

**ΣΕΜΙΝΑΡΙΑ
ΦΥΣΙΚΗΣ ΣΥΜΠΥΚΝΩΜΕΝΗΣ ΥΛΗΣ**

Παρασκευή 5-4-2019 16:00

Αίθουσα Σεμιναρίων Τομέα Φυσικής Στερεάς Κατάστασης, Πανεπιστημιούπολη, Ζωγράφου

«Wavefront and Dispersion Control with Functional Electromagnetic Metasurfaces»

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Metasurfaces are ultra-thin, two dimensional versions of metamaterials. In this talk, I will cover the possibilities offered by electromagnetic metasurfaces for performing elaborate functions which up to now have been realized with bulky, three-dimensional structures such as lenses, gratings, optical cavities and delay lines. Such advanced functionalities are made possible by *spatially* and *spectrally* tailoring the phase discontinuity imposed by the metasurface on the impinging wave. In the first part of the talk I will focus on metasurfaces for reconfigurable wavefront manipulation. I will show two examples: all-dielectric metasurfaces made of dielectric particles supporting toroidal- and magnetic-dipole Mie resonances [1], and metallic patch metasurfaces with integrated tunable elements offering complete local control over the complex surface impedance [2]. In the second part, I will discuss multi-resonant metasurfaces for dispersion control with an emphasis on broadband time delay [3]. The proposed metasurfaces are of deeply subwavelength thickness, thus exhibiting significant technological advantages over conventional diffractive and dispersive optical elements, respectively.

[1] O. Tsilipakos, A. C. Tasolamprou, Th. Koschny, M. Kafesaki, E. N. Economou and C. M. Soukoulis, “Pairing toroidal and magnetic dipole resonances in elliptic dielectric rod metasurfaces for reconfigurable wavefront manipulation in reflection,” *Adv. Opt. Mater.* 6, 1800633, 2018. <https://doi.org/10.1002/adom.201800633>

[2] O. Tsilipakos, F. Liu, A. Ptilakis, A. C. Tasolamprou, D.-H. Kwon, M. S. Mirmoosa, N. V. Kantartzis, E. N. Economou, M. Kafesaki, C. M. Soukoulis, S. A. Tretyakov, “Tunable Perfect Anomalous Reflection in Metasurfaces with Capacitive Lumped Elements,” in *Proceedings Metamaterials 2018*, pp. 392-394, 2018, <https://doi.org/10.1109/MetaMaterials.2018.8534083>

[3] O. Tsilipakos, T. Koschny, C. M. Soukoulis, “Antimatched Electromagnetic Metasurfaces for Broadband Arbitrary Phase Manipulation in Reflection,” *ACS Photonics* 5(3), pp. 1101-1107, 2018. <https://pubs.acs.org/doi/abs/10.1021/acsp Photonics.7b01415>