

Electro-Optics and Photonics Seminar

Friday September 13, 2019, 3 p.m., FH 568

Coherent methods for synthesis of diffractive optical elements, 3D
imaging and monitoring of processes

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The talk presents recent research activities conducted at the Institute of Optical Materials and Technologies to the Bulgarian Academy of Sciences (IOMT-BAS) in the field of synthesis of diffractive optical elements, coherent optical metrology and holographic 3D imaging. The talk begins with analysis of the optical behavior of a sinusoidal phase grating as a projection element in coherent 3D capture with structured light. Quality of the sinusoidal fringe pattern produced by an analog grating and a grating synthesized with a phase spatial light modulator (SLM) is analyzed. Activities dedicated to 3D holographic imaging includes art holography with recording of still white light viewable holograms for museum exhibitions on a silver-halide emulsion produced by IOMT-BAS and computational holography with focus on 3D contents generation for holographic displays. Important issues that comprise encoding of 3D information for holographic imaging starting from conversion of optically captured holographic data to the display data format are discussed. Recent collaboration with the Digital holography team at Korea Electronics Technology Institute in the field of holographic printers and more specifically in the development of a wave-front printer is also presented. Finally, dynamic speckle metrology and its application to determination of the speed of ongoing processes are discussed through pointwise processing of a temporal sequence of correlated speckle patterns formed on the diffusely reflecting surface of a 3D object under laser illumination.

Brief Biography

Elena Stoykova received her Ph.D. in wave optics in 1988 and her DSc in 2011. After her Ph.D., she was a research associate and a senior scientist in the Institute of Electronics at the Bulgarian Academy of Sciences. In 2002, she joined as a head of Holography and Optical Metrology department the Central Laboratory on Optical Storage and Processing of Information to BAS, which was transformed in 2010 into the Institute of Optical Materials and Technologies. Currently, Dr. Stoykova is a full Professor and acts as a scientific secretary of this Institute. Dr. Stoykova worked as a visiting scientist in DLR, Germany; University of Paris North, France; Tampere University of Technology, Finland; University of Ghent, Belgium; Tokyo University of Science, Japan; and Bilkent University, Turkey. In 2011-2017, she was a visiting scientist in the Korea Electronics and Technology Institute, Seoul, South Korea. She is currently visiting the University of Dayton as a Fulbright scholar. Dr. Stoykova's research interests are in optical metrology, digital holography and digital signal processing. She has more than 220 publications including over 75 journal papers and 4 book chapters.