

“Optoelectronics and photonics” Scientific-research laboratory

In 1974 the scientific-research laboratory “Optoelectronics” was established. In 2007 it renamed as “Optoelectronics and Photonics” laboratory

The main research interests are

- The study of laser-induced hydrodynamic motions in isotropic and anisotropic liquids by nanoparticles;
- Thermomechanical and electromechanical effects in liquid and solid nematics;
- Mechanical stability problems of modern optical elements; Creation and studies of new optical elements for light and, particularly, laser radiation steering;
- New linear optical phenomena induced by coherent and noncoherent radiations;
- Fresnel and Fraunhofer diffraction in 4-th generation optical elements;
- Electric, magnetic, light, acoustic, thermal and mechanical fields induced orientational effects;
- Small sized optoelectronic elements, laser radiation sources and controlling systems on liquid crystals with defect; Physics of photonic crystals.

New trends in our laboratory is to develop and introduce (innovate) the new and effective methods for creating tunable waveplates and devices based on nematic and cholesteric liquid crystals (NLC and CLC) and liquid crystalline polymers and elastomers (LCP and LCE). The *specific goal* of the laboratory is to prepare and study mechanical and optical properties of LCP and LCE. We are planning experimental and theoretical investigation of the optical properties of the CLC layer with a finite thickness with its helix pitch having spatial variability. The *subjects* of our laboratory *applied research* are related with the possibilities of tuning the parameters of the system by external electrical, magnetic, mechanical and thermal fields aiming to obtain tunable multi-functional optical devices for photonics, in particular, for their application as tunable optical diodes (locks), transistors, filters and mirrors, as well as energy accumulators and low threshold lasers, etc. We intend to investigate, as well, the optical properties of multilayer systems with CLC and isotropic (anisotropic) media layers, and magnetic photonic crystals.

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