Optica Latin America Optics and Photonics (LAOP) Conference 2024 Session Guide

Disclaimer: this guide is limited to technical program with abstracts and author blocks as of 7 August. For updated and complete information with special events, reference the online schedule or mobile app.

Monday, 11 November

Room: Vallarta Rooms 1-3
09:00 -- 11:00
M1A • Plenary Session I
Presider: José Javier Sánchez Mondragón; Inst Nat Astrofisica Optica Electronica, Mexico

M1A.1 (Plenary)
Quantum Entanglement for Interferometric Sensing, Gerd Leuchs[1]; [1]*Max-Planck-Inst Physik des Lichts, Germany.* Laserinterferometers can operate at a sensitivity level below the standard quantum limit when using squeezed light to induce entanglement between the light beams in the two interferometer arms. This is well known since 40 years for squeezed vacuum states produced by a chi(2) nonlinearity. We show how sensitivity enhancement can be achieved with displaced squeezed states produced by a chi(3) nonlinearity.

M1A.2 (Plenary)
Multiparticle Near-Field Dynamics of Plasmonic Waves, Omar Magana-Loaiza[1]; [1]*Louisiana State Univ., USA.* I will describe how the classical near-field dynamics of surface plasmons are defined by nonclassical processes of scattering among their constituent multiparticle subsystems. Additionally, I will discuss plasmonic waves excited by electromagnetic vacuum fluctuations.

Room: Vallarta Rooms 1-3
11:30 -- 13:30
M2A • Plenary Session II
Presider: Victor Coello Cardenas; CICESE, Unidad Monterrey, Mexico

M2A.1 (Plenary)
3D Images of Oxygenation by Near-Infrared Optical Tomography: State and Prospects, Martin Wolf[1]; [1]*Universität Zürich, Switzerland.* This is an overview of the current state of near infrared optical tomography, an optical method to generate 3D images of tissue. Since it images the oxygenation of tissue, it is of high clinical relevance.

M2A.2 (Plenary)
Towards Customized Ophthalmic Correction Using Optical Technologies, Susana Marcos[1]; [1]*Univ. of Rochester, USA.* Imaging techniques including 3D Optical coherence tomography/elastography allow quantification of the eye's structural, optical and biomechanical properties and personalized models. Adaptive optics simulators allow patients experience post-treatment vision. Those will shape future customized ophthalmological corrections.

M2A.3 (Plenary)
Obtaining Image Signatures That can be Used in AI Methods, Josué Alvarez Borrego[1]; [1]*CICESE, Mexico.* My research within my work group has focused on recognizing patterns invariant to rotations, scales, displacements, noise, lighting, distortions, and partially hidden objects. This line is the one that I have initiated and promoted nationally and internationally through my published articles and within the theses of my students. This has been applied to the successful identification of microscopic and macroscopic organisms and the detection of cancer spots on the skin, a topic that I have been working on lately.

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Room: Vallarta 1
15:00 -- 17:00
M3A • Optical Design, Instrumentation and Metrology I
Presider: Susana Marcos; Univ. of Rochester, USA

M3A.1 • 15:00 (Invited)
James C. Wyant, a Scholar and a Gentleman, Virendra N. Mahajan[1]; [1]*Univ. of Arizona, USA.* Professor James C. Wyant, was the epitome of a scholar and a gentleman. He possessed extraordinary technical skills, demonstrated exemplary leadership, and displayed monumental philanthropy. He received Ives Medal and Quinn Prize of Optica and the Gold Medal of SPIE, and was president of these societies.

M3A.2 • 15:30
Optical Design and Prototyping of Terrestrial Telescope, Josue A. Miranda Fernandez[1], Guillermo Baldwin[1], Jovanetty I. Choque Aquino[2]; [1]*Pontifica Universidad Católica del Perú, Peru;* [2]*Tacna, Universidad Nacional Jorge Basadre Grohmann, Peru.* This work shows progress achieved at the PUCP in the development of telescopes from optical design, manufacturing, prototyping and parameter evaluation. The telescope has a magnification of 28X, a field of view of 1.2°.

M3A.3 • 15:45
Effect of a Small Inclination of the Target on the Distortion Calibration., Irán Robles Gutiérrez[1], Martín López-Luna[1], J. Rufino Diaz-Uribe[1]; [1]*Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México, Mexico.* It is shown that, during the distortion calibration procedure, a small inclination of the calibration target has a small but significant effect on the coefficient value. Simulated as well as experimental data are reported

M3A.4 • 16:00
Withdrawn.

M3A.5 • 16:15
Improving the Sensitivity of a Mach-Zehnder Displacement Sensor by the Spectrum Differential Integration Method, Luis E. Guillen Ruiz[1], Gilberto Anzueto Sanchez[2], Jorge L. Camas Anzueto[1], Alejandro Martinez-Rios[2]; [1]*Instituto Tecnológico de Tuxtla Gutiérre, Mexico;* [2]*Centro en Investigación en Óptica, Mexico.* A micrometric displacement sensor was proposed based on two cascading abrupt-taper single-mode fiber optics. The spectrum differential integrator (SDI) method improves the sensitivity of 3.49 dBm/µm compared to traditional peak tracking (-0.042 nm/µm).

M3A.6 • 16:30 (Invited)
Focusing of Ultrashort Pulses of Light, Martha Rosete-Aguilar[1]; [1]*ICAT - Universidad autónoma de Mexico, Mexico.* The physical phenomena that modify the spatio-temporal intensity distribution of ultrashort pulses focused by a lens are discussed for low intensity beams, and high intensity beams where the Kerr effect becomes evident.

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Room: Vallarta 2
15:00 -- 17:00
M3B • Quantum Technologies, Interference and Detectors
Presider: Omar Magana-Loaiza; Louisiana State Univ., USA

M3B.1 • 15:00 (Invited)
Silicon Nitride Platform for Iintegrated Photonic Circuits Applied to Quantum Technologies, Karina Garay-Palmett[1], Francisco Domínguez-Serna[2], Ferney Castro[1], Jenny Romero-Castro[1,3], Ana Luisa Aguayo-Alvarado[1], Nayeli Casillas[1], Rafael Salas-Montiel[3], Wencel De La Cruz[4]; [1]*Centro de Investigación Científica y de Educación Superior de Ensenada, B.C., Mexico;* [2]*CONAHCYT - Centro de Investigación Científica y de Educación Superior de, Ensenada, B.C., Mexico;* [3]*Laboratory Light, nanomaterials and nanotechnologies, L2n CNRS UMR 7076, Université de technologie de Troyes, France;* [4]*Centro de Nanociencias y Nanotecnología, Universidad Nacional Autónoma de México, Mexico.* This work presents advances in developing photonic circuits, proposed on an integrated silicon nitride platform, for applications in quantum technologies. Among other functionalities, these devices are designed to generate and control quantum states of light.

M3B.2 • 15:30 (Invited)
Quantum Operations Assisted by Multiphoton and Muliphonon States, Mauricio Torres[1]; [1]*Benemérita Univ Autonoma de Puebla, Mexico.* Quantum operations in cavity-QED scenarios are theoretically investigated, where multiphoton states assist in generating atomic entanglement. Similar schemes are implementable with trapped ions. These operations can serve protocols such as entanglement purification.

M3B.3 • 16:00
Spatially-Resolved Mutli-Photon Interference, Miguel A Gonzalez[1], Jeimmy Alarcón[1], Ana S. Reyes[1], Andres C. Quintero[1], Alejandra Valencia[1]; [1]*Universidad de los Andes (Colombia), Colombia.* We propose a setup to measure the joint probability of detection at different positions for two distinguishable photons impinging in a beam splitter and show theoretically that it can associated to a matrix permanent.

M3B.4 • 16:15
Observation of the van Cittert-Zernike Modification of Quantum Coherence., Jannatul Ferdous[1], Mingyuan Hong[1], Riley Dawkins[1], Fatemeh Mostafavi[1], Alina Oktyabrskaya[2], Roberto Leon-Montiel[3], Chenglong You[1], Omar Magana-Loaiza[1]; [1]*Physics and Astronomy, Louisiana State Univ., USA;* [2]*Department of Mathematics, Louisiana State Univ., USA;* [3]*Physics, Instituto de Ciencias Nucleares, Universidad Nacional Autonoma de Mexico (UNAM), Mexico.* We report on the modification of quantum coherence via scattering of thermal multiphoton wave-packets upon propagation. Our observations are validated through the nonclassical formulation of the emblematic van Cittert-Zernike theorem.

M3B.5 • 16:30
Tabletop Automated TCSPS Measurement System for Characterizing Single-Photon Emitters, Alexei Lagutchev[1], Simeon Bogdanov[2], Alexandra Boltasseva[1], Vladimir Shalaev[1]; [1]*School of Electrical and Computer Engineering, Purdue Univ., USA;* [2]*Department of Electrical and Computer Engineering, Univ. of Illinois at Urbana-Champaign, USA.* We report on a table-top system for characterizing single

photon emitter fluorescence lifetimes, spectra, photon correlation and spin properties. Measurements are facilitated by automation and machine learning.

M3B.6 • 16:45
Simplifying Photon Detection and Analysis With Swabian Instruments' Time Taggers, Mireia Perera-González[1], Matteo Moioli[1], Edoardo Mornacchi[1], Mirco Kolarczik[1]; [1]*Swabian Instruments, Germany.* Swabian Instruments' Time Taggers significantly advance photonics research through their picosecond resolution, ultra-low jitter, versatile multi-channel capabilities, and innovative software architecture. These features enhance the precision and efficiency of Photon Number Resolution (PNR) experiments.

Room: Vallarta 3
15:00 -- 17:00
M3C • Other Coherent Optics I
Presider: José Javier Sánchez Mondragón; Inst Nat Astrofisica Optica Electronica, Mexico

M3C.1 • 15:00 (Invited)
New Modes of Laser Resonators: the Boyer-Wolf Gaussian Beams, Miguel A. Bandres[1]; [1]*Univ. of Central Florida, CREOL, USA.* Laser resonators support three families of modes: the Hermite, Laguerre, and Ince Gaussian modes. Here, we experimentally observe a new family: the Boyer-Wolf Gaussian modes. These modes represent a new element of structured light and open the door to new applications.

M3C.2 • 15:30 (Invited)
Collective Emission of Coherently Coupled Solid-State Quantum Emitters, Martijn Wubs[1]; [1]*Technical Univ. of Denmark, Denmark.* Coherently coupled quantum emitters in solids can exhibit superradiance, despite phonon interactions. We compare theories for collective photon emission that include phonon effects and study plasmonic enhancement of superradiance from 2D materials.

M3C.3 • 16:00
Tailoring Attosecond Pulse Trains Generated by Intense Femtosecond two-Color Fields, Trevor Olsson[1], William Medlin[1], Scott Chumley[1], Jody Davis[1], Courtney Wicklund[1], Guillaume M. Laurent[1]; [1]*Auburn Univ., USA.* We show how the temporal profile of attosecond pulses generated by two-color femtosecond fields can be tuned by varying both the intensity ratio and the relative phase between the two components of the field.

M3C.4 • 16:15
Withdrawn.

M3C.5 • 16:30
Electro-Optical Stern–Gerlach Effect, Wenguo Zhu[1], Xinzhou Liang[1], Zhe Chen[1,2]; [1]*Jinan Univ., China;* [2]*JiHua Laboratory, China.* A novel optical Stern–Gerlach effect is demonstrated in periodically poled electro-optical crystals. When the quasi-phase-matching condition is satisfied, the electro-optical coupling process within crystal is accurately described by the Schrödinger-Pauli equation for spin-1/2 particles.

M3C.6 • 16:45

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Holographic Multiplexing of Orbital Angular Momentum States in a Photorefractive Crystal, Angie L. Solano Navarro[1], Yezid Torres Moreno[1], Sabino Chávez Cerda[2]; [1]*Universidad Industrial de Santander, Colombia;* [2]*Instituto Nacional de Astrofisica Optica y Electronica, Mexico.* We present the recording and simultaneous readout of two holograms of Orbital Angular Momentum states with topological charges m_1=5 and m_2=15 in a photorefractive crystal. The principle of holographic multiplexing has been demonstrated experimentally.

Room: Vallarta 4
15:00 -- 16:45
M3D • Biophotonics and Medical Applications I
Presider: Cruz Elizabeth Perez Corona; INAOE, Mexico

M3D.1 • 15:00 (Invited)
Medtechpreneurship: Innovating a Non-Invasive Glucose Sensor in the Swiss Ecosystem, Aldo Di Costanzo Mata[1,2]; [1]*Neonatology, Univ. Hospital Zurich, Switzerland;* [2]*Neonatology, Univ. of Zurich, Switzerland.* Introducing **Gluckli.ch**, a revolutionary device measuring blood glucose in very- and extremely preterm infants transdermally, continuously, and non-invasively. Here, we will expose the project's support, guidance, and sponsorship from the unique Swiss MedTech ecosystem.

M3D.2 • 15:30
Development of a Novel Visual Prosthesis Device: Using Phosphenes Produced With Facial TACS, Veronica Kurkjian[1], Alexandre Douplik[1], Faraz Sadrzadeh-Afsharazar[1]; [1]*Toronto Metropolitan Univ., Canada.* Two million Canadians live with vision loss. This project explores a non-invasive visual prosthesis using tACS to generate phosphenes. A developed mask prototype and COMSOL simulations promise improved spatial accuracy, and feasibility for non-invasive phosphenes.

M3D.3 • 15:45
Semi-Supervised Hyperspectral Unmixing: Integration of Fixed and Variable End-Members, Juan N. Mendoza[1], Laura Quintana[2], Samuel Ortega[2,3], Gustavo M. Callico[2], Daniel U. Campos-Delgado[1]; [1]*Universidad Autonoma de San Luis Potosi, Mexico;* [2]*Universidad de las Palmas de Gran Canaria, Spain;* [3]*Norwegian Inst. of Food Fisheries and Aquaculture Research, Norway.* This study introduces a semi-supervised hyperspectral unmixing method, where some specific end-members are known upfront, while others are estimated during the unmixing process. Validation on a dyed breast tissue histological image confirms its effectiveness.

M3D.4 • 16:00
Photoacoustic Thermometry With Endogenous and Exogeneous Contrast, Ivan Kosik[1], Robert Weersink[1], Brian Wilson[1]; [1]*Univ. Health Network, Canada.* Photoacoustic thermometry (PT) is an attractive thermal therapy guidance method due to potentially simple handheld operation, deep tissue penetration and low cost. Here we characterize the capabilities of a new PT system using tissue mimicking phantoms and ex-vivo tissue during photothermal therapy.

M3D.5 • 16:15
A Cost-Effective and Noninvasive Method for Measuring Cell Viability in Candida Tropicalis Based on Laser Speckle Imaging, David Loaiza-Tozcuento[1], Cruz Elizabeth Perez Corona[1], Teresita Spezzia-Mazzocco[1], Juan P. Padilla Martinez[2], Julio C. Ramirez-San--Juan[1]; [1]*INAOE, Mexico;* [2]*BUAP, Mexico.* Cell viability measurement is crucial in biology and medicine. This work proposes a Laser Speckle Technique, showing high correlation with the MTT assay but offering lower cost, non-invasive, and

faster results.

M3D.6 • 16:30
Exhaled Breath Sensing: an IR-ENose Approach for Exhalome Studies , Johannes Glöckler[1], Boris Mizaikoff[1,4], Jan Mitrovics[3], Gabriela Flores Rangel[1], Francisco Bricio-Arzubide[2], Lorena Diaz de Leon Martinez[1,2]; [1]*Inst. of Analytical and Bioanalytical Chemistry, Ulm Univ., Germany;* [2]*Research and Development, Breathlabs, USA;* [3]*JLM innovation, Germany;* [4]*Hahn-Schickard, Germany.* Development of an infrared spectroscopic electronic nose (IR-eNose) combining IR using substrate-integrated hollow waveguides (iHWG) and metal oxide (MOX) sensors for non-invasive gastric cancer screening, tested with calibration gases and exhaled breath from gastric cancer patients.

M3D.7 • 16:30
Diphenylalanine Micro/Nanotubes in PDMS Microchannels: Unidirectionality and Optical Properties, Giovana Bonano Carlos[1], Carla Bandeira[1], Herculano da Silva Martinho[1]; [1]*UFABC, Brazil.* Diphenylalanine micro/nanotubes were prepared in PDMS polymer microchannels with and without an electric field. The goal is to develop microfluidic platforms for biomedical applications.

Room: Vallarta 1
17:30 -- 19:00
M4A • Advancements in Integrated Optics, Resonators and Hybrid Photonic Systems
Presider: Aura Higuera Rodriguez; Signify, Netherlands

M4A.1 • 17:30 (Invited)
Harnessing Brillouin Optomechanics in Lithium Niobate on Insulator, Gustavo S. Wiederhecker[1]; [1]*UNICAMP, Brazil.* The Lithium Niobate on Insulator (LNOI) platform has introduced numerous innovative devices and functionalities in the field of integrated photonics, primarily thanks to its exceptional piezoelectric and electro-optic properties. This presentation will explore how the interaction between photoelasticity and electrostriction force can further expand the potential applications of this integrated photonics platform. Specifically, we will present the first experimental demonstration of interpolarized backward-stimulated Brillouin scattering (BSBS) in a stabilized LNOI waveguide. Through polarization-dependent pump-probe experiments, we have measured both intramodal and intermodal scattering among counterpropagating optical modes. The interpolarization gain of SBS on the LNOI platform is notably high, enabling a wide array of applications, including radio-frequency signal processing, high-purity lasers, and polarization converter devices.

M4A.2 • 18:00 (Invited)
Heterogeneous and Hybrid Integration for Brillouin Microwave Photonics, Alvaro Casas-Bedoya[1]; [1]*Univ. of Sydney, Australia.* Abstract not available.

M4A.3 • 18:30
Inverse Design of Optical Microring Resonators Using a Supervised Machine Learning Approach, Sebastian Valencia[1], Jorge A. Montoya[2], Erick Reyes Vera[1], Esteban Gonzalez Valencia[1]; [1]*Instituto Tecnologico Metropolitano, Colombia;* [2]*Centro de Investigación Científica y de Educación Superior de Ensenada, Mexico.* This work introduces a supervised machine learning approach to design and optimize optical micro-ring resonators, hence improving design accuracy and efficiency. Using Keras and Optuna, the suggested approach significantly reduces computational resources than

conventional techniques.

M4A.4 • 18:45
Anomalous Strong Coupling of Asymmetric Porous Silicon Microcavity With CdSeS/ZnS Quantum Dots, Salvador Escobar Guerrero[1], Rocío Nava Lara[2], Jorge-Alejandro Reyes-Esqueda[1,3]; [1]*Instituto de Física, UNAM, Mexico;* [2]*Instituto de Energías Renovables - UNAM, Mexico;* [3]*Département de Physique, Université de Sherbrooke, Canada.* Exciton-polariton formation with a complex coupling constant and emission enhancement by the Purcell effect was obtained for asymmetric porous silicon microcavities strongly coupled with CdSeS/ZnS quantum dots

Room: Vallarta 2
17:30 -- 18:45
M4B • Spectroscopy
Presider: Marco Antonio Meneses-Nava; Centro de Investigaciones en Optica AC, Mexico

M4B.1 • 17:30
Detection of Dissolved Chromium in Water by Laser-Induced Breakdown Spectroscopy Assisted With Acoustic Levitation of Single Droplets, Victor U. Contreras Loera[1], Maria E. Román Abarca[1], Mohan K. Kesarla[1], Jorge Fuentes PAcheco[2]; [1]*Univ Nacional Autonoma de Mexico, Mexico;* [2]*Instituto Tecnológico de Chilpancingo, Tecnológico Nacional de México, Mexico.* LIBS assisted by acoustic levitation exhibits appealing benefits for liquid analysis, such as signal enhancement and low-volume sampling requirements. This work presents the detection of chromium in water at concentrations of 0.1 to 1ppm.

M4B.2 • 17:45
Withdrawn.

M4B.3 • 18:00
Towards Entangled Two-Photon Absorption in Cesium Atoms, Michael Caracas Nunez[1], Miguel A Gonzalez[1], Dario Egloff[1], Mayerlin Nunez Portela[1]; [1]*Universidad de los Andes, Colombia.* We address challenges in entangled two-photon absorption (ETPA) experiments, focusing on distinguishing ETPA signals in atomic systems, in particular, cesium. Our study presents theoretical and experimental methods to calculate and measure TPA and ETPA cross-sections.

M4B.4 • 18:15
Time Stability of a Fiber Optic Sensor for pH Detection, Carlos A. Megchum Ruedas[1], Pedro M. Velasco-Bolom[1], Ruben Grajales-Coutiño[1], Jorge L. Camas Anzueto[1], Rocío Meza-Gordillo[2]; [1]*Departamento de Posgrado, Grupo de Optomecatrónica, Tecnológico Nacional de México / I. T. de Tuxtla Gutiérrez, Mexico;* [2]*Departamento de Ingeniería Química y Bioquímica, Tecnológico Nacional de México/I. T. de Tuxtla Gutiérrez,, Mexico.* In this work, PEDOT:PSS/PVA was studied as an optical fiber coating for pH detection in the range of 1-7, showing a response in that range and high stability for approximately 10 minutes.

M4B.5 • 18:30
Pattern Recognition Algorithm Based on Interferometric Signal Vectorization, María Martínez[1], Jonathan Esquivel[1], Rodolfo Martínez[1], Luis Valentín[1,2], Silvia Díaz[3], Miguel Á. Armendáriz[3]; [1]*Centro de Investigaciones en Óptica A.C., Mexico;* [2]*Consejo Nacional de Humanidades, Ciencia y Tecnología,, Mexico;* [3]*Public Univ. of Navarre, Spain.* A pattern recognition algorithm for interferometric signals is presented. Using a database of vectorized reference signals, the measured signal is identified based on the similarity

obtained through the dot product operation.

Room: Vallarta 3
17:30 -- 19:30
M4C • Frontiers in Laser Technology: From Random Lasers to Precision Sensing and Material Processing
Presider: Wagner de Rossi; IPEN, Brazil

M4C.1 • 17:30
Real-Time Acoustic Monitoring of Laser Cleaning Process to Remove Paints Deposited on Glass Substrates, Jhenry Fidel Agreda Delgado[1], Héctor E. Paredes Aguilar[2], Miguel A. Valverde Alva[1], Claver W. Aldama Reyna[1]; [1]*Universidad Nacional de Trujillo, Peru;* [2]*Universidad Privada del Norte, Peru.* An experimental method to the real-time monitoring of the laser cleaning process of acrylic paints deposited on glass substrates using the pulsed photoacoustic technique is reported in this paper.

M4C.2 • 17:45
Direction Curvature Laser Sensor Based on Supermodal Interference in a Seven-Core Fiber, Ana L. Martinez De Leon[1], Alexa K. Roque-Mata[1], Jonathan R. Alonso-Cruz[1], Rodrigo Amezcua-Correa[2], José E. Antonio-López[2], Guillermo Salceda-Delgado[1]; [1]*Facultad de Ciencias Físico Matemáticas, Universidad Autónoma de Nuevo León, Mexico;* [2]*The College of Optics and Photonics, Univ. of Central Florida, USA.* A laser sensor for direction bending measurement is presented. It is based on a seven-core fiber (SCF) Mach-Zehnder interferometer in a laser cavity. Wavelength and intensity changes determine the magnitude and direction of bending, respectively.

M4C.3 • 18:00
Simple Technique for Measurements of Threshold Fluence for Nanosecond Laser Ablation for Metals, Claver Wilder Aldama Reyna[1], Jhenry Fidel Agreda Delgado[1], Carlos A. Hernández Ríos[1], Miguel A. Valverde Alva[1]; [1]*Física, Universidad Nacional de Trujillo, Peru.* A simple acoustic technique based on an electret microphone with an oscilloscope is proposed to measure threshold fluences for nanosecond laser ablation of metals. This technique was validated with pulsed photoacoustics with a piezoelectric sensor.

M4C.4 • 18:15
Withdrawn

M4C.5 • 18:30
Experimental Investigation of Carbon Nanotubes Deposition in a Capillary Fiber Optic tip Based on Multimodal Interference Effect, Andrés Camarillo-Avilés[1,2], Natanael Cuando-Espitia[3], Daniel May-Arrioja[1]; [1]*Laboratorio de fibras opticas, Centro de Investigaciones en Óptica, Mexico;* [2]*Consejo Nacional de Humanidades, Ciencias y Tecnologías (CONAHCyT), Mexico;* [3]*Electronics Department, CONAHCyT - Univ. of Guanajuato, Mexico.* Laser-induced deposition of carbon nanotubes (CNTs) in a capillary hollow fiber (CHF) tip is demonstrated. Multimodal interference effect generates a ring-intensity light pattern to

locate the CNTs within an annular structure at the CHF tip.

M4C.6 • 18:45
Micro-Cartridge Applied to Fluorine-18 Concentration Developed With Ultrashort Laser Pulse Machining, Antonio A. Gomes[1], Arian P. Nario[1], André L. Lapolli[1], Ricardo E. Samad[1], Emerson S. Bernardes[1], Wagner de Rossi[1]; [1]*Nuclear and Energy Research Inst., Brazil.* We present the first micro-cartridge developed in glass with ultrashort laser pulses machining, applied to radionuclide concentration to synthesize radiopharmaceuticals. The femtosecond laser is an alternative tool for developing these microdevices in different materials

M4C.7 • 19:00 (Invited)
Ultrashort Pulse Laser Processing of Materials in View of Emerging Technologies, Santiago Camacho Lopez[1]; [1]*CICESE, Mexico.* Abstract not available.

Room: Vallarta 4
17:30 -- 19:15
M4D • Materials
Presider: José Javier Sánchez Mondragón; Inst Nat Astrofisica Optica Electronica, Mexico

M4D.1 • 17:30 (Invited)
Hybrid Emitter-Photon Interfaces for Entanglement Generation and Distribution, Ravitej Uppu[1]; [1]*Univ. of Iowa, USA.* Photonic quantum interconnects promise to facilitate scaling quantum systems, but efficient, high-fidelity entangled multiphoton sources are a significant hurdle. I will discuss our ongoing research toward realizing practical entangled multiphoton sources.

M4D.2 • 18:00
Temperature-Dependent Polarization Rotation in Thermochromic Materials, Ariel Fong González[1], Jorge L. Camas Anzueto[1], Ruben Grajales-Coutiño[1]; [1]*Posgrado, Tecnológico Nacional de México / I.T. Tuxtla Gutiérrez, Mexico.* In this work we present the analysis of the rotation of the polarization of light through samples of a thermochromic material, by using the Malus law and the intensity of light transmitted by the samples.

M4D.3 • 18:15
Luminescence of Terbium Ions in an Amorphous Silicon Carbide Based Wide Bandgap Semiconductor Thin Films, Gonzalo A. Galvez[1], Rolf Grieseler[1]; [1]*Pontificia Universidad Católica del Perú, Peru.* SiC:Tb films were prepared by RF magnetron sputtering. The influence of the sputter parameters temperature and bias potential at the substrate were analysed. The results show that terbium emission can be tuned by changing these parameters.

M4D.4 • 18:30
Differences Between InGaN Solar Cells Graded, Rubén Martínez[1], Horacio I. Solís-Cisneros[1], Ariel Fong González[1], Jorge L. Camas Anzueto[1], Ruben Grajales-Coutiño[1]; [1]*Posgrado, Tecnológico Nacional de México/I.T. Tuxtla Gutiérrez, Mexico.* Using a finite element numerical calculation software (SILVACO), were made simulations for InGaN solar cells with graduated absorbent layers with Indium mole fractions ranging from 10% to 50%, with an increase of 10% for each simulation.

M4D.5 • 18:45

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Advanced Multi-Quantum Cascade Laser Sensor for Real-Time Multi-Species Measurement in Hypersonic Flows, Farhan arafin[1], Jonathan McGaunn[1], Ahmad Azim[2], Arkadiy Lyakh[1,2], Subith S. Vasu[1]; [1]*Univ. of Central Florida, USA;* [2]*IRGLARE, LLC, USA.* We developed a monolithic QCL array for hypersonic flow diagnostics, enabling high-speed, multi-species measurements. Despite power fluctuations, future iterations with narrower waveguides promise improved stability and accuracy for real-time hypersonic flow characterization.

M4D.6 • 19:00

Nonlinear Conversion of Total Angular Momentum With Thin Films of Amorphous Silicon, Evgenii Menshikov[1], Paolo Franceschini[1,2], Kristina Frizyuk[1], Ivan Fernandez-Corbaton[3], Andrea Tognazzi[4,2], Denis Garoli[5], Domenico de Ceglia[1,2], Mihail Petrov[6], Costantino De Angelis[1,2]; [1]*Univ. of Brescia, Italy;* [2]*National Inst. of Optics-National Research Council, Italy;* [3]*Karlsruhe Inst. of Technology, Germany;* [4]*Univ. of Palermo, Italy;* [5]*Universita degli Studi di Modena e Reggio Emilia, Italy;* [6]*Harbin Engineering Univ., China.* In this work, we explore third harmonic generation by a tightly focused laser beam in films of amorphous silicon. We show that our experimental results can be elegantly explained using Bessel beams of well-defined helicity.

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Tuesday, 12 November

Room: Vallarta 1
09:30 -- 11:00
Tu1A • Quantum Computing and Atomic and Photonic Systems
Presider: Daewook Kim; Wyant Coll of Opt Sciences, UArizona, USA

Tu1A.1 • 09:30
Withdrawn

Tu1A.2 • 09:30
Selective Ejection of Atoms in a Cold Rydberg Gas, Lucía Velazco[1], Juan Andrés Muniz[1], Horacio Failache[1], Arturo Lezama[1]; [1]*Universidad de la Republica, Uruguay.* We experimentally demonstrate that pairs of Rydberg atoms in a cold gas can be targeted by a precisely tuned microwave field that induces a strong dipole-dipole interaction that selectively ejects these atoms from the gas.

Tu1A.3 • 10:00
Quantum Random Light and the Quantum Gaussian-Schell Model, Riley B. Dawkins[1], Mingyuan Hong[1], Chenglong You[1], Omar Magana-Loaiza[1]; [1]*Louisiana State Univ., USA.* We present a novel scheme, utilizing inherent complex-Gaussian statistics, for quantizing a random, partially-coherent light source. This theory is then experimentally verified by studying the surprising quantum correlations between this classical, macroscopic source's multiphoton subsystems.

Tu1A.4 • 10:15
Measurement of the Quantum Dynamics of a Macroscopic Photonic System, Chenglong You[1], Mingyuan Hong[1], Roberto Leon-Montiel[2], Riley Dawkins[1], Omar Magana-Loaiza[1]; [1]*Louisiana State Univ., USA;* [2]*Universidad Nacional Autonoma de Mexico, Mexico.* We report on the observation of the nonclassical dynamics of a classical macroscopic system. The multiphoton dynamics of the subsystems can be opposite to that exhibited by the classical macroscopic system.

Tu1A.5 • 10:30
Large Photon Number Semiclassical Asymptotics of the HOM Interferometer With Partially Indistinguishable Photons, Miguel Villalobos[1,2], Alejandra Valencia[1], Alonso Botero[1]; [1]*Universidad de los Andes (Colombia), Colombia;* [2]*Politecnico di Milano, Italy.* The classical correspondence of the HOM interferometer with $n \rightarrow \infty$ partially indistinguishable photons is shown to arise from a concentration phenomenon of the quantum state in a Hilbert-space sector that can be associated

with a well-defined macroscopic fraction of effectively indisistinguishable photons.

Tu1A.6 • 10:45
Experimental Higher-Order Photon State Classification Assisted by Machine Learning, Chiran Wijesundara[1], Guangpeng Xu[1], Abigail Stressinger[1], James Berry[1], Tim Thomay[1]; [1]*Univ. at Buffalo, USA.* Classification of experimentally determined higher order photon states using a novel Machine Learning model based on a 2D Convolutional Neural Network (CNN) for rapid classification of multiphoton Fock states up to |3>

Room: Vallarta 2
09:00 -- 11:00
Tu1B • Biophotonics and Medical Applications II
Presider: Ricardo Lozano Rosas; INAOE, Mexico

Tu1B.1 • 09:00 (Invited)
Systemic Physiology Augmented Functional Near Infrared Spectroscopy: the Power of the Whole Picture, Ursula Wolf[1], Felix Scholkmann[1]; [1]*Universität Bern, Switzerland.* Systemic-physiology-augmented (SPA)-fNIRS, measuring systemic physiologic parameters simultaneously with brain activity, is a novel approach enabling a new dimension of neuroscience research by obtaining a holistic picture of the interaction between the body and the brain.

Tu1B.2 • 09:30
Viability Analysis of Hepcidin-25 Detection by FTIR-Raman Spectroscopies and DFT-MD Simulations., Julian M. Rayo Alape[1], Carla Bandeira[1], Giovana Bonano Carlos[1], Juan Nogueira[2], Herculano da Silva Martinho[1]; [1]*Univ. of ABC, Brazil;* [2]*Madrid, Universidad Autonoma de Madrid, Spain.* The hepcidin-25 is an iron homeostasis hormone regulator playing key role in hyperinflammation states. Here we present vibrational calculations, band assignment and limit of detection of hepcidin-25 aiming investigate viability of detection in biofluids.

Tu1B.3 • 09:45
Withdrawn.

Tu1B.4 • 10:00
Mid-Infrared Spectroscopy & Food Safety: Can Photonics Hunt a Cereal Killer?, Boris Mizaikoff[1,2]; [1]*Universitat Ulm, Germany;* [2]*Hahn-Schickard, Germany.* In this presentation, we will discuss state-of-the-art MIR sensing platforms using cascade lasers and mid-infrared LEDs for the detection of fungal infection and mycotoxin contamination in food and feed.

Tu1B.5 • 10:15
Mid-Infrared (Bio)Photonics: From Emerging Technology to Enabling Devices, Boris Mizaikoff[1,2]; [1]*Universitat Ulm, Germany;* [2]*Hahn-Schickard, Germany.* Infrared spectroscopy plays an increasingly important role in modern biodiagnostics, environmental analysis, and food safety/quality scenarios. This has led to the evolution of mid-infrared photonics from an emerging tool into an enabling technology.

Tu1B.6 • 10:30
Slowing the Maturation and Wrinkling of *Candida Tropicalis* Colonies With Methylene Blue Photodynamic Therapy, Maria G. Conde Cuatzo[1], Mayra F. Salazar Morales[1], Teresita Spezzia Mazzocco[1]; [1]*Instituto Nacional de Astrofísica Óptica y Electronica, Mexico.* *Candida* can cause opportunistic infections. This study investigates photodynamic therapy (PDT) with methylene blue (MB) on *Candida tropicalis*, showing it slows colony maturation and wrinkling, suggesting its potential as an alternative treatment amid rising antifungal resistance.

Tu1B.7 • 10:45
Mid-Infrared Arthroscopy: in-Vivo Assessment of Cartilage Damage, Boris Mizaikoff[1,2]; [1]*Universitat Ulm, Germany;* [2]*Hahn-Schickard, Germany.* We will highlight the utility of MIR catheter technology for analyzing cartilage damage in-vivo during arthroscopic surgery, and discuss potential and challenges when translating this technology into clinical practice.

Room: Vallarta 3
09:45 -- 11:00
Tu1C • Optical Communications and Optical Signal Processing I
Presider: Alvaro Casas-Bedoya; Univ. of Sydney, Australia

Tu1C.1 • 09:45 (Invited)
Withdrawn.

Tu1C.2 • 09:45
Assisted Temperature Detection Based on a Mach-Zehnder Interferometer Using the Optical Harmonic Vernier Effect, Cipriano Guzman Cano[1], Iván Hernández Romano[1], Laura G. Martínez Ramírez[1], Vladimir P. Minkovich[2], Sigifredo Marrujo García[1]; [1]*Universidad de Guanajuato, Mexico;* [2]*CIO, Mexico.* Using the Optical Harmonic Vernier Effect (i=1) with a simulated reference improved a sensor's temperature sensitivity, up to 56 times (from 0.031 to 1.753 nm/°C).

Tu1C.3 • 10:00
Adulterated Honey Detection Based on Hyperspectral Imaging, Omar Gutierrez-Navarro[1], Juan N. Mendoza-Chavarria[2], Rafael A. Casillas-Peñuelas[1], Daniel U. Campos-Delgado[2]; [1]*Universidad Autónoma de Aguascalientes, Mexico;* [2]*Facultad de Ciencias, Universidad Autonoma de San Luis Potosi, Mexico.* We propose a method to detect adulterated honey relying on hyperspectral imaging. Our proposal uses linear unmixing and machine learning based on known honey spectra. The proposal was tested on a published database that achieved an accuracy of 0.92 to 0.99.

Tu1C.4 • 10:15
Experimental Evaluation of the Impact of OSNR in MCF Interferometers, Cristóbal Melo[1], Jaime Cariñe[2], Gabriel Saavedra[1]; [1]*Departamento de Ingeniería Eléctrica, Universidad de Concepción, Chile;* [2]*Departamento de Ingeniería Eléctrica, Universidad Católica de la Santísima Concepción, Chile.* We study OSNR impact on Mach-Zehnder interferometers based on multicore fibers, noting visibility drops below 30 dB. To maintain QBER of 11% and 18% in 2D- and 4D-BB84 systems, OSNR needs to be 22.6 dB and 23.3 dB.

Tu1C.5 • 10:30 (Invited)

Geometric Representations for Polarization and Beam Shape, Miguel A. Alonso[1]; [1]*Fresnel Institut, France.* This talk presents how the Poincaré sphere construction can be generalized to describe polarization beyond the paraxial regime, as well as the geometry of structured Gaussian beams. Applications in microscopy are also described.

Room: Vallarta 3
11:30 -- 13:00
W2C • Spectroscopy and Laser Science Technology
Presider: To be Determined

W2C.1 • 11:30 (Invited)
High-Power Laser Technology for Terahertz Science and Technology, Clara Saraceno[1]; [1]*Ruhr Universitat Bochum, Germany.* Abstract not available.

W2C.2 • 12:00 (Invited)
Near-Infrared Dual-Comb Spectrometer With 500 MHz ErYb:Glass Lasers, Flavio de Cruz[1]; [1]*Universidade Estadual de Campinas, Brazil.* We describe a dual-comb spectrometer at 1350-1750 nm based on homemade ErYb:glass femtosecond lasers. By only stabilizing their repetition rates, short acquisition times (microsecond) provide suitable resolution and SNR for studying condensed phase molecular systems.

W2C.3 • 12:30
Tunable Multi-Wavelength Fiber Laser Using a Mach-Zehnder Interferometer as a Wavelength-Selector Filter, Adriana B. Gasca[1], Laura G. Martínez Ramírez[1], Erika C. Silva Alvvarado[1], Eloisa Gallegos Arellano[2], Julián M. Estudillo Ayala[1], Roberto Rojas Laguna[1], Iván Hernández Romano[1], Juan M. Sierra Hernandez[1]; [1]*Universidad de Guanajuato, Mexico;* [2]*Mecatrónica, Universidad Tecnológica de Salamanca, Mexico.* This work presents a tunable multi-wavelength erbium-doped fiber using a Mach-Zehnder interferometer (MZI) as a wavelength-selective filter (WSF). By applying curvature to the MZI, a laser emission from 1552.41 nm to 1557.29 nm was tuned.

W2C.4 • 12:45
Pumping Power Enhancement by Inserting Thin Fiber Segment Into a Telecommunication Fiber, Angeles Y. Pages Pacheco[1], Lelio De la Cruz May[1], Efrain Mejía-Beltran[2]; [1]*Universidad Autonoma del Carmen, Mexico;* [2]*Centro de Investigagcion en Optica, Mexico.* Experimental tests improved the design of the Raman fiber laser by inserting a thin segment between the MetroCor fiber sections, enhancing conversion efficiency and 2nd Stokes (1178-nm) peak potential by ~26%.

Room: Vallarta 1
11:30 -- 13:30
Tu2A • Advanced Laser Dynamics and Fiber Optics: From Molecular Dissociation to Waveguide Innovations
Presider: Jack Jewell; GreenVcsel, USA

Tu2A.1 • 11:30 (Invited)
Jim Wyant: Approachably Magnanimous, Jack L. Jewell[1]; [1]*GreenVcsel, USA.* Jim Wyant's exemplary teaching, leadership, business, vision, philanthropy, and more, made the world a better place, especially for those fortunate enough to interact with him. Jim continues to inspire.

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Tu2A.2 • 12:00
Estimation of Molecular Dissociation Energies of Organic Solvents Using a Supercontinuum Source With 53% of Degree of Polarization, Daniel H. Martínez Suárez[1,2], David Steinberg[2], Lucia A. Saito[2], E. A. Thoroh de Souza[2], Juan D. Zapata[1]; [1]*Faculty of Engineering, Universidad de Antioquia, Colombia;* [2]*School of Engineering, Mackenzie Presbyterian Univ., Brazil.* Applying Infrared Spectroscopy, dissociation energies of the CH, CC and OH molecular bonds of acetone and isopropanol were obtained using a 1–5 µm broadband supercontinuum source, as originated from 40 cm highly nonlinear fiber.

Tu2A.3 • 12:15
Experimental Study of Noise-Like Pulse Emission Under Single-Shot Characterization, Miguel A. Bello Jiménez[1], Jose L. Flores Gonzalez[1], M. V. Hernandez-Arriaga[1], R. Lopez-Estopier[1], Y. Navarro-Matrinez[1], E. Hernandez-Escobar[1], Olivier Pottiez[2], M. Durán-Sánchez[3], B. Ibarra-Escamilla[3]; [1]*Universidad Autónoma de San Luis Potosí, Mexico;* [2]*CIO, Mexico;* [3]*INAOE, Mexico.* A single-shot characterization of a passive mode-locked fiber laser based on nonlinear polarization rotation is experimentally demonstrated. Adjusting the intracavity polarization state enables noise-like pulse emission with a broad-bandwidth supercontinuum spectrum.

Tu2A.4 • 12:30
Passive and Active Dual Waveguides Produced by Femtosecond Laser Micromachining, Wagner de Rossi[1]; [1]*Centro de Lasers e Aplicações, Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN,, Brazil.* Dual waveguides were produced with ultrashort laser pulses in doped heavy metal glasses, showing low loss in straight and curved geometries, and demonstrating laser amplification when doped with rare earth ions.

Tu2A.5 • 12:45
Tunable Passively Q-Switched and Mode-Locked Fiber Laser at 1.9 µm Region Using a Mixture of Gold Nanorods and Polyvinyl Alcohol as a Saturable Absorber, Varsha Varsha[1], Gautam Das[1]; [1]*Lakehead Univ., Canada.* Demonstrated a tunable Q-switched and mode-locked laser at 1.9 µm band using a Saturable absorber of different amounts. It could generate mode-locked pulses of width 8.7 ns and 8.715 pJ energy.

Tu2A.6 • 13:00
Laser Tuning Based on the Angle Position of a Microfiber Mach-Zehnder Interferometer, Guillermo Salceda-Delgado[1], Alejandro Martinez-Rios[2], Luis Fernando Enriquez-Gomez[3]; [1]*Universidad Autónoma de Nuevo León, Mexico;* [2]*Centro de Investigaciones en Optica, Mexico;* [3]*Universidad Autónoma de Coahuila, Mexico.* A tunable optical fiber laser is presented. It is based on the bending of an optical microfiber Mach-Zehnder interferometer. The laser emissions can be tuned by factors around 0.405 nm/° via bending the interferometer.

Tu2A.7 • 13:15
Violation of the law of Conservation of Energy in the Numerical Models of Fiber Optic Laser, Yuri O. Barmenkov[1], Josue Adin Minguela-Gallardo[1], Pablo Muniz-Cánovas[1]; [1]*Centro de Investigaciones en Optica AC, Mexico.* We show that the law of conservation of energy is not always fulfilled in the numerical models of fiber lasers. This statement is based on the study of an analysis of the traveling waves model.

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Room: Vallarta 2
11:30 -- 13:00
Tu2B • Optical Design, Instrumentation and Metrology II
Presider: Victor Coello Cardenas; CICESE, Unidad Monterrey, Mexico

Tu2B.1 • 11:30 (Invited)
Title to be Announced, Daniel Malacara[1]; [1]*Centro de Investigaciones en Optica, Mexico.* Abstract not available.

Tu2B.2 • 12:00
Direct Measurement of the Polarimetric Parameters of a Retarder With Diattenuation and Depolarization, Neil C. Bruce[1], Efren Ulloa-Peña[1], Martha Rosete-Aguilar[1], Oscar G. Rodríguez-Herrera[2], LUIS Muñoz-Flores[1]; [1]*Univ Nacional Autonoma de Mexico, Mexico;* [2]*Electrical and Computer Systems Engineering Department, Monash Univ., Australia.* A method is presented to measure the polarimetric parameters, including depolarization, for a retarder with diattenuation. The method calculates the values of the diattenuation, retardance, the axes of the sample, as well as its depolarization.

Tu2B.3 • 12:15
Determination and Compensation of the Induced Error by Divergence Adapter Systems in the Measurement of Convex Surfaces by Ronchi Deflectometry, Franco A. Gonzales Niño[1], Josep Arasa[2]; [1]*Pontificia Universidad Catolica del Perú, Peru;* [2]*Center for the Development of Sensors and Systems (CD6), Technical Univ. of Catalunya, Spain.* The asymmetries and irregularities (<2%) measured for a reference sphere enables the possibility to determine and compensate the induced error by the divergence adapter systems in the measurement of convex surfaces by Ronchi deflectometry.

Tu2B.4 • 12:30 (Invited)
The Glory of Aberration Theory, Jose M. Sasian[1]; [1]*Univ of Arizona, Coll of Opt Sciences, USA.* The impact of aberration theory in optical engineering is discussed with special emphasis on lens design.

Room: Vallarta 3
11:30 -- 13:15
Tu2C • Physical Optics I
Presider: Chandra Roychoudhuri; Univ. of Connecticut, USA

Tu2C.1 • 11:30 (Invited)
Title to be Announced, Jorge G. Garcia-Sucerquia[1]; [1]*Universidad Nacional de Colombia, Colombia.* Abstract not available.

Tu2C.2 • 12:00 (Invited)
Thirty Years Since the Onset of Structured Optical Beams in Latin-America, Sabino Chávez-Cerda[1]; [1]*Inst Nat Astrofisica Optica Electronica, Mexico.* It all started with a new traveling wave approach to Bessel beams that solved all their apparent physical inconsistencies, new findings are still coming out.

Tu2C.3 • 12:30
Fresnel Transform With Control in the Wavefield to be Recovered, Modesto Medina-Melendrez[1]; [1]*Tecnólogico Nacional de México/ITCul, Mexico.* A novel method to retrieve a controlled window in the wavefield to be propagated by the Fresnel transform is proposed. This method is implemented

with parallel computing and validated using digital holograms.

Tu2C.4 • 12:45
Generation of Partially Coherent Sources With Circular Coherence Using a Digital Micro-Mirror Device, Pedro Moreno-Acosta[1], Carolina Rickenstorff-Parrao[2], Julio C. Ramirez-San-Juan[1], Ruben Ramos-Garcia[1]; [1]*Departamento de Óptica, INAOE, Mexico;* [2]*Facultad de Ciencias de la Electrónica, BUAP, Mexico.* Partially coherent Besinc pseudo-Schell model sources are generated, for first time, by means of their pseudo mode representation. Pseudo modes are encoded and displayed on a DMD. Self-focusing property and circular coherence are observed

Tu2C.5 • 13:00
Statistical and Spatial Characterization of a Gaussian Schell-Model Source, Miguel Angel Orjuela-Moreno[1], Geminiano Martinez-Ponce[1]; [1]*Centro de Investigaciones en Optica AC, Mexico.* A Gaussian Schell-model beam is generated using a rotating optical diffuser. Speckle contrast and fringe visibility of first-order interference pattern were used to find out the homogeneity of intensity and complex degree of spatial coherence.

Room: Vallarta Rooms 1-3
15:00 -- 17:00
Tu3A • Plenary Session III
Presider: Victor Coello Cardenas; CICESE, Unidad Monterrey, Mexico

Tu3A.1 (Plenary)
The Evergreen Tree: James C. Wyant Connecting Dots, Daewook Kim[1]; [1]*Wyant Coll of Opt Sciences, UArizona, USA.* Professor James C. Wyant, founding dean of the Wyant College of Optical Sciences at the Univ. of Arizona, passed away on Dec. 8, 2023, at 80. He profoundly impacted the international optics community and inspired many.

Tu3A.2 (Plenary)
Harnessing Extraordinary Guiding Mechanisms in Optical Fibers, Axel Schülzgen[1]; [1]*Univ. of Central Florida, CREOL, USA.* Optical fibers with nanometer sized features in the cross-section enable novel propagation effects including photonic band-gap guiding, anti-resonant guiding, and guiding by transverse Anderson localization. We will discuss how extraordinary fiber properties can be harnessed.

Tu3A.3 (Plenary)
Metrology Driving Manufacturing Innovation – a Historical Review, Jessica DeGroote Nelson[1]; [1]*Edmund Optics Inc., USA.* This presentation will review the past 30-years of manufacturing and testing innovations including everything from CNC processing to freeform optics highlighting the tried and true message “if you can’t measure it, you can’t make it

Room: Vallarta 4
17:00 -- 19:00
Tu4A • Joint Poster Session I

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Tu4A.1
Hyperbolic Metamaterial Enhancement Based High Sensitivity Side-Polished Fiber SPR Sensors, shiqi hu[1], Yaofei Chen[1], Gui-shi Liu[1], Lei Chen[1], Yunhan Luo[1], Zhe Chen[1]; [1]*Jinan Univ., China.* Hyperbolic metamaterials are novel materials that excite the surface plasmon resonance (SPR) by their unique hyperbolic dispersion properties. Here, we design a composite-based fiber HMM-SPR sensor and apply it for temperature sensing.

Tu4A.2
Iron Oxide and Copper Oxide Nanoparticles Synthetized by Laser Ablation Technique Used as Coatings to Prevent $CaCO_3$ Scale on Stainless Steel, Juan P. Cuenca Vargas[3,1], Juan D. López Varga[1,2], Paulo H. Silva Pinto[1], Henry Riascos Landazuri[2], Marcelo Werneck[1], Regina Allil[1], Sergio Camargo[1]; [1]*Universidade Federal do Rio de Janeiro, Brazil;* [2]*Universidad Tecnologica de Pereira, Colombia;* [3]*Universidad de Alicante, Spain.* This work presents the synthesis and optical characterization of Fe_3O_4 and CuO nanoparticles used to prevent $CaCO_3$ scaling on stainless steel. The results showed that Fe_3O_4-coated steel pieces inhibited $CaCO_3$ fouling by up to 40%

Tu4A.3
Hydrogen Sulfide Sensor Based on Plastic Optical Fiber Coated With Silver@Magnetite Nanoparticles, Juan D. López Varga[1], Paulo H. Silva Pinto[1], Alex Dante[1], Regina Allil[1], Marcelo Werneck[1]; [1]*Universidade Federal do Rio de Janeiro, Brazil.* This study presents hydrogen sulfide (H_2S) sensors based on plastic optical fiber (POF) coated with magnetite and silver@magnetite nanoparticles. The silver@magnetite-coated sensor displayed 12 times higher sensitivity when tested at 50 ppm of H_2S.

Tu4A.4
Acoustic Levitation of Silica Spheres for the Detection of Metals Dissolved in Water by Laser-Induced Breakdown Spectroscopy, Marco Antonio Meneses-Nava[1], Mario Rodriguez[1], Jose Luis Maldonado[1]; [1]*Centro de Investigaciones en Optica AC, Mexico.* Detecting metals in water using LIBS faces challenges due to energy wastage. We propose acoustic levitation of silica spheres to address this issue. Benefits include ppb limit of detection, stability, repeatability and reduced time measurements.

Tu4A.5
Use of Predictive Neural Networks to Study of the Pulsed Operating Regimes in a F8L, Juan Carlos C. Hernandez garcia[1], Maximino R. Tapia García[1], Stephanie G. Hernández García[1], Julián M. Estudillo Ayala[1], Olivier Pottiez[2], José D. Filoteo Razo[3], Roberto Rojas Laguna[1]; [1]*Universidad de Guanajuato, Mexico;* [2]*Centro de Investigaciones en Óptica, Mexico;* [3]*Universidad Autónoma de Tamaulipas, Mexico.* The operating regimes evolution in an Er/Yb fiber laser was studied through an automated polarization control system. The study showed a temporal phase-shift, which allowed predicting the pulsed regime, and improving the laser operation.

Tu4A.6
Development of Photosensitizers Based on Doped TiO_2 Nanoparticles for Use in Antimicrobial Photodynamic Therapy, Ricardo Lozano Rosas[1], Mayra Felix Salazar-Morales[1], Ruben Ramos-Garcia[1], Teresita Spezzia-Mazzocco[1]; [1]*INAOE, Mexico.* Titanium dioxide (TiO_2) doped with metal ions enhances antimicrobial photodynamic therapy (APDT). Doped TiO_2 nanoparticles show photoactivity with visible light and increased antifungal efficacy against *Candida albicans.* This study includes synthesis, characterization, and application details.

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Tu4A.7
Determination of the Refractive Index of Aqueous Nanosuspensions With a Surface Plasmon Resonance Approach, Angel Mendez[1], Ricardo D. Araguillin[1,2], César Costa Vera[1]; [1]*Departamento de Física, Escuela Politecnica Nacional, Ecuador;* [2]*Departamento de Automatización y Control Industrial, Escuela Politécnica Nacional, Ecuador.* A prism-based surface plasmon resonance (SPR) sensor is employed to estimate the refractive index of gold and silver aqueous nanosuspensions. Measurements at four angles of incidence in wavelength interrogation mode are used for this.

Tu4A.8
Non-Hermitian Zigzag Glauber Lattice, Gilberto S. Fahara Ojeda[1], Braulio M. Villegas Martínez[1], José Javier Sánchez Mondragón[2], Sandra Gesing[3], Torey Battelle[4], Antonio F. Neto[5], Iván A. Bocanegra Garay[6], Jacob Licea Rodríguez[1], Roberto A. Beltrán Vargas[1], J J. Escobedo Alatorre[1]; [1]*Centro de Investigación en Ingeniería y Ciencias Aplicadas (CIICAp-IICBA), Mexico;* [2]*Óptica, Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE), Mexico;* [3]*San Diego Supercomputer Center, Univ. of California, USA;* [4]*Arizona State Univ. (ASU), USA;* [5]*DEPRO, UFOP, Brazil;* [6]*Departamento de Física Teórica, Atómica y Óptica and Laboratory for Disruptive Interdisciplinary Science, Universidad de Valladolid, Spain.* A non-unitary transformation is applied to a non-Hermitian zigzag waveguide array, resulting in Hermitian dynamics that describe a reciprocal waveguide system. A comparison between the exact and numerical solution is performed.

Tu4A.9
On the Analysis of Photoacoustic Signals via Dynamic Mode Decomposition, Roberto G. Ramírez-Chavarría[1], Argelia Pérez-Pacheco[2], Rosa M. Quispe-Siccha[2]; [1]*Instituto de Ingeniería, Universidad Nacional Autónoma de México,, Mexico;* [2]*Unidad de Investigación y Desarrollo Tecnológico (UIDT), Hospital General de México "Dr. Eduardo Liceaga", Mexico.* Photoacoustics is a promising technology in biomedicine. This work approaches a data-driven method to analyze the underlying dynamics of photoacoustic signals. We show the data workflow and promissory results to test the proposed technique.

Tu4A.10
a Polymer-Coated Mach-Zehnder Based on NZ-DSF to Improve Curvature Sensitivity, Laura G. Martínez Ramírez[1], Iván Hernández Romano[1], Cipriano Guzman Cano[1], Sigifredo Marrujo García[1], Arturo Fernandez Jaramillo[2], Eloisa Gallegos Arellano[3], Roberto Rojas Laguna[1], Juan M. Sierra Hernandez[1]; [1]*Universidad de Guanajuato, Mexico;* [2]*Unidad Académica de Ingeniería Biomédica, Universidad Politécnica de Sinaloa, Mexico;* [3]*Departamento de Mecatrónica, Universidad Tecnológica de Salamanca, Mexico.* Here, we propose an in-line fiber optic Mach Zehnder interferometer for measuring curvature based on non-zero dispersion-shifted fiber (NZ-DSF), a waist-enlarged technique, and a polymer. It was observed that curvature sensitivity increased to 7.01 nm/m^{-1}.

Tu4A.11
Study of Refractive Index in Holographic Reflection Gratings, Angelica R. Hernandez Delesma[1], Arturo Olivares-Pérez[1]; [1]*INAOE, Mexico.* We study the behavior of the refractive index of Bragg-type reflection volume holographic gratings, using the coupled Kogelnik theory, obtaining a non-linear behavior in the refractive index.

Tu4A.12
A Comparative Assessment of Point Sources for Digital Lensless Holographic Microscopy, Carlos A. Buitrago[1], Brayan Patiño-Jurado[1], Jorge G. Garcia-Sucerquia[1]; [1]*Universidad Nacional de Colombia,*

Colombia. Point sources for Digital Lensless Holographic Microscopy are comparatively analyzed. Sources based on pinholes, cone-shaped optical fibers, optical pick-up units, and aspheric lenses are assessed on their robustness, compactness, reliability, cost-effectiveness, and imaging performance.

Tu4A.13
Boehmite/Gold Substrates for SERS-Based Detection of Hormone Hepcidin: COVID-19 Hyperinflammation Screening, Carla Bandeira[1], Julian M. Alape[1], Herculano d. Martinho[1]; [1]*Federal Univ. of ABC, Brazil.* We produced SERS-based nanostructured substrates for the detection hepcidin and artificial saliva, with a view to rapid screening for hyperinflammation by COVID-19. The promising results showed a signal amplification of more than 20 times.

Tu4A.14
Angle Laser Sensor Based on Bending a Mach-Zehnder Interferometer Constructed With a Tapered Microfiber, Dylan A. Huerta Arteaga[1], Guillermo Salceda-Delgado[1], Mitchel A. Ruiz-Robles[1]; [1]*Facultad de Ciencias Físico Matemáticas, Universidad Autónoma de Nuevo León, Mexico.* An angle laser sensor based on bending a Mach-Zehnder interferometer constructed with tapered microfiber is presented. Experimentally, it demonstrates a sensitivity of 0.05715 nm/° between -152° and -86°, showing potential application in engineering.

Tu4A.15
Effects on Weed Plants Caused by IR-Laser Radiation as a Growth-Control Method, Andres Leon Zenteno[1], Federico A. Gutierrez-Miceli[1], Jorge L. Camas-Anzueto[1], Rafael Mota-Grajales[1], Madaín Pérez-Patricio[1], Joel Gómez-Pérez[1], Jose G. Joya-Davila[2]; [1]*Tecnologico Nacional de Mexico/IT Tuxtla Gutierrez, Mexico;* [2]*Facultad de Ciencias Agronomicas Campus V - UNACH, Mexico.* Laser as a weed-control method is studied widely. Investigations around this subject are important. In this study, weed plants were irradiated with IR-CO_2-laser, and the effects were analyzed. Optimal power and time values were evaluated.

Tu4A.16
Simulation of Lead-Free Perovskite Solar Cell Based on $MASnI_3$ Compared With $FAPbI_3$, Yeraldin A. Velez Galvis[1], Jefferson A. Echeverri Perez[1], Erick Reyes Vera[1], Esteban Gonzalez Valencia[1], Byron Medina[2], Alexander Sepulveda[3]; [1]*Instituto tecnologico metropolitano, Colombia;* [2]*Universidad Francisco de Paula Santander, Colombia;* [3]*Universidad Industrial de Santander, Colombia.* This work uses COMSOL Multiphysics simulations to evaluate lead ($FAPbI_3$) and lead-free ($MASnI_3$) perovskite solar cells. A comparison of the main electrical parameters reveals that the lead-free cells exhibit good performance and pollute less

Tu4A.17
Thermo-Optical Characterization of a New Imidazole Derivative for Application in Fiber Optic Sensors, Pedro M. Velasco-Bolom[1], Jorge L. Camas Anzueto[1], Madaín Pérez-Patricio[1], Joel Gómez-Pérez[1], Marcoantonio Ramírez-Morales[1]; [1]*Grupo de Optomecatrónica, Departamento de posgrado, Tecnológico Nacional de México/I. T. de Tuxtla Gutiérrez, Mexico.* In this work, a new imidazole derivative is characterized in a 30° to 65 °C temperature range. It shows thermochromic properties in its absorption spectrum to be used in manufacturing fiber optic sensors.

Tu4A.18
Design and Realization of Beamforming Optics for Short-Distance Free-Space Optical (FSO) Communications, Rebeca Baltazar-Barrón[1], Celso Gutiérrez-Martínez[1]; [1]*INAOE, Mexico.* Beamforming optics for short distance FSO links is designed and laboratory tested. The transmitting optics is

designed to collimate a diverging laser beam. The receiving optics concentrates light in a fiber-pigtailed photodetector. Results are reported.

Tu4A.19
Chromatic Dispersion Effects by sub-100 fs Pulses on a Non-Linear Confocal Positioner Based on a GaP Photodiode., Jesús Delgado-Aguillón[1], Camilo Ruiz Méndez[2], Martha Rosete-Aguilar[1], Enrique García-García[3], Cruz Méndez[3], Jesús Garduño-Mejía[1]; [1]*Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México, Mexico;* [2]*Instituto Universitario de Física Fundamental y Matemáticas y Departamento de Didáctica de la Matemática y de las Ciencias Experimentales, Universidad de Salamanca, Spain;* [3]*Centro de Láseres Pulsados - CLPU, Spain.* A nonlinear confocal positioning system was implemented for a ti:sapphire laser, where chromatic dispersion plays an important role for pulses below 100 fs. We use an astigmatic positioning system to characterize the chromatic aberration introduced.

Tu4A.20
Identification of Antibiotic Resistance Susceptibility in Different Species of Microorganisms Implementing Machine Learning, Claudia P. Barrera Patiño[1], Jennifer M. Soares[1], Kate C. Blanco[1], Natalia M. Inada[1], Vanderlei S. Bagnato[1,2]; [1]*São Carlos Inst. of Physics, Univ. of São Paulo, Brazil;* [2]*Biomedical Engineering, Texas A&M Univ., USA.* Based in previous publish work [1], in this study, we highlight the importance of building robust machine learning foundations to differentiate antimicrobial resistance involving between gram-negative and gram-positive bacteria. This advance is crucial to be applied to clinical needs.

Tu4A.21
Characterizing Blood Vessels in Blood Flow Phantoms Using Spatial Angle Filter Imaging for Improved Imaging Depth in Light Scattering Media, Fiona Zerai[1], Kiana Daliry[1], Alexandre Douplik[1], Aditya Pandya[1]; [1]*Toronto Metropolitan Univ., Canada.* Our study uses Spatio-Angular Filtering (SAF) to achieve high-resolution imaging of blood vessels in a skin-like PDMS and TiO_2 phantom, aiming for 3mm depth imaging to enhance cancer diagnostics and treatment in scattering media.

Tu4A.22
Semi-Supervised Adaptation of a Channelized Quadratic Observer, Uday Talwar[2], Afrooz Jalilzadeh[2], Meredith Kupinski[1]; [1]*Univ of Arizona, Coll of Opt Sciences, USA;* [2]*Univ. of Arizona, USA.* Binary classification of high-dimensional, low-sample-size datasets is feasible with channelized quadratic observers. Channel solutions can be optimized iteratively. A semi-supervised extension is developed for unlabeled data with smaller quantities of labeled data.

Tu4A.23
All-POF Spectral Filter Based on in-Line Holes, Mariana Anguiano-Lasso[1], Hector Santiago-Hernandez[1], Azael Mora-Nuñez[1], Beethoven Bravo-Medina[1], Anuar Beltran-Gonzalez[1], José Luis de la Cruz-González[1], Olivier Pottiez[2]; [1]*Universidad de Guadalajara, Mexico;* [2]*CIO, Mexico.* We propose a spectral filter using a plastic optical fiber with micro-holes, offering a low-cost, robust, and highly reproducible solution. Transmission traces show a spectral blue shift in peak transmission at 587 nm, 567 nm, 556 nm, and 536 nm for fibers with zero, one, two, and three holes, respectively. The filter displays a bandpass period of approximately 120 nm. Additionally, we compare transmissions with holes spaced at 1 cm and 500 µm apart, finding that the hole spacing does not affect the spectral transmission. By filling the holes with glucose solutions of varying concentrations to change the refractive index, we find that the filtering band and spectral shape remain consistent, ensuring the stable and robust performance of our spectral filter.

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Tu4A.24
Implementation of a Fiber Optic Sensor for Structural Vibration Monitoring, Jesus Perez-Toala[1], Joel Gómez-Pérez[1], Jorge L. Camas-Anzueto[1], Ruben Grajales-Coutiño[1], Pedro M. Velasco-Bolom[1], Luis E. Guillen Ruiz[1]; [1]*Tecnológico Nacional de México/ ITTG, Mexico.* The proposal uses fiber optics to measure vibrations in a PVC beam. It evaluates single-mode and multi-mode fibers, measuring frequencies from 6 to 18 Hz, combining sensitivity and precision, ideal for vibration detection.

Tu4A.25
Experimental Study of Sagnac Interferometer With Stric Polarization Controlled to Clean Amplified Optical Signals, Diego Hernandez Ruiz[1], José Luis de la Cruz-González[1], Sarah Naomi Alvares del Rio[1], Hector Santiago-Hernandez[1], Olivier Pottiez[2], Azael Mora-Nuñez[1], Beethoven Bravo-Medina[1], Anuar Beltran-Gonzalez[1], Jorge Luis Flores Núñez[1]; [1]*Universidad de Guadalajara, Mexico;* [2]*Centro de Investigación en Óptica, Mexico.* We study the transmission of the Optical Fiber Sagnac Interferometer (OFSI) with strict polarization control to clean signals amplified by an Erbuimm doped fiber amplifier. The signal and noise were amplified. However, the temporal show that OFSI adjusted at maximum transmission can filter the noise of low radiation.

Tu4A.26
Low Pressure Measurements With a Fabry-Perot Interferometer, Sergio Calixto[1], Roberto Zitzumbo[2], Zacarias Malacara[3]; [1]*Centro de Investigaciones en Optica AC, Mexico;* [2]*Centro de innovacion aplicada en tecnologias competitivas, Mexico;* [3]*Centro de investigaciones en optica, Mayotte.* Here is presented the application of the Fabry-Perot interferometer to measure low pressures in the order of tens of Pascals. The fabrication of the interferometer and the method to make the measurements is described.

Tu4A.27
Optomechatronic System to Quantify the Rotation of Linear Polarization of Light in Temperature-Controlled Chromoactive Materials, Alfredo R. Morales Navarro[1], Ruben Grajales-Coutiño[1], Jorge L. Camas-Anzueto[1], Alonso Juarez Ontiveros[1], Carlos A. Megchum Ruedas[1]; [1]*Instituto Tecnológico de Tuxtla Gutiérre, Mexico.* Optomechatronic system implementing the rotation of a linear polarizer to measure the polarization plane in a temperature controller from -15°C to 105°C in chromoactive materials, with applications in fluorescence, polarization, and spectroscopy.

Tu4A.28
Optical Characterization of a Reverse Geometry Contact Lens, Martín Isaías Rodriguez Rodriguez[2], Carla Velázquez Velasco[2], Johana Yadira Diego Hernández[2], Itzel MuñozJuárez[2,1], Marcela López de la Cruz[2], Mary Carmen Bates-Souza[2], Rafael Izazaga-Pérez[3], Daniel Aguirre[1,5], Brian Vohnsen[4], Rufino Diaz-Uribe[1]; [1]*ICAT-UNAM, Mexico;* [2]*FES Iztacala, Mexico;* [3]*INAOE, Mexico;* [4]*UCD, Ireland;* [5]*UNITA-UNAM, Mexico.* The radius of curvature of each surface of a reverse geometry contact lens (RGCL) as a first quantitative characterization is reported. The convex surface is measured with a TOCO topographer, the concave with a ZYGO interferometer.

Tu4A.29
Measurement of the Refractive Index of a Glass Plate Using a low-Cost Portable Interferometer, Jose Ortega[1], Jose Angeles[1], Arturo Guzman[1], Rafael Zaca[1]; [1]*Universidad Politécnica de Tulancingo, Mexico.* This paper presents the use of a low-cost kit to implement the Michelson interferometer and measure the refractive index of a glass plate. This kit is easy to assemble and uses low-cost optical materials.

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Tu4A.30
Ultraviolet Radiation - C: Promising Optical Technique in the Decontamination of Organs for Transplantation, Loraine Carolina G. Mafud[1], José Dirceu Vollet[1], Natalia Inada[1], Cristina Kurachi[1], Vanderlei S. Bagnato[1,2]; [1]*Universidade de São Paulo, Brazil;* [2]*Biomedical Engineering, Texas A&M Univ., USA.* At present, there is a pursuit to increase the availability of organs for transplantation. Here, it is demonstrated that UV-C during the organ infusion process reduces the bacterial load of the organ.

Tu4A.31
Non-Invasive Helicobacter Pylori Detection via Mid-Infrared IHWG Sensor, Gabriela Flores Rangel[1], Lorena Diaz de Leon Martinez[1], Boris Mizaikoff[1,2]; [1]*Universität Ulm, Germany;* [2]*Hahn-Schickard, Germany.* Mid-infrared spectroscopy using integrated hollow waveguides (iHWGs) enables precise isotopic ratio measurements of $^{13}CO_2/^{12}CO_2$ in simulated breath tests. This non-invasive method provides a sensitive, portable diagnostic platform for *Helicobacter pylori* detection

Tu4A.32
Radiobiological Effects in the Tumour Blood Microcirculation During High-Dose Radiation Therapy Imaged With Optical Coherence Tomography, Hector A. Contreras Sanchez[1], William J. Zabel[1], Edward Taylor[2], Alex Vitkin[1,2]; [1]*Medical Biophysics, Univ. of Toronto, Canada;* [2]*Radiation Oncology, Univ. of Toronto, Canada.* In radiotherapy, the use of high doses of radiation for treating cancer is suggested to cause microvascular injuries that possibly enhance tumour cell death. Optical Coherence Tomography may assist in revealing these little-known radiobiological effects.

Tu4A.33
Estimation and Comparison of Brainstem Fiber Orientation via Diffusion MRI Tractography and Polarization Sensitive OCT, Isabella Aguilera[1], Travis Sawyer[1], Elizabeth Hutchinson[1]; [1]*Univ. of Arizona, USA.* dMRI-based tractography methods reconstruct neural pathways but often lack detailed microstructural information. This study compares fiber orientation distributions in the human brainstem obtained through Constrained Spherical Deconvolution Tractography and polarization-sensitive OCT.

Room: Vallarta 1
19:00 -- 20:30
Tu5A • Other Coherent Optics II
Presider: José Javier Sánchez Mondragón; Inst Nat Astrofisica Optica Electronica, Mexico

Tu5A.1 • 19:00 (Invited)
Time-of-Flight Sensors for Motion Compensation in Contactless Vital Sign Monitoring, Mohammed N. Islam[1]; [1]*Univ. of Michigan at Ann Arbor, USA.* Time-of-flight sensors are being used in smartphones and AR/VR headsets, which we use to observe contactlessly and unobtrusively facial blood flow and physiological parameters. 3D sensors and AI are used to compensate for motion artifacts and ambient light interference.

Tu5A.2 • 19:30
Evidences of Photoacustics Effects in Microparticle Manipulation Using a CW Modulated Laser, Sergio Reyes Barragán[1], Javier Silva Barranco[1], Ulises Ruíz Corona[1], Ruben Ramos-Garcia[1]; [1]*INAOE, Mexico.* Photoacoustic pulses are generated by focusing a cw laser beam on a titanium nanofilm,to manipulate microparticles. The velocity of microparticles reported is much larger than those obtained

by thermophoresis.

Tu5A.3 • 19:45
Monitoring of Nanostar Growth Using Optical Coherence Tomography and UV-Vis Spectroscopy, Yenisey Ponce de León[1], Juan Luis Pichardo-Molina[2], Noé Alcalá Ochoa[2], Mauricio Ortiz-Gutiérrez[3]; [1]*Facultad de Física, Universidad Veracruzana, Mexico;* [2]*Centro de Investigaciones en Óptica, Mexico;* [3]*Facultad de Cs. Físico Matemáticas, Universidad Michoacana de San Nicolás de Hidalgo, Mexico.* Nanostar growth was monitored by Optical Coherence Tomography and spectroscopy. Plots for both techniques show similar behavior, confirming is possible monitoring the growth kinetics of nanoparticles using OCT imaging. Additionally, OCT allows detecting few nanoparticles

Tu5A.4 • 20:00
Fiber Optic Probe for Complex Light Beams Multiplexing Single- and few-Mode Signals, Amado M. Velazquez-Benitez[1,2], Eloy Montesinos-Garrido[1], Itzel M. Garnica-Palafox[1], Thomas Bradley[2], Naser Qureshi[1], Chigo Okonkwo[2]; [1]*ICAT-UNAM, Mexico;* [2]*High-Capacity Optical Transmission Laboratory,, Eindhoven Univ. of Technology, Netherlands.* A fiber bundle device capable to generate multiple spots, single and multimode, that can be used for different applications requiring complex light patterns. The device is simple in fabrication based on existing fiber bundle technology.

Tu5A.5 • 20:15
Torsión Residual en Fibras óPticas, Diana Tentori[1], Sergio Ivan Ramirez Zavala[2], Daniel Jauregui Vazquez[1]; [1]*CICESE, Mexico;* [2]*Div. Ingenierias, Irapuato-Salamanca, U de Guanajuato, Mexico.* El modelo teórico de la birrefringencia residual de una fibra con un componente de birrefringencia elíptica y una torsión residual, predice correctamente los resultados experimentales obtenidos para fibras monomodo convencionales y fotónicas.

Room: Vallarta 2
19:00 -- 20:30
Tu5B • Innovations in Materials Science and Nanophotonics Interfaces
Presider: Gustavo Wiederhecker; UNICAMP, Brazil

Tu5B.1 • 19:00 (Invited)
Bidirectional Optoelectronic Brain Machine Interfaces for Neuroscience Research, Abraham Vázquez-Guardado[1]; [1]*Electrical and Computer Engineering, North Carolina State Univ., USA.* Advances in genetic engineering allowed the development of optical tools to interrogate life. This talk will present novel bio-integrated optoelectronic interfaces for stimulation and biosensing of the brain in conscious freely-moving animal models relevant for neuroscience research.

Tu5B.2 • 19:30
Thermal Characterization of Iron Oxides, Metallic and, Core-Shell Nanoparticles Under Physiological Simulated Conditions Using a Thermal Lensing Approach, Ana B. Terán[1], Victor Santos[2], Andrea Montero[3,5], Xavier Cattöen[5], Sara Aldabe-Bilmes[3,4], César Costa Vera[1]; [1]*Mass Spectrometry and Optical Spectroscopy Group, Physics Department, Escuela Politécnica Nacional, Ecuador;* [2]*Departamento de Automatización y Control Industrial, Escuela Politécnica Nacional, Ecuador;* [3]*Departamento de Química Inorgánica Analítica y Química Física, Universidad de Buenos Aires, Argentina;* [4]*CONICET, Universidad de Buenos Aires, Argentina;* [5]*Institut NEEL, Université Grenoble Alpes,*

France. Thermal lensing was employed to estimate the thermal diffusivity of nanosuspensions and core-shell nanoparticle's porosity. Different materials and solvents, including a biological buffer, were studied to monitor the release kinetics of dye from porous nanoparticles.

Tu5B.3 • 19:45
Effects of Doping and Nanoimprinting on the Infrared Response of Conductive Polymer Metasurfaces, Haydee Pacheco[1], Deirdre O'Carroll[1]; [1]*Rutgers Univ., USA.* We present conductive polymer metasurfaces that exhibit tunable infrared responses using doped poly(3,4-ethylene dioxythiophene):poly(styrene sulfonate) (PEDOT:PSS). By enhancing film conductivity through dopants, we observe significant changes in photonic properties with prospective applications in nanophotonics and infrared devices.

Tu5B.4 • 20:00
Sensitivity of Experimental Conditions on Inhomogeneous Thin Film Growth, Ramon Rodriguez[2], Emmanuel Villa[2], Noemi Abundiz[3], Roberto Sangines[3], Juan Aguila[3], Estrella Teran[4], Julio Cruz[4], Lorena Cruz[2], Roberto Machorro[1]; [1]*Advanced Materials, CNyN UNAM, Mexico;* [2]*Doctorado en Nanociencias, CICESE, Mexico;* [3]*Cátedra adscrita al CNyN UNAM, CONAHCyT, Mexico;* [4]*Estancia Posdoctoral CNyN UNAM, CONAHCyT, Mexico.* Fourier transform approximation is used to synthesize continuously changeable refractive index filters on a substrate. Its performance is sensitive to small variations of the involved deposition parameters. We study this dependence, numerically and experimentally.

Tu5B.5 • 20:15
Laguerre-Gaussian Beam Transmission Through a Hyperbolic Metamaterial, Volodymyr I. Fesenko[1], Oleksiy Shulika[1], Vladimir Tuz[2]; [1]*Univ. of Guanajuato, Mexico;* [2]*V.N. Karazin Kharkiv National Univ., Kharkiv, Ukraine.* The interaction of a three-dimensional Laguerre-Gaussian beam with a hyperbolic metamaterial is considered. Conditions are found at which the Laguerre-Gaussian beam can be transmitted through the metamaterial almost without any distortion

Room: Vallarta 3
19:00 -- 20:15
Tu5C • Optical Communications and Optical Signal Processing II
Presider: Miguel Alonso; Fresnel Institut, France

Tu5C.1 • 19:00 (Invited)
Title to be Announced, Rodrigo Amezcua-Correa[1]; [1]*Univ. of Central Florida, CREOL, USA.* Abstract not available.

Tu5C.2 • 19:30
Optically Generated Millimeter Waves by Selective Filtering of Multimode Laser Emission, José Carmona-Suárez[1], Celso Gutiérrez-Martínez[1]; [1]*Instituto Nacional de Astrofisica, Optica y Electronica (INAOE), Mexico.* A 70 GHz millimeter wave (mm-wave) signal is generated by photomixing a pair of optically filtered adjacent modes from a multimode laser (MML). Selective filtering of MML is achieved by fiber optic photonics filters.

Tu5C.3 • 19:45

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A Hybrid Convolutional Neural Network for Classification and SNR Estimation of QAM Modulation Formats, Javier Herrera[1], Jose Núñez-Kasaneva[2], Nicolás Pereda[1], Alex Alvarado[2], Gabriel Saavedra[1]; [1]*Universidad de Concepción, Chile;* [2]*Eindhoven Univ. of Technology, Netherlands.* A hybrid convolutional neural network to identify modulation format and estimate signal-to-noise ratio (SNR) using received constellations is shown. Accuracy of 91.38% and average error of 0.83 [dB] are shown estimating modulation format and SNR.

Wednesday, 13 November

Room: Vallarta 1
09:30 -- 11:00
W1A • Other Multidisciplinary Areas of Photonics
Presider: Jorge Camas Anzueto; Instituto Tecnológico de Tuxtla Gutiérre, Mexico

W1A.1 • 09:30 (Invited)
Exact Dynamics of a Non-Hermitian Zigzag Glauber-Fock Lattice, Braulio M. Villegas Martinez[1]; [1]*CIICap, Mexico.* A non-Hermitian zigzag Glauber-Fock lattice with unequal hopping rates is mapped to a Hermitian waveguide system through a non-unitary transformation. This approach provides an exact solution for the system's dynamics.

W1A.2 • 10:00
Development of Tools for Bubble Characterization in Microfluidic Systems Using Intelligent Vision System, Antonio A. Gomes[1], Arian P. Nario[1], Evandro D. da Silva[1], Ricardo E. Samad[1], Wagner de

Rossi[1]; [1]*Nuclear and Energy Research Inst., Brazil.* We present the first results in the development and validation of tools for analyzing speed, size and quantity of bubbles in gas-liquid two-phase flow in microfluidic mixers, using an intelligent image capture system.

W1A.3 • 10:15 (Invited)
Pedagogical Approaches for Student Learning, Mike McKee[1], Matthew T. Posner[2]; [1]*Univ. of Central Florida, CREOL, USA;* [2]*Axonal Networks, Inc., Canada.* The goal of instruction is to have students learn material presented in courses. Yet, students often struggle with content or misconceptions go unanswered. Using an approach called ABC-CBV-R, instructors reorganize instruction so students learn material.

W1A.4 • 10:45
Self-Powered Depth-Sensing Surfaces, Canek Fuentes Hernandez[1], Brian Jiang[1], Shamik Datta[1], Huan T. Ngo[1], Zhenming Yang[1], Shaghayegh Mesforush[1], Tara Arjomandbigdeli[1]; [1]*Electrical and Computer Engineering, Northeastern Univ., USA.* High-power and privacy concerns of current depth perception technologies limit their general use in many applications. We present an approach to achieve self-powered depth sensors based on distributed photodiode networks with a limited field-of-view.

Room: Vallarta 2
09:00 -- 11:00
W1B • Nonlinear Material Characterization
Presider: Victor Coello Cardenas; CICESE, Unidad Monterrey, Mexico

W1B.1 • 09:00 (Invited)
Extremely Non-Degenerate Nonlinear Photonics, Eric Van Stryland[1]; [1]*Univ. of Central Florida, CREOL, USA.* In memory of both Mansoor Sheik-Bahae and George Stegeman, I will discuss the enhancement of bound-electronic nonlinearities utilizing near resonance with extremely nondegenerate photons. Enhancement of 2-4 orders-of-magnitude are possible for two-photon absorption.

W1B.2 • 09:30 (Invited)
Enabling Silicon Nitride as a χ(3) and χ(2) Nonlinear Optics Platform, Jaime Cardenas[1]; [1]*Univ. of Rochester, USA.* Silicon nitride is the leading on-chip platform for χ(3) nonlinear photonics. Recent reports on optical and optical poling of silicon nitride are enabling χ(2) nonlinear processes. We review recent progress in silicon nitride χ(2) photonics.

W1B.3 • 10:00
Characterization of Transverse Light-Drag in Hot Atomic Vapors Using Zeeman EIT, Samuel Arroyo[1], Long Nguyen[1], Robert Boyd[1,2]; [1]*Univ. of Rochester, USA;* [2]*Department of Physics, Univ. of Ottawa, Canada. Light undergoes drag when it travels through a moving medium. In this work, we study transverse drag between a moving light source and a stationary slow-light medium using nondegenerate Zeeman Electromagnetically Induced Transparency (EIT).*

W1B.4 • 10:30
Nonlinear Optical Characterization of Highly Scattering and Absorptive Materials via Reflection Intensity Correlation, Gleison S. Bezerra[1], Albert S. Reyna[1], Cid Bartolomeu de Araujo[2]; [1]*Programa de Pós Graduação em Engenharia Física, Universidade Federal Rural de Pernambuco, Brazil;* [2]*Departamento de Física, Universidade Federal de Pernambuco, Brazil.* **Abstract:** We present a novel nonlinear optical technique to

study non-transparent (simultaneously absorbing and scattering) materials by analyzing the *intensity correlation function* of speckle patterns modified by their nonlinear interaction with an intense laser beam.

W1B.5 • 10:45
Ablation and Dynamic Distributions Exhibited by Lung Epithelial Cancer Cells Monitored by Chaotic Attractors, Carlos Torres-Torres[1], Blanca Estela García-Pérez[1], Hilario Martines-Arano[2]; [1]*Instituto Politécnico Nacional, Mexico;* [2]*Universidad Autónoma del Estado de Hidalgo, Mexico.* Changes in distribution of A549 cancer cells were identified by a straightforward single-beam measurement of a modulated optical transmittance. The assistance of a chaotic attractor improves the sensitivity dependent on resonant conditions of the sample.

Room: Vallarta 3
10:00 -- 11:00
W1C • Optical Design, Instrumentation and Metrology III
Presider: Martha Rosete-Aguilar; Univ Nacional Autonoma de Mexico, Mexico

W1C.1 • 10:00 (Invited)
Fundamental Properties of Beam-Splitters in Classical and Quantum Optics, Masud Mansuripur[1]; [1]*The Univ. of Arizona, USA.* We examine a pair of single-mode wavepackets in the number-states [endif]--> and [endif]--> that simultaneously arrive at a beam-splitter's input ports, and find the distribution of photon-number-states at the output ports using an argument inspired by Feynman's scattering analysis of indistinguishable Bose particles.

W1C.2 • 10:30
Desing a High-Precision Power Stability Drive System for DFB Diode Laser, Gerardo León[1], Jorge L. Camas Anzueto[1], Gilbert F. Perez-Garcia[1], Ruben Grajales-Coutiño[1], Rafael Mota-Grajales[1], Vicente Leon-Orozco[1]; [1]*ITTG, Mexico.* The proposal introduces a DFB laser diode, a significant advancement in the field of optoelectronics. The design of an optoelectronics system to stabilize the optical power of the laser diode, feedback-controlled by an internal photodiode, is a crucial development that will greatly impact the field.

W1C.3 • 10:45
Nanosecond-Laser Annealing of Zinc Oxide Thin-Films, Swapneal Jain[1], William Medlin[1], Sunil Uprety[1], Tamara Isaacs-Smith[1], Trevor Olsson[1], Jody Davis[1], Spenser Burrows[1], Scott Chumley[1], Minseo Park[1], Guillaume M. Laurent[1]; [1]*Auburn Univ., USA.* In this work, we have investigated the role of both the laser wavelength and fluence on the crystallization of zinc oxide (ZnO) thin-films induced by nanosecond laser.

Room: Vallarta 1
11:30 -- 13:15
W2A • Fiber Optic Sensors
Presider: Mayerlin Nunez Portela; Universidad de los Andes, Colombia

W2A.1 • 11:30
Sensor Based on U-Bent MMM Optical Fiber Structure for Detection of Mercury in Water, Arturo Gaviria-Calderón[1], Brayan Patiño[1], Wilmer Saldarriaga[1], Jorge G. Garcia-Sucerquia[1]; [1]*Universidad Nacional*

de Colombia, Colombia. U-MMM optical fiber structures for the detection of Hg2+ ions in water are evaluated. The U-MMM can detect the presence of mercury ions in water at low concentrations, via the immobilization of a chitosan/Fe2O3 layer in a coreless fiber section.

W2A.2 • 11:45
A Rapid Method for Ag85B Detection of Tuberculosis Using Label-Free Biosensor Based on an E-SMS Optical Fiber Structure, Brayan Patiño[1], Arturo Gaviria-Calderón[1], Manuel S. Moncada-Barrera[2], Yamile Cardona-Maya[3], Marisol Jaramillo-Grajales[2], Y. J. Montagut-Ferizzola[2], Juan F. Botero-Cadavid[1]; [1]*Universidad Nacional de Colombia, Colombia;* [2]*Universidad EIA, Colombia;* [3]*Institución Universitaria Pascual Bravo, Colombia.* E-SMS optical fiber structures are evaluated as biosensors through the binding between the immobilized Ag85B antigen and anti-Ag85B antibody. By tracking the wavelength response, it is demonstrated that the E-SMS devices can measure low concentrations of anti-Ag85B.

W2A.3 • 12:00
Multichannel Polarization Fiber Optic Sensors Using Wavelength Multiplexing, Martin Kyselák[1], Jiri Vavra[1], Zdenek Vylezich[1], Karel Slavicek[2], David Grenar[3]; [1]*Univ. of Defence, Czechia;* [2]*Masaryk Univ., Czechia;* [3]*Brno Univ. of Technology, Czechia.* A novel approach for multichannel polarization fiber optic sensors using wavelength multiplexing. By exploiting the unique properties of polarization and multiplexing techniques, our system achieves enhanced sensitivity and robustness for various sensing applications.

W2A.4 • 12:15
Detection of Gases at the Molecular Level, Varsha Varsha[1], Joshua O. Trevisanutto[1], Gautam Das[1]; [1]*Lakehead Univ., Canada.* Developing a low-power device using intracavity laser absorption spectroscopy to measure gases (e.g., ammonia) emitted from fertilized fields. An inventory of these gases will minimize the application of fertilizers and help to combat climate change.

W2A.5 • 12:30
Temperature Compensation of all-Fiber Multimode Interference Devices Using a Polymer Cladding, Victor I. Ruiz-Perez[1], Wendy N. Montejo Vicente[1], Miriam Elizabeth Picos-Lopez[1], Daniel Lopez Cortes[1]; [1]*Universidad Autonoma de Chiapas, Mexico.* In this work is demonstrate a thermo-optic compensation method for multimode interference-based fiber devices reducing the wavelength shift from 12.36 pm/°c to 1.43 pm/°C by using a section of multimode fiber with a polymer cladding.

W2A.6 • 12:45
Estimation of Thermo-Optical Coefficient With Hilbert Transform in Multiparametric Fibre Refractometer, Jonathan Esquivel[1], Rodolfo Martínez[1], Luis Valentín[1], Daniel Maldonado[2], David Barrera[3], Salvador Sales[2]; [1]*Centro de Investigaciones en Optica A.C., Mexico;* [2]*ITEAM Research Inst., Universitat Politecnica de Valencia, Spain;* [3]*Department of Electronics, Univ. of Alcala, Spain.* This study demonstrates the use of the Hilbert transform in fiber refractometers to estimate the thermo-optical coefficient from temperature and refractive index changes, achieving a novel approach with low standard deviation for optical applications.

W2A.7 • 13:00
Fiber Optic Temperature Sensor Based on PDMS End-Capped Michelson Interferometer, Miriam Elizabeth Picos-Lopez[1], Daniel Lopez-Cortes[1], Wendy N. Montejo Vicente[1], Victor Ivan Ruiz-Perez[1]; [1]*Universidad Autonoma de Chiapas, Mexico.* A temperature sensor based on an offset and capped with PDMS is demonstrated. The intensity's dependence on temperature shows a sensitivity of 0.087 dB/°C with a linear response in the range of 25-60 °C

Optica Latin America Optics and Photonics (LAOP) Conference 2024 Session Guide

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Room: Vallarta 2
11:30 -- 13:15
W2B • Physical Optics II
Presider: Sabino Chavez-Cerda; Inst Nat Astrofisica Optica Electronica, Mexico

W2B.1 • 11:30 (Invited)
Ince-Gauss Beams in Phase Space, Julio C. Gutierrez-Vega[1]; [1]*Tecnologico de Monterrey, Mexico.* We discuss the propagation properties of the Wigner distribution function of the Ince-Gauss beams. This function can be expressed as a finite double summation of products of Laguerre-Gaussian fields.

W2B.2 • 12:00
Generation and Characterization of OAM Beams in the Partially Coherent Regime, Carlos Cardoso-Isidoro[1], Raul I. Hernandez-Aranda[1], Benjamin Perez-Garcia[1]; [1]*Tecnológico de Monterrey, Mexico.* We report an experimental approach for the characterization of structured partially coherent light by means of the measurement of the Cross Correlation Function, involving a Spatial Light Modulator illuminated by an extended thermal source.

W2B.3 • 12:15
Propagation of Bessel Beams in Lenslike Media, Pamela Bravo-Cassab[1], Jesús E. Gómez-Correa[1], Sabino Chávez-Cerda[1]; [1]*INAOE, Mexico.* We study the propagation of Bessel beams in inhomogeneous lenslike media with a quadratic gradient index through the observation of the shadows caused by the obstruction of the wave field.

W2B.4 • 12:30
Holographic Recording and Diffraction Features of Vector Vortex Gratings, Dixie Leilany Medina-Espíritu[1], Rosa Julia Rodríguez-González[2], Geminiano Martinez-Ponce[1]; [1]*Centro de Investigaciones en Optica AC, Mexico;* [2]*Departamento de Materiales Avanzados, Centro de Investigación en Química Aplicada, Mexico.* Holographic vector vortex gratings are inscribed in a photoanisotropic medium by spatial modulation of linear/circular birefringence. Simulations pave the way to faithful-reconstruct vector hologram when one of the recording vector beams is used as illumination.

W2B.5 • 12:45 (Invited)
Non-Interaction of Waves (NIW): Consequences in Interpreting the Various Physics Phenomena, Chandra Roychoudhuri[1]; [1]*Univ. of Connecticut, USA.* Superposition Principle cannot become manifest without the action a detector. This has serious consequences in interpreting many classical and quantum physics phenomena. We will present examples of prevailing incongruent interpretations in classical and quantum optics.

Room: Room: Vallarta Rooms 1-3
15:00 -- 17:00
W3A • Plenary Session IV
Presider: José Javier Sánchez Mondragón; Inst Nat Astrofisica Optica Electronica, Mexico

W3A.1 (Plenary)
Guiding Trojan Beams via Lagrange Points, Haokun Lou[1], Yunxuan Wei[1], Fan O. Wu[2], Georgios Pirialakos[1], Demetrios N. Christodoulides[1,2], Mercedeh Khajavikhan[1,2]; [1]*Ming Hsieh Dept. of Electrical and*

Computer Engineering, Univ. of Southern California, USA; [2]The College of Optics and Photonics, Univ. of Central Florida, CREOL, USA. A new mechanism for guided wave transport, based on stable Lagrange points, is introduced. The concept can be applied to both optical signals and charged particle beams. This approach can, for the first time, enable the propagation of charged particles in a guided fashion.

W3A.2 (Plenary)
Optical Thermodynamics of Nonlinear Multimode Systems, Demetrios N. Christodoulides[1]; [1]*Univ. of Southern California, USA.* In this plenary presentation, we will provide an overview of recent developments in the field of optical thermodynamics of nonlinear multimode systems.

W3A.3 (Plenary)
Opportunities in Photonic Sciences, Robert Sewell[1]; [1]*ICFO -Institut de Ciencies Fotoniques, Spain.* In this talk I will discuss opportunities for study, research training and collaboration in photonic sciences, particularly for students and young researchers. The talk will be based on our long-standing collaborations between ICFO and partners in Mexico and Latin America, and highlight in particular emerging fields with great potential, such as quantum technologies, medical optics, and renewable energy.

Room: Vallarta 4
17:00 -- 19:00
W4A • Joint Poster Session II

W4A.1
Optical Property Characterization of Agar-Based Phantoms With Variable Ink and Nanoparticle Concentrations, Elvis A. Garcia Cortes[1], Julio C. Pérez-Sansalvador[1], Teresita Spezzia-Mazzocco[1]; [1]*Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico.* This study seeks to simulate different tissues using agar-based phantoms with varying ink and nanoparticle concentrations. Spectrometric methods were used to characterize the optical coefficients, revealing increased values with higher concentrations of ink and nanoparticles.

W4A.2
Energy Transfer Mechanisms Between Surface Plasmon Polaritons and Er^{3+} Ions in Hybrid Thin Films, José Y. Chacaliaza Ricaldi[1], VIctor Anthony Garcia Rivera[2], Younès Messaddeq[2], Euclydes Marega Junior[1]; [1]*Universidade de São Paulo, Brazil;* [2]*Université Laval, Canada.* This study investigates strong coupling between rare-earth ions in nanoglasses and surface plasmon polariton on Au metasurfaces, enhancing Er^{3+} luminescence and radiative emission rates. Hybrid thin films demonstrating potential for advanced optical devices.

W4A.3
Study of Synthetized Organic Molecules as Hole Transport Layer in Sb_2S_3 Solar Cells , Andrea Cerdan[1], Eugenio Hernández-Fernández[1], Lourdes Ramos Galicia[2], Shadai Lugo Loredo[1], Sanal K. C.[1], J. Alejandro Hernandez-Magallanes[1]; [1]*Univ. Autonomous of Nuevo Leon, Mexico;* [2]*Unidad Monterrey, Centro de Investigación en Materiales Avanzados S.C., Mexico.* Sb_2S_3 based solar cells testing two synthesized hole transport materials were analyzed and compared with P3HT. XRD, cyclic voltammetry, band gap and photocurrent response of these materials were obtained to evaluate its suitability

W4A.4

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Analysis of the Fluorescent Properties of Lophine - BI $(NO_3)_3$ for Generating Warm White Light, Marcoantonio Ramirez[1], Jorge L. Camas Anzueto[1], Ruben Grajales-Coutiño[1], Pedro M. Velasco-Bolom[1], Carlos A. Megchum Ruedas[1], Madaín Pérez-Patricio[1], Carlos Hernández Gutiérrez[1]; [1]*Instituto Tecnológico Tuxtla Gutiérrez, Mexico.* We characterized bismuth nitrate-lophine solid membranes. The nitration of the metal salt and the aromatic group of lophine exhibit fluorescent properties, making these membranes interesting for generating warm white light.

W4A.5
Carbon Quantum Dots as Sensors of Bifenthrin and Abamectin in Water Samples, Rosaura Cazares-Hernandez[1], Blanca A. Gómez Rodriguez[1], Hector Hugo Cerecedo-Núñez[1]; [1]*Universidad Veracruzana, Mexico.* The present work explores the viability of using carbon quantum dots derived from table sugar as an optical sensor for residues of agrochemicals commonly used in crops, specifically bifenthrin and abamectin.

W4A.6
Method for Finding Leaf Layers in Optical Coherence Tomography Images, Jose E. Loman Cordova[1], Yenisey Ponce de León[1], Hector Hugo Cerecedo-Núñez[1], Patricia Padilla Sosa[1], Marcelo David Iturbe Castillo[2], Dora Trejo Aguilar[3], Mauricio Ortiz-Gutiérrez[4]; [1]*Facultad de Física, Universidad Veracruzana, Mexico;* [2]*Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico;* [3]*Facultad de Cs. Agrícolas, Universidad Veracruzana, Mexico;* [4]*Facultad de Cs. Físico Matemáticas, Universidad Michoacana de San Nicolás de Hidalgo, Mexico.* A procedure for determining leaf layers in Optical Coherence Tomography images is proposed. By analyzing coffee leaves, three layers were successfully identified. The same procedure was applied to avocado and mango leaves for verification

W4A.7
Fractional Photobiomodulation on Breast Cancer, Is it a New Therapy?, Silvia I. Franco Pastrana[1], Carolina Álvarez Delgado[2], Teresita Spezzia-Mazzocco[1]; [1]*INAOE, Mexico;* [2]*INNOVACIÓN BIOMÉDICA, CICESE, Mexico.* Breast cancer is the main cause of death in women. Breast adenocarcinoma and fibroblasts cells were used to test photobiomodulation therapy continuously and fractional. The fractional dose reduces cancer cells. Possible alternative treatment.

W4A.8
Fabrication and Characterization of a Carbon Nanotube Saturable Absorber for Passive Mode-Locking, Taina M. Ramírez[1], Jaime Cascante[1], Esteban Avendaño[1], Mavis Montero[1]; [1]*Universidad de Costa Rica, Costa Rica.* In this research we report the characterization of a passive modulator using single walled carbon nanotubes in sodium carboxymethyl cellulose as a host polymer. The results show that this saturable absorber has a modulation depth of α_s=32% , saturation intensity of I_s= 114.9 MW/cm^2 and recovery time of τ = 240 fs.

W4A.9
a Novel Approach to Biofilm Analysis: Laser Speckle Imaging and Haralick Descriptors, Froylan Garcia-Cruz[2], Cruz Elizabeth Perez Corona[1], David Loaiza-Tozcuento[1], Teresita Spezzia-Mazzocco[1], Hayde Peregrina-Barreto[1], Julio C. Ramirez-San--Juan[1]; [1]*INAOE, Mexico;* [2]*UTM, Mexico.* This study uses Laser Speckle imaging and Haralick descriptors to analyze biofilm dynamics under varying DMSO concentrations. Results show increased sample stability and uniformity, highlighting LS as a non-invasive, cost-effective alternative for cell viability assessment.

W4A.10
Qubint-4Lexp: Interactive Tool for the Four Bell States, Claudia A. Vidales[1], Braulio M. Villegas Martinez[2], Sandra Gesing[3], Gilberto S. Fahara Ojeda[2], Misael M. Rodríguez Arias[2], Wilmer Contreras[4]; [1]*Centro de Investigación en Matemáticas, Mexico;* [2]*Centro de Investigación en Ingeniería y Ciencias Aplicadas, Mexico;* [3]*San Diego Supercomputing Center, USA;* [4]*Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico.* We present Qubint-4Lexp, an integrated educational tool designed to illustrate fundamental concepts of the four Bell states in quantum computing. This tool is freely available and has already been integrated into the QUBITHUB platform.

W4A.11
Peruvian Binoculars: Advances in the Prisms Manufacturing, Guillermo Baldwin[1], Franco Gonzales[1], Alejandro Montoya[1], Miguel Asmad[1], Fernando Perez[1]; [1]*Pontificia Universidad Católica del Perú, Peru.* In the frame of binoculars development, we present details on the prisms manufacturing and their testing. We will also present some of the main different steps we did in the development of binoculars.

W4A.12
Impact of Functional Occlusion Test Protocol on Muscle Oxygenation During Reactive Hyperemia, Vanja Dvekar[1], Leah DeVos[3], Gennadi Saiko[1], Alexandre Douplik[1,2]; [1]*Physics, Toronto Metropolitan Univ., Canada;* [2]*Inst. of Biomedical Engineering, Science and Technology (iBest), Keenan Research Centre of the LKS Knowledge Inst., St. Michael's Hospital, Canada;* [3]*Engineering, Toronto Metropolitan Univ., Canada.* This research explores effects of arterial occlusion protocols on muscle oxygenation, comparing two pressures (150 vs 200 mmHg) and cuff positions (wrist vs upper arm). Cuff position differences were statistically significant; pressure comparisons were not.

W4A.13
Influence of Arterial Occlusion at Various Cuff Pressures on Systemic Circulation Measured by RPPG, Leah DeVos[1], Vanja Dvekar[1], Gennadi Saiko[1], Alexandre Douplik[1,2]; [1]*Toronto Metropolitan Univ., Canada;* [2]*iBest, Keenan Research Centre of the LKS Knowledge Inst., St. Michael's Hospital, Canada.* This study uses remote photoplethysmography (rPPG) to investigate systemic physiological responses to occlusion and reperfusion at different pressure cuff positions. We aim to characterize hemodynamic disturbances from varying occlusion positions by analyzing skin microcirculation during occlusion.

W4A.14
Analysis of Atomic Spectral Lines in Metal Archaeological Artifacts From the Peruvian Salinar and Virú Cultures Through Laser-Induced Plasma Spectroscopy, Miguel A. Valverde Alva[1], Jhenry Fidel Agreda Delgado[1], Claver W. Aldama Reyna[1], Will B. Villegas Bueno[1]; [1]*Universidad Nacional de Trujillo, Peru.* Pulsed laser-induced plasma spectroscopy examined metal artifacts from the Salinar and Virú cultures on the Peruvian coast. Salinar artifacts contained copper, silver, and gold, while Virú artifacts contained copper, as confirmed by elemental composition analysis.

W4A.15
Characterization of the Absorption Band of a Cationic Polymer, Pedro M. Velasco-Bolom[1], Carlos A. Megchum Ruedas[1], Marcoantonio Ramírez-Morales[1], Jorge L. Camas Anzueto[1], Nancy A. Martínez-López[2]; [1]*Departamento de Posgrado, Grupo de Optomecatrónica, Tecnológico Nacional de México / I. T. de Tuxtla Gutiérrez, Mexico;* [2]*Departamento de Ingeniería Química y Bioquímica, Tecnológico Nacional de México/I. T. de*

Tuxtla Gutiérrez, Mexico. The absorbance characterization of a cationic polymer is presented, using it as a polymer matrix as a base for the assembly, showing a greater absorption band modifying the concentration of the diluted polymer.

W4A.16
Characterizing Breast Tissue Samples With Integrated Imaging, Alexandre Douplik[1], Shahram Moradi[1,3], Alexander D'Ippolito[2], Kate Dingle[2], Marius Michel[1,4], Alexandra Easson[1]; [1]*Department of Physics, Toronto Metropolitan Univ., Canada;* [2]*Dept of Engineering, Toronto Metrolpolitan Univ., Canada;* [3]*Keenan Research iBest, Center of the LKS Knowledge Inst.,, St. Michael's Hospital, Canada;* [4]*Univ. Health Network, Canada.* A method was developed to distinguish cancerous from non-cancerous breast tissue using white and UV light imaging, analyzing fluorescence intensity. Pathologist-marked images confirmed accuracy, optimizing tissue thickness for transmission mode analysis.

W4A.17
Superficial Modification of Optical Sensors to Improve Refractometric Response, Erika Rodriguez-Sevilla[1], Karla I. Serrano Arevalo[2,1], Monserrat Alonso Murias[1], David Monzon Hernández[1], Héctor Pérez Aguilar[2]; [1]*Centro de Investigaciones en Óptica, Mexico;* [2]*Facultad de Ciencias Físico Matemáticas, Universidad Michoacana de San Nicolás de Hidalgo, Mexico.* In this study, we present a simple approach to enhance the refractive index response of a multi-modal interferometric device using graphene oxide and gold nanorods as sensitive nanomaterials in a hetero-core structure.

W4A.18
Identification of Structured Optical Fibers With Adequate Sensitivity and Range for Displacement Sensors in Structural Health Monitoring Applications, Luis E. Guillen Ruiz[1], Jorge L. Camas-Anzueto[1], Gilberto Anzueto Sanchez[2], Joel Gomez Perez[1]; [1]*Instituto Tecnológico de Tuxtla Gutiérre, Mexico;* [2]*Láseres y fibras ópticas, Centro de Investigación en Óptica, Mexico.* A displacement sensor with a centimeter resolution based on structured optical fibers is presented. A toroid-shaped transducer achieved ranges more significant than 15 cm with sensitivities of up to 103.3 nW/cm.

W4A.19
Development and Experimental Analysis of a Metal-Filled Side-Hole Photonic Crystal Fiber-Based WGM Temperature Sensor, Erick Reyes Vera[1], Hernan M. Hernandez[2], Esteban Gonzalez Valencia[1], Sebastian Valencia[1], Pedro Torres[2]; [1]*Instituto Tecnologico Metropolitano, Colombia;* [2]*Universidad Nacional de Colombia, Colombia.* The development and experimental analysis of a WGM temperature sensor using a Bismuth-filled side-hole PCF microresonator is reported. The sensor exhibits a sensitivity of 17.14 pm/°C, maintaining a nearly constant Q-factor from 25°C to 61°C.

W4A.20
Potential of Bloch Surface Wave Sensors for Refractive Index Sensing, Esteban Gonzalez Valencia[1], Erick Reyes Vera[1], Yeraldin A. Velez Galvis[1], Pedro Torres[2]; [1]*Instituto tecnologico metropolitano, Colombia;* [2]*Universidad Nacional de Colombia, Colombia.* This work reviews recent progress and developments of fiber optic configurations for exciting Bloch surface waves (BSWs), which represent the most advanced and developed refractive index sensing technology.

W4A.21
Synthesis of NaYF4:Yb,Tm /PEG -Conversion Nanoparticles Modified with Fullerene Photosensitizer for Photodynamic Therapy, Gazy K. Albedry[1], Abubakr A. Siddig[1], Abrar Altayeb[1], Sundus Osman[2]; [1]*laser physics department, AL-Neelain Univ., Sudan;* [2]*Medical Physics, ALNeelain*

Univ., Sudan. We synthesized one-step NaYF4:Yb,Tm/PEG nanoparticles with two antistoke emission bands at 450 and 360 nm using an infrared diode laser of wavelength 980 nm for photodynamic therapy .

W4A.22
Application of Structured Light Projection for the Digital Reconstruction With Color Texture of Archaeological Objects, Alejandro Montoya[1], Miguel Asmad[1], Heyner Vilchez[1]; [1]*Science, Pontifical Catholic Univ. of Pery, Peru.* This work proposes opto-digital techniques for the digital reconstruction with color texture of 3-D objects. The techniques are applied to a small sarcophagus from the Chachapoyas culture, achieving very similar digital and color reconstructions.

W4A.23
Design and Implementation of an Integrative Sphere Spectrophotometer Prototype , Angelica Hernandez[1], Eduardo Montes Ramirez[1], Teodoro Cordova Fraga[1], Rafael Guzman[2]; [1]*Division of Sciences and Engineering, Univ. of Guanajuato Campus León, Mexico;* [2]*Engineering Division, Univ. of Guanajuato Irapuato-Salamanca Campus, Mexico.* The research focuses on designing a portable spectrophotometer using an integrating sphere, 3D printed with PLA and coated with high reflectance paint. The AS7265 Triad module detects spectra, proving comparable to commercial equipment.

W4A.24
Towards Coherent Control of Charge Carriers in Back Gated Graphene, Braulio Antonio[1], Jean-Michel Nunzi[1]; [1]*Queen's Univ., Canada.* In this work we show a mechanism to achieve coherent control of optically injected current in gated single layer graphene, using a two-colored optical field at ω and 2ω (808 nm and 404 nm).

W4A.25
Fusing Computed Tomography Image Spectrometry and Convolutional Neural Networks for Biological Tissue Classification, Grecia B. Magdaleno Martinez[1], Freddy J. Narea[2], Jorge Castro Ramos[3]; [1]*Ciencias y Tecnologías Biomédicas, INAOE, Mexico;* [2]*Facultad de Ciencias de la Electrónica, BUAP, Mexico;* [3]*Óptica, INAOE, Mexico.* A computed tomography imaging spectrometer (CTIS) was used to distinguish between biological tissues of animal and human origin, following a compressed learning framework with a convolutional neural network (CNN) architecture, directly on raw CTIS images.

W4A.26
Withdrawn.

W4A.27
Topography and Thickness of a Contact Lens Using the Point Projection Method, Irán Robles Gutiérrez[1], Rufino Diaz-Uribe[1]; [1]*Universidad Nacional Autónoma de México, Mexico.* The topography of both surfaces and the thickness map of a rigid contact lens measured by the point projection method is presented. For this, a direct triangulation method and exact ray tracing are used.

W4A.28
Withdrawn.

W4A.29
Nonlinear Optical Response of Perfluorinated Antimony Phthalocyanine $F_{16}PcSbCl$, Yolanda E. Bravo-García[1], Edmundo Reynoso Lara[1], Adalberto Alejo-Molina[1], José A. Dávila-Pintle[1], Gustavo Mendoza-

Torres[1], Gabriela Méndez-Muñoz[2], Marcela M. Mendez-Otero[2], Diego H. Cuate-Gomez[3]; [1]*Facultad de Ciencias de la Electrónica, Benemérita Universidad Autónoma de Puebl, Mexico;* [2]*Facultad de Ciencias Físico-Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico;* [3]*Energías Renovables, Instituto Tecnológico Superior Progreso, Mexico.*

A set of six samples of Perfluorinated Antimony Phthalocyanine ($F_{16}PcSbCl$) were prepared from a base solution of 10mg of $F_{16}PcSbCl$ diluted in 100ml of methanol. Z-scan experiments were made with a HeNe laser, with different powers. Samples exhibit absorption and a negative nonlinear optical behavior.

W4A.30
Practical Quantum Position Verification Schemes, George Cowperthwaite[1], Adrian Kent[1], Damián Pitalúa García[1]; [1]*Univ. of Cambridge, UK.* We discuss quantum position verification schemes, practical with current technology, based on the standard quantum cryptographic assumption that a tagging device can keep classical data secure. We describe how a proof-of-principle demonstration might be performed.

W4A.31
Comparison of two Fixation Methods in Automated Pollen Classification on Whole Slide Images, Blaz Cugmas[1,2], Eva Štruc[1], Mindaugas Tamosiunas[2], Laura Goldberga[2], Inese Berzina[2,3], Roberts Kadikis[4], Maksims Ivanovs[4], Swarn S. Warshaneyan[4], Peter Naglič[5]; [1]*Vetamplify SIA, Latvia;* [2]*Univ. of Latvia, Latvia;* [3]*VetCyto SIA, Latvia;* [4]*Inst. of Electronics and Computer Science, Latvia;* [5]*Univ. of Ljubljana, Slovenia.* We compared automated MobileNet V3 Large-based pollen classification accuracy on whole slide images. Pollen fixation to microscope slides with silicone achieved higher median accuracy (78.7%) than the standard adhesive tape-based fixation (68.9%).

W4A.32
Initial Conditions Retrieving Through Fourier Analysis in a Rotating Retarder Stokes Polarimeter, luis a. herrera[1], Oscar Rodríguez-Cortés[2], Azael Mora-Nuñez[3], Juan Hernández-Rodríguez[1], Geminiano Martinez-Ponce[2], Beethoven Bravo-Medina[1], HECTOR SANTIAGO-HERNANDEZ[1], Anuar Beltran-Gonzalez[1]; [1]*epartamento de Ingeniería Electro-Fotónica, Universidad de Guadalajara, Mexico;* [2]*Centro de Investigaciones en Óptica, A. C., Mexico;* [3]*epartamento de Ingeniería Electro-Fotónica, Univercidad de Guadalajara, Mexico.* A Fourier analysis-based method to determine the arbitrary initial orientation angles of anisotropic optical elements comprised in a Stokes polarimeter is presented. Using these data, the four Stokes parameters of incident polarized light are retrieved.

W4A.33
Classification of Rugosity in Plasmonic Metallic Thin Films Using Deep Learning for Speckle Images, Christopher N. Magaña Barocio[2], Marlen Gonzalez[2], Mary Carmen M. Peña-Gomar[2], Miguel Torres-Cisneros[1], Alejandro E. Rodriguez-Sanchez[3]; [1]*Universidad de Guanajuato, Mexico;* [2]*Facultad de Ciencias Físico Matematicas, Universidad Michoacana, Mexico;* [3]*Ingeniería, Universidad Panamericana, Mexico.* We report the classification of metallic samples with different roughness values. We obtain speckle images of the samples. They were processed and used as inputting neural networks such as ResNet50 and EfficientNet. We obtained 99.63 % accuracy in classifying the samples with the ResNet50 model and 99.48 % accuracy for the EfficientNet model.