

IN MEMORIAM:

IONEL-VALENTIN VLAD

(22 September 1943–24 December 2017)



Ionel-Valentin Vlad, Editor-in-Chief of *Romanian Reports in Physics* and President of *The Romanian Academy*, passed away on 24 December 2017 after a severe illness. Vlad was widely recognized as a pioneer in the fields of holography, nonlinear optics, and information optics by both the Romanian scientific community and by the most prestigious international optics and photonics professional societies.

Ionel-Valentin Vlad was born in Bucharest on September 22, 1943. His parents, Ioan Vlad and Lucretia Vlad (née Timis), were distinguished Romanian intellectuals with deep roots in Transylvania and Maramures regions of Romania. He graduated the Polytechnic Institute of Bucharest, Department of Electronics, in 1966, and obtained the scientific title of Doctor in Electronic Engineering from the same Institute, in 1972, with a thesis on information processing in holography, supervised by Gheorghe Cartianu-Popescu, Corresponding Member of the Romanian Academy.

From 1966 until 1975, he was a researcher at the Institute of Atomic Physics, Bucharest, Romania, the Laboratory of Optical Methods in Nuclear Physics, led by Ion Agarbiceanu, Corresponding Member of Romanian Academy. Here, he developed in 1966–1968, in collaboration with his colleague, George Nemes, the

first solid state laser in Romania [G. Nemes, V. I. Vlad, *Laser effect in neodymium glass*, Rev. Roum. Phys. **14** (4), 395 (1969)]. In the period 1969–1970, he also studied at the University of Paris (with M. Françon) and visited CGE-Marcoussis. At CGE, he demonstrated and studied real time holograms recorded in saturable absorbers.

In 1975, Ionel-Valentin Vlad started and became head of Holography Laboratory at the Department of Lasers, Institute of Atomic Physics, Bucharest, Romania. In the interval of 1977–1989, he was a senior researcher at the Central Institute of Physics, Bucharest. During that time, he was also a visiting scientist at the “A. F. Ioffe” Physical Institute in Sankt Petersburg, working in holography, ultra-fast optical phase conjugation, wave-mixing in photorefractive crystals, and picometer-amplitude vibration measurements, in collaboration with Yu. I. Ostrovski and M. P. Petrov. He also visited the Technical University Darmstadt as a recipient of a DAAD Fellowship for studies of wave mixing in photorefractive crystals with T. Tschudi. Until 1990, the main research fields of V. I. Vlad were holography, holographic interferometry, and optical processing of information. He published two books on these topics: V. I. Vlad, *Introduction in holography* (in Romanian), Publishing House of the Romanian Academy, Bucharest, 1973 and V. I. Vlad, R. Zaciu, J. Maurer, N. Miron, and D. Sporea, *Optical processing of information* (in Romanian), Publishing House of the Romanian Academy, Bucharest, 1976.

By the imperatives of that period, in addition to basic research in holography and information optics, he led the design and development of a good number of devices and systems for testing and measurement, which were based on holographic interferometry and other optical methods. A series of holographic interferometry systems have been designed and accomplished by him and his group such as for non-destructive testing of optical and mechanical components, for testing composite materials used in aviation industry, for calibration of high-precision measuring devices used in fine mechanics (Romanian patent no. 71070/1976 and US patent no. 4378160/1983, in collaboration with J. Maurer, N. Miron, D. Sporea *et al.*), and for precise measurement of homogeneity of optical glasses. He realized also a portable holo-camera in collaboration with D. Popa and N. Califaru (Romanian patent no. 4378160/1983), laser anemometers based on heterodyne optical detection (for measurement of flow speed in hydro- and wind-tunnels), optical filtering systems (Fourier and optical schlieren systems), optical correlators, optical coding of the relief and associative optical memory for robot vision, and Talbot-moiré deflectometry. In collaboration with N. Ionescu-Pallas, for solving difficult inverse problems in optics, and with V. Capatina and Adriana Vlad, for an innovative computer image processor, Vlad designed and developed an optical tomographic method and an apparatus based on it for the non-contact measurement of diameter and refractive index profile of optical fibers (Romanian

patent no. 93121/1985) and also a system based on schlieren method for precise measurement of flow parameters in a tri-sonic wind tunnel for aviation research.

In the years 1989–1990, Vlad proposed the use of the selective amplification in the two-wave-mixing in GaAs:Cr and of a self-calibration method based on Bessel function properties in the measurement of the ultralow vibration amplitudes by holographic interferometry. Based on these methods, picometer-amplitude vibrations were measured in Vlad's laboratory, results published in a highly-cited paper [S. I. Stepanov, I. A. Sokolov, G. S. Trofimov, V. I. Vlad, D. Popa, and I. Apostol, *Measuring vibration amplitudes in the picometer range using moving light gratings in photoconductive GaAs:Cr*, *Opt. Lett.* **15**, 1239 (1990)].

Since 1990, he led the Laboratory “Nonlinear and Information Optics” in the Lasers Department of the National Institute for Laser, Plasma and Radiation Physics, Bucharest-Magurele. As Professor at the Faculty of Physics of the University of Bucharest (since 1990), he held a course on Information Optics. At the Institute of Atomic Physics and University of Bucharest he supervised many PhD students among which we mention A. Petris, V. Babin, Anca Mocofanescu, Mona Levai, I. Dancus, Tatiana Bazaru Rujoiu, S. Popescu, and Petronela Gheorghe.

Following an invitation from J. Tsujiuchi, he was a Visiting Professor at Chiba University, Japan in 1991, being a recipient of a JSPS Fellowship for a collaborative work in associative storage and processing in photorefractive crystals. In 1992, he was a Visiting Professor at Centro de Investigaciones en Optica, León, Mexico (Catedra de Excelencia) and had a fruitful scientific collaboration with D. Malacara in the area of direct spatial reconstruction of optical phase. As a result of this collaboration, a relevant paper was published in 1995 in the Elsevier book series “Progress in Optics”, edited by E. Wolf [V. I. Vlad and D. Malacara, *Spatial direct reconstruction of the optical phase from phase modulated images*, *Progress in Optics* **23**, pp. 261–314 (1995)].

Ionel-Valentin Vlad established a long standing collaboration in adaptive interferometry and optical information processing with J.C. Dainty, Imperial College, Blackett Laboratory, in London, since 1991, through an exchange program between the Romanian Academy and Royal Society. In two research projects, in collaboration with J. C. Dainty and M. Damzen, he obtained significant results in stimulated Brillouin scattering (SBS). As a result of this collaboration a “first book to comprehensively describe SBS and its applications” was published [M. Damzen, V. I. Vlad, V. Babin, and A. Mocofanescu, *Stimulated Brillouin Scattering. Fundamentals and Applications*, IOP Publishing, Bristol, London & Philadelphia, 2003]. Furthermore, Vlad and his collaborators obtained and published in this collaborative work relevant results in wave-mixing, adaptive interferometry, and interconnection using photorefractive crystals [A. Petris, M. J. Damzen, and V. I. Vlad, *Opt. Commun.* **176**, 223 (2000); A. Petris, M. J. Damzen, and V. I. Vlad, *Opt. Commun.* **205**, 437 (2002)].

Since 1994, for more than seven years, Vlad was also an external collaborator of H. Walther, in the Max-Planck-Institute for Quantum Optics in Garching, where he proposed and made experiments on space charge distribution in photorefractive crystals with a highly sensitive atomic force microscopy for information storage with few photons [see *J. Opt. Soc. Am. B* **15**, 2185 (1998) and *Appl. Phys. A* **66**, 337 (1998)].

In 1995, Vlad became an associate researcher of the International Centre for Theoretical Physics (ICTP), Trieste, Italy and in 2003, an ICTP Senior associate. During that period, he studied the quantum gases in cavities with small adiabatic invariants and published relevant results, in co-operation with N. Ionescu-Pallas, see, V. I. Vlad and N. Ionescu-Pallas, *The radiation of the double quantized cubic cavities*, *Fortschritte der Physik* **48**, 657 (2000); V. I. Vlad and N. Ionescu-Pallas, *Discrete Bose-Einstein systems in a box with low adiabatic invariant*, *Fortschritte der Physik* **51**, 510 (2003); V. I. Vlad and N. Ionescu-Pallas, *Exponential decrease of thermodynamic functions of photon gas in cubic and spherical cavities with low adiabatic invariants*, *Laser Physics* **17**, 1001 (2007).

In 1998–1999, Vlad won two ICTP-TRIL grants for research at Università “La Sapienza” di Roma, Department of Energetics, led by Mario Bertolotti. There, he proposed the generation of optical spatial solitons in sillenite photorefractive crystals, nonlinear optical materials well-known to him, cheap and relatively widespread, but with a strong optical activity. In a collaborative work with M. Bertolotti, E. Fazio, and V. Babin, he succeeded in showing the first evidence of spatial solitons in photorefractive crystals with optical activity [*Proc. Romanian Academy, Series A* **1**, 25 (2000)].

In the period 2001–2008, he was a project coordinator, jointly with Eugenio Fazio, for studies of optical spatial solitons and soliton waveguides induced in photorefractive crystals, in the framework of the Inter-governmental Italian-Romanian Collaboration Agreement in R&D, at Università “La Sapienza” di Roma, Department of Energetics. He was also Visiting Professor at the same university, in 2001 and 2005. The original results of complex theoretical and experimental studies in the area of spatial solitons and soliton waveguides in photorefractive crystals have been published in a series of papers in high impact archival journals: *Phys. Rev. E* (2002, 2003), *Appl. Phys. Lett.* (2004), *Appl. Surf. Sci.* (2005), *J. Optics A: Pure Appl. Optics* (2003, 2006), *Phys. Rev. A* (2007), and in book chapters in prestigious publishing houses (Kluwer and Springer), in 2003 and 2009. We would like to point out that his highly influential work in this research area, which was a result of this longtime collaboration [E. Fazio, F. Renzi, R. Rinaldi, M. Bertolotti, M. Chauvet, W. Ramadan, A. Petris, and V. I. Vlad, *Screening-photovoltaic bright solitons in lithium niobate and associated single-mode waveguides*, *Appl. Phys. Lett.* **85** (12), 2193–2195 (2004)], is his mostly cited paper. It is worth mentioning other relevant works performed by Vlad’s group, which deal with the fast writing of soliton waveguides in lithium niobate

using low-intensity blue light [S. T. Popescu, A. Petris, and V. I. Vlad, *Appl. Phys. B-Lasers and Optics* **108** (4), 799 (2012)] and the writing of soliton waveguides in blue light assisted by the pyroelectric field [S. T. Popescu, A. Petris, and V. I. Vlad, *J. Appl. Phys.* **113** (4), 043101 (2013); *J. Appl. Phys.* **113** (21), 213110 (2013)]. Vlad proposed and contributed essentially to the reflection I-scan method, and collaborating with Adrian Petris, to the reflection double Z-scan method with ultrafast pulsed lasers, as new techniques for characterization of the nonlinear optical properties of nanomaterials.

The list of scientific publications of V. I. Vlad includes more than 150 papers published in Romanian and international journals. He took part with communications in over 200 national and international scientific conferences (more than 15 invited and plenary lectures). He is author or co-author of five books and editor of seven Proceedings of SPIE-The International Society for Optics and Photonics. The International Conferences “Trends in Quantum Electronics”, chaired by the Nobel Laureate A. M. Prokhorov (Russia) and I. Ursu (Romania) and held in Bucharest in 1982, 1985, and 1988, were continued by V. I. Vlad, who was the Chairman of eight International Conferences on Optics and Photonics “ROMOPTO”, which were held in Romania every three years, in the period 1994–2015, with support of the most prestigious international organizations in Optics and Photonics (ICO, ICTP, OSA, SPIE, and EOS).

After 1990, V. I. Vlad brought important services for the physics community: he was co-founder of the Romanian Physical Society and was the first president of the Division of Optics and Lasers of this professional organization. He obtained the recognition of this Division as ICO Territorial Committee and EOS Affiliated Society. In 1991–1993, he was the Vice-president of SPIE-Romanian Chapter. In 1990, Ioan Iovitz-Popescu and Ionel-Valentin Vlad established a new Physics journal, *Romanian Reports in Physics*, in its current format, continuing the former journal *Studii și Cercetări de Fizică* (published in Romanian). Since 1999, starting with volume 51, numbers 7–8–9–10, he has been acting as the Editor-in-Chief of *Romanian Reports in Physics*. He started the electronic version of this journal on Internet, he organized it for Thomson Reuters/Clarivate Analytics – Web of Science indexing and ranking and introduced a good number of new features to turn it into a modern archival physics journal. Vlad was also the Editor-in-Chief of the multidisciplinary archival journal *Proceedings of the Romanian Academy, Series A*. He was member of the editorial board of *Optics Letters* (1980–1990), *Journal of Optics A: Pure and Applied Optics* (1998–2006), *Journal of the European Optical Society – Rapid Publications*, *SPIE Reviews*, and *Optoelectronics and Advanced Materials – Rapid Communications*.

Besides other services, we remark his important achievements as the President of Physics Commission of Romanian Consultative College for R&D (1991–2002), with important contribution to the Physics Strategic Plan “Horizon 2000”, project evaluation and funding, as the Vice-president of Grant Commission

of the Romanian Academy (1994–2007), and as a co-director of the Romanian Center of Excellence in Photonics (ROCEP). He was also the national project coordinator of the EU Network of Excellence FP6-PHOREMOST-NoE IST-2-511616 “Nano-photonics to Realize Molecular Scale Technologies”, with relevant results in the area of optical nonlinearities of nano-structured materials, quantum dots, in nano-imaging, and in theory of thermodynamic functions of cavities with low adiabatic invariants. He was also the national project coordinator of three EU COST Actions on optical information storage and processing, on physics of photonic crystals, and on sub-wavelength photonic devices.

Ionel-Valentin Vlad received different awards for his work, including “T. Vuia” Award of the Romanian Academy in 1978. He was elected Fellow of the Optical Society of America (OSA) in 1978, “*in recognition of distinguished service in the advancement of optics*”, Corresponding Member of the Romanian Academy (among 181 distinguished intellectuals of the country) in 1991, Titulary Member of the Romanian Academy in 2009, and Fellow of the Institute of Physics and Chartered Physicist, U.K, in 1999. In 2005, he was elected Member of Academia Europaea and he received the “Galileo Galilei” Award of the International Commission of Optics (ICO), “*for his outstanding contributions to the field of optics, non linear optics and photorefractive optics achieved under comparatively unfavorable circumstances*”. In 2006, he was elected Fellow of the International Society of Optical Engineering (SPIE), for “*specific achievements in photorefractive crystals, holography, and interferometry*”, being “*one of the world’s leading researchers in dynamic holography, photorefractive crystals and nonlinear optics*”. In the period 2011–2017, V. I. Vlad was a member of the Board of Directors, member of the Executive Committee, and Chairman of the Advisory Committee of the European Optical Society (EOS). On the occasion of the International Year of Light and Light-Based Technologies in 2015, he presided over a series of national and international scientific events, including the International Conference “Micro- to Nano-Photonics IV-ROMOPTO 2015”, Bucharest, September 1–4, 2015.

In 2008, he was decorated by the Presidency of Romania with the Romanian National distinction “Knight of the *Faithful Service Order*” and in 2013 he was decorated by the Presidency of Romania with the Romania’s highest civil Order “Knight of the *Star of Romania Order*”.

In 2010, Ionel-Valentin Vlad was elected Vice-President and in 2014 was elected President of the Romanian Academy, the highest scientific forum in Romania. We remark his strong contributions in the building of the Doctoral School of the Romanian Academy, in the evaluation of the scientific output of different research institutions, and in many scientific and cultural activities.

Ionel-Valentin Vlad was an excellent science communicator and an outstanding mentor and advisor to many undergraduate and graduate students. He was permanently trying to transmit to his students and young colleagues the

passion for scientific research, the imagination and courage to explore new ideas, the perseverance and accuracy in experimental work, in interpretation and modeling of experimental results. He was a fine diplomat and his deep knowledge of several foreign languages made him an extremely enjoyable person, a human quality very much appreciated by colleagues all-around the world. Therefore, his peers very much appreciated his ability to speak with people from various countries with diverse cultural heritages, in their mother tongue on many subjects starting from physics to philosophy, literature, music, and art.

Ionel-Valentin Vlad was an extraordinary mentor to several generations of optical physicists and engineers in Romania and will be remembered for his warmth, generosity, and impeccable probity and honesty. He will be greatly missed.

May God rest his soul in peace!

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