

Research areas:

Experimental radiospectroscopy of controllable metamaterials (photonic crystals, artificial media) included natural materials:

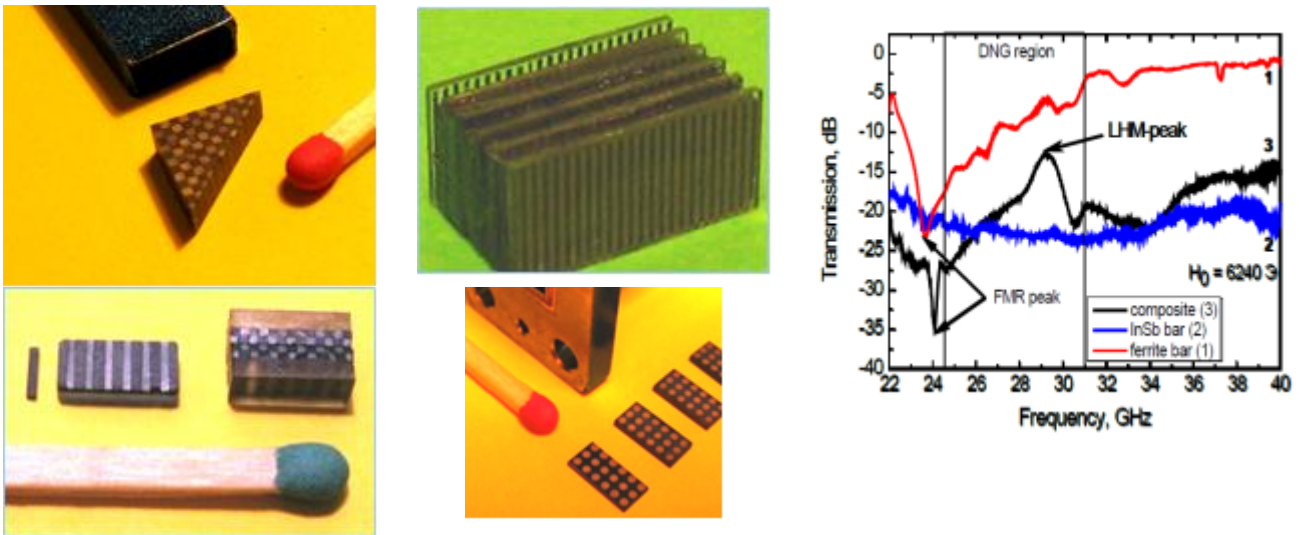
- Three-dimensional (3D) photonic crystals in the millimeter wave band, surface states. (Tamm States)
- Metamaterials, including left-handed media based on magnetic, semiconductor, dielectric and metal elements;
- Planar (2D) photonic crystals.

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Main results:

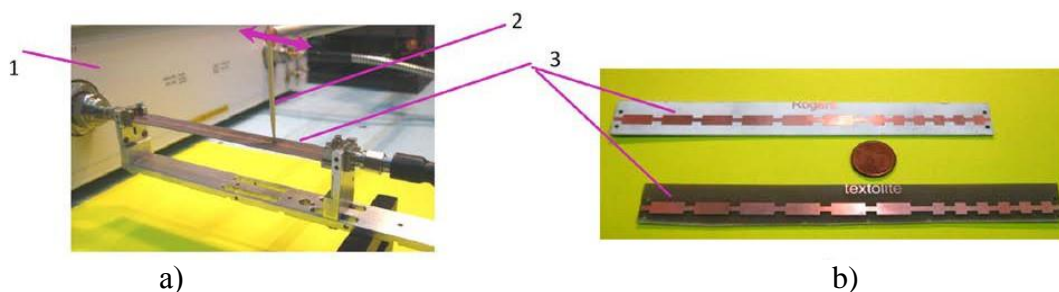
Left-handed “chess” metamaterial.

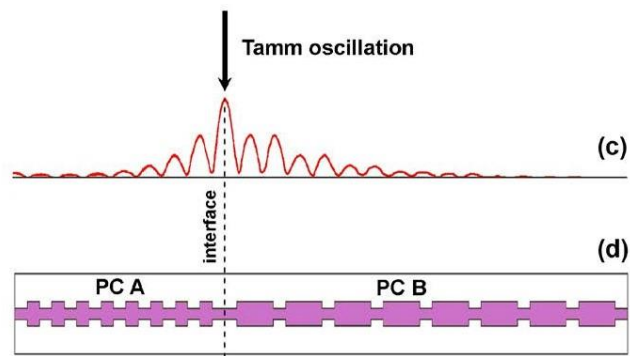
The left-handed properties of the metamaterial, controlled by external magnetic field and formed by ferroelectric and semiconductor (InSb) are revealed experimentally in the microwave band. The numerical simulation of related processes is carried out.



Tamm State in planar metamaterial:

The electrodynamic analogs of Tamm State as well as zone structure of spectra for planar photonic crystal have been revealed experimentally, numerically and analytically. The techniques to control the spectrum of planar photonic crystals are proposed.





Detailed description of the results presented are given in

References:

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6. D.P.Belozorov, A.A.Girich, S.I.Tarapov, “An Analog of Surface Tamm States in Periodic Structures on the Base of Microstrip Waveguides, *U.R.S.I. (Radio Science Bulletin)* **345**, pp.64-79 (2013).
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9. A.A. Girich, M.A. Miliaiev, S.V. Nedukh, A. Shuba, S.I. Tarapov, “A Planar Photonic Crystal-Based Resonance Cell for Ferromagnetic Resonance Spectrometer,” *Telecommunications and Radio Engineering* **73**(8), p.749-755 (2014)