Program & Abstracts
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Andres Cantarero, Molecular Science Institute, University of Valencia, Spain
Zhiming Wang, Institute of Fundamental and Frontier Sciences, UESTC, China
Novel Photonic Devices

Invited Speakers:

- **Juliano Borges**, Universidade Federal do Rio de Janeiro, UFRJ, Brazil
  Fractional Erbium laser in the treatment of photoaging: randomized comparative, clinical and histopathological study of ablative (2940nm) vs. non-ablative (1540nm) methods after 3 months

- **Muriel Botey**, Universitat Politècnica de Catalunya, Spain
  PT-symmetry photonic nanostructure for light concentration

- **Massimiliano Guarneri**, FSN-TECF/IS-DIM ENEA C.R. Frascati, Italy
  Multiple Combined Amplitude Modulated Lasers for the generation of 3D Hyperphotos for terrestrial, underwater and nuclear environments

- **Clarissa L. M. Hofmann**, Fraunhofer Institute for Solar Energy Systems ISE, Germany
  Bragg stacks for enhanced upconversion: theoretical optimization and experimental characterization of photonic effects

- **Miguel Holgado**, Universidad Politécnica de Madrid, Spain
  Advanced photonics transducers and readout platforms for label-free biosensing: Applications to Point of Care devices

- **Zhefeng Hu**, University of Electronic Science and Technology of China, China
  All optical tunable delay line and its applications

- **Enrique Maciá-Barber**, Universidad Complutense de Madrid, Spain
  Photon management via spectral sharpening in quasiperiodically designed nanophotonic devices

- **Andres Marquez**, Universidad de Alicante, Spain
  Application of PA-LCoS Modulators in Multilevel Phase Elements and in Holographic Data Storage

- **Kohki Mukai**, Yokohama National University, Japan
  Formation of Superlattice of Colloidal Quantum Dots for Solar Cell Application

- **Francesco Pedaci**, CBS, CNRS, France
  Optical angular manipulation for applications in biophysics

- **Mirbek Turdnev**, TED University, Turkey
  Focusing of light waves under diffraction limit via photonic crystal structures: Ordered and disordered inhomogeneous photonic media

- **Xiangru Wang**, University of Electronic Science and Technology of China, China
  Some of our recent improvement on non-mechanical optical beam steering using liquid crystal spatial light modulator

- **Shin-ichi Zaitsu**, Kyushu University, Japan
  Molecular optical modulation of a continuous-wave laser based on an intracavity phase-matched process
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<td>B18: Multiple Combined Amplitude Modulated Lasers for the generation of 3D Hyperphotos for terrestrial, underwater and nuclear environments</td>
<td>Massimiliano Guarneri FSN-TECFIS-DIM ENEA C.R. Frascati, Italy</td>
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<td>Juliano Borges Universidade Federal do Rio de Janeiro, UFRJ, Brazil</td>
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<td>Francesco Pedaci CBS, CNRS, France</td>
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<td>Shin-ichi Zaitsu Kyushu University, Japan</td>
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B17: Application of PA-LCoS Modulators in Multilevel Phase Elements and in Holographic Data Storage

F. J. Martínez, A. Márquez, S. Gallego, R. Fernández, S. Fenoll, M. Ortuño, C. Neipp, M. L. Álvarez, I. Pascual, A. Beléndez

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Parallel-aligned liquid crystal on silicon (PA-LCoS) microdisplays are used as spatial light modulators (SLM) in many optics and photonics applications, such as optical interconnections, diffractive optics, holographic data storage (HDS) or in optical metrology, since they can provide phase-only operation without amplitude coupling [1]. In a first approximation, they can be modeled as linear variable retarders even though they exhibit some artifacts, such as time flicker and cross-talk between neighbouring pixels, which produce deviations in their performance in high-end photonics applications. Recently, we demonstrated a novel characterization method based on time-average Stokes polarimetry [2], able to provide robust and precise measurement of the linear retardance value even in the presence of flicker.

The ability of the time-average Stokes polarimetric technique [2], to measure the linear retardance and its flicker amplitude eases the capability to simulate the performance of spatially varying phase multilevel [3] elements typically addressed onto PA-LCoS devices, being the blazed gratings a widespread example used in optical interconnections. It also helps to simulate the actual transmittance characteristics of modulation regimes, such as the appealing hybrid-ternary modulation (HTM), proposed in HDS [4] to display the data pages since they diminish the hot spot of the Fourier transform DC-term saturating the dynamic range of the recording material. Within this context, recently we demonstrated [3] the capability of the calibration provided by the average Stokes polarimetric technique to predict the performance of blazed gratings, both their average diffraction efficiency, static analysis, and its associated time fluctuation, dynamic analysis. Alternatively, we have also shown the validity of the simulated results in HDS when addressing hybrid-ternary modulated (HTM) data pages and using our in-house produced PVA/AA photopolymer as the storage material [5].

In the present work we take advantage of the demonstrated predictive capability of our approach to analyse the wide range of applicability of PA-LCoS devices in various applications in spite of flicker. In particular, we show blazed gratings with a 2π radians phase depth, with different spatial periodicities and with a different number of quantization levels. Specifically we apply one pixel per level, so that an N-levels blazed grating has an N-pixels period. Both the static performance and the dynamic variation of the diffraction efficiencies are analyzed. Furthermore we show that PA-LCoS devices used in HDS cannot implement pure HTM but a rather close approximation. Experimental results with polyvinil alcohol/acrylamide (PVA/AA) materials show bit-error rates (BER) in the range of the threshold for potential application in HDS (~ 10⁻³), which is a promising result.
Acknowledgment. Work supported by the Ministerio de Trabajo y Competitividad of Spain (projects FIS2014-56100-C2-1-P and FIS2015-66570-P) and by the Generalitat Valenciana of Spain (projects PROMETEOII/2015/015 and ISIC/2012/013) and by the University of Alicante (GRE12-14).