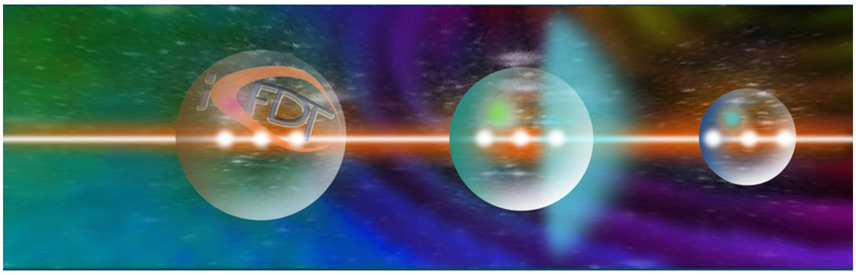

Contribution ID: **33** Type: **Talk**

METAMATERIAL DEVICES BASED ON NANO GAP HYBRID LC MICROCAVITIES

Thursday, 4 October 2018 09:45 (20 minutes)

METAMATERIAL DEVICES BASED ON NANO GAP HYBRID LC MICROCAVITIES

Metamaterials based on split-ring resonators have been the subject of intense research efforts in the last two decades. Initially conceived to manipulate the magnetic response of solids [1], metallic metasurfaces have found applications in sensing [2] as well as in flat optics [3] .Among other features, the metallic split ring resonators present a remarkable sub-wavelength 3D confinement of the electric field which has been exploited in a variety of applications including the ultra-strong light matter coupling regime but also to improve the performances of active Terahertz metamaterial devices .
Recently, we reported on experiments with a complementary superconducting niobium (Nb) cavity showing a fully switchable behavior as a function of the temperature with a quality factor Q=54 coupling at THz frequencies [4].
Weare now investigated another functionality of a THz metasurface integrating a nanodetector, consisting of a ultra small superconducting hot electron bolometer (HEB), into a narrow band subwavelength LC split ring resonator (SRR), realizing an active metamaterial device adding the detection capability of the incident input power coupled to metasurface. .In this work, we will report our latest achievements in the field of metamaterial based devices showing our results obtained with nanogap hybrid LC microcavities

1) J.B. Pendry et al "Negative refraction makes a perfect lens"Physical review letters 85-18 (3966-3969) 2000
2) G. Cerulo "Complmentary split-ring resonator antenna coupled quantum dot infrared photodetectors"Appl. Phys. Lett. 110 (2017)
3) N. Yu et al "Light propagation with phase discontinuities: generalized laws of reflection and refraction" Science 334, October 2011
4) G. Scalari et al. Appl. Phys. Lett. 105, 261104 (2014)

Summary

In this work we will report our latest achievements in the field of metamaterial-based devices: we will show our results obtained with nanogap hybrid LC microcavities.

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Session Classification: Satellite Meeting on Metameterials