ΠΡΟΣ

1) Όλα τα μέλη ΔΕΠ του Τμήματος Επιστήμης και Τεχνολογίας Υλικών

2) Τους εκπροσώπους των Μεταπτυχιακών φοιτητών του Τ.Ε.Τ.Υ.

3) Την Επταμελή Εξεταστική Επιτροπή

4) Όλα τα μέλη της Πανεπιστημιακής Κοινότητας

Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής Διατριβής του κ. Di Battista Diego

(Σύμφωνα με το άρθρο 12 του Ν. 2083/92)

Την Πέμπτη 15 Δεκεμβρίου 2016 και ώρα 10:00

στην αίθουσα 1 στο Ίδρυμα Τεχνολογίας Έρευνας, Ηράκλειο Κρήτης

θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής Διατριβής του υποψήφιου διδάκτορα του Τμήματος Επιστήμης και Τεχνολογίας Υλικών

κ. Di Battista Diego με θέμα:

«Ad Hoc Control of Scattering for Adaptive Opaque Lenses»

ABSTRACT

Microscopy and optical imaging are drastically limited by the inhomogeneities encountered by the light while propagating from the object of interest to the detection plane.[1] In this context, adaptive optics and wavefront manipulation are able to improve the contrast (visibility) of systems embedded in turbid environments. By wavefront shaping, the light fluence propagating through complex systems can be fully controlled, thus, confining the light in a defined microscopic region in the volume or at the back of scattering structures and counterintuitively turning optical barriers into scattering lenses.[2,3]

We demonstrate “opaque lenses” to be configurable stand-alone optical devices. We show that properly filtering the scattered light we can scale down the focusing resolution[4] and/or obtain numerous novel optical features such as non-diffractive amorphous speckles and Bessel-like beams.[5] Our results have potential for enhancing the penetration depth in microscopy and the imaging resolution of thick samples.

Thence, we have foreseen the operation of opaque lenses in optical circuits, to this aim we designed micro-fabricated scattering systems that are proved to be unreproducible and robust, hence resulting suitable for authentication control operations.[6] Moreover, fashioning the geometry of the single scatterers via laser ablation we can engineer the process of multiple scattering in order to produce tailored structured illuminations and tunable super-thin light sheets usable for selective plane illumination microscopy.[7] Ultimately, we present a lab-on-a-chip: a programmable platform that can support and inspect large biological systems of interest in a controlled environment.

1. V. Ntziachristos, *Nature methods* **7** (8), 603-614, 2010.

2. Mosk, A. Lagendijk, G. Lerosey and M. Fink, *Nature photonics* **6** (5), 283-292, 2012.

3. I. Freund, *Physica A: Statistical Mechanics and its Applications* **168** (1), 49-65, 1990.

4. D. Di Battista, G. Zacharakis and M. Leonetti, *Scientific reports* **5,** 17406, 2015.

5. D. Di Battista, D. Ancora, M. Leonetti and G. Zacharakis, "Tailoring non-diffractive beams from amorphous light speckles," *Applied Physics Letters*, vol. 109, no. 12, p. 121110, 2016.

6. H. Zhang and S. Tzortzakis, *Applied Physics Letters*, **108** (21), 211107, 2016.

7. D. Di Battista, D. Ancora, H. Zhang, K. Lemonaki, E. Marakis, E. Liapis, S. Tzortzakis and G. Zacharakis, *Optica* **3** (11), 1237-1240, 2016.