**Topics for student’s scientific research**

**«Laser and Fiber Optic Systems»**

|  | **Laboratory** | **Supervisors** | **Topics** | **Students** |
| --- | --- | --- | --- | --- |
|  | Fiber optics | Liokumovich Leonid Borisovich  [leonid@spbstu.ru](mailto:leonid@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](mailto: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 Nikolaevna  [velichko-spbstu@yandex.ru](mailto:velichko-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](mailto: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 Minhuei  Van Tsin |
|  | Magnetic resonance quantum devices | Ermak Sergey Viktorovich  [serge\_ermak@mail.ru](mailto:serge_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 Nikolaevich  [andrey.litvinov@mail.ru](mailto:andrey.litvinov@mail.ru)  Kuraptsev Aleksei Sergeevich  [aleksej-kurapcev@yandex.ru](mailto:aleksej-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 Aleksandrovich  [nushakoff@gmail.com](mailto:nushakoff@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 Constantinovich  [constantine.korikov@gmail.com](mailto:constantine.korikov@gmail.com) | 1. Machine learning 2. Data analysis 3. Signal processing in physics and engineering applications |  |
|  | Special Technological Center-Polytech | Pavlov Vitaliy Aleksandrovich  [pavlov.va.spbstu@gmail.com](mailto:pavlov.va.spbstu@gmail.com) | 1. Application of neural network approaches for optical image segmentation |  |
|  | The self-organized high-temperature nanostructures | Kvashenkina Olga Evgenievna  [kvol.spbspu@gmail.com](mailto:kvol.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](mailto: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 |  |