**Topics for student’s scientific research**

**«Laser and Fiber Optic Systems»**

|  | **Laboratory** | **Supervisors** | **Topics** | **Students** |
| --- | --- | --- | --- | --- |
|  | Fiber optics | Liokumovich Leonid Borisovichleonid@spbstu.ru  | 1. Spectral interferometric optical fiber sensors: signal processing and accuracy improvement
2. Optical coherence tomography with multiplexed probes
 |  |
|  | International Scientific and Educational Center «National Instruments – Polytechnic» | Medvedev Andrei Viktorovich medvedev@rphf.spbstu.ru  | 1. Fiber optic electric and magnetic fields measurements.
2. Signal demodulation and processing in fiber optic interferometric sensors.
 |  |
|  | Laser photometry and spectroscopy | Velichko Elena Nikolaevnavelichko-spbstu@yandex.ru  | 1. Determination of nanoparticles sizes by a laser correlation spectroscopy method
2. Development of the image processing systems for medical diagnostics purposes
3. Electrophoretic light scattering
 | Farid Shariaty |
|  | Laser photometry and spectroscopy | Pleshakov Ivan Viktorovich ivanple@yandex.ru  | 1. Optical and radiospectroscopic studies of new materials in photonics and optoelectronics
2. Investigation of magnetic structures formed by ferrofluids in complex media, including biological
3. Use of NMR spectroscopy and magnetometry methods for study of magnetic materials of electronics, including magnetic nanostructures
 | Sun MinhueiVan Tsin |
|  | Magnetic resonance quantum devices | Ermak Sergey Viktorovichserge\_ermak@mail.ru  | 1. Atomic clocks and its applications
2. Quantum magnetometers and its applications
3. Nuclear gyroscopes and its applications
4. Semiconductor sources and receivers of optical radiation.
5. Semiconductor sources characteristic stabilization.
 |  |
|  | Optical spectroscopy of quantum systems | Litvinov Andrey Nikolaevichandrey.litvinov@mail.ru Kuraptsev Aleksei Sergeevichaleksej-kurapcev@yandex.ru  | 1. Quantum optics
2. Laser spectroscopy
3. Interaction of laser radiation with atomic ensembles
4. Quantum frequency standards (atomic clocks) on "cold" and "hot" atoms
5. Quantum gyroscopes based on nuclear magnetic resonance
6. Resonator and waveguide quantum electrodynamics
7. Interaction of light with polyatomic ensembles
8. Spectroscopy of cold atoms
9. Spectroscopy of impurity centers (atoms, quantum dots) in a dielectric
10. Cavity and waveguide quantum electrodynamics
11. Simulation of mesoscopic atomic systems using the computational resources of Peter the Great St. Petersburg Polytechnic University Supercomputer Center
 |  |
|  | Quantum photonics laboratory | Ushakov Nikolai Aleksandrovichnushakoff@gmail.com  | 1. Interrogation of optical fiber sensors with the use of single photon detectors
2. Biphotons generation in optical fibers
 | Freddy Parra |
|  | Quantum photonics laboratory | Korikov Constantine Constantinovichconstantine.korikov@gmail.com | 1. Machine learning
2. Data analysis
3. Signal processing in physics and engineering applications
 |  |
|  | Special Technological Center-Polytech | Pavlov Vitaliy Aleksandrovichpavlov.va.spbstu@gmail.com | 1. Application of neural network approaches for optical image segmentation
 |  |
|  | The self-organized high-temperature nanostructures | Kvashenkina Olga Evgenievnakvol.spbspu@gmail.com  | 1. Ultra-fast optical shutter operating for new generation of lasers
2. Technology of efficient transformation of multilayer metal nanostructures for lasers with short-pulse radiation
3. The physical layer of the home IoT using of a modern diagnostic system
4. Determination of individual parameters of multilayer metal nanostructures by the analysis of optical radiation incident on a sensor system
5. Development technology exposure to SHS-light radiation on some types of optical fibers for modern electronics
 |  |
|  |  | Tkachenko Dmitry Aleksandrovich ppdtkach@mail.ru  | 1. Investigation of possible scenarios for convergence of 5G and Broadcast networks
2. Comparative analysis of effectiveness of 5G and Digital TV networks for broadcast content delivery
 |  |