE and oemagazine will host the 2004 Photonics Market Opportunities Forum: “Show Me the Money” at Photonics West, 28 January 2004. Photonics technology is assuming an increasingly important role in many areas of technology, including biotechnology, nanotechnology, semiconductor manufacturing, lighting, data storage, and more. Many companies in the photonics industry have the resources to succeed in these hot markets, but they need a plan.

The 2004 Photonics Market Opportunities Forum is the perfect place to gain market intelligence and refine business strategy. The forum is designed to give attendees a current snapshot about hot areas, trends in funding and research, and technologies required for the growth areas. Come find out about the technologies in demand, the high growth areas, and avenues to future funding.

Registration includes a post-forum networking reception, a video on CD-ROM of the presentations, and a handout of the view graphs presented. The cost for SPIE members is $295, or $375 for nonmembers.

To register, or for more information, go to oemagazine.com/forum.

members in the news

ITT Industries receives NASA contract
Corporate member ITT Industries of White Plains, NY, was awarded a $274 million subcontract by NASA for operations and maintenance of NASA’s Deep Space Network facilities. The contract includes incentive provisions that can extend the contract for an additional five years, increasing the contract value by an additional $306 million.

The Deep Space Network, managed by the Jet Propulsion Laboratory (Pasadena, CA), is an international network of antennas that supports interplanetary spacecraft missions. The network also supports selected Earth-orbiting missions.

universities partner in photonics research and education
In a ceremony at the Duke University (Durham, NC) campus in September, Duke and the National Chiao Tung University (NCTU; Hsinchu, Taiwan) formally agreed to establish new collaborative education and research programs in photonics and electro-optics.

Dr. Chun-Yun Chang, president of NCTU, and Duke President Nannerl O. Keohane signed the agreement after touring the Duke campus and the future home of Duke’s Fitzpatrick Center for Photonics and Communication Systems.

“These kinds of international partnerships provide not only research opportunities for our students, they promote cultural understanding that will enhance our vision to educate students as the next generation of leaders in our society,” says Duke’s Pratt School of Engineering Dean and SPIE member Kristina M. Johnson (see profile on Johnson in oemagazine, October 2003, p. 31).

Duke and NCTU plan to pursue collaborative research programs that will enable both faculty and student exchanges, and to co-sponsor seminars, workshops, and scientific meetings.

Patterson selected as associate director for engineering
SPIE member Steven Patterson, a distinguished professor of precision engineering at the University of North Carolina at Charlotte, is Lawrence Livermore National Laboratory’s (LLNL; Livermore, CA) new associate director for engineering. In his new position, Patterson leads more than 2200 engineers, designers, technicians, machinists, and other personnel in the engineering directorate.

Patterson has a PhD and MS in applied science from the University of California at Davis. He has a BS in physics from the California Institute of Technology (Pasadena, CA). He joined LLNL in 1979 as deputy project leader in engineering, and in 1993, he joined the University of North Carolina at Charlotte.

forum to highlight market intelligence at Photonics West

speaker lineup

Ray Beausoleil, H P Laboratories; Molecular Photonics: Molecular Electronics and Photonics
Jules Duga, Battelle Memorial Institute; R&D in the U. S.: Forecast, Analysis, Trends, and Implications
Steve Eglash, Worldview Technology Partners; Beyond Telecom: Innovation, Opportunity, and VC Funding
Alain Hanover, Navigator Technology Ventures; Building Successful Start-ups in Photonics and Nanotechnology
Bill Heetderks, National Institutes of Health; Research Opportunities in Photonics at the National Institute of Biomedical Imaging and Bioengineering
John Murphy, PerkinElmer Inc.; Optoelectronics: Fueling the Medical, Digital, and Genomics Revolution
Dan Tracy, SEMI; Semiconductor Capital Equipment Industry Outlook
Anthony Durkin, Beckman Laser Institute; Photonics in Biotechnology

To register, or for more information, go to oemagazine.com/forum.
Newspaper appoints Eichenholz to new position
SPIE corporate member Newport Corporation (Irvine, CA) has assigned SPIE member Jason Eichenholz to the newly created position of senior research market and technology manager. In this position, Eichenholz manages Newport’s relationship with the photonics research community, with emphasis on new product identification and technology roadmapping, and support for customers in demanding and cutting-edge applications.
Eichenholz received his PhD in optical sciences and engineering from CREOL/School of Optics at the University of Central Florida (Orlando, FL) in 1998.

new SPIE products available soon
Coming soon from Education Services is “Pulling Property Out of Thin Air: The Optical Patent” on video and CD-ROM. SPIE member Marshall Honeyman will cover the nuts and bolts of patents in this one-hour introductory course. This is not a legal lecture or overly technical program, but rather an informal session giving how-to answers. Examples of optical inventions are used to show how common sense patenting techniques can be applied in real-world situations.

SPIE Press also has new titles featuring the work of members. New this month is Two Methods for the Exact Solution of Diffraction Problems by Frederick E. Alzofon. In this book, Alzofon presents two methods of calculating the electromagnetic fields due to radiation scattering by a single scatterer. Both methods yield valid results for all wavelengths of the incident radiation as well as a wide variety of scatterer configurations.

In The Art and Science of Holography: A Tribute to Emmett Leith and Yuri Denisyuk, H. John Caulfield has compiled 21 chapters from the most highly regarded holographers worldwide. This volume celebrates both the triumphs and the exquisite details of one of the most creative fields in optics: the art and science that is modern holography. Through anecdotal narratives and rigorous mathematical analyses, this book reveals the elegance of the field pioneered by physicists Yuri Denisyuk and Emmett Leith. It explores all of the modern holographic advances and ponders the role holography will play in future technology. The book will be available in January.

For more information on these resources, visit the Publications and Education Services pages on SPIE Web (spie.org).

instrumental changes
Fellow Linc Endelman was an early member of SPIE and influential in the field of optical instrumentation.
By Bud Weisbrod

Lincoln “Linc” Endelman was one of the early members of SPIE, and was the first secretary of the SPIE Cocoa Beach/Cape Canaveral, FL chapter, formed in 1958. Bob Murkshe was the chapter president.
Endelman was born in Indiana, and by age 19 was a radio operator and waist gunner on a B-24 Liberator bomber based in Italy. “I was lucky because the Luftwaffe had been put almost totally out of operation by then [1945],” Endelman says.
However, on one mission, with 2000 anti-aircraft guns shooting at him, he was even luckier. Shrapnel from a flak burst went through the plane where Endelman’s head had been as he was bending over dumping “chaff” (tin foil) to confuse the German radar.
Later, when he turned in his equipment after the mission, his sergeant discovered that another piece of shrapnel had penetrated almost through his parachute, headed toward his stomach. Endelman was awarded an “Air Medal and some other decorations,” he says. He’s both lucky and modest.

SPIE Fellow Linc Endelman with another early member, SPIE Fellow Jed Durrenberger, at the SPIE 40th Anniversary Annual Meeting in 1995 in San Diego, CA.
Since he enjoyed working the radios more than the guns, after WWII Endelman studied electrical engineering at Ohio State University (Columbus, OH) and eventually earned a BA in radio and television. After a slight delay of some 27 years, he received an MA in business management from Redlands University (Redlands, CA). In 1956 he recalls taking a short course in IBM Computers from Case Institute of Technology (Cleveland, OH)—at which time there were no “long” courses in computers, since they had just been invented.

Endelman began his career editing technical documents for the Corps of Engineers and other federal agencies, but after a couple of years he left to become public relations director for WJW Radio (Cleveland, OH) in 1953, where he worked with Alan Freed, the disc jockey who started the rock ‘n’ roll craze. Endelman also was an assistant director for WBN S-TV in Columbus, OH, working with Jonathan Winters, who was a staff announcer.

His start in optical instrumentation began in Ft. Eustis, VA, documenting an Air Force project “blowing up trains,” and then led him to Cape Canaveral, FL, where he worked for Convair Astronautics. He specified optical tracking systems for the Atlas missile program and directed a program using high-intensity missile-mounted light sources so the engineers could determine the position, velocity, acceleration, and attitude of missiles using ballistic-plate cameras and cine-theodolites at ranges up to 1500 miles.

After working on the Atlas liquid-fueled missile, where he helped develop launch pad camera housing systems that could be placed directly in the rocket exhaust for flame pattern studies, Endelman’s next efforts were on The “Pershing,” a solid propellant intermediate-range missile for the Army. This required coordinating with the Army, the missile manufacturer, and the flight test crews.

As Endelman became familiar with all aspects of the test programs and instrumentation, it seemed only logical for him to begin work with PerkinElmer Corporation (Wilton, CT), then one of the industry leaders in optical instrumentation. In addition to assisting with range operations, he helped with the initial testing of components of the space telescope, which, in Endelman’s words, “is one of the most significant contributors to man’s attempt to understand the beginning of the universe.”

Because of his broad background in all aspects of instrumentation, he worked with the International Standards Organization and the American National Standards Institute, helping establish industry standards for motion pictures, television, lasers, and electro-optical systems still in use today.

He has been honored with the status of Fellow by both SPIE and the Society of Motion Picture and Television Engineers, based on his lifetime of contributions to our industry.

His mentors read like a “Who’s Who” in history: He learned photographic techniques from Alfred Eisenstadt, Constance Bannister, and Margaret Bourke-White at Kent State (Kent, OH), briefed General Jimmy Doolittle on various R&D programs, worked with Harold Edgerton, inventor of the strobe light, and even received a technical briefing from Clarence Kelly, of Skunk Works fame. Mort Sultanoff, creator of “The Sultanoff Techniques” (used for extreme high-speed photography of explosions), assisted him in instrumenting a test range using high-speed cameras to evaluate the Army’s then-new TOW missile.

Endelman also worked with Frank Back, of Zoomar lens fame, improving the quality of missile launch photographic data. (He was also involved in firing ballistic missiles at the writer, Bud Weisbrod, who was working on Kwajalein, Marshall Islands, at the time. But since he missed me, he’s forgiven!)

His personal life revolves around his wife, Sally, their two grown children, and some interesting hobbies: photography, of course; stamp and coin collecting; music; and history, circa 1500 to 1918, the times when both industrial and political revolutions were occurring. In the past, he raced, and even won, in a Triumph TR-3 on the dirt tracks of Florida. Thanks to Lincoln “Linc” Endelman, the world is a better place for all of us.

SPIE Fellow Bud Weisbrod is the author of this special series on founding and early members of SPIE.
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