ABSTRACT OF SCIENTIFIC SPECIALTY
2.2.6. OPTICAL AND OPTO-ELECTRONIC DEVICES AND COMPLEXES

It provides for the study of the physical foundations and principles of operation of optoelectronic devices and complexes. The role and prospects of using optical-electronic systems for various purposes are considered. The skills of designing and using radiometric, thermal imaging, lidar and other optoelectronic systems are being formed.

Includes the following areas of research:

Research and development of new methods and processes that can be used as the basis for the creation of optical and optoelectronic devices, systems and complexes for various purposes, operating in the optical range of the spectrum and the terahertz range.

Development of new optical information technologies, including technologies based on fiber, adaptive, integrated optics and waveguide optics.

Research of optical and optoelectronic devices and complexes by computer simulation methods.

Creation and research of methods for calculating and optimizing optical systems, methods for assessing the quality of an optical image, development effective complexes for computer-aided design of optical systems.

Development of devices and complexes for remote sensing of the Earth and space objects in the optical range of the spectrum, including multispectral and hyperspectral equipment, devices for orientation and navigation of spacecraft.

Development of promising optoelectronic devices of complexes And designed For obtaining geospatial information associated with global positioning systems, including ground-based, aviation and space-based scanners, geodetic instruments.

Development of promising lidar technologies, lidars and lidar complexes.

Creation of optical and optoelectronic systems included in the structure of robotic complexes.

Creation of optical systems based on freeform surfaces, including for lighting systems, optical devices of medical equipment, photovoltaic concentrators.

Development of microminiature optical and optoelectronic systems, including those based on MEMS technologies and using the principles of facet vision.

Development and use of modern information technologies in the analysis and transformation of optical images, including images obtained by multispectral photomatrixes.

Development, improvement and research of the characteristics of devices, systems and complexes using electromagnetic radiation of the optical wave range, designed to solve problems:

- measurements of geometric and physical quantities;
- research and control of parameters of various environments and objects, including including when solving technological, environmental and biological problems;
- transmission, reception, processing and display of information;
- management of the operation of technological equipment and control production processes;
- creation of optical and optoelectronic devices and systems for medicine;
- creation of optical and optoelectronic equipment for scientific research in various fields of science and technology.