



The International Commission for Optics (ICO) under the leadership of Prof Anna Consortini: a fruitful period for the optics and photonics world community

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Dedicated to Professor Anna Consortini for her significant contributions and pioneering works in the field of atmospheric turbulence and her continuous commitment to promote optics at global level

This contribution, dedicated to recognizing Anna Consortini, provides a short and non-exhaustive overview of some of Professor Consortini's very important research achievements in science, atmospheric optics and of her leadership for the benefit of the International Commission for Optics (ICO). Due appreciation is extended to her by providing information, in a pedagogical style, on some of her main contributions. In addition, we will present a brief introduction on the history of ICO, and in particular, during her period as ICO President. © Anita Publications. All rights reserved.

Doi: [10.54955/AJP.33.3-4.2024.127-137](https://doi.org/10.54955/AJP.33.3-4.2024.127-137)

Keywords: History of science, History of optics, Photonics.

1 A brief history of the International Commission for Optics

As mentioned by J N Howard [1], the International Commission for Optics (ICO) is an international scientific society created in 1947 as an Affiliated Commission of the International Union for Pure and Applied Physics (IUPAP). The first official meeting of ICO took place 12-17 July, 1948 at the Physics Laboratory of the Technische Hogeschool, Delft, Netherlands. Forty-four delegates from eleven countries attended that first meetings. At the first session the then IUPAP Secretary, Pierre Fleury, announced that IUPAP had cordially accepted the affiliation of ICO and had approved the Statutes provisionally adopted in a preliminary meeting at Prague in 1947. In those years, after the Second World War, the industry in Europe and in many other countries was under rather critical conditions. The largest part of the powerful industries, which developed greatly after the so-called industrial revolution, were suffering from big losses and the production was very weak. The industry in optics was not an exception. As an example, one can mention the German Zeiss company, established as early as 1846. The first decade of the 20th century witnessed the introduction of many optical instruments, the increased production of microscopes and their accessories, mirrors, lenses, as well as photographic films. After the Second World War the company was split until the German reunification in 1989. Another example comes from French optical industry and the scientific contributions in areas related to optics, spectroscopy, and other associated techniques as glass fabrication, with a mention to Saint Gobain industry. While optics research had been prominent in many University physics departments worldwide throughout the 19th century, one of the oldest and largest groups specialized in optics research and education in Europe, together with the Optics section of Blackett Laboratory at Imperial

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College was the Institut d'Optique in Paris, which had been founded in 1917 with the distinguished optical physicist Charles Fabry (1867-1945) as its first director. In 1945, Fabry's successor Pierre Fleury took the initiative to revitalize scientific activities in this area of science in connection with important industries as glass manufacturing and the link to optical instrumentations. In 1946 he organized a meeting with opticians from 15 different countries: Argentina, Belgium, Canada, Denmark, France, Italy, Norway, Poland, Romania, Sweden, Switzerland, The Netherlands, United States of America and United Kingdom. Indeed, this was the first post-war conference in optics and related areas. All agreed that an international organization was needed to promote all those important subjects and extend them to a larger community. Fleury was in addition the secretary of IUPAP and he proposed that the new international commission be associated to IUPAP. This proposal was then approved by IUPAP General Assembly in July 1948 in Amsterdam. One may think that this new commission could be a European organization. However, since the beginning of all these activities, the United States of America was involved as well, and therefore, ICO was a truly international organization since its inception. The first ICO president was the British physicist Thomas Smith (1883-1969) who did key contributions in optical design.

Today, ICO continues with its mission to contribute, on an international basis, to the progress and diffusion of knowledge in the fields of optics and photonics. Now the ICO is a Category 1 Full Member of the International Science Council (ISC) with sixty members, comprised of 53 Territorial Committee Members (of which 13 Associate Members) and 7 International Organizations working in optics and photonics worldwide.

2 Anna Consortini's presidency of the International Commission for Optics

The ICO structure of organization and international representation rests on the General Assembly (GA). Currently, this GA is constituted by a total of 53 Territorial Committees and 7 International Organization members, all having the voting rights and paying membership dues [2]. It is renewed every three years on the occasion of the ICO General Conference. Up to the present times, ICO has celebrated a total of 25 general meetings in places all over the world. The first meeting took place in Delft (The Netherlands) and the last one ICO-25 took place in Dresden (Germany).



Fig 1. Left: The Galileo Galilei medal. Right: Anna Consortini and the 2007 winner of the Galileo Galilei Award, Oleg V Angelsky (Chernivtsi University, Ukraine).

In 1987, it was the celebration of ICO-14, in Québec, Canada, under the lemma: “*Optics and the Information Age*”. At the General Assembly, Anna Consortini was elected Vice-President along with other new members of the ICO Bureau. She was the first woman to be elected as a member of the Bureau. At the next general conference in 1990, ICO-15, she was reelected for another three years. During this six years period as Vice-President, she took care with high dedication of many aspects of education and training in optics and photonics and the ICO Award and of the Galileo Galilei Medal (Fig 1). To stress this fact, she always showed a great motivation and concern about the world of education and how it is important to boost initiatives toward the young students and researchers. In particular, it was through the Education Committee which she gave many ideas and insights to motivate many groups of people in optics from many countries around the world. We will come back to these matters in the next subsection.

In 1993, on the occasion of the ICO-16 General Meeting, “*Optics as a Key to High Technology*”, held in Budapest, Hungary, Anna Consortini was elected ICO President [3]. This time again, she was the first woman in physics and in optics to be elected to such a position. The three years of her presidency tenure were very important for the consolidation of ICO as an international organization spreading over many countries of the world. In that scientific conference, Anna Consortini contributed with a communication under the title: “*Measured inner scale effect in laser atmospheric scintillation*”. In that paper, she studied and measured the effect of the inner scale of turbulence on the intensity fluctuations of laser radiation through the atmosphere. Intensity fluctuations, inner scale and structure parameter were simultaneously measured under the conditions of homogeneous turbulence during a number of summer days, starting from very early morning, before sunrise, up to about noon. She found that, during the day, the turbulence strength varied slowly and continuously, allowing measurements in condition of very low as well as intermediate and very high turbulence levels. It was a pioneering work in the field of atmospheric optics. Her data constituted a reference for comparison of experimental data with results from theory or numerical simulations [4]. By that time, she was a professor at the Università degli Studi, in Florence, Italy, where she developed her main academic and scientific career. To have an idea of the importance of the meeting one may mention that there were more than four hundred contributions, including from pioneering scientist in optics as the late professor Emil Wolf. In a next section, we will present and summarize Anna Consortini’s contributions to modern optics and to the branch of atmospheric optics.

During her terms on the ICO Bureau, Anna Consortini supported the clarification of the role of ICO in conferences, topical schools and other scientific events. Around 1990, there was a confusion about what events ICO can and should realistically support with some of its resources, i.e., the voluntary work by the Bureau members and the Territorial Committee members. In 1993, the ICO Rules and Codes of Practice were updated by the General Meeting and introduced the distinction between the ICO major events, regional events, co-sponsored events and endorsed events.

Another much needed step was the introduction of a new membership category within ICO. While in 1947, the ICO was clearly the only body organizing international conferences in the field of optics, the situation changed after a few years. Learned societies from various parts of the world, supported by a large membership base and possibly by their large professional publishing activity, started establishing regular events in the various parts of optics and photonics, creating a complex situation that needed to be regulated in some way. One of the actions taken was to first establish, in around 1980, the tradition for the ICO Bureau to organize, in conjunction with its Bureau meetings and General Meetings, an informal meeting of the leadership of learned societies in optics having international activity. During Anna Consortini’s Presidency, it was considered appropriate to create stronger and lasting links between ICO and those learned societies. In 1999, the ICO General Meeting adopted new statutes and established, aside the “Territorial Committees”, the “International Organization members”.

An interesting activity initiated as early as in 1989 was the edition of the ICO “trend” books, pursued by Anna Consortini together with her predecessors and successors in the ICO presidential chain. Successive volumes appeared under the names "Trends in Optics, Trends in Optics and Photonics, Trends in Applied Optics, inside the series Lasers and Optical Engineering. Each volume was edited by the respective ICO President (see Fig 2).



Fig 2. The various books on Trends in Optics edited by the respective ICO President. The book edited by Anna Consortini, in 1996, is the second from left. (See text for details).

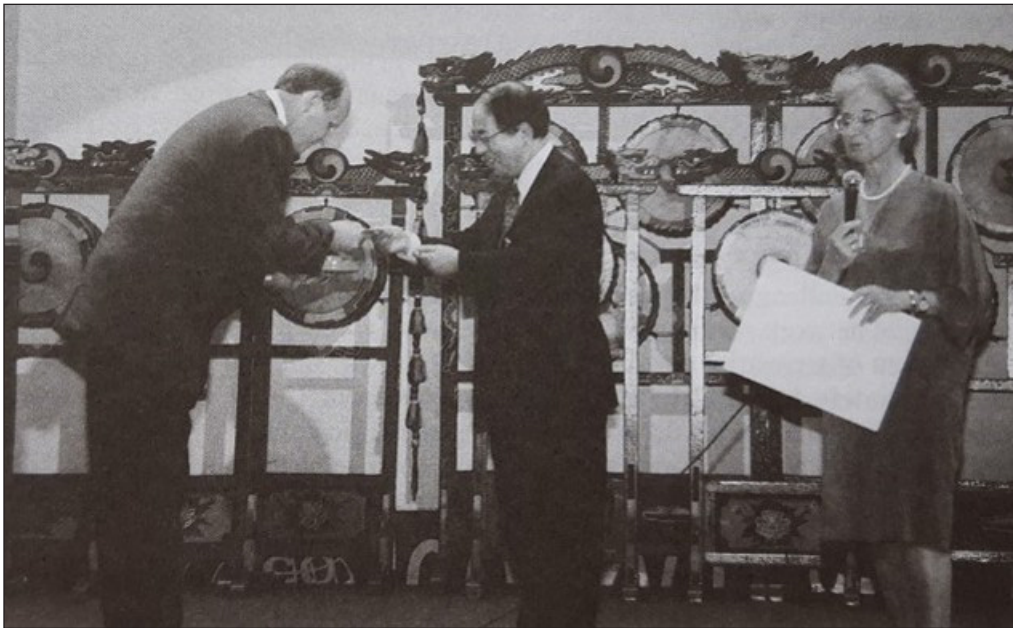


Fig 3. ICO ceremony award at the ICO-17 General Meeting, Taejon, South Korea, August 1996. From left to right: A K Rebane, 1993 ICO Prize Winner; T Asakura ICO President, 1996-1999; Anna Consortini, ICO President 1993-1996.

These ICO Books usually consisted of a set of chapters written by internationally renowned leaders in the different subjects covered. The main objective was to provide a broad and authoritative overview of research actually underway in the fields of optical science and engineering throughout the world. Moreover, there was an intention in the content of the chapters to provide interesting and useful data, not only to specialists in optical science and engineering but also to a wider audience of scientists, engineers and managers who need to keep up with the current trends in optics and photonics research. Anna Consortini edited the

Trends in Optics 1996 volume, which covers a broad spectrum of optical science topics [5]. This book, with a total of thirty-one chapters is a compilation of research reviews written by outstanding figures in the field of optics. It was aimed not only for specialists in the optical sciences, but also for scientists of other fields who might want to broaden their knowledge of optics. The current developments in this rapidly progressing field are described, and new applications are detailed, including some previously undisclosed material on the U.S. “Star Wars” project. Authoritative and approachable this volume provided a comprehensive insight into the ever-expanding optical sciences.

In 1996, at the ICO-17 General Assembly held in Taejon (South Korea), Anna Consortini became Past-President for another three years term with the new elected Bureau (see Fig 3). During that period, she continued with her tireless work as she did in previous terms with many activities and initiatives.

To have an idea of the enormous work needed and done, during her period of presidency, one may consider the actual state of the art in optics and photonics development around the world. After the first laser source demonstrated by Maiman in 1960, photonics was emerging as a powerful new branch of science and technology. Obviously, this activity contributed highlighting the big gap existing between industrialized and non-industrialized countries. For ICO, it was a real challenge to bridge this undesirable gap and allow more and more young students and researchers from all continents to be part of this new world of science. Going back to the year 1947, when ICO was first founded, a global view of the topics covered by scientists at the time indicates that a fast change was just starting. Indeed, within a few years, there was a real progress in many of the classical optics fields, including vision, optical design, interferometry and the emergent concept of holography, microscopy, to cite some of them. The present times and its idiosyncrasy indicate that the current technologies concern many multidisciplinary fields and that the challenge is still there for those who initiate a period of formation and education.

2.1. The activities in education and training: an insight from the International Center for Theoretical Physics (ICTP)

The International Center for Theoretical Physics (ICTP) was created in 1964 under the leadership of the late Prof Abdus Salam, a Pakistani physicist who received the Nobel Prize for Physics in 1975 for his contribution to the electroweak unification theory. Up to this day, the ICTP, in its infrastructures located in Trieste (Italy), performs important tasks toward the formation and training of young researchers, in particular for those coming from developing countries and are having an orientation and specialization for physics.

The first Winter College in Optics took place in 1993 under the agreement between the Abdus Salam International Centre for Theoretical Physics (ICTP) and ICO. That first college, codirected by Anna Consortini and Chris Dainty and with local organization by Gallieno Denardo, was dedicated to optical systems. It included as well a practical training component, with laboratories in optical information processing, Fourier optics and related topics. Since that year ICO started offering ICTP advice for the organization of the Winter College on Optics and oriented to various specializations as energy, microscopy, quantum optics, photonics and all topics affording current emerging technologies based, specifically, upon optics and photonics.

Another interesting activity was the so-called Active Learning in Optics and Photonics (ALOP) which was an activity sponsored by UNESCO with additional support of ICTP and SPIE. Initiated in 2003 and during its many years of work, ALOP offered training in many local educational places as secondary schools and colleges. It also provided continued education to teachers eager to learn some particular practical work. Anna Consortini was involved in some of these activities and participated and cooperated in the design of new experimental set ups. As clear achievements, student’s involvement in understanding these simple conceptual demonstrations is obvious from observations in the classroom [6].

In 1994, Anna Consortini proposed to the late Prof Gallieno Denardo, a professor of physics at the University of Trieste, the then head of “external activities” for the initiation of the ICO/ICTP award. The

award was finally approved and started its activities in 1999. The ICO and the Abdus Salam International Center for Theoretical Physics agreed to establish this joint prize reserved for researchers from developing countries (as defined by the United Nations) and less than 40 years old (on 1st December of the year for which the award is given), who are active in research in Optics and have contributed to the promotion of research activities in Optics in their own or another developing country. In 2007, the prize renamed as the ICO/ICTP Gallieno Denardo Award in recognition to the late Prof Denardo and his tireless dedication to the promotion of optics and photonics in young people oriented toward science [2].

Gallieno Denardo was convinced that optics and photonics should play a large role for the development and visibility of the Abdus Salam ICTP and for its connection with other academic bodies in the Trieste area such as the Elettra Synchrotrone Trieste and the University. In 2003, he proposed the creation of the so-called Trieste System for Optical Sciences and Applications (TSOSA) Advisory Group, with the mandate to promote actions on Optics and Photonics in developing countries, proposing of subjects for future Winter Colleges, training courses, Sandwich programs, and, as a summary, all the possible external activities relevant for the ICTP and associated organizations in Trieste that can be exported to developing countries. Anna Consortini has been participating in TSOSA from the beginning until the present. The size of the TSOSA Advisory Group was defined by the incorporation of various international organizations and learned societies as: International Atomic Energy Agency (IAEA), ICO, Institute of Electrical and Electronics Engineering/Lasers and Electro-Optics Society (IEEE/LEOS), Optical Society of America (OSA, now OPTICA), Optics within Life Science (OWLS), International Society for Optics and Photonics (SPIE), UNESCO, and the Trieste optics environment itself, designated as the “Trieste System” (as a unique body). Representatives of the mentioned organizations needed to be elected inside them. An annual meeting of the TSOSA Advisory Group is, since then, taking place coinciding with the ICTP Winter College in Optics. Anna Consortini did a superb work to promote the Winter College and to support to new training laboratories, designed as a simple and affordable way for students to be introduced to optical experimental techniques. The Winter college participants and other young people attending Trieste events could benefit from her activity (see Fig 4).



Fig 4. Anna Consortini preparing some practical experiments to be offered to students participating at various schools and events in optics and photonics. Left: At the Winter College in Optics, ICTP. Right: At the Active Learning in Optics and Photonics (ALOP), ICTP, 2012.

Anna Consortini had been an advocate to encouraging the activities in optics and photonics in Ibero-American countries. During her period as ICO vice-president, she supported with the ICO Bureau the 1st meeting of Optics in Ibero-America (RIAO-Reunión Iberoamericana de Óptica, Ibero-American Optics Meeting) that was held in Barcelona in 1992, being Prof Consortini a member of the Scientific Committee of

this conference. At the time of the second RIAO Conference, held in Guanajato, Mexico, in 1995, Anna was invited to present a plenary talk with the title “Scintillation and other Turbulence Effects in Laser Atmospheric Propagation” [7]. The same year, 1995, a different conference, Optilas (5th Encuentro latinoamericano de óptica, láseres y sus aplicaciones, Latin-American Meeting for Optics, Lasers and Applications) applied to ICO for support, and it was held in Havana, Cuba. At that time Anna was ICO President, and she was crucial to suggest to the ICO Bureau to recommend the organizers of both conferences to merge. This recommendation was followed by the organizers and the next conference in 1998 in the city of Cartagena de Indias, Colombia, was organized a joint conference (RIAO-Optilas) which was considered as an ICO Regional Conference. The major learned societies were sponsors of this conference. It has continued as a joint conference in the future. Anna Consortini has attended many of this series conferences and has presented papers in several of them. She has always been very interested in knowing the progress of this conference. No doubt, the success of this conference is due to the vision of Anna Consortini to organize only one big conference on Optics in Ibero America.

Currently, the activities in optics and photonics at the ICTP continues with the offers of the Winter College, keeping its quality and high appreciation for all attending students in the various topics linked to the expansion and development of optical and photonics technologies (see Fig 5).



Fig 5. Participants at the Winter College on Optics, February 2023, ICTP, Trieste, Italy. Anna Consortini is in the first row, fifth to the right.

3 The contributions of Anna Consortini in the field of Atmospheric Optics

To complete this brief journey through the professional career of Anna Consortini, we introduce an insight on her outstanding scientific achievements. These activities went forward in parallel with her work and leadership as ICO Vice-President, President and Past-President, as member of TSOSA and her enormous work at the ICTP inside TSOSA. Her outstanding work as a scientist in the field of atmospheric

optics spans over more than fifty years. The aim of this summary of her major achievements is to let the reader to know more on her unique profile as a woman in science.

Holding an undergraduate degree in Physics and a Ph D in Electromagnetic Waves defended in 1968, Anna Consortini, currently a retired Professor of Physics of the Università degli Studi di Firenze, Italy, is still active in teaching in the fields of Optics and Optometry. As an example, she is still teaching to undergraduate students in the city of Vinci (near Florence) to deliver some lectures on the three years grade in Optics and Optometry belonging to the University of Florence. Before becoming a professor, she worked at the "Istituto di Ricerca sulle Onde Elettromagnetiche" (IROE), National Research Council, CNR, of Italy. Consortini's research activity, initially in the field of radio waves including radar, space vehicles and antennas, mostly dealt with theoretical and experimental problems in Classic and Modern Optics and Quantum Physics. Anna Consortini later headed the group of theoretical and experimental research on atmospheric propagation at the University of Florence. She also established the Computer Center of the Institute and was the Center Director until 1978. She has produced internationally recognized, original contributions in the fields of laser cavities and fundamental problems of diffraction, optical images, problems of quantum mechanics, statistical optics, adaptive optics, laser beam propagation and scintillation through the atmospheric turbulence, and development of laser methods to investigate turbulence. She published more than 160 papers and presented many more congress talks.

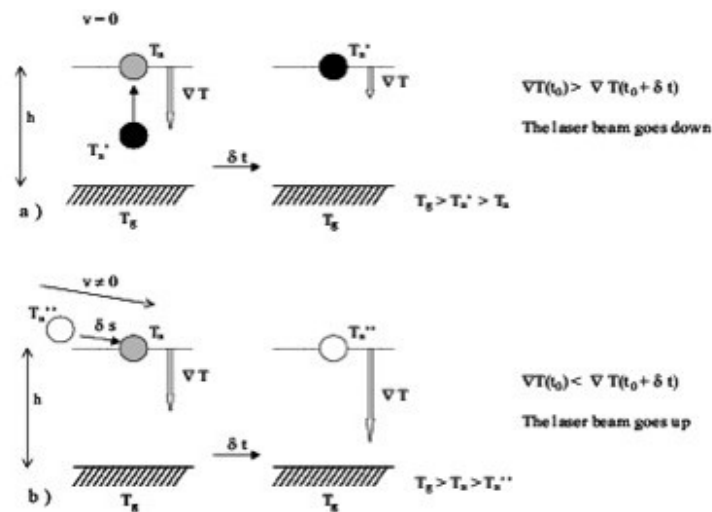


Fig 6. Sketch of the time evolution of the temperature gradient related to wind and convection processes: (a) convection in the absence of wind; (b) wind of velocity v in the absence of convection (after Ref 9).

To give an example on her scientific contributions, in 1970 she published a paper, with Laura Ronchi and Leopoldo Stefanutti with experimental results on the so-called “*relative dancing*” [8]. In the close proximity of a boundary, a pair of laser beams, co-aligned and set to propagate along a fixed direction, would lead to short-exposure relative beam wander, depending on the placement of the two sources. As an insight, beam wander associated with a propagating beam in the atmosphere has impact on the short-term and long-term spot size, and the scintillation index. From the point of view of modelling this phenomenon, the authors studied the statistics showing that beam wander qualitatively and quantitatively differs for horizontal and vertical orientations, implying the presence of turbulence anisotropy. This anisotropy can be related to the local convective air movement from the ground, irregularly perturbed by the wind. The

absolute temperature gradient is then always directed downwards, but its intensity varies as a function of time [9]. As depicted in Fig 6, wind and convection produce opposite effects on the absolute temperature gradient so that opposite movements of the laser beam are expected: in case (a), the beam vertical position falls downwards from its initial position at t_0 ; in the other case it rises up in the interval δt .

This measurement procedure suggested a very simple, optics-based method for imprinting the signature of air turbulence onto the intensity statistics of propagating light. Fluctuating temperature of the turbulent air is the dominating random process affecting the fluctuating refractive index, so that the air velocity turbulence can be directly related to the refractive index turbulence, also termed optical turbulence. In Anna Consortini's pioneering work it was demonstrated that absolute temperature fluctuations are, largely responsible for optical turbulence of the air. Then, the anisotropic behavior of the absolute temperature field increases the refractive index fluctuations [10].

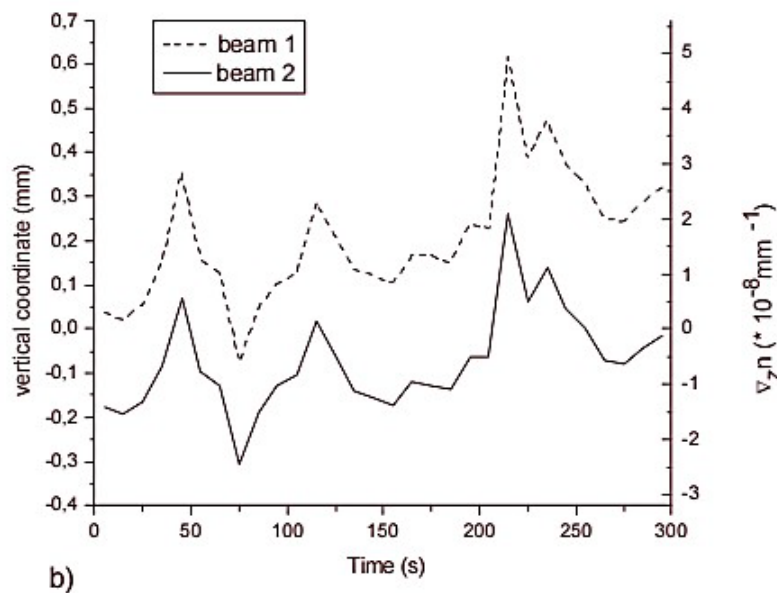


Fig 7. Experimental measurement of time evolution of the vertical components of the air refractive index gradient (after Ref 11).

On the subject of atmospheric turbulence, she worked for many years and made contributions with her students and researchers of her group. We mention here her work on the characterization of the atmospheric refractive index along with her former Ph D students Claudia Innocenti and Samira Ceccarelli [11]. In this work, they used the laser beams wander as a sensitive tool to investigate atmospheric turbulence, giving some examples obtained from experimental data as the evolution of the refractive index gradient in open air (see Fig 7). The measurements were performed with two independent parallel laser beams. The beams were spaced by 11.5 cm, in the open air at a height of about 1.5m over grass, in a summer day.

4 The ETOP meeting series and the contributions of Anna Consortini in Education in Optics and Photonics

In addition to her vast work in atmospheric optics and turbulence characterization, Anna Consortini has been dedicated for many years to the world of education and training. She has participated in many conferences and workshops in the so-called Education and Training in Optics and Photonics (ETOP) meeting series. A biennial international conference, ETOP is a unique forum to bring together educators

from around the world to share information about the practice of teaching optics at all levels. The teaching of optics and photonics are at the core of today's worldwide technological infrastructure. The unique ETOP forum is continually upgraded and renewed in order to meet the growing demands of research, science, and industry and with a particular orientation to the training of educators and young researchers. ETOP is led by international learned societies as, OPTICA (former OSA), IEEE/LEOS, SPIE and the international organization ICO [12].

Before the current name, ETOP was called the conference on Education in Optics. Among the several contributions of Anna Consortini to these Conferences we can mention that in 1991 she presented at the ETOP Conference in Saint Petersburg an invited paper with the title "How much mathematics should optics students know?" [13] and in 1995 she presented an invited paper with the title "Diffraction and Fourier Optics: The Mathematics required" [14]. The topic related with studies in statistics was presented by her as a plenary talk in 1999 [15]. She participated as well in the special section devoted to Women in Optics in the ETOP Conference in Porto in 2014 (see figure 8).



Fig 8. Anna Consortini at the ETOP (Education and Training in Optics and Photonics) Conference in Porto, Portugal, 2014.

Moreover, let us mention here one of the contributions by Anna Consortini among her many studies devoted to appraise the advantages and disadvantages of using computers in education and research, a study based on her own experiences as a professor [16]. Use of computers in laboratory experiments is important for teaching, mainly if the students are involved in the preparation of an experiment. In addition to the need of learning the suitable computer software, they are faced with all problems found in setting up experiments. We quote here part of the conclusions of her paper: <<Introduction of computers marked a big difference between the no-computer era. *Computers have evolved strongly in time allowing many different uses. In my 50 years of scientific activity, I have experienced an increasing capability of the computers, so that things that were not possible or very difficult to do before, became suddenly possible and easy*>>.

5 Conclusions

We have presented in this paper an overview and summary of the activities of Prof Anna Consortini at the time of her leadership at the International Commission for Optics (ICO). During her more than thirty years of activities since the time when she joined the Bureau as Vice-President. As President and Past-President, she has developed and carried out many important initiatives toward the expansion of optics and photonics at an international level. Moreover, the scientific profile of Anna Consortini deserves a mention of her work in fields as atmospheric optics and laser beams turbulences and its connection to characterize the atmospheric refractive index variation as a consequence of air turbulences. In particular, we have mentioned two interesting works carried out in her group at the University of Florence in Italy.

Acknowledgements

Authors would like to thank Prof Manuel F M Costa, University of Porto, for his help in the photographic documentation. We also thank Nigel Balmroth, Portfolio Manager, Taylor & Francis for kind assistance.

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[Received: 01.07.2023]



Prof Maria L Calvo is currently an Emeritus Professor at the Department of Optics, Faculty of Physics Sciences, Complutense University of Madrid where she continues with her labor on academic activities and research. She was Head of the Department of Optics during the period (2006-2010). She has been a visiting professor and researcher in various international institutions, Bremen University, University of California at Berkeley at the Visual Center Studies led by Prof Jay M Enoch, University of Missouri Saint Louis at the group of Prof V Lakshminarayanan, National Research Council of Canada in Ottawa, Institute for Optics and Astrophysics (INAOE, Puebla) in Mexico, among others. She has participated as co-director and lecturer in various Winter College in Optics, at the Abdus Salam International Center for Theoretical Physics (ICTP, Trieste) in Italy. She has authored and co-authored more than 200 scientific publications, articles, chapters, and conference papers. She has edited and co-edited four books (one in Spanish) and has published one book on the Alhazen's Book of Optics (in Spanish). Her main areas of interest are holography, holographic materials, light scattering, image processing, optical information processing, neutron optics and history of optics. Very recently she has contributed 2 articles to Asian J Phys and is willing to serve AJP.

She was President of the International Commission for Optics, ICO, (term 2008-2011).



Pierre Chavel graduated in Physics from Université Paris-Sud, Orsay, with a Doctor of Science in 1979. He is currently an associate Director at Institut d'Optique – Graduate School (a member institution of Université Paris-Saclay) and a member of Laboratoire Hubert Curien at Université Jean Monnet de Saint-Etienne. His research interests include diffractive optics, speckle, coherence, and optical instrument design. An OPTICA Fellow, he was recognized with the OPTICA 2021 Robert E Hopkins leadership award.

A former head of graduate education at Institut d'Optique (1993-98 and 2009-2013), he served as the Director of Laboratoire Charles Fabry (CNRS/Institut d'Optique, 1998-2009 and 2013-2014) and the CNRS comité national for the Electronics and Photonics section (section 08, 1993-1995). He is chairing the French Physics Olympiads (2011-)

He served as the Secretary of the International Commission for Optics (1990-2002) and on the governing bodies of Optica, Société française de physique, Société française d'optique.



María J Yzuel is an Emeritus Professor at the Autonomous University of Barcelona, where she was a full professor of optics from 1983 to 2011. She worked in diffraction image theory, image quality evaluation, optical pattern recognition, and in image techniques for medical diagnosis. During the last two decades she also worked in polarization characteristics of spatial light modulators and its use in diffractive optics. Yzuel is a fellow member of OPTICA, IOP, SPIE, EOS, SEDOPTICA, and RSEF. She was a vice-president of the ICO (International Commission for Optics) from 1990 to 1996 and from 2011 to 2017. From 1993 to 1996 she was the President of the Spanish Optical society. Yzuel was a member of the SPIE Board of Directors from 2001 to 2003 and from 2007 to 2010. She was 2009 SPIE President. Currently, she is Advisory Editor of Asian J Phys.