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What is Digital Holographic Microscopy? State of the Art and Applications

Quantitative Phase Imaging (QPI) techniques provide quantitative information about the refractive index variations and thickness of samples, which is not accessible with conventional intensity-based imaging systems. Among the different QPI methods, Digital Holographic Microscopy (DHM) stands out for its high resolution, sensitivity, wide field of view and fast acquisition rate. This talk provides an overview of the basic principles of DHM systems, including a description of the optical designs and the different reconstruction strategies to reconstruct quantitative phase images with high accuracy. hardware and software information. To finish, we will revise the applicability of DHM systems to different applications, including biological and biomedical research studies, characterization of materials, and oceanography sciences.

Short bio:

Ana Doblas received her BS, Ms., and Ph.D. degrees in Physics from the Universitat de València, Spain, in 2010, 2011, and 2015, respectively. After she finished her PhD work, she joined the Optical Coherence Imaging Laboratory under the supervision of Dr A. Oldenburg (Department of Physics and Astronomy, University of North Carolina in Chapel Hill, U.S.A.), where she did her 1-year Postdoc. From 2016 to the summer of 2023, she was in the Department of Electrical and Computer Engineering at the University of Memphis (Memphis, Tennessee, U.S.A.). From 2016 to 2018, she was the Research Assistant Professor at the Computational Imaging Research Laboratory (CIRL). In 2019, she became an Assistant Professor and principal investigator of the Optical Imaging Research Laboratory (OIRL). In 2021, she received the NSF CAREER award for her project titled “Three-dimensional super-resolution light microscopy of thick, unprocessed biological samples.” Since Fall 2023, she has joined UMass Dartmouth, becoming the newest faculty member of the Electrical & Computer Engineering department. Her current research interests are focused on optical engineering, computational optics, and three-dimensional imaging. Her final goal is to advance the fundamental science and engineering in imaging and photonics instrumentation for biological and biomedical applications, transitioning research outcomes to commercial products and systems. Since 2012, she has co-author of 46 peer-reviewed scientific journals, her work has been presented at over eighty-five international conferences, and she is co-inventor of three US patents.