Metasurfaces as a versatile platform to generate and control vectorial light beams

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Metasurfaces are ultra-thin metamaterials composed by artificial planar meta-atoms arranged in some specific macroscopic orders, which exhibit extraordinary capabilities to control electromagnetic waves [1]. Recently, much attention has been devoted to employing carefully designed metasurfaces to generate and control vectorial light beams, which exhibit not only non-trivial wavefronts but also freely tailored polarization distributions [2]. In this talk, I will present several recent examples of such studies. I will first describe how to design metadevices exhibiting (in principle) *infinite* wave-control functionalities based on coherent wave interferences [3], and then demonstrate an efficient meta-platform to generate vectorial holograms with arbitrarily designed wave-fronts and polarization distributions [4].

[1] Shulin Sun, *et. al.*, ***Nature Materials*** **11**, 426 (2012)
[2] Dongyi Wang, *et. al.*, ***Light: Science & Applications*** **10**, 67 (2021)
[3] Yuejiao Zhou, *et. al.*, ***Advanced Photonics***, submitted
[4] Tong Liu, *et. al.*, Manuscript in preparation

Short Bio:

Zhou, Lei received his PhD in Physics from Fudan University, Shanghai, China, in 1997. He then went to Institute for Material Research in Tohoku University (Sendai, Japan) for postdoctoral research. In 2000 - 2004, he was a visiting scholar in Physics Department of the Hong Kong University of Science and Technology. He joined Physics Department of Fudan University in 2004, became a “Xi-De" Chair Professor since 2013, served as Chair of Physics Department in 2020-2024, and is now vice president of Fudan University. He got the NSFC "Grant for Outstanding Young Scientist" in 2007 and was entitled "Chang Jiang Scholars Program" Chair Professor in 2009. He was elected as an OSA Fellow in 2019. He is a funding co-editor-in-chief of *Photonics Insights*, a managing editor of *Nanophotonics*.