

# METAMATERIALS' 2017

## PROGRAM Errata

### Monday, 28<sup>th</sup> August

#### 10:30 Mechanics I

12:15 – 12:30 – ~~Spatio-Temporal Phononic Crystals: Tunability, Gain and Non-Reciprocity~~ Withdrawn

12:15 – 12:30 – Broad acoustic bandgap switching in structured plates

- Younes Achaoui, Institut FEMTO-ST, Univ. Bourgogne Franche-Comté, France

*We report in this paper a broadband gap switching by harnessing resonance coupling between two perforated plates. We first recall and explain the mechanism of bandgap enlargement, which emanates from destructive interferences in one slotted plate. The trade-off between bandwidth and the shielding efficiency is highlighted. A particular attention is brought to the designed structured plates placed in cascade for broad bandgaps tunability purposes.*

#### 14:00 Thermal Radiation and Effects

14:45 – 15:00 – ~~Optimization-Based Design Of Thermal Metamaterials~~ Withdrawn

14:45 – 15:00 – Regularized Transformation Optics For Transient Heat Transfer

- Richard Craster, Imperial College London, UK
- Sebastien Guenneau, Institut Fresnel, France
- Harsha Hutridurga, Imperial College London, UK
- Greg Pavliotis, Imperial College London, UK

*We report on certain cloaking strategies for transient heat transfer. Regularized Kohn's transform is employed to design cylindrical cloaks and to prove a near-cloak result. Our main result says that, after the lapse of a certain threshold time, the temperature field outside the cylindrical cloak is close to that of the uniformly conducting medium irrespective of the conductivity enclosed in the cloaked region.*

#### 16:00 Topological effects and light spin

17:15 – 17:30 – ~~Coupled Mode Theory for Interaction between a Nanoantenna Array and Orbital Angular Momentum Light~~ Withdrawn

17:15 – 17:45 – Exploiting Topological Singularities of Vortex Fields for Shaping and Rotating the Radiation Pattern of Patch Antennas

Extended oral

- Mirko Barbuto, "Niccolò Cusano" University, Italy
- Mohammad-Ali Miri, University of Texas at Austin, Department of Electrical and Computer Engineering, USA
- Andrea Alù, University of Texas at Austin, Department of Electrical and Computer Engineering, USA
- Filiberto Bilotti, "Roma Tre" University, Department of Engineering, Italy
- Alessandro Toscano, "Roma Tre" University, Department of Engineering, Italy

*In this contribution, we explore the generation and manipulation of topological singularities of vortex fields in order to shape and rotate the radiation pattern of patch antennas. We first extend at microwaves a result already obtained at optical frequencies for which, by superimposing a constant background on a vortex field, one can modify at will the position of its phase singularity. Then, we demonstrate how this phenomenon can be exploited to design a patch antenna with a desired radiation pattern with topologically robust properties.*

### Tuesday, 29<sup>th</sup> August

#### 14:00 Special Session on Hydrodynamic Metamaterials for Maritime Engineering

14:45 – 15:00 – ~~Removable Tsunami Wall Composed of Acoustic Eaton Lens Array~~ Withdrawn

14:30 – 15:00 – Experimental measurements of perfect absorption on surface water waves

Extended oral

- Eduardo Monsalve, ESPCI Paris, France
- A. Maurel, Institut Langevin, France
- V. Pagneux, Laboratoire d'Acoustique de l'Université du Maine LAUM, France
- P. Petitjeans, Physique et Mécanique des Milieux Hétérogènes PMMH, France

*We present experimental measurements of perfect wave absorption on surface gravity-capillary waves. The equilibrium between friction losses and coupled resonance yields the reflection coefficient zero. As a simple resonator, among other possibilities, the trapped modes produced by a non-symmetrical cylinder are used to generate absorption.*

Wednesday, 30<sup>th</sup> August

**10:30 Quantum Plasmonics and Superconducting Metamaterials**

11:30 – 11:45 – ~~Towards Ultrastrong Plexcitonic Coupling by Dynamical Molecular Aggregation~~ Withdrawn

11:30 – 11:45 – Random Lasing Emission And Active Control Of DCM-Doped PMMA Random Lasers

- Bhupesh Kumar, Department of Physics, The Jack and Pearl Resnick Institute for Advanced Technology, Bar-Ilan University, Israel
- Yossi Abulafia, Department of Physics, The Jack and Pearl Resnick Institute for Advanced Technology, Bar-Ilan University, Israel
- Mélanie Lebental, Laboratoire de Photonique Quantique et Moleculaire, ENS Cachan, France
- Patrick Sebbah, Department of Physics, The Jack and Pearl Resnick Institute for Advanced Technology, Bar-Ilan University; Institut Langevin, ESPCI ParisTech, Israel and France

*Random lasing is reported in solid state PMMA-DCM doped 1D organic microstructure with randomly distributed grooves along the length of polymer strip. Role of disorder which is provide by randomly distributed 100 nm grooves along the length of polymer strip is shown by the variation in emission spectra of random laser with local pump position.*

12:15 – 12:30 – ~~Optical Response Of Niobium Around The Superconducting Transition Temperature~~ Withdrawn

12:00 – 12:30 – Quantum optics of zero-index media

Extended oral

- Iñigo Liberal, Public University of Navarre, Spain
- Nader Engheta, University of Pennsylvania, United States

*During recent years zero-index media have offered unique tools for the control and manipulation of electromagnetic waves. However, similar concepts and techniques could be transplanted and utilized in the manipulation of quantized fields. As a specific example, we demonstrate theoretically that supercoupling phenomena in a N-port epsilon-and-mu-near-zero (EMNZ) hub can be utilized in the generation of subradiant, maximally entangled, multi-qubit states.*

Thursday, 31<sup>th</sup> August

**10:30 Special Session on Seismic Metamaterials**

10:30 – 10:45 – ~~Efficient Filtering of seismic waves with seismic metamaterial composed by sub-wavelength local resonator~~ Withdrawn

10:30 – 10:45 – Experimental Structured Soils and Seismic Surface Waves

- S. Brulé, Ménard, Soil Dynamics Lab., Chaponost, France
- S. Enoch, Aix-Marseille Université, CNRS, Centrale Marseille, France
- S. Guenneau, Aix-Marseille Université, CNRS, Centrale Marseille, France

*Structured soils and, among them, seismic metamaterials, have experimentally shown their ability to interact with seismic surface waves. In elastodynamics, seismic metamaterials have emerged in the last decade for soft soils structured at the meter scale, and have been tested thanks to full-scale experiments carried out on holey soils in 2012.*

**10:30 Quantum and Extreme Metamaterials**

11:30 – 11:45 – ~~Topological Casimir force phase transitions in the graphene family~~ Withdrawn

11:00 – 11:30 – Enhanced spontaneous emission and nonlinear frequency conversion at exceptional points of inverse-designed photonic crystals

Extended oral

- Zin Lin, Harvard University, USA
- Adi Pick, Harvard University, USA
- Weiliang Jin, Princeton, USA
- Alejandro Rodriguez, Princeton, USA

*We describe and apply a powerful inverse-design method based on topology optimization to design complex photonic crystals supporting Dirac points formed out of the accidental degeneracy of modes used to realize EPs of arbitrary order as well as complex contours of EPs. We bound the possible enhancements and spectral modifications in the spontaneous emission rate of emitters in the vicinity of EPs in both linear and nonlinear media.*

11:30 – 11:45 – First-principles study of the Haldane model in artificial graphene

- Sylvain Lannebère, Instituto de Telecomunicações - Universidade de Coimbra, Portugal
- Mário Silveirinha, University of Lisbon – Instituto Superior Técnico, Portugal

*We present a first-principles study of the Haldane model in an "artificial graphene" platform formed by a two-dimensional electron gas modulated by an electrostatic potential with the honeycomb symmetry and by a static spatially-varying magnetic field. The relation between the tight-binding parameters and the actual physical parameters is found. The overall topological properties of the material are determined and compared to the Haldane's theory, and the consequences of a quantized Hall conductivity on the photonic topological properties are discussed.*