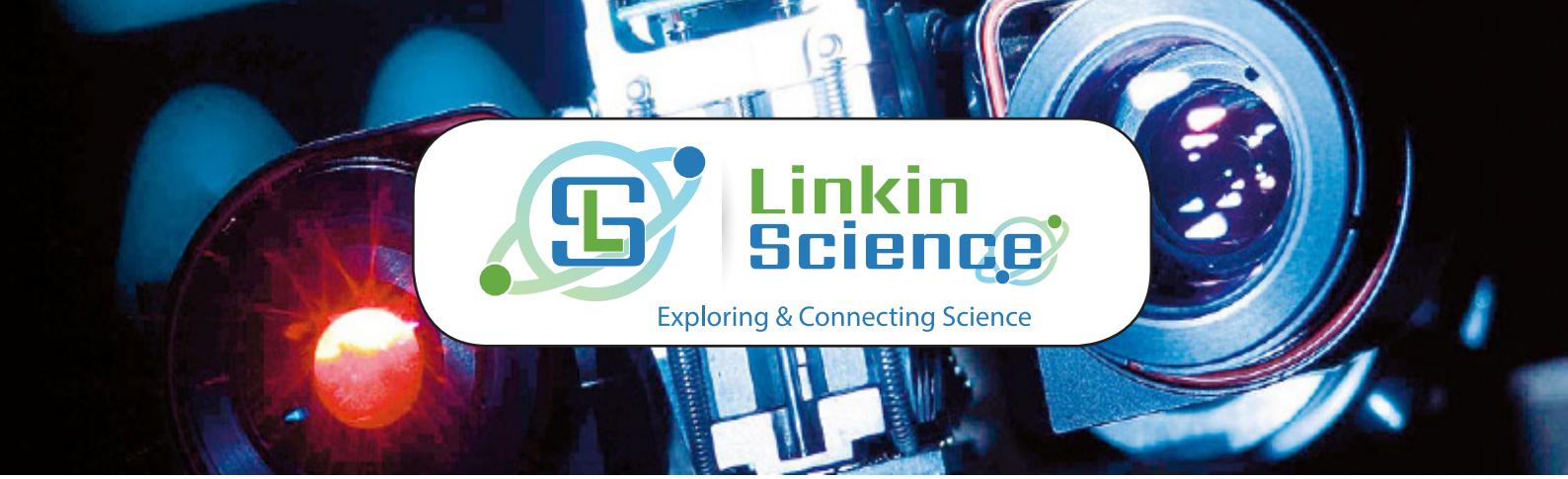


Linkin Science

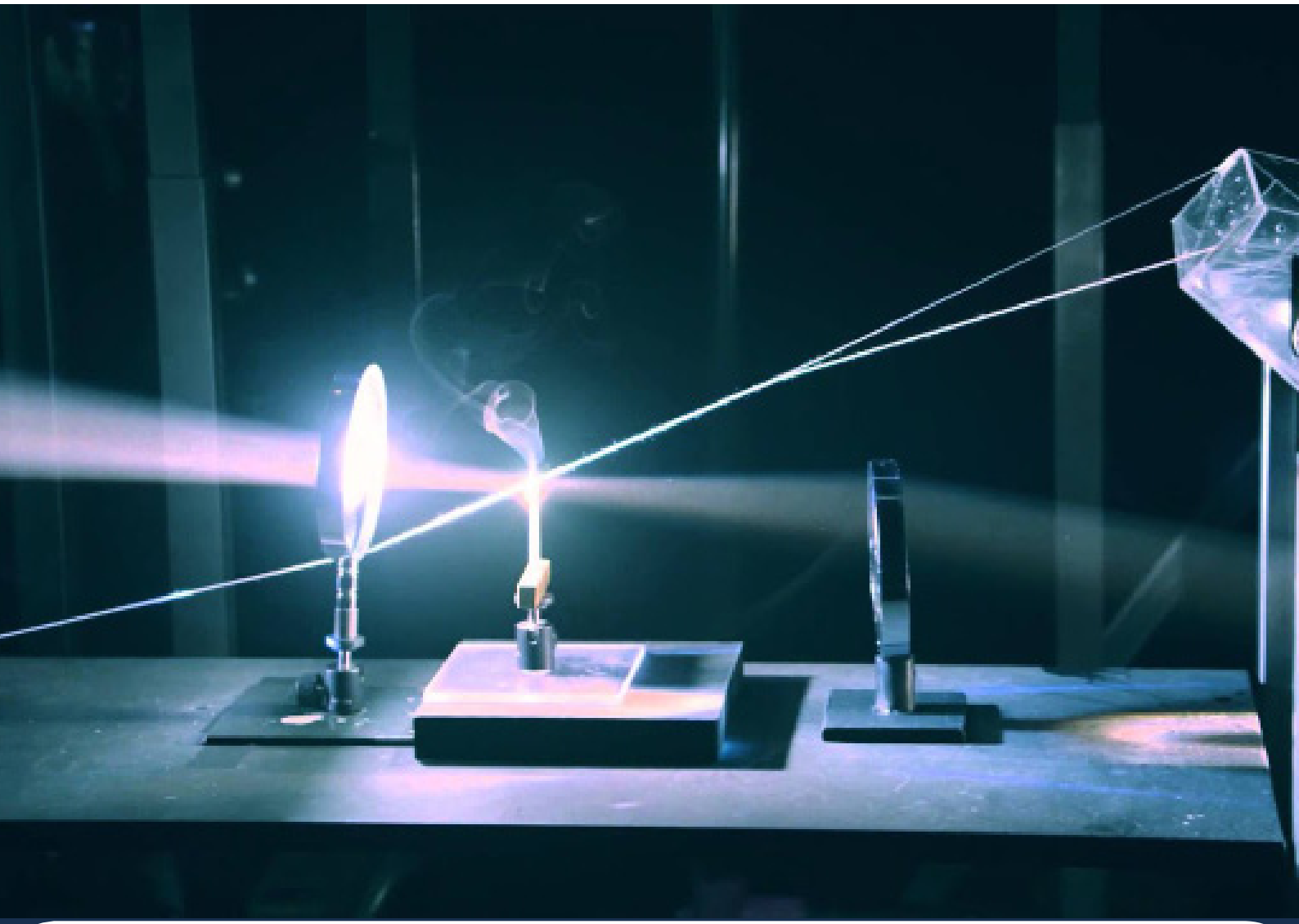
Exploring & Connecting Science

Proceedings of

3rd Edition of Virtual Online Conference on

Advancements of Laser, Optics & Photonics

September 01-02, 2021



HOSTING ORGANIZATION

Linkin Science Pvt. Ltd

649 Mission St. 5th Floor, San Francisco, CA 94105, USA

Ph: +1 (415) 704-1402 | www.laseroptics.linkinscience.com | laseroptics@linkinscience.com

Linkin Science

Exploring & Connecting Science

Mission

Our mission is to bring the researchers on a common platform and provide opportunity for them to interact. This scientific networking helps for the betterment of science by exchanging the ideas in a broader way.

Vision

Magnifying Scientific Knowledge by Sharing the research and ideas. We believe in accelerating the possibilities of novel discoveries and enhancement in scientific research, by connecting scientific community for knowledge sharing.

Why Linkin Science

Join us to redefine and explore new research, to provide a credible source to barter ideas for scientific studies. To revolutionize the true outcome of a distinct scientific discovery and grab the attention for rare emerging technologies.

Linkin Science Conferences

Linkin Science conferences are well crafted and designed by a team of skilled experts. Our conferences are vast expanded into Medical, life sciences, health care, Engineering and other social sciences. Each conference, summit or executive briefing is tailored to the sector, topic and audience need. Our event structure varies depending on issue and market requirements featuring Keynote presentations, Oral talks, Poster presentations, Young research forum, Exhibitions, roundtables and variable formats.

Welcome to Linkin Science

Linkin Science organizes a wide range of scientific events worldwide and thus evolving to be a hub for scientists, researchers, doctors, students, industries and delegates. We are dedicated to provide high-quality online Journals, Conferences, events and information, through unparalleled speaking sessions, workshops and unique face-to-face networking opportunities. This Scientific Networking creates meaningful relationships with like-minded professionals that elevate the conference experience for the participants. We value the research and other scientific prospects and works done by individuals.

We schedule different Medical, Health Care, clinical and engineering conferences to establish divergent platforms for delegates and other scientific researchers. Each conference, summit or executive briefing is tailored to the sector, topic and audience need. Our event structure varies depending on issue and market requirements. Keynote presentations delivered to all works for some content, whilst other conferences feature multiple breakout sessions, panels, roundtables and variable formats.

A team of highly skilled committee members dwell upon the trending topics of research to create a conference theme which can be used to exhibit ideas and research works among the scientific group laying the path for scientific discoveries.

Welcome Message

Linkin Science welcomes you all to the the Virtual Online Conference On Advancements Of Laser, Optics & Photonics to be held during September 01-02, 2021. We anticipate, your participation at Laser, Optics & Photonics 2021 which catalyses ideas and enhance new interdisciplinary collaborations.

Laser, Optics & Photonics 2021 are rapidly expanding by playing a prominent role in many fields. This Conference is a platform to Industry, Academia, Researchers, Innovators to come together to discuss the research activities, advancements, ideas and exhibit laser, optics & photonics products.

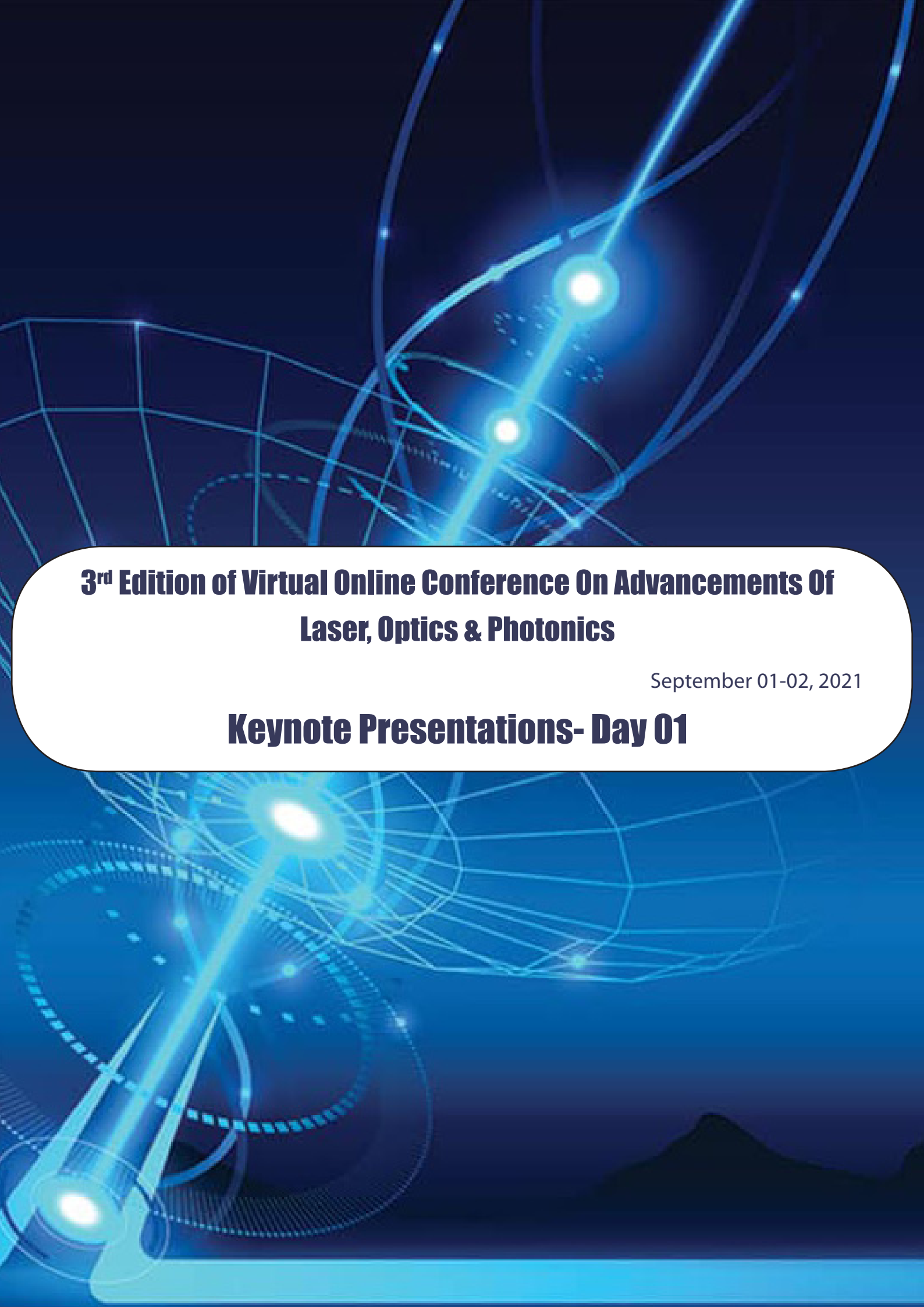
Laser, optics & photonics is rapidly gaining traction across a range of industries, from agriculture to water treatment to energy storage. Today, laser, optics & photonics is one of the most innovative, cutting-edge areas of scientific study and it continues to advance at staggering rates. Laser, optics & photonics have made some of the greatest advancements in pediatric optometry & skin laser resurfacing. Scientists in the laser, optics & photonics fields are focused on determining how future drifts in laser, optics & photonics. While laser, optics & photonics are their recent application & trends in it, the benefits are clear with it. Scientists and engineers are focused on applying laser, optics & photonics to resolve these issues. Laser, optics & photonics have been hailed as the next big thing for decades, but it is only now that it is truly becoming a reality in the medical device space.

Our exciting scientific program will be presented over the course of three days in various session types Keynote Presentations, Oral sessions, Young research forum, symposia, Poster sessions and workshops.

Highlights of Conference

- Keynote Talks
- Best Poster Awards
- Outstanding Abstract
- Best Research
- Young research Forum (YRF)

Regards,
Scientific Committee



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Keynote Presentations- Day 01

Photonics in Radar and LiDAR Systems

Paulo Pereira Monteiro
Universidade de Aveiro, Portugal

Photonics is expected to revolutionize approaches for next-generation Radar and LiDAR systems since it can provide high spectral purity on signal generation and signal integrity on detection and processing of high-frequency signals.

Photonics is also enabling the implementation of a distributed network of coherent multi-static MIMO (Multiple Input-Multiple Output) radars with co-located or widely separated antennas exploiting spatially distributed information, enhancing the detection capability in case of complex targets.

This talk discusses the main trends of using Photonics in Radar and LiDAR Systems and the approach followed in the projects RETIOT (Reflectometry Technologies to Enhance the Future Internet of Things and Cyber-Physical Systems) and LANDmaRk (Light communicAtioN Detection and Ranging).

Biography

Paulo P. Monteiro received the diploma "Licenciatura" in Electronics and Telecommunications Engineering from the University of Aveiro in 1988, the M.Sc. in Electronic Engineering, from the University of Wales UK, in 1990 and the Ph.D. in Electrical Engineering, from the University of Aveiro, in 1999. Presently, he is an Associate Professor at the University of Aveiro and a Senior Researcher at the Instituto de Telecomunicações. His main research interests include Optical Communication Networks and Microwave Photonics. He tutored and co-tutored successfully more than 14 Ph.D.'s, having participated in more than 28 research projects (national and international). He has authored/co-authored more than 18 patent applications and over 110 papers in journals and 380 conference contributions. He is a member of the ECOC Technical Program Committee and Senior Member of IEEE.

Notes:

Cryogenic Laser Technology

David C. Brown
Advanced Photonic Sciences, USA

In this Plenary talk, we will discuss the history, development, and state-of-the-art of cryogenic solid-state lasers. The substantial advantages of cryogenic cooling will be discussed, and obstacles to further development examined. The variation of laser crystal thermal expansion coefficient α, thermal conductivity k, and the thermo-optic coefficient β will be examined as a function of temperature for a variety of laser crystals. We will discuss the variation in the thermally-induced phase in laser amplifiers and show how thermally-induced aberrations are dramatically reduced as the temperature is lowered, and examine the important new parameter ξ, defined as the magnitude of the thermally-induced phase distortion per unit laser output power. Optical and lasing properties also significantly vary with temperature. Absorption and emission lines typically increase in amplitude while the spectral bandwidths narrow. The need to determine Sellmeier equations at lower temperatures and the variation in the saturation fluence and intensity with temperature will all be discussed. We will also examine how cryogenic-cooling can be beneficial in the scaling up of laser systems with concomitant average and peak power and how laser beam quality is affected. Such a cryogenic amplifier system has been developed at APS.

In view of the broad progress and applicability of cryogenic solid-state lasers, the development and investigation of this field have just begun. The future of cryogenically-cooled lasers will be discussed, with an emphasis on what directions may yield interesting or new physics and capabilities. These include further studies of crystals' physical, laser, optical, and thermo-optic parameters as temperatures are further lowered from 77 K towards 4.15 K and the resulting potential for further increases in average power with very low optical distortion. The investigation of linear and nonlinear properties of crystalline and rare-earth-doped glasses and the measurement of laser-induced damage thresholds as a function of temperature.

Biography

David C. Brown received his Ph.D. degree in physics from Syracuse University in 1974. Since then, he has held senior research positions at The Laboratory For Laser Energetics at The University of Rochester, Northrop-Grumman, and the GE Research and Development Center. He is currently the Manager and CTO of Advanced Photonic Sciences, a company he founded in 1993.

In 2019, he was elected a Fellow of The Optical Society of America, pioneering research on rare-earth activated lasers, rare-earth doped cryogenic laser technology, and understanding thermal effects in fiber lasers and cryogenic lasers. He is a life-long member of OSA and IEEE and is a reviewer for sixteen laser and optics journals worldwide. Dr. Brown's pioneering work in cryogenic lasers has been adopted in many laser facilities and projects worldwide. His generous support and reviews have been instrumental in initiating important cryogenic laser projects in the Czech Republic, France, and Romania. His current research interests include developing high power ultra-narrowband Yb, Er:Glass lasers, blue and green diode-pumped tunable CW and ultrafast lasers, and the spectroscopy of rare-earth ions at room and cryogenic temperatures in various hosts.

Notes:

Creating materials with a desired refraction coefficient

Alexander G. Ramm

Kansas State University, USA

The theory of acoustic and electromagnetic (EM) wave scattering by one and many small impedance particles of arbitrary shapes is developed. The basic assumptions are $a<<d<<\lambda$, where a is the characteristic size of particles, d is the smallest distance between the neighboring particles, λ is the wavelength.

This theory allows one to give a recipe for creating materials with a desired refraction coefficient.

One can create material with negative refraction: the group velocity in this material is directed opposite to the phase velocity.

One can create a material with the desired wave focusing property.

Equation is derived for the EM field in the medium in which many small impedance particles are embedded.

Similar results are obtained in [6] for heat transfer in the media in which many small particles are distributed. The theory presented in this talk is developed in [1]-[9].

Practical realizations of this theory are discussed in [9].
In [9], the problem of creating material with a desired refraction coefficient is discussed in the case when the material is located inside a bounded closed connected surface on which the Dirichlet boundary condition is imposed.

References

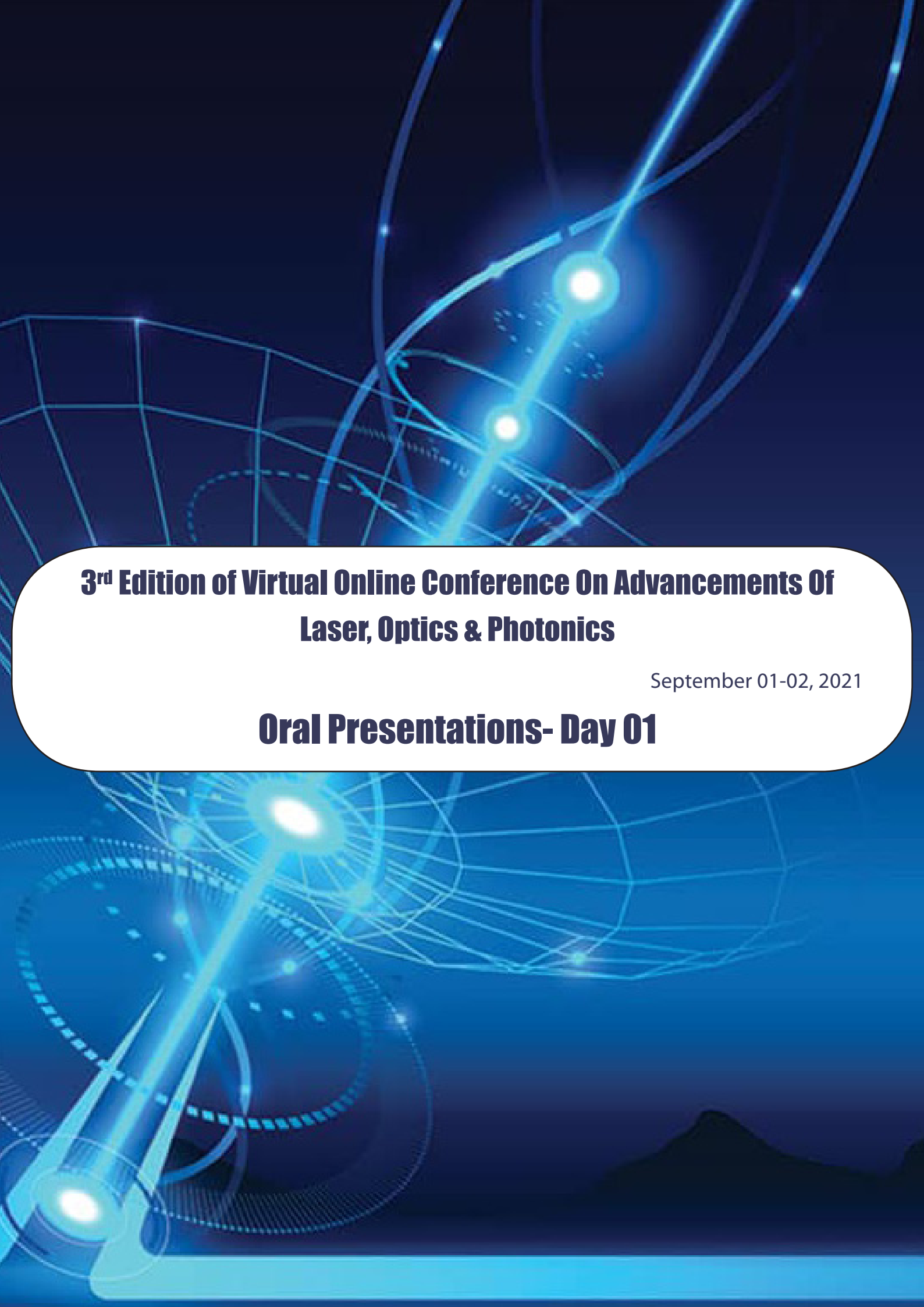
[1] A.G.Ramm, Scattering of acoustic and electromagnetic waves by small bodies of arbitrary shapes. Applications to creating new engineered materials, Momentum Press, New York, 2013.
[2] A.G.Ramm, Many-body wave scattering problems in the case of small scatterers, J. of Appl. Math and Comput.,(JAMC), 41, N1, (2013),473-500.
[3] A.G.Ramm, Scattering of electromagnetic waves by many nano-wires, Mathematics, 1, (2013), 89-99. Open access Journal: http://www.mdpi.com/journal/mathematics
[4] A.G.Ramm, Wave scattering by many small bodies: transmission boundary conditions, Reports on Math. Physics, 71,N3, (2013), 279-290.
[5] A.G.Ramm, Scattering of EM waves by many small perfectly conducting or impedance bodies, J. Math. Phys. (JMP),56, N9, 091901, (2015).
[6] A.G.Ramm, Heat transfer in complex medium, In the book "The foundation of chaos revisited: from Poincare to recent advances", Editor C. Skiadas, Springer, 2016, pp. 119-136.
[7] A.G.Ramm, Creating materials with a desired refraction coefficient, IOP Concise Physics, Morgan and Claypool Publishers, San Rafael, CA, USA, 2017.

[8] A.G.Ramm, Many-body wave scattering problems for small scatterers and creating materials with a desired refraction coefficient, in the book "Mathematical Analysis and Applications: Selected Topics", Wiley, Hoboken NJ, 2018, Chapter 3,pp.57-76. (ed. M. Ruzhansky, H. Dutta, R. Agarwal)
[9] A.G.Ramm, Creating materials with a desired refraction coefficient, Second expanded edition, IOP Publishing, Bristol, UK, 2020.

Biography

Alexander G. Ramm is a Professor Emeritus of Mathematics with broad interests in analysis, scattering theory, inverse problems, theoretical physics, engineering, signal estimation, tomography, theoretical numerical analysis, and applied mathematics. He is the author of 708 research papers, 20 research monographs, and is the editor of 3 books. A. G. Ramm has solved inverse scattering problems with fixed-energy scattering data, with non-over-determined scattering data and has studied scattering problems with under-determined scattering data. He has solved many specific inverse problems and developed new methods in this area. He has also solved the many-body wave scattering problem when the bodies are small particles of arbitrary shapes and used this theory to give a recipe for creating materials with a desired refraction coefficient. These results attracted attention from the scientists working in nanotechnology. He gave formulas for the scattering amplitude for scalar and electro-magnetic waves by small bodies of arbitrary shapes and formulas for the polarizability tensors for such bodies. He gave a complete solution to the Pompeiu problem, proved the Schiffer's conjecture, and gave first symmetry results in harmonic analysis. He has developed the Dynamical Systems Method (DSM) for solving linear and nonlinear operator equations, especially ill-posed. He developed a random fields estimation theory, proved nonlinear inequalities, and used these for obtaining new results in stability theory. He studied convolution integral equations and inequalities with hyper-singular integrals. Recently, he solved the millennium problem (concerning the Navier–Stokes Problem (NSP)) and proved the paradox in the NSP which shows the contradictory nature of the NSP and the non-existence of its solution on the interval $t>0$ for the non-zero initial data.

Notes:



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Oral Presentations- Day 01

Multi-electron trojan wave packets in the circularly polarized and the magnetic fields on the multi-layer Langmuir type (1) trajectories in helium atoms and quantum dots

Matt Kalinski

Utah State University, USA

We extend the concept of the Langmuir type (1) "Hoop Earrings" rotating Helium-like model trajectories used in the early attempts to impose the Hydrogen Bohr atom quantization from the even 2N electrons two-plane configurations to the multi-plane 2N even or 2N + 1 odd number or electrons. While our recently discovered 2N electron Helium naturally extended 2-electron Langmuir trajectories consist of only two layers of electrons moving in phase on the two parallel circles with electron configurations placed at the vertexes of angles of regular polygons also parallel in space placed symmetrically on the two parallel planes with respect to the nucleus and also one being the perpendicular projection of the other that multi-layer for 2N or 2N + 1 electrons consist of k parallel layers where k is the divisor of the 2N or 2N + 1 and for the odd k with the one layer embedded in the plane containing the atom nucleus. When the 2N + 1 is prime, there is only one layer forming the regular polygon. Additionally, the polygons on one side of this plane can be of a different size so the whole configuration forms a "Wigner Diamond". Similar to the 2N two-layer case, the addition of the Circularly Polarized electromagnetic field with the electric field rotating in planes of the field free electrons is causing the shape polarization distortion from the discrete rotational symmetry group of the resulting "Barrel" polyhedron. The classical stabilization of the trajectories by the combination of fields further leads to the existence of non-dispersing localized wave packets moving around the trajectories. The time-dependent Hartree simulations confirming the existence of such Wave Packets in selected cases and the simulations using our recently developed Time-Dependent Quantum Diffusion Monte Carlo Method, are conducted.

Biography

Matt Kalinski (born 1968) is a US theoretical physicist who discovered Trojan wave packets, squeezed, coherent, and intrinsically coordinate-entangled states of electrons in true atoms solving the long-standing problem of interstellar rocket propulsion by extending the positron or positronium lifetime and control the arbitrary slowdown of the recombination process of antimatter in a positronic rocket engine. Kalinski earned his Ph.D. in Physics from the University of Rochester. The broad applications of his discovery of coherent non-dispersing electrons and electron pairs in atoms, polar molecules, and heterodyne two-electron Rydberg atoms are important and not limited to photonic superconductivity, laser centrifugal isotope separation of Deuterium, theory of cold nuclear fusion in Palladium, detection of ultra-weak magnetic fields with Aharonov-Bohm effect, direct observation of Berry phase in single atoms, arbitrary quantum state preparation with the technique of chirped quantum painting, observation of Unruh-Davies effect as well as for the detection of possible gravitoelectromagnetic force and twisted corrections to Einstein equations and precise engineering of complex quantum dot systems.

Notes:

Application of lasers in Phosphor material development for solid-state lighting

Hisham Menkara

PhosphorTech Corporation, USA

Nearly all current solid-state lighting (SSL) systems used for general illumination are based on the phosphor converted LED (pcLED) architecture, which offers a practical and mass producible structure for white light generation. Laser-based SSL devices do exist in limited applications such as select automobile headlights and in some image projection devices utilizing laser-based Digital Light Processors (DLPs). This study will present recent work on how RGB lasers and SSL emitters were combined with selected phosphor materials to produce novel infrared (IR) optical sources and imaging devices. For example, by combining a high power (10W) blue 445nm laser with a ceramic phosphor, it was possible to produce a source with optical emission in the near-infrared (NIR 700-900nm), as well as continuous thermal emission extending from the short-wave infrared (SWIR 0.9-1.7μm), to the mid-wave infrared (MWIR) and even past the 14μm range of the long-wave IR (LWIR). A holographic IR display prototype was built and demonstrated by down-converting RGB into IR using phosphors. In addition, it will be shown how lasers can be used in the development, analysis, and optimization of phosphors. Using lasers as excitation sources instead of conventional LEDs, it is possible to perform accurate and high-power density lifetime measurements on the phosphor converters by de-coupling the optical material aging from the polymer encapsulant (epoxy/silicone) degradation typically observed in high power SSL devices. Unlike an LED light, a laser beam can be easily focused into a 200-300 μm spot from a distance away from the sample under test, which helps indirectly monitoring the optical output and operating temperature of the down-converter independently of the excitation source itself. Using such an approach, several different types of LED phosphor materials can be monitored and compared simultaneously for thousands of hours.

Biography

Dr. Menkara has a Ph.D. in Physics from Georgia Tech and is one of the original founders of PhosphorTech Corporation and currently serving as its CEO. He has both technical and business backgrounds and has been involved in the basic development and commercialization of virtually all of the current product lines & services offered by PhosphorTech. He has over 20 years of experience in semiconductors, photonics/photodetectors, light-emitting devices, and phosphor technologies for light energy capture and conversion. He has developed and patented several novel materials, processes, and devices for energy-efficient lighting and material analysis. He has successfully managed and co-managed multi-million-dollar projects and, in the process, transformed basic scientific concepts and feasibility studies on new materials and structures into actual commercial products. For the past 10 years, he has been additionally involved in the area of nanotechnology and specifically functional nano-materials for light-harvesting and energy conversion.

Notes:

Experimental realization of chiral photonic lattices

Vasiljević[1*], Alessandro Zannotti[3], D. V. Timotijević[2], Cornelia Denz[3], and D. M. Jović Savić[1]

[1,2]University of Belgrade, Serbia

[3]University of Münster, Germany

Nondiffracting beams find their applications in optics, photonics, and atom physics. Particularly, their transverse intensity distribution propagates unchanged for hundreds of diffraction lengths, consequently allowing the creation of 1D and 2D photonic lattices with nondiffracting beams in photosensitive media. Low diffraction and robustness of nondiffracting beams make them appropriate for deployment in free-space wireless communications, optical interconnections, long-distance laser machining, optical tweezers, biology, surgery, etc. There are four different propagation invariant light fields: Plane waves, Bessel, Weber, and Mathieu nondiffracting beams. Mathieu beams are the solution of the Helmholtz equation in elliptic cylindrical coordinates, therefore being the best suited to address physical effects described in elliptical coordinates. They are classified according to their symmetry properties as even and odd Mathieu beams. Elliptical Mathieu beams are obtained as a complex superposition of appropriate even and odd Mathieu beams, with remarkable continuously-modulated spatial phase distributions that create orbital angular momenta, related with a transverse energy flow. Their transverse intensity distribution can be shaped by their order and the parameter of ellipticity.

We study linear characteristics and nonlinear self-action of elliptical Mathieu beams in a photorefractive crystal experimentally and numerically. Linear propagation of such beams validates a nondiffracting transverse intensity distribution with transverse energy redistribution along elliptic paths compensated in each point. In contrast, their nonlinear self-action breaks this sensitive equilibrium and leads to the formation of high-intensity filaments, which rotate in the direction determined by the energy flow. Our study advances the field of chiral light and photonic structures by pointing to the suitability of Elliptical Mathieu beams as light patterns for optical induction of chirally twisted photonic lattices with elliptic envelopes in the transverse plane. The order of used Elliptical Mathieu beam determines the number of created chiral waveguides, where the waveguides slopes can be manipulated by changing the nonlinearity strength or the structure size of the used beam.

Biography

Dr. Jadranka M. Vasiljević received her Ph.D. degree in 2020 at the Faculty of Physics at Belgrade University, Serbia. Since 2015 she joined the research group of Dr. DraganaJovićSavić at the Institute of Physics, University of Belgrade, Serbia. She is part of the Laboratory for Nonlinear Photonics at the Institute of Physics, University of Belgrade, Serbia. Her research area is Nonlinear Optics and Photonics. Currently, research interests are nondiffracting beams, in particular, based on the family of Mathieu beams. She is studying the realization of two-dimensional dynamical structures in the photorefractive medium by Mathieu beams, aperiodic and complex structures with Mathieu beams, and investigating phenomena correlated with light propagation in Mathieu photonic lattices.

Notes:

Application of ultra-short pulse lasers in the restauration of historical stained-glass

Luis Angurel
University of Zaragoza, Spain

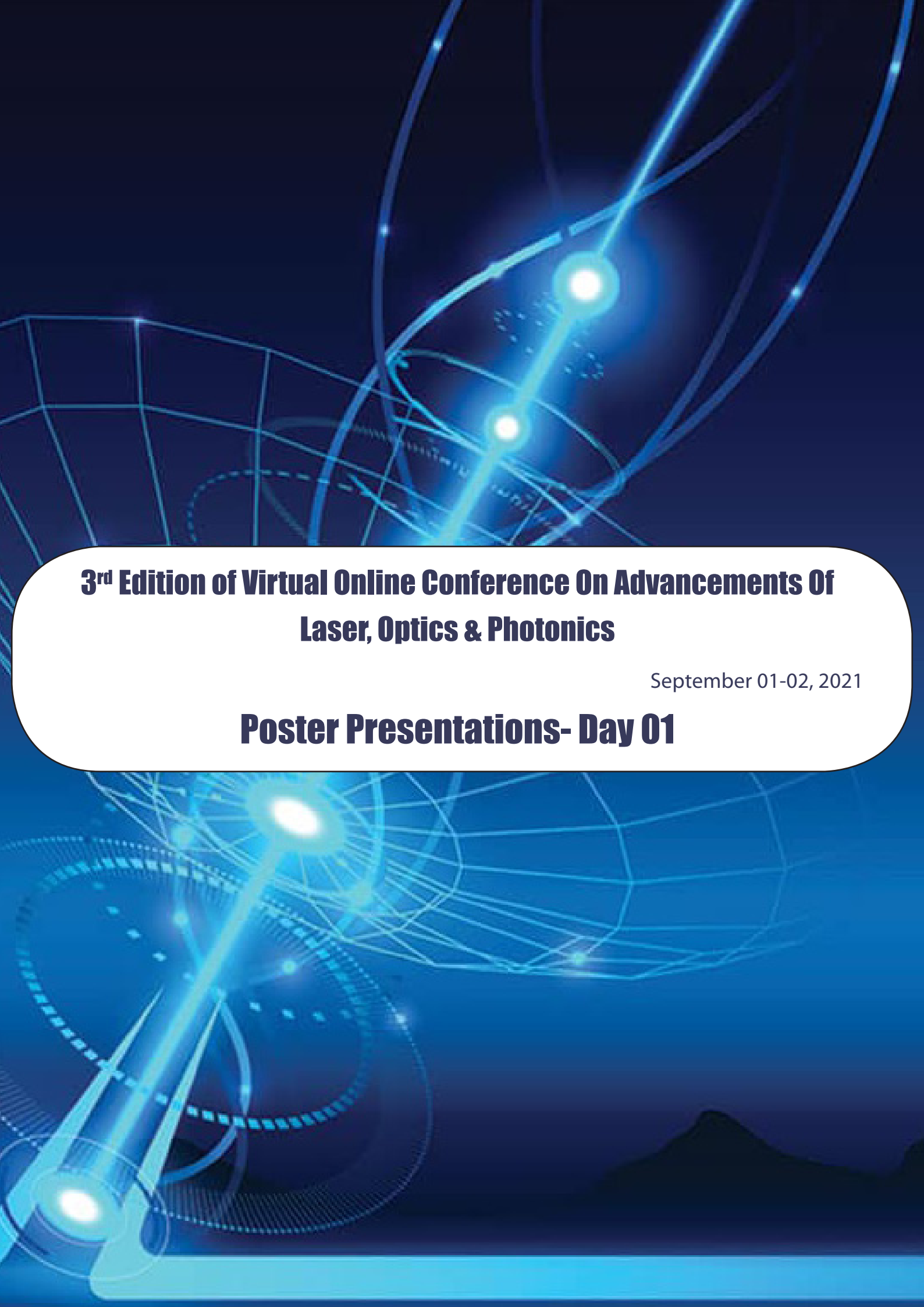
Stained-glass windows are one of the most amazing components in cultural heritage buildings. The application of laser technologies in conservation has widely being used. Still, short-pulse lasers open new opportunities for safe decontamination because they better control the volume affected by the laser treatment. In this work, the interaction of picosecond and femtosecond IR and UV pulsed lasers with some contemporary and historic stained glasses has been analyzed, exploring their applicability to restore stained-glass windows safely. It has been demonstrated that heat accumulation in the layer that is being eliminated during the cleaning process is enough to induce cracks on the glass due to the thermal stresses generated on the surface, even if the damage threshold of the glasses was above the irradiance or fluence levels used in the laser treatment.

In consequence, laser parameters have to be selected to minimize the temperature increase. Temperatures reached during the laser treatments have been recorded using a thermocamera. Two different alternatives have been explored. When it is possible, frequency values lower than 20 kHz are enough to avoid heat accumulation between consecutive pulses when the required distance between spots to obtain a uniform treatment is used. For laser systems working with frequencies in the range of several hundreds of kHz, the option is to work in burst mode, limiting the number of pulses in each position and selecting an adequate time lapse between two consecutive burst runs. A proof of concept was carried out on a colorless stained-glass sample from Cuenca Cathedral, dated at the end of the XV century, showing that it is possible to eliminate the external gypsum layer without affecting the pigments used to decorate the stained glass.

Biography

Dr Luis Alberto Angurel is Professor at the University of Zaragoza and researcher at the Laser for Energy and Advanced Materials research group in Institute of Nanoscience and Materials of Aragón (INMA), joint research institute of the Spanish National Research Council and the University of Zaragoza. His main areas of research are the fabrication and characterization of superconducting materials for large-scale electrical applications and the development of laser processes for different applications. From the point of view of material fabrication, he has been working in the development of 1) laser melting techniques to texture bulk High-Temperature Superconductors and other ceramics with different cylindrical and planar geometries, and 2) laser ablation methods, with experience in developing laser cleaning protocols for different materials. In the field of Cultural Heritage, he participates in the project European Doctorate in Archaeological and Cultural Heritage Materials science (ED-ARCHMAT, H2020-MSCA-ITN-2017/ EXCELLENT SCIENCE (EU173832)).

Notes:



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Poster Presentations- Day 01

LED Photobiomodulation therapy combined with biomaterial as a scaffold promotes better bone quality in the dental alveolus in an experimental extraction model

Vanessa Dalapria*, Marcos RL, Bussadori SK, Anselmo G, Benetti C, Silva ACA, Marinheiro N.R.S, Pinto R.S, Sales R.S, De França L.S, and Deana A.M

UNINOVE- Nove de Julho University, Brazil

The loss of the dental element causes deformity and bone atrophy. On the other hand, bone grafting immediately after tooth extraction will enable rehabilitation with implants to restore mastication and aesthetics. Photobiomodulation accelerates bone healing, activating osteoblasts, decreasing osteoclastic activity and improving the integration of the biomaterial with bone tissue. The aim of the study was to evaluate the effect of photobiomodulation (LED λ=850nm) on the bone quality of Wistar rats submitted to molar extraction with and without bone graft with hydroxyapatite biomaterial (Straumann® Cerabone®). Forty-eight rats were divided into five groups (n = 12): Baseline (no interventions); control (extraction); LED (extraction + LED); biomaterial (extraction + biomaterial) and biomaterial + LED (extraction + biomaterial + LED). Euthanasia occurred 15 and 30 days after extraction induction. The ALP analysis showed improvement in bone formation in the control and biomaterial + LED groups in 15 days ($p = 0.0086$ and $p = 0.0379$. In addition, the LED group had better bone formation compared to the other groups at 30 days ($p = 0.0007$, Bonferroni). In the analysis of AcP, all groups had lower resorption compared to the baseline group. Bone volume increased in the biomaterial, biomaterial + LED and basal groups compared to the control group at 15 days ($p < 0.05$, t-test). At 30 days, the basal group had greater volume compared to the control and LED groups ($p < 0.05$, t-test). The LED combined with the biomaterial improved bone formation in the histological analysis and decreased bone degeneration, promoting an increase in bone density and volume. In conclusion, LED may be an important therapy to be combined with biomaterials to promote bone formation, along with other known benefits of this therapy, such as pain control and the inflammatory process.

Notes:

Effects of photobiomodulation on xerostomia in cancer patients undergoing oncological treatment. A randomized controlled clinical trial

Susyane Vieira de Oliveira*, Rebeca Boltes Cecatto, and Maria Fernanda Setúbal Destro Rodrigues

UNINOVE- Nove de Julho University, Brazil

Xerostomia is defined as a subjective sensation of dry mouth described by patients, which is commonly related to hyposalivation (decreased salivary flow rate). Its etiology is multifactorial and can be associated with secondary salivary gland disease, systemic diseases, drugs, as well as head and neck radiotherapy, which is related to radiation dose, fraction size and duration of treatment. Xerostomia impairs speech, chewing and swallowing with a consequent worsening of the nutritional status and functional decline.

Therapeutic management of xerostomia includes oral hygiene with fluorate and antimicrobial agents, saliva substitutes and sialogenic agents. In this context, Photobiomodulation (PBM) is an effective therapy for the supportive care of cancer patients undergoing radiotherapy, mainly in preventing high-grade mucositis. However, its effects in the treatment of xerostomia in cancer patients are not yet established.

Objective: Thus, the aim of this study is to evaluate the effects of PBM on xerostomia after radiotherapy in cancer patients receiving oncological treatment.

Materials and methods: This study will be a randomized, blind-controlled clinical trial in which cancer patients (female or male) submitted previously to radiotherapy will be divided into 2 groups: G1 (experimental group), in which patients will receive the standard treatment for xerostomia and PBM and G2- (control group), in which patients will receive the standard treatment for xerostomia + PBM placebo. The parameter of PBM will be as follow: diode laser with emission at 808nm, 100mW, 4J per point and 40 sec. The irradiation will be applied in parotid (3 points), submandibular (2 points) and sublingual glands (2 points) as well as in the oral mucosa, totaling 20 points. Patients will be treated 3x/week for 8 weeks. The primary outcome measure will be the Xerostomia Inventory and the secondaries will be the evaluation of speech, articulatory and nutritional assessment and sialometry.

Notes:

The effect of pre-emptive photobiomodulation with infrared LED to prevent pain, trismus, and edema. I Impacted lower third molar teeth surgery: A controlled clinical trials, double-blind, randomized

Erika da Silva Mello*, Anna Carolina Ratto Tempestini Horliana, Laura Caroline Diana, Leticia Viana dos Santos, Marta Cristina Dantas dos Santos, Rafaela Neves de Souza Santos, Vitória Gonçalves Gaspar, Kristianne Porta Santos Fernandes, Sandra Kalil Bussadori, and Alessandro Melo Deana

UNINOVE- Nove de Julho University, Brazil

The impacted lower third molar teeth surgery is indicated to prevent cists and pericoronitis. The pain, edema, and trismus are frequently associated with surgery, and analgesics, anti-inflammatory, and physiotherapy are indicated. The photobiomodulation post-surgery is effective in reducing edema, trismus, and pain. The purpose of this study is to evaluate the preemptive use of infrared LED to prevent pain, trismus, and edema on conditioned orofacial tissues. This randomized, double-blind clinical trial, randomized, double-blind evaluated the impact of preconditioning the tissues involved on impacted lower third molar teeth surgery to prevent these unwanted effects. The participants were divided into two groups, and 1h before the surgery, the treated group received photobiomodulation with infrared LED 850nm, 8J, the 80s, and the control group was used a similar device without irradiation. The participants were evaluated and received the corresponding treatment on the second and seventh days after surgery. After the second day, the treatment group demonstrated a significant pain reduction in relation to the placebo group ($p = 0.006$, Mann-Whitney); there was no significant change in trismus. The treatment group showed on the seventh-day post-surgery facial measurements statistically equal to pre-surgical values. This study demonstrated that the conditioning of the orofacial tissues involved in third molar surgeries using infrared LED with 850nm wavelength 8J, 80s, performed one hour before the surgical procedure, showed positive results in reducing post-operative pain.

Notes:

Research protocol application of diode laser in women with genitourinary menopause syndrome

Silvia Pereira

UNINOVE- Nove de Julho University, Brazil

Postmenopausal Genitourinary Syndrome (PGS) is caused by the physiological hypoestrogenism of the climacteric and results in several urinary, genital, and sexual alterations. Brazilian women live about a third of their life after menopause, where hormonal changes occur along with clinical manifestations, characterized by vaginal and vulvar dryness, burning, discomfort, vulvovaginal irritation, lack of lubrication, dyspareunia, dysuria, pollakiuria, and recurrent urinary infections. Fractionated photothermolysis and radiofrequency systems, alone or in combination, were tested to improve PGS. The goal of this project is to evaluate the clinical response of patients with symptoms of genitourinary menopause syndrome after the application of photobiomodulation in the vagina and its introit. In this randomized, double-blind, placebo-controlled study protocol, 60 women, aged 50 years or older, with complaints of postmenopausal PGS, which will be randomized according to in two groups (placebo control and treatment), as shown in Figure 1. The treatment group (n=30) will receive four consecutive applications, using laser diode DMC (808 nm), 4J per point, 100mW of power, 510mW/cm², beam area of 0.2cm², 8 sites in the external vagina, for 40s in each site, once per week for 4 weeks. The Placebo Group (n=30) will be handled as treated but with the laser turned off. The life quality will be analyzed by using a visual analog scale (VAS), female sexual functioning index (FSFI-6), urinary incontinence questionnaire (ICIQ-SF), Vaginal Health Index Score (VHI) and compared between groups. Also, the vaginal temperature will be measured using a thermal camera, the pressure of the pelvic floor force (vaginal dynamometer) and a 1-hour Pad Test performed to quantify the urinary loss. All data will be analyzed regarding its distribution and an appropriate inferential test will be applied. With this procedure, we intend to obtain an overall better life quality and diminished symptoms in women with PGS.

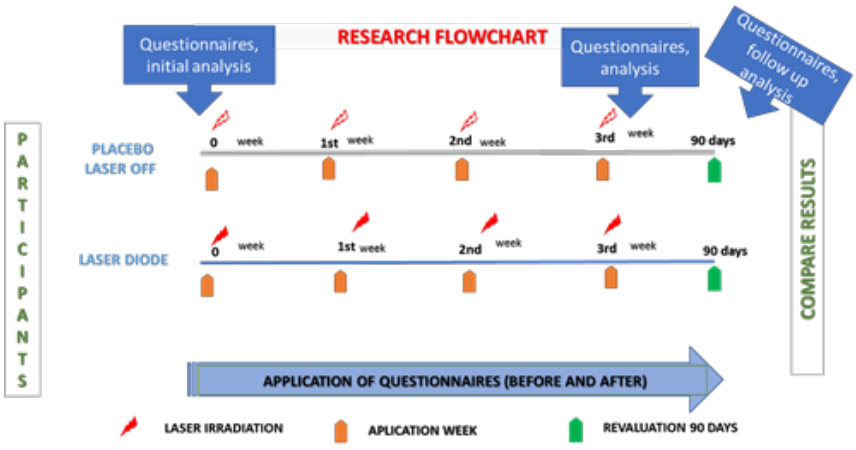


Figure 1. Research Flow chart

Notes:

Evaluation of the efficacy of photodynamic therapy in the treatment of pericoronitis: A randomized, controlled, double-blind clinical trial

Tânia Oppido Schalch* and Anna Carolina Ratto Tempestini Horliana

UNINOVE- Nove de Julho University, Brazil

Pericoronitis is a common disease in the eruption phase of third molars, sometimes debilitating. There is no consensus in the literature regarding a gold standard treatment. Studies using antimicrobial photodynamic therapy (aPDT) showed promising results of aPDT in the treatment of symptoms of pericoronitisis, which could be an interesting alternative therapy because it is easy to perform and does not cause bacterial resistance. The aim of this study was to evaluate the effectiveness of a new formula of methylene blue (MB) in aPDT for pericoronitis. In this controlled trial, 10 individuals with pericoronitis were randomized into the positive control group (n = 5): irrigation with sterile saline and aPDT (conventional MB at 0.005% concentration and irradiation with low-intensity laser λ = 660 nm, 9J per point and radiant exposure of 318 J/cm2), and the experimental group (n = 5): treatment identical to G1, however MB were delivered in a new formulation for oral use. We analyzed the pain, edema and mouth opening. The variables were evaluated in baseline and 4th day after aPDT. Statistical analysis was performed with ANOVA two-way supplemented by the Bonferroni test. Significant values were $p < 0.05$. No statistical improvement in pain or swelling was observed in either group after treatments. In both groups, there was a significant improvement in mouth opening, with a better result on the 4th day in favor of the experimental group. The results suggest that aPDT is an efficient therapy in the treatment of trismus caused by pericoronitis and that the new MB formula is more efficient than the conventional one for this purpose. Larger samples, as well as new studies, are needed for further conclusions.

Notes:

Transcutaneous systemic photobiomodulation reduces lung inflammation in experimental model of asthma

Vanessa de Souza* and Adriana Lino-dos-Santos-Franco

UNINOVE- Nove de Julho University, Brazil

Asthma is a chronic inflammatory disease characterized by recurrent and reversible episodes of wheezing, dyspnea, chest stiffness and cough. Its treatment includes several drugs, high cost, and considerable side effects. Photobiomodulation (PBM) emerges as an alternative treatment, showing good results, and it can be applied locally or systemically. Here, we aim to evaluate the effect of transcutaneous systemic photobiomodulation (TSPBM) by red diode light. Therefore, adult rats were sensitized and challenged with ovalbumin (OVA) plus alum for induction of asthma and irradiated or not with TSPBM in the caudal vein (Wavelength 660 ± 10nm; Total Radiant Emission 15 J; Area 2.8 cm^2; Energy density 5.35 J/cm^2; Irradiance 33.3 mW/cm^2; Exposure time 150 s). Our investigations prioritized the cell migration into the alveolar space and lung, tracheal responsiveness, release and gene expression of cytokines, mast cell degranulation, and anaphylactic antibodies. Our results showed that TSPBM reduced the cell migration and mast cell degranulation without altering the tracheal responsiveness and ovalbumin antibody titers. Indeed, TSPBM increased interleukin 10 (IL-10) levels in the BAL fluid without altering the gene expression of cytokines in the lung tissue. Thus, this study showed that transcutaneous systemic irradiation reduced lung inflammation by altering mast cells degranulation and IL-10 level. Further studies investigating different dosimetric parameters are needed in order to improve the effects of the TSPBM.

Notes:

Sistemic photobiomodulation therapy on vascular activity under experimental diabetes model

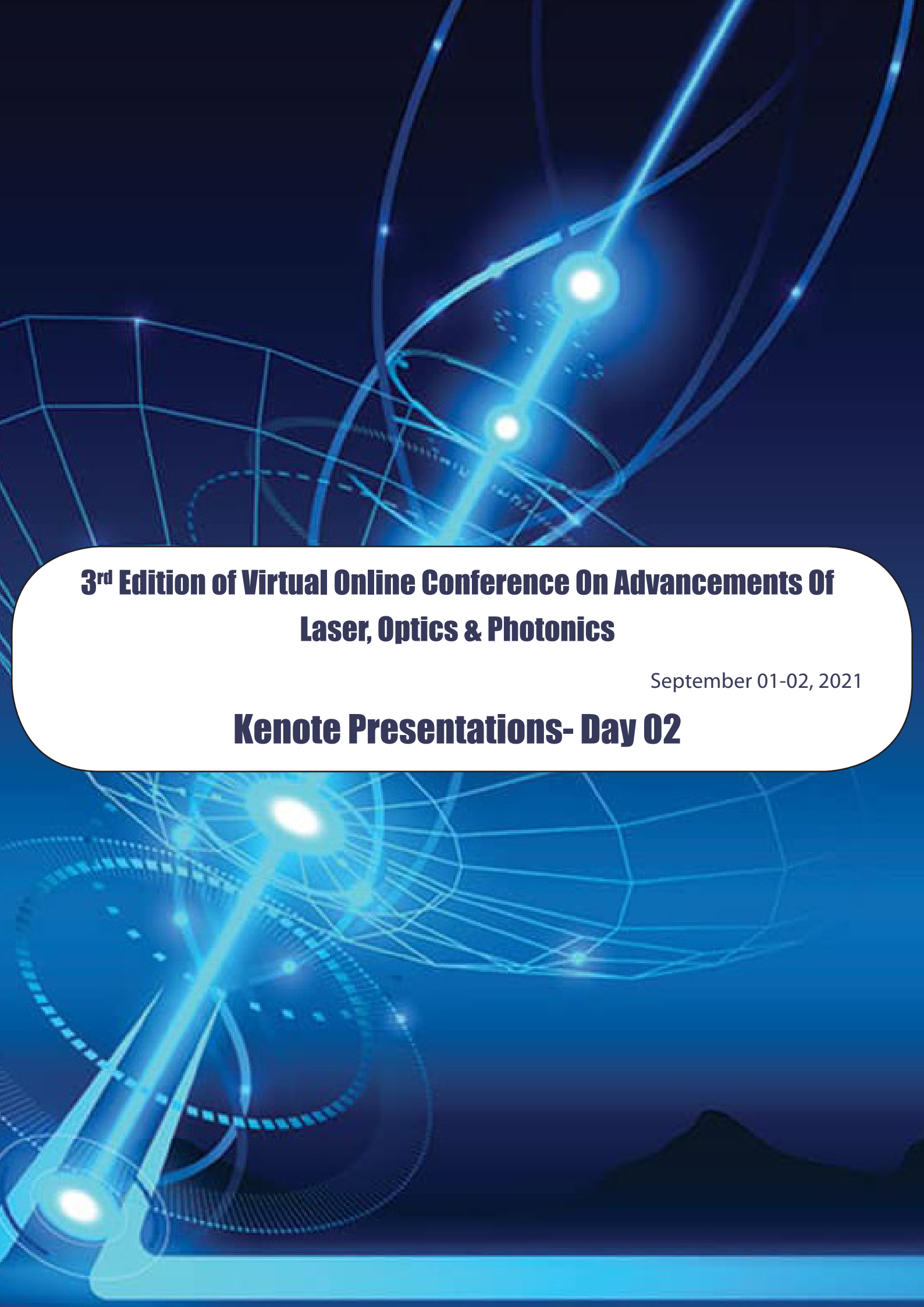
Aguilera Cantero, Jose Maria*; Mello, Dominique Cavalcanti; Carvalho, Almeida-Mattos, Patrícia; Rodrigo Leal; Parizotto, Nivaldo Antônio; Labat Marcos, Rodrigo

UNINOVE- Nove de Julho University, Brazil

Vascular Diseases are related to damage into vascular structures, with a correlation between lifestyle habits such as food, sedentarism, obesity, tobacco, dyslipidemia associated with other metabolic disorders. Diabetes Mellitus affects 20% of the world population. It's a chronic and not transmissible disease related to carbohydrates and lipids altered metabolism, which is a consequent formation of Atherosclerotic Plate's Disease. Photobiomodulation Therapy is widely used to repair vascular structures altered due to Diabetes Mellitus. The Goal pursuit for this study is to know the repair mechanism involved in a PBMT for Diabetes damaged vessels, and their properties, into physics variations and gene expression for repair due to the action of PMBT.

The study design is based on Three groups of Winstar mice. The first is the control and healthy group, the second group is Winstar with Diabetes but without treatment, and the third is the group with Diabetes treated with insulin and PBMT. The disease is induced by Streptozocin. Later we confirm the diagnosis of Diabetes, set a biological and blood test in order to know in detail all Physiological and Biochemical status of each component of all study groups. The PBMT elected is Sistemic Laser Irradiation Therapy in the tail artery (830nm, 3 Joules, 100mW) at alternate days during a period of 45 days. Later is perform a Xilasine and Cetamine anesthetic association prior to euthanasia. The Blood and the Aorta of specimens state under a solution to preserve them in order to practice morphologic, biochemical, and functional analysis and tests.

Notes:



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Kenote Presentations- Day 02

High-power red/green/blue(Violet)-LDs module for vehicle white-lighting communication

Gong-Ru Lin*[1] and Chih-Hsien Cheng*[2]

[1]National Taiwan University,Taiwan

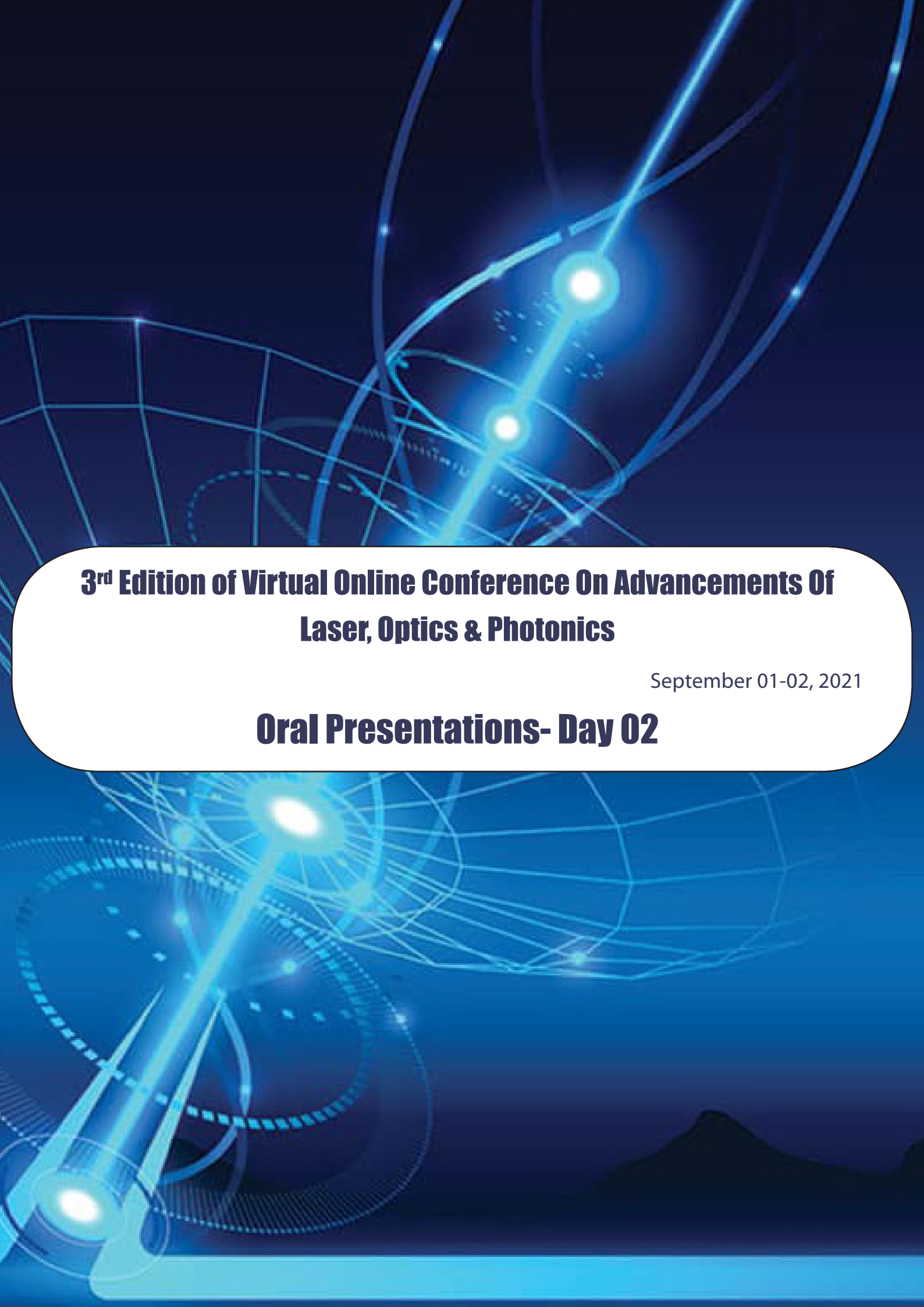
[2]University of Tokyo, Japan

Combing the vehicle head-lighter with the semiconductor solid-state white-lighter as a vehicle lighting communication module has recently emerged as the hot research topic, which will play an important role in traffic data streaming, instant sensing and contouring, and wireless access routing networks for future unmanned vehicles. In this talk, we discuss the characteristics of a high-power red/green/blue(violet) tri-color laser-diode (LD) module with a miniature package for vehicle head-lighting communication. In the first work, the visible light communication composed by red/green/violet (RGV) LDs and a yellow light-emitting diode (Y-LED) diverged by a frosted glass is proposed for both the indoor high-quality white-lighting and the high-speed communication. Coding the RGV LDs for wavelength division multiplexing (WDM) wireless communication is achieved. The RGV-LD+Y-LED white-lighting VLC system can support a transmission data rate of 28.4 Gbit/s with a CCT of 4852 K, a high CRI of 71.6, the CIE coordinate at (0.37, 0.49), the illuminance of 6800 lx with a divergent angle of 60°. In the second work, the size of the miniaturized R/G/V/Y module greatly reduces the volume. Moreover, the output power of the R/G/V LDs can provide a high illuminance. And the high-power R/G/V/Y mixed white-lighting source exhibits a qualified CRI, a CCT, and CIE coordinate, which can satisfy the requirements of serving as a car headlight for vehicle communication. From the above mentioned discussion, the illuminance, color temperature, color rendering index, divergent angle, and the data transmission rate of such a mixed white-light source will be overviewed toward the compact white-lighting for vehicles in the near future.

Biography

Gong-Ru Lin is the full professor with the Graduate Institute of Photonics and Optoelectronics and the Department of Electrical Engineering, and also the Associate Dean with College of Electrical Engineering and Computer Science at National Taiwan University. He is honored as the Y. Z. Hsu Science Chair Professor and the Lifetime Distinguished Professor of the NTU. He is the Fellows of IEEE, OSA, SPIE, IET, IOP, and the Distinguished Research Fellow of MOST Taiwan. He served as the 13th President of Taiwan Photonics Society.

Notes:



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Oral Presentations- Day 02

Free standing 2D/3D nanostructures fabrication using Femto-second laser lithography

Shobha Shukla

Indian Institute of Technology(IIT- Mumbai), INDIA

2D/3D nanostructures are implemented towards the generation of functional parts of the miniaturized devices. Immense research efforts towards the refinement of lithographic techniques over decades have facilitated the shrinkage of fabrication regime to submicrometer scales. The current state-of-the-art nanolithographic techniques are based on patterning, using Focussed Ion Beam (FIB), Electron Beam Lithography(EBL) and Optical Lithography. Despite having good resolutions, prototyping based on FIB and EBL are limited to planar 2D geometries, and the resolution of optical lithography is constrained by the diffraction limit, along with inherent disadvantages of low throughput and time-consuming, complex serial processing. Two-photon photopolymerization (TPP) is based on the nonlinear interaction of tightly focussed intense laser pulses with photopolymers[1]. Such nonlinear interactions are confined within the focal volume, hence providing the means to write nanostructures having resolutions beating the diffraction limit in a single exposure step. Two patternable photon formulations (TPPFs) used in TPL are dependent on two-photon absorbing (TPA) dyes/photoinitiators for initiating the two-photon processes and hence photopolymerization. These TPA molecules are toxic and involve complex chemical reactions in their synthesis, hence introducing a bottleneck in the development of this technology[2]. Few groups have developed and used these molecules to obtain TPPFs with good TPP sensitivity, but such molecules and TPPFs are proprietary. Due to the lack of commercial TPA molecules, there is a dire need to develop dyeless TPPFs to enable further growth of this technology. To address this challenge, we have formulated a TPPF that implements a commercially available free radical generating UV photoinitiator (Lucirin-TPO-L) to initiate the TPP reaction.The formulation was void of any two-photon dyes, however the large quantum yield (~0.99) of the used initiator, enables efficient absorption and radical generation and hence the good TPP sensitivity of the formulation. Sub-wavelength resolution as good as ~140 nm was achieved in the structures fabricated at 800 nm excitation[3]. TPL was demonstrated to produce micro/nanostrucutres using this resin. This TPPF provides an economical resin for TPL requirements and is expected to facilitate the growth of this technology to its true potential.

Notes:

Higher order polarized light in optically active medium

Dipti Banerjee
University of Calcutta, India

The optical activity of a chiral medium is discussed from the viewpoint of transfer of energy where higher ordered linearly polarized light is made to pass through it. The intensity decreases, showing loss of orbital angular momentum(OAM). The absorbed energy of the polarized light in the optically active medium induces the quantum mechanical rotation of the chiral molecule. The molecule acquires the helicity-dependent quantum(Berry) phase with the corresponding loss of the energy of OAM having an optical rotation of its plane of polarization. Further, the correlation of polarized photon and chiral molecules forms a singlet state through quantum entanglement.

Background/Objectives and Goals

The optical rotation usually increases with the increase of concentration resulting in some absorption of energy of polarized light in terms of intensity. The absorbed intensity of polarized light is the source of mechanical torque on the chiral molecule for which it acquires the quantum phase due to the shift of direction of helicity. Here we focused on higher-order polarized light having OAM behave as Vector Vortex beam. The propagation of polarized photons of any order (higher or lower) through the chiral solution is associated with macroscopic behavior through optical rotation of plane polarization. Transfer of angular momentum will be highlighted. Any physical system with some initial state and final state and some interactions in between is a candidate for an information processing device. The basic tool for information processing of quantum particles is Quantum entanglement and Quantum phases. These two entities are involved here in the correlation of photon and fermion entanglement associated with macroscopic behavior.

1. Methods
Mostly theoretical with the short experimental part.

2. Expected Results/ Conclusion/ Contribution

1.The rotation of the plane of polarization of polarized light by the chiral molecule is caused due to the equivalence between the optical and mechanical toque.
2. The absorbed intensity originates in the SAM-dependent geometric phase whose classical counterpart is a solid angle, both dependent on the angle of optical rotation.
3. The decrease of intensity or OAM of Laser light. It is an OTSC (OAM to SAM conversion) process, where the chiral molecules gain SAM through helicity-dependent Berry Phase.
4. Entanglement is the source of exchange.

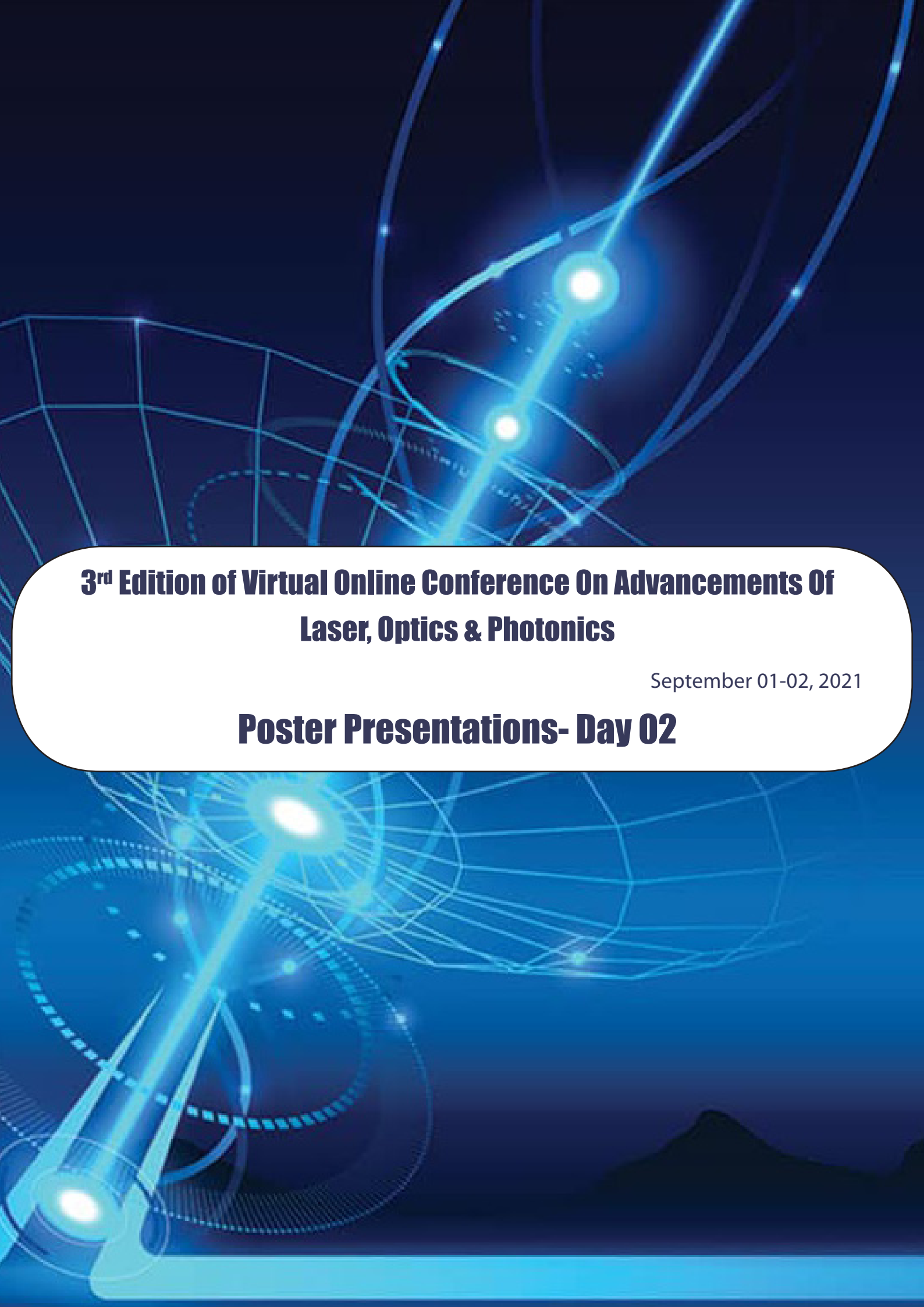
Acknowledgments: This is an extended MRP work of my UGC(INDIA) project (2017-2019) having project number-ID no-WC2-157.

Notes:

Biography

Dr. Dipti Banerjee has completed his Ph.D., and Post Doc (5 yrs) from the University of Calcutta worked in Indian Statistical Institute from 1988. She was a Regular Associate of ICTP, Trieste, ITALY, during 2003-2010. She is a full member of the organization of Women in Science for developing countries(OWSD). Member of AMS & OSA. Visiting collaborator of NWU, IL, US. She has published more than 40 papers in reputed journals and serves as an AMS reviewer and referee of many reputed journals.

Notes:



3rd Edition of Virtual Online Conference On Advancements Of Laser, Optics & Photonics

September 01-02, 2021

Poster Presentations- Day 02

Local (but not systemic) photobiomodulation treatment reduces mast cell degranulation, eicosanoids and Th2 cytokines in an experimental model of allergic rhinitis

Virgínia M.M. Rodrigues* and Adriana Lino-dos-Santos-Franco

UNINOVE- Nove de Julho University, Brazil

Allergic rhinitis (AR) is an inflammatory disorder of the nasal mucosa, and is a worldwide health problem with a significant impact on the quality of life. The main goal of AR treatment is to relieve symptoms. However, standard treatments have considerable side effects or are not effective. Photobiomodulation (PBM) therapy has emerged as an alternative treatment. Here, we evaluated the effects of transcutaneous systemic (tail) or local (skin over nostrils) PBM using a 660 nm light-emitting-diode (LED) array. Adult rats were sensitized with 7 intradermal injections of ovalbumin (OVA) plus alum. After the immunization, a nasal challenge was performed by intranasal instillation of OVA (2%) daily for 7 days. The symptoms and signs of AR were then provoked by intranasal instillation of OVA (1%) daily for 3 days. The animals were treated with PBM (local or systemic) immediately after the last instillation of OVA. Our results showed that local PBM treatment reduced mast cell degranulation in the nasopharynx and nostrils, levels of leukotriene B4, thromboxane A2, and interleukin 4 (IL-4) in the nasopharynx, as well as gene expression of IL-4. Moreover, we showed higher levels and gene expression of IL-10 after local PBM treatment. Systemic PBM treatment did not change any of the evaluated parameters. In conclusion, our data showed that local (but not systemic) treatment with PBM could improve parameters related to AR in an animal model, and should be tested clinically.

Notes:

Effects of systemic photobiomodulation on a cross-sectional area and muscle fiber diameter during the compensatory hypertrophy process in skeletal muscle

Valéria de Souza* , Andréia Martinelli de Siqueira Araujo, , Lucas Andreo, Tainá Caroline dos Santos, Stella Mares Lins Terena, Kristianne Porta Santos Fernandes, Sandra Kalil Bussadori, and Raquel Agnelli Mesquita-Ferrari

UNINOVE- Nove de Julho University, Brazil

Skeletal muscle is a dynamic and adaptive tissue capable of altering its characteristics to meet its diverse functional demands. Compensatory hypertrophy (CH) occurs due to excessive mechanical load on a muscle, promoting an increase in the size of muscle fibers. Photobiomodulation (PBM) has demonstrated beneficial effects on muscle tissue during CH. However, there is little information about transcutaneous systemic application. The aim of this study was to evaluate the effect of systemic photobiomodulation (PBMS) on the volume of muscle fibers during the CH process. Wistar rats were divided into three groups: control group (n=5), hypertrophy (H) group (n = 10) and Hypertrophy + PBMS group (n = 10). CH was induced through the ablation of synergist muscles of the plantaris muscle. The preserved plantaris muscle below the removed muscles was submitted to excessive functional load. PBMS was performed with low-level laser (AsGaAl, λ = 780 nm; 40 mW; energy density:80 J/cm²; 80 seconds; 1 point, 3.2 J). Animals were euthanized after seven and 14 days. The plantaris muscles were removed and submitted to histological evaluation with H&E staining to determine the cross-sectional area (AST) and fiber diameter. The results showed an increase in AST after 7 and 14 days in the H + FBMS group compared to the H group. Fiber diameter increased in group H+FBMS when compared to group H after 7 and 14 days. Based on these findings, it is concluded that an FBMS was able to positively influence the morphological aspects considered essential for increasing the size of muscle fibers during the CH process.

Notes:

Treatment of vulgar acne with blue light: A systematic review

Mara Diogo

UNINOVE- Nove de Julho University, Brazil

Acne treatment is commonly performed with retinoids, such as adapalene, retinoic acid, isotretinoin, which have anti-comedogenic, anti-inflammatory, and comedolytic characteristics. The main disadvantage of most topical retinoids is related to cutaneous side effects. Acne usually improves after exposure to sunlight or artificially produced UV radiation. This research aimed to analyze the use of blue light for the treatment of inflammatory acne. A systematic literature review was carried out, whose research protocol followed the PRISMA recommendation, and randomized clinical trial studies that compared blue light with another intervention as a control were included in the sample. The search was carried out in the PUBMED and WEB of SCIENCE databases, combining the terms "photobiomodulation", "Acne", "LLLT", Phototherapy, "LED" and "blue light". The methodological quality of the included studies was assessed using the Cochrane Collaboration Risk of Bias Scale. After excluding duplicates, the titles, and abstracts of 81 articles were evaluated, and 50 articles were selected for full reading, including 8 articles in the review at the end. For this purpose, articles were selected from 1990 to 2021. Eight randomized controlled clinical trials were analyzed using blue light and a comparative method. Most studies compared the use of blue light with benzoyl peroxide, and the others used another light source or placebo as a comparison. The included studies differed from each other regarding the protocol applied with blue light. The studies showed significant improvements in the general picture of acne with blue light, considering the number and size of lesions, and as for inflammation, red light showed better results. It is concluded that despite the great potential in its use in the treatment of acne, there is a need for more detailed tests on the effect of blue light in this treatment.

Notes:

Photobiomodulation therapy regulates the production of Reactive Oxygen Species (ROS) in an experimental model of Chronic Obstructive Pulmonary Disease (COPD)

Cíntia Estefano Alves[1]*, Auriléia Brito, Tawany Gonçalves, Marina Marcos, Cristiano Alvarenga, and Ana Paula Ligeiro de Oliveira

UNINOVE- Nove de Julho University, Brazil

The immunopathology of COPD is a crossover and complex conversation between inflammatory and structural cells that trigger both cell migration and airway remodeling, with clinical consequences of irreversible airflow limitation and respiratory symptoms. This process is likely triggered by various components of tobacco smoke. Thus, the study of photobiomodulation in chronic obstructive pulmonary disease can become a successful reality for the treatment of patients with the disease. In this sense, the aim of this work is to evaluate whether photobiomodulation therapy regulates pulmonary inflammation via reactive oxygen species (ROS) in an experimental model of COPD. The COPD induction protocol was performed by applying orotracheal smoke cigarette extract, 1 application of the extract, twice a week for 6 weeks and euthanasia performed 24 hours after the last application. After 3 weeks of exposure to cigarette extract, the COPD animals underwent low-intensity laser therapy (LLL) for 3 weeks, with different doses of energy (1J/cm^2, 5J/cm^2 and 7.5J/cm^2) at the low-level laser. In this context, we evaluated the presence of inflammatory cells in the bronchoalveolar lavage (BAL), in the blood and lungs of animals. In addition to necrosis and apoptosis cells as well as ROS in the lung. Our data indicated an increase in the number of macrophages, neutrophils and lymphocytes in BAL and lung of animals with COPD, on the other hand, laser with 1J/cm^2 and 5J/cm^2 reduced the number of cells in BAL, whereas the dose of 7.5J/cm^2 no show differences in cell migration to the lung. We also found a reduction in pulmonary ROS and BAL ATP after laser therapy (1J/cm^2 and 5J/cm^2). With these results, we can suggest that photobiomodulation acts on the pulmonary inflammation observed in COPD via the regulation of ROS production.

Notes:

Photobiomodulation therapy increases regulatory T cells by IL-10-dependent mechanism in allergic lung inflammation

Tawany Gonçalves Santos

UNINOVE- Nove de Julho University, Brazil

It is widely known that photobiomodulation (PBM) has beneficial effects on allergic lung inflammation. Our previous study showed an anti-inflammatory effect of PBM therapy in an experimental model of asthma, and we observed that this mechanism is partially dependent on the secretion of IL-10 in the lung. In this sense, the objective of this study was to verify the anti-inflammatory role of the PBM therapy in the pulmonary inflammatory response in the chronic experimental asthma model. The protocol used for asthma induction was the administration of OVA subcutaneously (days 0 and 14) and intranasally (3 times/week, for 5 weeks). On day 50, the animals were sacrificed to assess inflammation and lung remodeling, as well as the percentage of Treg cells ($CD4^+CD25^+Foxp3^+$) and their secretion of IL-10 in the lung. The laser used was the diode, with a wavelength of 660 nm, power of 100 mW and 1J for 10 s/point, in three different application points. Our data showed that PBM therapy decreased the macrophages, neutrophils and lymphocytes counts in the bronchoalveolar lavage. More there, there was also a decrease in the release of cytokines in the lung, mucus and collagen in the airways, as well as reduced pulmonary mechanics. In addition, it is worth highlighting the increase of Treg cells with a consequent increase in the release of the IL-10 in the lung, contributing thus to the reduction of pulmonary inflammation. Therefore, we conclude that the use of PBM therapy in chronic airway inflammation attenuated the inflammatory process, as well as the pulmonary functional and structural parameters, probably via regulatory T cells. In this sense, this therapy can be used as an immunotherapeutic strategy in the treatment of asthma.

Notes:

Analysis of the psychopathological profile and cost-effectiveness of oral lichen planus patients treated with photobiomodulation

Sergio de Sousa Sobral

UNINOVE- Nove de Julho University, Brazil

Background: Oral lichen planus (OLP) is a chronic inflammatory disease that affects 1.9% of the population, with a slight predilection for women, characterized by manifestations in the skin and mucous membrane.

Objective: To evaluate the effect of PBM on the psychological profile of patients with oral lichen OLP in comparison to corticoid and to investigate the cost-effectiveness of both treatments.

Materials and methods: Patients were randomized into two groups: Control (clobetasol propionate 0.05%) and Photobiomodulation (660 nm, 100mW, 177 J/cm^2, 5 s, 0.5 J) twice a week for 30 days. The Hospital Anxiety and Depression Scale (HADS) was used in different treatment time points and at follow-up. The cost-effectiveness was calculated using the improvement in OHIP-14 after treatment.

Results: OLP patients showed detected levels of anxiety and depression at baseline. No improvement in anxiety and depression was noticed after treatments. The treatment with corticoid was more cost-effective than PBM.

Conclusions: Psychological distress was not improved after both treatments. This study highlights the need for additional therapeutic interventions in OLP patients to recognize and manage the alterations in their psychological profile early. Moreover, PBM is a minimally invasive therapy associated with no side effects that must be considered in clinical practice, especially in those patients with refractory disease.

Trial registration: This study is registered at ClinicalTrials.gov; the registration number is NCT03320460, registered in 17/10/2017.

Keywords: Oral lichen planus; Anxiety; Depression; Photobiomodulation; Cost-effectiveness

Notes:

Photobiomodulation therapy in patients with COVID-19: Analysis of the effects on inflammatory mediators

Carlos Alberto Ocon
Ninth of July University, Brazil

SARS-CoV-2 is responsible for the spread of COVID-19, which soon became a pandemic, spreading to many countries. According to the WHO, there have been 4 million deaths caused by COVID-19 in the world since its appearance in the province of Wuhan-China. The advance of the pandemic is extremely fast, it took 263 days to reach 1 million deaths, 108 days for 2 million, 93 days for 3 million and only 81 days to reach 4 million. Brazil today has 20.7 million confirmed cases occupying the 3rd position among the countries with the highest number of infections by COVID-19 and the 2nd position in number of deaths, with 579 thousand deaths, São Paulo with 4.25 million confirmed cases and 145 thousand deaths is the state with the highest number of deaths in Brazil. The present clinical study will use TFBM to assess the response of sublingual transvascular Low Intensity Laser irradiation to inflammatory and infectious changes in individuals with Covid-19.

The study will be carried out at the Hospital Lydia Storópoli, where a group of 26 people will be randomly divided into 2 groups, the 1st group consisting of 13 patients applying placebo (LED-off), the 2nd group will apply the LED (CW), transvascular sublingual in red, 660nm, in 3 points with no overlap between them, in the following dosimetry: Power = 5 mW/point; Power Density = 5 mW/cm2; total application time = 7 minutes (420 seconds); Effective lighting area = 1 cm2; Energy Density (fluency) = 2.1 J/cm2 ; will be administered 1x/day in the afternoon until hospital discharge. Will be collected and analyzed: saliva swab, IL-1β, IL-6, IL-10, RCR and TNF-α, arterial blood gas, chest X-ray and computed tomography. It is expected with this clinical study that the application of TFBM by transvascular sublingual LED (ILIB) will present beneficial effects to patients with COVID-19, on inflammatory mediators and reducing the length of hospital stay and possibly morbidity and mortality. The data will be analyzed by the STATISTICAL PACKAGE for Social Sciences (SPSS) software version 26.0, setting the rejection level of the null hypothesis at 5%.

Notes:

Index