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## **ABSTRACT BOOK**

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## **СБОРНИК ТЕЗИСОВ**

**5-ой Конференции с международным участием  
«Терагерцевое и микроволновое излучение:  
генерация, детектирование и приложения»  
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to the study and absolute measurement of quantum efficiencies of the analog superconducting terahertz HEB bolometers. Experimental approaches based on the SPDC generation scheme with a nonlinear crystal placed in the He cryostat together with HEB and a single-photon detector in the optical detection channel are analyzed.

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### **ELECTRICALLY-TUNABLE REFLECTARRAYS FOR MILLIMETER WAVES BASED ON LIQUID-CRYSTAL-LOADED HIGH-IMPEDANCE SURFACES**

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We present the results of experimental development of planar metamaterial structures operating in reflection in the range of 110-150 GHz and enabling spatially nonuniform electrical tuning of the reflection phase and amplitude. The devices have an optical diameter of 50-70 mm and are implemented as resonant high-impedance surfaces loaded with a thin liquid crystal (LC) layer. A unique nematic LC composition based on n-quaterphenyl and n-quinquiphenyl substances and distinguished by high optical anisotropy (0.39) and low dielectric losses (<0.002) at millimeter waves was developed for this work with the industrial implementation of the devices at the final stage. For 1D- and 2D-controlled meta-pixels of the reflectarrays we demonstrate two operation modes: 1) with phase tuning > 360 degrees, 2) with amplitude tuning > 30 dB. Possible applications of the developed devices as beam-steering/ beam-shaping antennas for 6G wireless communication systems, as well as spatial pattern generators in single-pixel subTHz imagers are discussed.

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### **EXCITATION OF FUNDAMENTAL PLASMON MODES IN GRAPHENE RECTANGLE DEPENDING ON FINITE WIDTH**

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Two-dimensional (2D) plasmons can be used in terahertz (THz) devices for localization and gain of electromagnetic field [1]. One of the most useful materials for realization of 2D gas is graphene [2], which characterized by high mobility [3] and the relaxation time of the momentum of charge carriers, reaching 2 ps at room temperature [4].

We consider plasmon excitation in graphene rectangle separating two half-spaces with different dielectric constants. We solved the electrodynamic problem of incidence of electromagnetic wave polarized along the OX