**САРАТОВСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ**

**ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ ИМЕНИ Н.Г. ЧЕРНЫШЕВСКОГО**

**Факультет иностранных языков и лингводидактики**

**Кафедра английского языка и межкультурной коммуникации**

**Кафедра немецкого языка и межкультурной коммуникации**

XIV научно-практическая конференция «Presenting Academic Achievements

to the World»

**10-11.04.2023**

**Саратов**

**Организационный комитет конференции**

Председатель мероприятия:

– Шилова С.А. – декан факультета иностранных языков и лингводидактики, доцент кафедры английского языка и межкультурной коммуникации.

**Организационный комитет:**

 Председатель организационного комитета:

– Алексеева Д.А. – к.филол.н., доцент кафедры английского языка и межкультурной коммуникации

Секретарь организационного комитета:

– Исайкина М.А. – к.пед.н., доцент кафедры английского языка и межкультурной коммуникации

**Программный комитет:**

Председатель программного комитета:

– Сосновская А.А. – к.филол.н., доцент кафедры английского языка и межкультурной коммуникации.

Секретарь программного комитета:

– Пыжонков С.В. – старший преподаватель кафедры английского языка и межкультурной коммуникации

Члены программного комитета:

- Шидо Т.А. - к.филол.н., доцент кафедры немецкого языка и межкультурной коммуникации

– Боц Т.С. – к.филол.н., доцент кафедры английского языка и межкультурной коммуникации

– Косарева С.А. – к.пед.н., доцент кафедры английского языка и межкультурной коммуникации

– Павлова О.В.– к.пед.н., доцент кафедры английского языка и межкультурной коммуникации

– Сабитова Л.Р. – к.ист.н., доцент кафедры английского языка и межкультурной коммуникации;

– Смирнова А.Ю. – к.филол.н., доцент кафедры английского языка и межкультурной коммуникации;

– Сокиркина Л.И. – к.филол.н., доцент кафедры английского языка и межкультурной коммуникации

– Уколова М.В. – преподаватель кафедры английского языка и межкультурной коммуникации

- Богатенко Т.Р. – преподаватель кафедры английского языка и межкультурной коммуникации

– Миронов С.В. – к.ф.-м. н., декан факультета компьютерных наук и информационных технологий

– Максимова Е.А. – доктор пед. н., профессор кафедры английского языка и методики преподавания

– Гребенюк К.А. – к.ф.-м. н., доцент кафедры радиотехники и электродинамики

– Пожаров М.В. – к.хим.н., доцент кафедры общей и неорганической химии;

– Ханадеев В.А. – к.ф.-м.н., старший научный сотрудник лаборатории нано-биотехнологии ИБФРМ РАН.

– Гуторова О.В. – ст. преподаватель кафедры генетики

– Андросов И.А. – программист Центра олимпиадной подготовки им. Н.Л. Алексеевой

– Крючкова А.А. – инженер по автоматизации тестирования ПАО Банк «ФК Открытие»

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|  **March 23, Tuesday** |
| **Event** | **Place** |
| **PRECONFERENCE EVENT** |
| **Workshop:****Delivering a successful presentation at a scientific conference****16.00 -17. 10**  | ***Presenter: Anna Yu. Smirnova*** (PhD in Literature, Assoc.Prof., Department of English Language and Intercultural Communication, SSU),***Anna A. Sosnovskaya*** (PhD inLinguistics, Assoc.Prof., Department of English Language and Intercultural Communication,SSU) | <https://telemost.yandex.ru/> |
| **April 10, Monday** |
| 09.45-12.00 | **Panel Discussion 1: Physics**  | Building 12, Room 125 |
| 12.15-13.50 | **Panel Discussion 2: Pedagogics** | Building 12, Room 125 |
| 15.40-17.00 | **Panel Discussion 3: Computer Science**  | Building 12, Room 125 |
| **April 11, Tuesday** |
| 12:00-13:40 | **Panel Discussion 4: Mathematical support and administration of information systems**  | Building 12, Room 310 |
| 12:00-14:00 | **Panel Discussion 5: Mathematics and Mechanics, Computer Science and Informatics, Economics** | Building 12, Room 420 |
| 12:30-13:30 | **Panel Discussion 6: Natural Science** | Building 9, Room 201 |
| 12:30-14:30 | **POSTER SESSION 1: Physics**  | Building 12, Room 125 |
| 12:30-14:30 | **POSTER SESSION 2: Natural Sciences**  | Building 12, Room 126 |
|  |
| 16.00-18.00 | **Deutsche Sektion**  | <https://us04web.zoom.us/j/764471884?pwd=MGM0eVNnNlF3QWJmTnFQK05mTkVLUT09>  |

**Panel Discussion 1: Physics (Building 12, Room 125)**

**10 April, Monday 09:45-12:00**

**Time-limit: 7 minutes**

*Chairpersons:*

***Konstantin A. Grebenyuk*** *(PhD in Physics and Mathematics, Associate Professor, Department of Radiophysics and* [*Electrodynamics*](http://www.multitran.ru/c/m.exe?t=1260594_1_2)*, SSU)*

***Lyubov I. Sokirkina (****PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

***Sergey V. Pyzhonkov*** *(Senior Lecturer, Department of the English Language and Intercultural Communication, SSU)*

**Vera Balayeva**

*Strange Nonchaotic Attractors in Weakly Dissipative Henon Map*

The aim of the work was to search for SNA in the case of weakly dissipative systems using the Henon map for the example. To identify SNA, the statistical characteristics of its stability were analyzed using values calculated on the basis of a series of local Lyapunov exponents: the dependence of the proportion of unstable trajectory sections on the length of the section on which the local Lyapunov exponent is calculated; distribution of the value over the parameter/parameters plane; instability characteristics when using rational approximations of quasi-periodic effect on the system; histograms for a series of local Lyapunov exponents. The results of the evaluation of these values are their comparative differences for SNA and other modes. The method of determining the areas of SNA in the parameters plane is implemented based on the characteristics of the maximum deviations in the window of N local Lyapunov exponents and the values of the senior Lyapunov exponent.

 *(Scientific Advisor: Alexey V. Savin, PhD in Physics and Mathematics, Associate Professor, Department of Nonlinear Physics, SSU)*

**Aleksandr Dubrovsky**

*Confocal Microscopy for Quantitative Analysis of Meningeal Lymphatic System Photomodulation*

The aim of my research is to study the brain clearance process by the meningeal lymphatic system in laboratory rats during photomodulation using the method of confocal laser scanning microscopy. Contemporary research indicates the importance of the lymphatic system for the condition of brain tissue as well as for the functioning of the immune system. This presentation discusses the effects of photomodulation on the meningeal lymphatic system in laboratory rats by comparing the aftermath of brain clearance in cases with and without photomodulation. *(Scientific Advisor: Ivan V. Fedosov, PhD in Physics and Mathematics, Associate Professor, SSU)*

**German Guyo**

*New Extensions of Multiresolution Wavelet Analysis for EEG Signals Study*

The report deals with the problem of developing tools for studying complex signals recorded in various experimental studies. Considering the non-stationary nature of many processes in nature, it is important to apply and improve methods for analyzing the structure of experimental processes in the dynamics of systems with time-varied characteristics. One of the most popular approaches is wavelet analysis and methods that use decomposition in the basis of wavelet functions as the main or intermediate stage of analysis. In this study, various versions of extended multiresolution wavelet analysis (MWA) were tested, aimed at improving the quality of diagnostics of complex oscillations and their changes when the operating conditions of the system change. The characterization of intergroup differences using the skewness and kurtosis of the probability distribution of the wavelet decomposition coefficients improves the diagnosis of age differences as compared to the approach based on the standard deviations.

**Veronika Kildisheva**

*Core-Shell Carriers in an Alternating Magnetic Field*

The main problem associated with the use of nanomaterials in the field of precision medicine is the creation of targeted drug delivery systems, as well as methods for their controlled release in the immediate vicinity of the affected areas of the body.

The study results show that the influence of a non-heating alternating magnetic field on core-shell carriers contributes to solving these problems. This makes it possible to significantly increase the effectiveness of drugs and seriously reduce their total concentration in the body and, as a result, to reduce the side effects of their use.

*(Scientific Advisor:* *Maria V. Lomova, PhD in Physics and Physics, Associate Professor, Department of Material Science, Technologies and Quality Management, SSU)*

**Nikita Klychkov**

*Gas Sensitivity Model of Polycrystalline Semiconductor Films*

The mathematical model of gas sensitivity for chemoresistive sensors based on semiconductor polycrystalline films is proposed and discussed in the report. It was assumed that adsorbed particles induce of donor and/or acceptor-like surface states in the band gap of the grain semiconductor. In order to calculate the electrophysical properties of the active gas sensor layers based on composites with multiple p-n heterojunctions, the distributed impurity (donor and acceptor) states in grain volume were observed. The processes surface association and dissociation of adsorbed oxygen particle were considered. For model verification, the tin dioxide thin films were deposited by the RF-sputtering of the SnO2 target in the argon–oxygen mixture. It was demonstrated that the results of the performed calculations using the model describe qualitatively the electrophysical properties of the fabricated gas-sensitive structures, such as the temperature dependence of SnO2 films conductivity in a dry air.

*(Scientific Advisor: Vyacheslav V. Simakov, Doctor of* *Sciences, Professor, Department of Materials Sciences and Technologies and Quality Management, SSU)*

**Pavel Kolesnichenko**

*Electron Transport Control in Quasi-2D Layered ZnO Nanoflakes from the Standpoint of their Effective Application in Solid-state Sensors*

The report discusses the electronic characteristics of quasi-2D layered ZnO nanoflakes, as well as the role of controlling their thickness from the standpoint of increasing the sensitivity of their surface to analytes (acetone, butanol, etc.), which is necessary from the point of view of using these structures as materials for solid gas sensors. The study was conducted using the SCC DFTB method in the DFTB+ software package. ZnO nanoflakes with a hexagonal structure (symmetry group P63mc) with a phase surface (11$\overbar{2}$0) were chosen as the object of study. For this object, the optimal width of the 2D layer was found, after which various analytes were placed on its surface and the resistance was calculated. The result of the study was a diagram of the change in the resistance (conductivity) of zinc oxide when various analytes are on the surface.

 *(Scientific Advisor: Olga E. Glukhova, Doctor of Physics, Professor, Head of Department of Radiotechnology and Electrodynamics, SSU)*

**Svetlana Konnova**

*Investigation of Blood Serum Components Using Microstructural Waveguides*

Sensors are devices whose purpose is to detect and quantify physical or chemical changes. Using hollow core microstructured waveguides we investigate the composition of the blood serum of volunteers. Serum control components were separately examined and critical wavelength breakpoints, which are unique to different blood components, were determined. With the help of waveguides, albumin, glucose, cholesterol were characterized, and the most suitable solvents for each type of biological material were selected.

*(Scientific Advisor: Polina A Dyachenko, PhD in Physics and Mathematics, Associate Professor Department of Optics and Biophotonics, SSU)*

**Semyon Levitsky**

*Current Transfer and Charge Transport in Layered Van der Waals Thin Films Based on 2D-Diamane*

The report discusses the electronic characteristics of layered van der Vaals thin films based on 2D-diamane. The study was conducted using the DFT method in the SIESTA software package. Diamane nanoribbon with various dopped atoms (H and F atoms) and various interlayer connection geometry were chosen as the objects of study. For these objects, the optimal geometry of structures was found, after which resistance was calculated. The result of the study was a diagram of the change in the resistance (conductivity) of diamane films depending on the length of the structure.

*(Scientific Advisor: Olga E. Glukhova, Doctor of Physics, Professor, Head of Department of Radiotechnology and Electrodynamics, SSU)*

**Vyacheslav Leshchev**

*Investigation of Optical and Spectral Properties of Cartilage Tissue during Optical Clearing*

The report examines the optical and spectral properties of cartilage tissue. The research was carried out using a Raman spectrometer. The effectiveness of various clearing agents was compared. The data obtained can be used in further research.

*(Scientific Advisor: Valery V. Tuchin, Doctor of Physics, Professor, Department of Optics and Biophotonics, SSU)*

**Ibadulla Ramazanov**

*Coupled Van der Pol-Mathieu-Duffing Oscillators*

The paper presents a study of the dynamics of two dissipatively coupled Van der Pol-Mathieu-Duffing oscillators. Van der Pol-Mathieu-Duffing oscillator is a self-oscillating system with parametric forcing on the natural frequency and cubic nonlinearity. Models of oscillators of this type describe well the oscillations of microelectromechanical resonators. The dynamics of a self-oscillating system with a parametric action can strongly depend on the amplitude of the parametric excitation and can be determined by either the self-oscillating or parametric component, in addition, the presence of cubic nonlinearity leads to the appearance of nonisochronism and hysteresis. All this has a rather strong influence on the synchronization of such oscillators. In this work, a numerical study of the synchronization region was carried out for fixed parameters of nonlinearity and parametric excitation. It is shown that the presence of parametric action leads to the appearance of regions of parametric oscillations, in which oscillations occur at the highest frequency of partial generators. The regime map shows the boundaries of the parametric oscillations regions, phase synchronization, and damping of oscillations.

*(Scientific Advisor: Andrei V. Slepnev, Ph.D. in Physics and Mathematics****,*** *Associate Professor, Department of Radiophysics and Nonlinear Dynamics, SSU)*

**Lev Takaishvili**

*Realization of a Brain Thalamocortical Circuit Using Radio-Technical Neurons with Approximation of the Nonlinear Function by Diodes.*

In this paper, the FitzHugh-Nagumo neuron model with diode approximation of nonlinearity was used to construct the thalamocortical system. This model approximates the cubic function worse and requires additional adjustment when changing the type of diodes in the circuit, but it is much simpler in terms of element base and therefore can be used to develop networks of several tens of elements. The model was reproduced, and then modifications including excitatory (for PY, NT and TC neurons) and inhibitory (for RE and IN neurons) synapses were developed for it.

After triggering from the trigeminal nerve, the model demonstrates stimulated oscillations in the thalamocortical network, which later, after the end of the exposure, transform into residual (not stimulated) oscillations, which represent a transient process. To date, the lengths of the obtained transients are significantly inferior to those given in other works, but this problem can probably be solved by a more careful selection of the element base.

*(Scientific Advisor: Ilya V. Sysoev, Doctor of Physics, Professor; Department of System Analysis and Automatic Control)*

**Anna Vakhlayeva**

*Mathematical Model of Electrocardiogram Signal with Given Phase of Frequency Modulation*

The report deals with the mathematical modeling of the electrocardiogram signal with the given phase of frequency modulation. Analysis of the low-frequency rhythms of the heart rate variability signal is a promising tool of preclinical diagnostics. There is no general algorithm for introduction of the instantaneous phases for biological signals. Parametrization of the phase introduction algorithms is one of the main difficulties, it could be resolved by testing different sets of parameters against the model data. The model is based on McSharry`s mathematical model, but we introduced the frequency modulation of the heart rate, for which the phase of the modulating signal could be set beforehand and is, therefore, known. The phase of the modulating signal could be extracted from real data or generated. The adequacy of the model was confirmed using the spectral and statistical analysis. The resulting model can be used to test the algorithms of phase introduction.

*(Scientific Advisor: Yuri M. Ishbulatov, PhD in Physics and Mathematics, Associate Professor, Department of Dynamic Modeling and Biomedical Engineering, SSU)*

**Arseny Yelizarov**

*Optical Visualization of Biopsy Samples of Cartillage Tissue Using OCT and Smartphone Via Optical Clearing*

The paper considers the influence of the optical clearing technique on various methods of optical examination of biological tissue. Visualization of some methods with optical clearing was carried out to assess its effect on the result. The positive effect of an optical clearing agent in the study of biological tissue was confirmed. Visualized results were obtained on the basis of which it is possible to assess the degree of influence of optical clearing.

*(Scientific Advisor: Valery V. Tuchin, PhD in Physics and Mathematics, Professor, Department of Optics and Biophotonics, SSU)*

**Panel Discussion 2: Pedagogics (Building 12, Room 125)**

**10 April, Monday 12:15-13:50**

**Time-limit: 7 minutes**

*Chairpersons:*

***Elena A. Maksimova*** *(Doctor of Pedagogics, Professor, Department of the English Language and Methods of Teaching, SSU)*

***Olga V. Pavlova*** *(PhD in Pedagogics, Assoc.Prof., Department of English and Intercultural Communication, SSU)*

***Maria A. Isaikina*** *(PhD in Pedagogics, Assoc.Prof., Department of English and Intercultural Communication, SSU)*

**Anastasiya Abramova, Vladimir Poleshchuk**

*Conducting Electricity Lessons in a School Physics Course*

The report provides a description of problems that may arise when introducing new material during physics lessons. The authors discuss ways to solve these problems, mainly related to the teaching of the topic “Electricity”. The article presents materials on theoretical and practical research of the issue under study, reveals its relevance nowadays. The article pays attention to computer modelling of electrical circuits. It touches upon the problem of students’ creative thinking.

*(Scientific Advisor: Philip A. Belov, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Anna Batanova**

*Students’ Experimental Skills Development by Computer Modelling Means*

The report is devoted to the issues of experimental activity as the source of students’ motivation and their research skills development. The digital pedagogy involves the elaboration of simple computer models of physical, technical, biological and social systems that would be understandable to students. It is advisable to use the computer modeling when other methods are less effective or too time-consuming and require complex mathematical calculations. The author discusses the computer modeling techniques that allow solving a large number of different physical problems.

*(Scientific Advisor: Natalia G. Nedogreeva, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Angelica Birun, Victoria Vasilyeva**

*Ways to Improve the Efficiency of Teaching Natural Science Disciplines*

The report reveals the issues connected with the efficiency improvement in teaching natural science disciplines. The main goal of teaching and studying such disciplines as astronomy and physics is to form students' holistic natural science worldview as well as understanding of cause-and-effect relationships. The important feature of teaching process is the awakening of students' interest in science and scientific activity in general. The authors emphasize the relevance of developing students' cognitive interests, intellectual and creative abilities.

*(Scientific Advisor: Natalia G. Nedogreeva, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Ksenia Veklenko**

*Using of Visual Programming Environment Alice in the Frame of a School IT-Course*

The author considers the potential of the Alice programming environment, which can act as an additional resource for teaching programming. The paper focuses on the possibility of using this environment in the basic informatics course. It also presents the author's laboratory tasks and the results of their approbation.

*(Scientific Advisor: Olga A. Litvinova, PhD in Pedagogics, Associate Professor, Department of Information Systems and Technologies in Education, SSU)*

**Anna Gavrilova, Nadezhda Kornilova**

*The Modern Direction of Information Technology Implementation*

The present report deals with the actualization of digital education in modern community. It examines the information and communication platform "Sphereum". The usage of the platform, its advantages and disadvantages are mentioned. The principles of teacher-students interaction with the help of this resource are depicted.

*(Scientific Advisor: Olga V. Pikulik, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Viktoria Grichek**

*Informatization of Society as a Basis for the Creation of Gamification Lessons in the Educational Process*

Nowadays technologies are developing at a high speed and progress affects all spheres of life, including education. Due to psychological characteristics and the influence of informatization of society, the modern generation is losing interest in studying. This article consider gamification as a tool to increase student`s motivation to study and learn new things. One of the most difficult moments in creating game lessons is to distribute the balance between study and play, so the basics of working with the gamification method are given.

*(Scientific Advisor: Irina V. Veshneva, Doctor in Technical Sciences and PhD in Physics and Mathematics, Professor, Department of Information Systems and Technologies in Education, SSU)*

**Olga Egorova**

*Using Total Physical Response in ESL Classes in Primary School*

Teaching a foreign language in primary school is a time-consuming process in which it is necessary to take into account the psychological characteristics of students, the atmosphere in the classroom, and also various teaching methods. When planning and conducting a lesson, frequent changes of activities play a great role, as well as reducing the use of the native language in English lessons. This study examines the practical application of the method of total physical response (TPR), based on memorizing new phrases and lexical constructions using gestures, commands and active games. The study presents the results of work at the primary school of Lyceum No. 37 in Saratov.

*(Scientific Advisor: Dina A. Alexeeva, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Anastasiia Pavlovskaia**

*Worldskills Junior Championships and Preparations for it*

The report presents a brief history of the WorldSkills Championships. The international movement is considered from the aspect of the mechanism of professional self-determination of schoolchildren. It analyses the correspondence of the content of school educational programme to the Worldskills standard and competencies. Also we analyzed the availability of published recommendations for the preparation of students at different levels to the championship.

*(Scientific Advisor: Olga A. Litvinova, PhD in Pedagogics, Associate Professor, Department of Information Systems and Technologies in Education, SSU)*

**Anton Pronin**

*The development Arduino library for Kumir programming language*

The report describes the process of creating Arduino library for KuMir programming language as a part of training and methodology complex for teaching robotics to schoolchildren of grades from 6 to 11. The author reflects the process of KuMir interactive development editor creation and analyses the necessary instruction set of Arduino for programming.

*(Scientific Advisor: Elena E. Lapsheva, Senior Lecture; Department of Programming and Informatics, SSU)*

**Dina Sedova**

*Multimedia Lessons Support*

The report is devoted to the issues of multimedia support for teaching different disciplines. Mainly it is connected with teaching physics at secondary school. The author considers the multimedia support to be effective in presenting new educational material. The multimedia means are applied with the help of computer and digital technologies. The article presents the principles of using educational resources in the most effective way.

*(Scientific Advisor: Natalia G. Nedogreeva, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Anastasiya Sukhaya**

*Critical Thinking Formation at Physics Lessons*

The report discusses the technology of critical thinking, the specific features of its use in the educational process. The main attention is given to the methods of forming critical thinking as a personal characteristic of a student during physics lessons as well as its influence on cognitive interest in learning activities. In addition, concrete examples of application of this technology are considered. The efficiency of different methods, ways of developing critical thinking and level of motivation to research activities are observed.

*(Scientific Advisor: Tatyana G. Burova, Doctor in Physics and Mathematics, Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Stanislav Tsarannikov**

*Technical Design and Modelling in Students’ Project Activities*

An important element of project activities is the construction and modeling of the physical phenomena or processes under study, the complexity of which depends on the creation of the model. Constructing in the learning process is a means of deepening and expanding the theoretical knowledge obtained and developing the creative abilities, inventive interests and aptitudes of students. An important role in the implementation of the project is assigned to the physics teacher, who is also the project leader. The article describes the following stages of project work: problem definition and goal setting; planning; project execution; project defense and project evaluation.

*(Scientific Advisor: Natalia G. Nedogreeva, PhD in Pedagogics, Associate Professor, Department of Physics and Methodological and Information Technologies, SSU)*

**Panel Discussion 3: Computer Science (Building 12, Room 125)**

**April 10, Monday, 15:40-17:00**

**Time-limit: 7 minutes**

*Chairpersons:*

***Alexandra A. Kruchkova*** *(Test Automation Engineer, PJSC Bank Otkritie Financial Corporation)*

***Dina A. Alexeeva*** *(PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

***Tatiana R. Bogatenko*** *(Lecturer, Department of the English Language and Intercultural Communication, SSU)*

**Ekaterina Gudkova**

*Analysis of Public Opinion on the Issue of the Introduction of Digital Technologies into the Space of the Urban Environment*

The report explores the concept of a "smart city", presents an analysis of the attitude of the population to the digitalization of the urban environment. The general characteristics of the concept are considered and the definition of a "smart city" is given. During the study, two sociological surveys were conducted, followed by an analysis of public opinion on the need and effectiveness of the introduction of digital technologies into the urban environment.

*(Scientific Advisor: Anna V. Molochko, PhD in Geography, Associate Professor, Head of the Department of Social and Economic Geography, SSU)*

**Galina Gromova**

*Graph Methods for Social Network Analysis*

The report is devoted to the study of social networks presented in the form of graphs. The studied graph metrics were calculated for the selected datasets. Then the data were analyzed for graphs separately, the obtained values were explained by the structure of the networks and their origin. Lastly, the similarities were revealed. As a result, the structural features of social graphs were determined.

*(Scientific Advisor: Marina V. Ogneva, PhD in Physics and Mathematics, Head of the Department of Informatics and Programming, SSU)*

**Ekaterina Sukhova**

*Augmentation of Tabular Data in Machine Learning*

The report discusses and compares various methods of augmentation of tabular data. For the analysis, a dataset was used, which was artificially reduced for the application of augmentation methods. The selected methods were applied on a reduced dataset. The same models were trained on the original dataset and datasets obtained during the application of augmentation methods. As the best method, the one that showed the quality of the model closest in accuracy to the original dataset was chosen.

*(Scientific Advisor: Elena E. Lapsheva, Senior Lecturer, Department of Informatics and Programming, SSU)*

**Dmitrii K. Uspenskii**

*Development of the Educational Web Application on the .NET Platform*

The report deals with the process of creating an educational web application, taking into account the capabilities provided by the .NET platform. Step-by-step development covers the details of creating an adaptive application design, database modeling, defining and writing business logic in C# programming language, as well as visual representation using Razor technology. The processing of requests to the application is analyzed in terms of the introduced components of the ASP.NET Core middleware layer. The result is a functioning web application for learning HTML (hypertext markup language).

*(Scientific Advisor: Lyubov V. Kabanova, PhD in Economics, Associate Professor, Department of Informatics and Programming, SSU)*

**Arina Monastyrskaya**

*Application of Machine Learning in the Problem of Recognizing Damage on the Tire Tread*

The report examines the solution to the problem of road traffic accidents due to non-compliance with the rules of tire use by drivers. It is proposed to introduce computer vision into photofixation in order to recognize improper use of protectors.

*(Scientific Advisor: Inna A. Batraeva, PhD in Physics and Mathematics, Head of the Department of Programming Technologies, SSU)*

**Arseniy Nikitin**

*Investigation of the Main Patterns of Technical Analysis*

The report is dedicated to technical analysis, a popular method used by traders to analyze financial markets and make investment decisions. It involves identifying patterns and trends that can be used to predict future price movements. It is based on the assumption that market trends, both short-term and long-term, are driven by supply and demand forces. One of the key tools is trend identification through maximums and minimums. This involves identifying the highest and lowest points of a trend, and using this information to determine the direction of the trend. The application involves the implementation of an algorithm for identifying technical analysis patterns, for example flags, pennants, rectangles, etc. The algorithm is tested on several examples, including Energy Focus, Yandex and others.

*(Scientific Advisor: Mikhail B. Abrosimov, Doctor of Physics and Mathematics, Head of the Department of Computer Security and Cryptography Theory, SSU)*

**Pavel Dunaev**

*Mutation-based Fuzzing of Compilers*

The work is devoted to the study of the possibility of effective mutation-based fuzzing of compilers. The main problem of this type of qualification testing is its inapplicability to text input data, to which source codes belong. This report proposes a way to solve this problem using a byte code, that semantically matches the compiler language, and fuzzing the bundle of the byte code decoder and compiler. As part of the work, a test compiler and a source code converter to byte code and vice versa were written. For research purposes, errors were intentionally added into the compiler and the possibility of their detection in the proposed way was studied.

*(Scientific Advisor: Inna A. Batraeva, PhD in Physics and Mathematics, Head of the Department of Programming Technologies, SSU)*

**Maksim Shkodin**

*Prediction of the Result of a Tennis Match Using Statistical Methods*

The report is about the prediction of the result of a tennis match using statistical methods such as Markov chains, machine learning, and statistical analysis. The work discusses how Markov chains can be used to model the progression of points in a tennis match and predict the probability of a certain player winning the entire match. It also covers how machine learning algorithms can be used to predict the outcome of a tennis match as a regression problem or a binary classification problem. The report presents a statistical analysis method that can predict the outcome of a set of a match based on certain conditions. Also, the work presents the results of a program that uses a statistical method to analyze a player's victory in a set of a match.

*(Scientific Advisor: Anna A. Kazachkova, Senior Lecturer, Department of Informatics and Programming, SSU)*

**Panel Discussion4: Mathematical support and administration of information systems (Building 12, Room 310)**

**April 11, Tuesday, 12:00-13:40**

**Time-limit: 7 minutes**

*Chairpersons:*

***Ivan A. Androsov*** *(Programmer, Coach of SSU student programming teams, Programmers Olympiad Training Center named after N.L. Andreeva, SSU)*

***Mariya A. Isaikina*** *(PhD in Education, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

***Maria V. Ukolova*** *(Lecturer, Department of the English Language and Intercultural Communication, SSU)*

**Vladislav Pelipets**

*Sound Recognition and Classification Using Neural Networks*

The purpose of the report is to develop a neural network for the recognition and classification of sounds, comparing the results of its work with other modern methods of a similar purpose. The objectives of the work are: studying the sphere of voice recognition and other sound signals; studying the structure of a WAV audio file; writing a program for obtaining and converting the numerical characteristics of a WAV file; obtaining skills for writing and training a neural network; choice of tools and neural network training model; obtaining skills for processing sound signals; studying the principles of operation of various methods for classifying sounds; obtaining the results of these methods.

*(Scientific Advisor: Inna A. Batraeva, PhD in Physics and Mathematics, Head of the Department of Programming Technologies, SSU)*

**Andrei Kotuma**

*Classification of Natural Language Texts* *Based on Rhythmic Characteristics*

The purpose of the report is to study the methods and features of the classification of texts by genre in natural language based on rhythmic characteristics. In connection with this goal, the objectives of the report are to review existing solutions in the field of text classification, to study the main list of rhythmic characteristics and classifiers. To accomplish these tasks, the report analyzed a number of studies and publications in the field of computational linguistics in general and stylometry in particular, as well as analyzed the advantages and disadvantages of the main classification algorithms and machine learning models that correspond to them.

*(Scientific Advisor: Marina V. Ogneva, PhD in Physics and Mathematics, Head of the Department of Informatics and Programming, SSU)*

**Viktoria Gamayunova**

*Mathematical Modeling of People Evacuation in Case of Fire*

The report discusses the software implementation of an integrated model of evacuation of people in case of fire and the spread of fire hazards. The models used in the program are considered: a model of the spread of fire hazards based on cellular automata and a multi-agent model of evacuation of people. The process of evacuation and spread of fire in rooms of various configurations is analyzed. The amount of time spent on evacuation of people is evaluated.

*(Scientific Advisor: Alexei S. Bogomolov, Doctor of Technology; Professor; Department of Mathematical Cybernetics and Computer Scienceы, SSU)*

**Maria Chernets**

*Locations of Blind Spots of a Car*

The report is devoted to the study of the locations of the blind spots of a car. The main danger is that the driver does not see the presence of vehicles next to him, and this often causes collisions in passing introduction. In the work, the exact locations of blind spots for detecting cars were identified by experimental method. Their quantitative characteristics are given. As a result, a diagram was drawn up with their location, which was used for a long study.

*(Scientific Advisor: Elena V. Kudrina, Associate Professor, Department of Informatics and Programming, SSU)*

**Artyom Gruzdev**

*Optimizing the 5G Base Stations Location Using Adaptive Particle Swarm Optimization Algorithm*

The report deals with the methodology of optimizing 5G base stations location. The methodology uses particle swarm optimization algorithm (PSO) as the main optimizing algorithm and genetic algorithm (GA) for initial parameters searching, i.e., as meta-optimizer. The resulting algorithm is called particle swarm optimization algorithm with genetic adaptation or adaptive particle swarm optimization algorithm (APSO). This algorithm was applied to a two-dimensional simplified model. As a result, after calculation of 5G signal area covering it was established that the methodology or the model needed to be further elaborated.

*(Scientific Advisor: Dmitry K. Andreychenko, Doctor of Physics and Mathematics, Head of the Department of Mathematical Support of Computer and Information Systems, SSU)*

**Dmitrii Panteleev**

*Analysis Methods of Medical Snapshots*

The report is devoted to the application of its own development to assess the patient’s health on the basis of medical snapshots with the use of neural network. Current healthcare system has few automations and usually depends on manual labor, so the purpose of this application is to partially automate the diagnosis process and make if faster. Developed application have a variety of use cases already on current stage of development. It is able to precisely detect the presence of ulcers or internal blood leaking of different types on image, since it is usually noticeably redder, than the rest of the organ lining.

*(Scientific Advisor: Inna A. Batraeva, PhD in Physics and Mathematics, Head of the Department of Programming Technologies, SSU)*

**Daniil Ostroukhov**

*Developing a Risk Assessment Application Diseases with Pneumonia*

This report describes how to create a web application for entering patient information and classifying patients by incidence based on machine learning. The reason for choosing a decision tree as a machine learning algorithm is described. References are made to literature that details the difference between machine learning algorithms.

*(Scientific Advisor: Alexander S. Ivanov, Associate Professor, PhD in Physics and Mathematics, Department of the Mathematical Cybernetics and Computer Sciences, SSU)*

**Alexey Petrov**

*Creating an Interactive Environment as a Strategy Game for Learning Javascript*

The report is devoted to improving the quality of teaching the JavaScript programming language using interactive gaming environments. The currently available software analogues were considered. The shortcomings are identified and the creation of your own application is justified. A list of tasks and a description of their solution are presented. As a result, an interactive software environment was obtained and tested. The results of the work carried out are formulated, its practical significance and prospects for the subsequent use of the resulting software product and its improvement are determined.

*(Scientific Advisor: Marina V. Ogneva, PhD in Physics and Mathematics, Head of the Department of Informatics and Programming, SSU)*

**Ilya Loktev**

*Development of a Dependency Injection Container for Java Applications*

The report discusses the development of a lightweight dependency injection container framework for Java applications. It includes an overall description of inversion of control and dependency injection patterns and gives description of popular alternative frameworks. In the end of the report, the developed application and Spring Framework implementation are compared.

*(Scientific Advisor: Elena E. Lapsheva, Senior Lecturer, Department of Informatics and Programming, SSU)*

**Pavel Rodichkin**

*The Principle of Creating IT-Products without Using Code*

According to analysts’ forecasts, by 2024, 65% of developed applications will be created using visual programming. The platforms that enable it promise to make IT–product development as easy as using Microsoft office applications (Word, Excel, PowerPoint). At the same time, an ordinary business-user will be able to promote their projects without additional costs (money and time) for a team of professional programmers. Unlike platforms created by traditional programming, visual programming also requires certain skills, but at the same time it promises to accelerate the development of IT–products, allowing developers to work in a friendly visual environment. When using visual programming methods, productivity increased by 5–7 times. A poll conducted by No-Code Census in 2020 showed this performance improvement over traditional programming.

*(Scientific Advisor: Vladimir M. Soloviev, Associate Professor, PhD in Physics and Mathematics, Department of the Mathematical Cybernetics and Computer Sciences, SSU)*

**Panel Discussion 5: Mathematics and Mechanics, Computer Science and Informatics, Economics (Building 12, Room 420)**

**April 11, Tuesday, 12:00-14:00**

**Time-limit: 7 minutes**

*Chairpersons:*

***Sergey V. Mironov*** *(PhD in Physics and Mathematics, Dean of the Faculty of Computer Science and Information Technologies, Head of the Department of Mathematic Cybernetics and Computer Sciences, SSU)*

***Dina A. Alexeeva*** *(PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

***Inna S. Pronichkina*** *(Lecturer, Department of the English Language and Intercultural Communication, SSU)*

**Elena Burdenkova**

*Some Problems for Linearly Invariant Families*

Some problems for linear invariant families are considered. The scope of function change is determined. Single-leaf radii and near-convexity of some class of holomorphic functions families are provided. The fact that the single-leaf function has the single-leaf integral in the circle is proved.

*(Scientific Advisor: Dmitry V. Prokhorov, Doctor of Physics and Mathematics, Professor, Department of Mathematical Analysis, SSU)*

**Vladimir Pleshkov**

*Finite Element Method for Studying the Effect of Microstructure on the Mechanical Properties of a Retroreﬂective Film*

In this report, the data of numerical experiments on the tension test of a retroreﬂective ﬁlm by the finite element method were analyzed. The retroreﬂective ﬁlm is a composite of an epoxy layer with semi-included glass spheres. Since the spheres in the epoxy were randomly arranged, the problem of circle packing in a square was additionally solved. The numerical experiments differed in the number of glass spheres, the arrangement of the spheres in the epoxy, and the thickness of the epoxy. The results of the numerical calculations were the values of displacements along the applied forces. The Young's modulus and rotation angle were investigated as the parameters for analysis. The numerically calculated Young's modulus was compared with the inverse rule of mixtures. In order to compare the experiments with each other, a rotation angle coefficient was introduced, representing an approximation of the rotation angle as a function of the applied force.

*(Scientific Advisor: Maria V. Wilde, Doctor of Physics and Mathematics, Professor, Department of Mathematic Theory of Elasticity and Biomechanics, SSU)*

**Kirill Khrustitskii**

*Complex Automation of the Design and Production of Enclosures Using Software Components on CNC Machines*

In the report problems of automation of design-technology preparation of production of details of irregular shape on machines are discussed with numerical program control. The complex technique of design of preparations of details and the operating programs for machines with CNC based on use of modern technologies of the automated design and electronic measuring instruments is offered and described.

*(Scientific Advisor: Irina V. Kirillova, PhD in Physics and Mathematics, Associate Professor, Department of Mathematic Theory of Elasticity and Biomechanics, SSU)*

**Evgeniy Kokin**

*Topological and Geometric Approaches to Image Compression*

The report reflects the work on the creation of an algorithm that can potentially be used for purpose of image compression. In this approaches, the image is divided into patches (pieces) of 3x3 pixels and the space where these patches lie is studied. The mathematician D. Mumford and co-authors provided strong evidence that within this entire space there is a 2-dimensional submanifold where high-contrast patches lie. His colleague G. Karlsson with co-authors developed these ideas and showed that this 2-manifold is the Klein bottle. We applied this method to a real photo and saw that most of the patches really lie on the surface of the Klein bottle and can be described as two-dimensional coordinates on it.

*(Scientific Advisor: Sergei V. Galaev, PhD in Physics and Mathematics, Associate Professor, Department of Geometry, SSU)*

**Dmitriy Tomilov**

*On the Question of the Method of Constructing a Reduced Graph Deck and a Tree Deck of a Tree*

Trees are an important class of graphs. Many problems that are difficult in the general case are effectively solved for trees. The report deals with the size of tree decks. There are four different tree decks such as tree deck, reduced tree deck, graph deck, reduced graph deck. After evaluating the sizes of tree decks a hypothesis about the minimum size of the reduced graph deck are formed. The report describes an effective algorithm for finding the size of a reduced tree deck.

*(Scientific Advisor: Mikhail B. Abrosimov, Doctor of Physics and Mathematics, Head of the Department of Computer Security and Cryptography Theory, SSU)*

**Vladimir Shkatov**

*On the Question of Computation Efficiency of Some Invariants for Unigraphs*

Unigraphs are graphs that are uniquely determined by the degrees of their vertices. Studying the properties of this class of graphs is of significant interest. In this report, we will present the results on efficient computation of several NP-complete invariants for unigraphs.

*(Scientific Advisor: Mikhail B. Abrosimov, Doctor of Physics and Mathematics, Head of the Department of Computer Security and Cryptography Theory, SSU)*

**Ilia Schneider**

*Modeling the Spread of Atmospheric Air Pollutants*

The report is dedicated to modeling the dispersion of air pollutants. The study examines the use of modern computational models for predicting the spread of harmful substances in the atmosphere under various environmental conditions using the Gaussian plume method with available data on air pollution concentration and meteorological observations. The results of numerical experiments and their comparative analysis are presented. The advantages and limitations of modeling using the Gaussian plume method for environmental monitoring and forecasting are described. The results of the study are necessary to develop more effective strategies for combating air pollution and solving the problem of identifying unknown sources of pollution in industrial areas.

*(Scientific Advisor: Alexei S. Bogomolov, Doctor of Technology; Professor; Department of Mathematical Cybernetics and Computer Scienceы, SSU)*

**Timofei Emelianov**

*Searching for Visually Similar Artworks Using Artificial Neural Networks*

The report considers the problem of image recognition on the example of searching for visually similar artworks. As a means of solving the problem, artificial neural networks are used as an effective method. The paper compares the actual architectures of neural networks and selects the optimal one based on ranking metrics. To demonstrate the results of the report, a telegram bot was implemented that finds similar artworks.

*(Scientific Advisor: Sergey V. Mironov, PhD in Physics and Mathematics, Dean of the Faculty of Computer Science and Information Technologies, Head of the Department of Mathematic Cybernetics and Computer Sciences, SSU)*

**Andrei Nartsev**

*Developing a Mathematical Model of the Digital Advertising System*

The report describes the stages of the development of a mathematical model of digital advertising, which includes the mechanisms of contextual and targeted advertising. The proposed mathematical model can be used to simulate advertising auctions in order to develop optimal bidding strategies to maximize targeted user actions.

*(Scientific Advisor: Inna A. Batraeva, PhD in Physics and Mathematics, Head of the Department of Programming Technologies, SSU)*

**Dmitrii Kizhaev**

*The Antecedents of Russian Government Employees’ Satisfaction and Turnover Intentions*

Given the turbulent development of Russian public service after the socialism-capitalism transition in the 1990s and continuous government bashing, one might expect finding low morale and negative perceptions of government jobs among public administrators. This study examines the factors that influence job satisfaction (JS) and government job decisions (GJD) of government employees and tests their tenure intentions. The study uses the internal vs. external prestige and the positive vs. negative government image concepts to measure the attitudes. The results of ordinal and binomial logistic regressions suggest that government employees’ perceptions of government image, and prestige influence JS and GJD.

*(Scientific Advisor: Nataliya W. Mityaeva, Doctor of Economics, Professor, Department of Economics Theory and National Economy, SSU)*

**Sergei Shubin**

*Problems and Prospects for the Development of the Labor Market and Employment in an Era of Global Instability*

The work studies the issues, problems and prospects for the development of the labor market and employment in an era of global instability. The causes of the crisis in the labor market, development trends and its transition to new stages are analyzed.

*(Scientific Advisor: Georgy A. Cheremichinov, Doctor of Economics, Professor, Department of Economics Theory and National Economy, SSU)*

**Panel Discussion 6: Natural Science (Building 9, Room 201)**

**April 11, Monday, 12:00-13:30**

**Time-limit: 7 minutes**

***Chairpersons:***

***Tatiana S. Bots (PhD in Philology, Department of English and Intercultural Communication, SSU)***

**Olga V. Gutorova (Senior lecturer, Department of Genetics, SSU)**

**Victoria Adushkina**

*Enhancing the Therapeutic Effects of Bevacizumab with Loud Music in Rats with Glioblastoma*

The development of new methods of drug delivery to the central nervous system remains an urgent issue of modern medicine. The blood-brain barrier (BBB) prevents the passage of an overwhelming number of antitumor drugs into the brain tissue, which complicates the treatment of glioblastoma (GBM), including bevacizumab (BCM), which is used to suppress angiogenesis in GBM tissues. However, in the zone of intact BBB around the tumor, BCM does not work, which is why its therapeutic effects are reduced. It is known that loud music increases the permeability of the BBB. In this study, the hypothesis was tested that sound-induced violation of BBB permeability can increase the therapeutic effects of BCM. The results revealed that the effect of loud music on BBB is accompanied by a more intensive distribution of fluorescent BCM in healthy cerebral vessels around GBM compared to rats receiving one BCM in therapy.

 *(Scientific Advisor: ElenaI. Sarantseva, PhD in Biology; Associate Professor of the Department of Human and Animal Physiology, SSU)*

**Daria Elovenko**

*GB20 Pharmacopuncture As a Potential Method for Brain Drug Delivery via the Perivascular Spaces*

The development of new methods of drug brain delivery is a crucial step for the effective therapy of the brain diseases. Pharma- and acupuncture are the forms of alternative therapy of the brain pathology, including an increase in the permeability of blood-brain barrier. However, the mechanisms of pharma- and acupuncture-mediated effects on the brain physiology remain not fully understood. This pilot study on healthy mice clearly demonstrates the Evans Blue spreading in the mouse head and in the brain via the perivascular spaces (PVSs) of the trigeminal structure and the cribriform plate after the dye injection into the Feng Chi point (Galbladder 20, GB20). These results suggest that pharmacopuncture at GB20 can be a perspective method for brain drug delivery via PVSs.

*(Scientific Advisor: Oxana V. Semyachkina-Glushkovskaya, Doctor in Biology, Associate  Professor, Department of Human and Animal Physiology, SSU)*

**Anastasia Eremakina**

*Phytopathogenic Fungi Isolated from the Trophic Chain: Horse Chestnut (Aesculushippocastanum) - Chestnut Miner Moth (Camerariaohridella) in Saratov in 2022*

The article is devoted to the determination of the species composition and quantitative indicators of fungi from the leaves of the common horse chestnut and caterpillars of the chestnut miner moth. A study of three generations of the ohrid miner caterpillars, mines and horse chestnut leaves collected in Saratov in 2022 was carried out. According to the results of the study, 6 genera of phytopathogenic fungi *Alternaria*, *Aspergillus*, *Cladosporium*, *Fusarium*, *Penicillium* and *Rhizopus* were identified.

 *(Scientific Advisor: Vasily V. Anikin, Doctor in Biology, Professor, Department of Animal Morphology and  Ecology, SSU)*

**Eduard Khachaturov**

*Structural Analysis of Durum Wheat Productivity Elements*

The objects of the study were plants of 14 varieties of durum wheat *Triticum durum*Desf., permitted for use at different times in the period from 1975 to 2014.An analysis of the elements of ear productivity in durum wheat plants of Saratov varieties under the conditions of 2020 and 2021 was carried out. The varietal features of the development of the spike of the main shoot were revealed according to a number of characteristics: the number of spikelets in a spike, the number of grains in an ear, the weight of a grain, the number of ungrained and grained spikelets. Based on the data obtained, the morphogenetic productivity index of the studied varieties was calculated.A cultivar with balanced types of morphogenetic systems was reviewed in terms of the elements of ear productivity: the number of spikelets, the number of caryopses and their weight – Luch 25 (2020), Nikolasha and Zolotayavolna (2021).

*(Scientific Advisor: Valeria V. Korobko, Associate Professor, Department of Microbiology and Plant Physiology,SSU)*

**Aleksandr Kovrizhnikov**

*Automation of MLVA&SNP Analysis of Bacteria Genomes Using Simple Gene Analysis and VNTRFinderTools*

The report reviews high-resolution genotyping methods with interlaboratory reproducibility - MLVA and SNP-analysis. These methods make possible to establish relationships between different members of the same group by analyzing their genomes. Bioinformatictools are suggested to speed up and simplify genomic analysis.

*(Scientific Advisor: Svetlana A. Konnova, Doctor in Biology, Professor, Head of the Department of Biochemistry and Biophysics, SSU)*

**Yulia Kuliseva**

*Peculiarities of Spatial Distribution of Corvid Nests in the Urbanized Environmental Components (on the Example of the Kirovsky District of Saratov)*

The study is dedicated to peculiarities of nest placement of the four species of the Corvidae family: the Jackdaw, Rook, Hooded Crow and Eurasian Magpie on the territory of the Kirovsky district of Saratov. The following methods were used in the work: route and areal accounting, cartographic modeling, assessing the dependence of the number of nests on the rate of the territory urbanization using Spearman's correlation coefficient. Distribution of 652 nests according to the biotopes was analyzed, assessment of corvid nesting density in various urban environmental habitats was carried out. The density of nest placement is the highest on the territories with a large number of nesting sites and low rates of anxiety. The Jackdaw and the Rook are the most selective for breeding sites species. The Hooded Crow nests most evenly on the model area. The Magpie’s nesting areas are more associated to large groups of woody vegetation.

 *(Scientific Advisor: Evgeny Yu. Melnikov, PhD in Biology, Associate Professor, Department of Animal Morphology and Ecology, SSU)*

**Semyon Losev**

*The Use of GIS and RSE in the Geoecological Analysis of the Territory*

This report will consider the use of geoinformation technologies and remote sensing of the earth in geoecological research. The fundamentals of these technologies and their inseparable connection with each other are considered. A brief historical summary of the application and development of these technologies is presented. The differences between the imaging equipment for different satellites are determined. At the end, the advantages of using these technologies are presented. It is determined how an acceleration and reduction in the cost of productioncan be improved with the help of these technologies.

*(Scientific Advisor: Vladimir Z. Makarov, PhD in Geography, Professor of the Department of Physical Geography and Landscape Ecology, SSU)*

**Vitaly Shardin**

*Phage Antibodies Against Heat Shock Proteins as Tools for in Vitro Cancer Diagnosis*

Despite the decades of research, cancer causes millions of deaths every year. Therefore, the development of methods for the indication of tumor markers is very relevant. Heat shock proteins (HSPs) are important for oncogenesis and malignant progression and are a marker of cancer development. Here, HSP-specific antibodies were prepared by using a nonimmune human scFv phage library. A dot immunoassay and an enzyme-linked immunosorbent assay (ELISA) with selected recombinant antibodies were used to determine HSPs in the blood sera of diseased animals. The minimum detectable HSP concentration was 0.015 μg/mL. Thus, HSP-specific phage antibodies are promising for use as sensitive markers in in vitro cancer diagnostics.

*(Scientific Advisor: Matvey V. Kanevskiy, PhD in Biology, Associate Professor, Department of Biochemistry and Biophysics, SSU)*

**POSTER SESSION 1: Physics (Building 12, Room 125)**

**11 April, Tuesday 12:30-14:30**

**Time-limit: 7 minutes**

***Vitaly A. Khanadeev*** *(PhD in Physics and Mathematics, Senior Research Associate, Laboratory of Nanobiotechnology, Institute of Biochemistry and Physiology of Plants and Microorganisms, Saratov Scientific Centre of the Russian Academy of Sciences (IBPPM RAS)*

***Anna A. Sosnovskaya (****PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Anton Andreev, Igor Hairushev, Nikita Koronevskiy, Ilya Velikanov**

*Influence of the Concentration of Magnetite Nanoparticles in a Colloidal Solution on the Process of Their Loading into Composite Material Based on Calcium Carbonate Microparticles*

An attempt was made to improve the magnetic susceptibility and shielding properties of a composite material based on polycaprolactone fibers mineralized with vaterite microparticles with magnetite nanoparticles encapsulated in them. It is shown that an increase in the concentration of a colloidal solution of magnetite when using the method of adsorption induced by crystallization with the encapsulation of magnetite nanoparticles in vaterite microparticles leads to an increase in the mass fraction of magnetite nanoparticles relative to the total mass of the composite material and leads to a deterioration in the surface morphology of the synthesized material.

 *(Scientific Advisor: Sergei A. Sergeev, PhD in Physics and Mathematics, Associate Professor, Department of Solid Body Physics, SSU)*

**Anton Andreev, Igor Hairushev, Evgeniy Ryabov, Bella Sergeeva**

*The Influence of Temperature on the Permittivity of Plastic in the X-band*

In this paper the characteristics of plastic used in FDM 3D-printing technology are studied in the temperature range of 20÷105ºC. The influence of temperature on the dielectric constant of plastic has been studied. It is shown that the rise in temperature has a greater effect on the shrinkage of plastic than on the permittivity.

 *(Scientific Advisor: Sergei A. Sergeev, PhD in Physics and Mathematics, Associate Professor, Department of Solid Body Physics, SSU)*

**Aleksandra Bogomolova**

*Magnetic Field-controlled Double Negative Media Based on Ferromagnetic Semiconductors for the Microwave Frequency Range*

The results of a theoretical study of dispersion characteristics of transversely and longitudinally magnetized ferromagnetic semiconductors taking into account losses are introduced in this report. It is shown that such medium have the properties of double negative medium in which there are backward electromagnetic waves propagating in gigahertz band.

 *(Scientific Advisor: Sergei V. Grishin, PhD in Physics and Mathematics, Associate Professor, Head*

*of the Department of Electronics, Oscillations and Waves, SSU)*

**Kirill Chulanov, Varvara Lukonina**

*Separate Detection of Sweat Gland Activity and Hemodynamics*

The report presents a new method for detecting the activity of sweat glands and hemodynamics using spectral processing of dynamic thermograms. Concepts such as hemodynamics, vasculomotor and sudomotor functions were studied. Three methods of detecting the activity of sweat glands are considered. The algorithm of separate detection of blood and sweat glands activity of fingers is written. The results of these algorithms were separate images (videos, gif animations) of sweat glands activity and hemodynamics. The data obtained can be used to diagnose various diseases at early stages, such as diabetes mellitus, Parkinson's disease.

*(Scientific Advisor: Andrey A. Sagaidachny, PhD in Physics and Mathematics, Associate Professor, Department of Medical Physics, SSU)*

**Andrey Fomin**

*Analysis of News Published on the Official Website of Saratov State University*

This report describes the use of a set of tools for intelligent data analysis based on machine learning. The data collected from the official website of Saratov State University was used for the study. The dataset consists of news publications in English collected from February 2016 to November 2022. The news section itself plays an important role in disseminating information about the activities, initiatives, and achievements of the institution to a wide audience. This article presents a qualitative analysis of the news published on the university's official website in order to assess its quality, relevance, and effectiveness. The results of the analysis showed that the news section is of high quality, relevance, and effectiveness, and the news articles cover a wide range of topics and are intended for a variety of audiences. The analysis highlights the importance of a well-designed and regularly updated news section on the official university website to inform and engage stakeholders.

*(Scientific Advisor: Livat B. Tyapaev, PhD in Physics and Mathematics, Associate Professor, Department of Discrete Mathematics and Informational Tесhnologies, SSU)*

**Yuliya Gudova**

*Determination of the FSH Level Using Microstructured Waveguides*

Follicle-stimulating hormone (FSH) is a glycoprotein secreted by the adenohypophysis. FSH regulates the production of estrogen and stimulates the growth of ovarian follicles in the ovary. The determination of FSH in the blood is important for in vitro fertilisation (IVF), since its level determines the tactics of treatment and the preparation of a hormone therapy protocol.

At present, microstructured waveguides are considered as one of the most promising sensitive elements of optical waveguide sensors of physical quantities. It is possible to determine the level of sex hormones by using a device with a sensitive element based on microstructured waveguides. This method is distinguished by good repeatability and high sensitivity of the sensitive element to changes in the concentration of the test liquid.

The aim of the study is to improve the parameters and increase the accuracy of the method of determining the FSH level in blood serum using microstructured waveguides.

 *(Scientific Advisor: Valery V. Tuchin , Doctor in Physics and Mathematics, Professor, Department of Optics and Biophotonics, SSU)*

**Darya Korolyova, Ksenia Kovalenko, Margarita Pomyaksheva**

*Investigation of Сhanges in the Level of Microcirculation During Traumatic operations Using LDF*

Measurements of the perfusion index of the peripheral circulatory system of patients during open traumatic operations under combined anesthesia were carried out. The contribution of passive and active vascular tone factors was determined by the spectrum of the laser Doppler flowmeter. It was shown that during the operation at the peak of combined anesthesia, passive vascular tone factors prevailed in the spectrum of blood flow fluctuations: respiratory and cardiac.

 *(Scientific Advisor: Aleksandr V. Skripal, Doctor in Physics and Mathematics, Professor, Head*

*of the Department of Solid Body Physics, SSU)*

**Pavel Lepilin**

*Development of Optical Methods for Analyzing the Quality of Food Products Using Microstructural Waveguides*

Since the advent of spectroscopy, experts have been trying to apply it to analyze the quality of food and develop reliable testing methods. Despite a large number of studies in this direction, the food industry still needs express methods such as determining the percentage of sugar in beverages, allergens, identifying dyes, as well as identifying counterfeit products. According to the "Research Financial Institute" on February 28, 2022, experts conducted a study of the alcohol market in Russia based on 223 indicators of Rosstat, the Federal Customs Service, the Ministry of Economic Development and the Bank of Russia, it was proved that 20% of strong alcohol is sold illegally. MSW with a hollow core provides direct interaction of the liquid or gaseous medium being analyzed directly with the fundamental mode propagating through the core of the waveguide, which means that waveguides of this type have a high potential for their use as a basic element of an optical analyzer.

 *(Scientific Advisor: Valery V. Tuchin , Doctor in Physics and Mathematics, Professor, Department of Optics and Biophotonics, SSU)*

**Arina Maslennikova**

*SERS-Substrates Based on Porous Silicon for Determination of L-929*

At present, it remains difficult to quickly and easily diagnose infectious diseases using sensors with high specificity and sensitivity. Therefore, the report discusses the solution of this problem using SERS-substrates based on porous silicon and silver nanoparticles, which will allow the detection of chemicals in low concentrations due to the phenomenon of giant surface-enhanced Raman scattering of light (SERS). The L-929 cell line is used as the analyte.

 *(Scientific Advisor: Denis V. Terin, PhD in Physics and Mathematics, Associate Professor, Department of Material Sciences and Technologies and Quality Management, SSU)*

**Izabella Serebryakova**

*Noninvasive Method of Diagnosis and Postoperative Monitoring of Human Skin Neoplasms in Vivo*

The diagnostic possibilities of the multimodal approach and the prospects of application in dermatooncological practice, including high-frequency ultrasound (US), optical coherence tomography (OCT), backscattering spectroscopy are presented. This diagnostic method based on a complex of special markers has the potential to differentiate various skin neoplasms at an early stage of development, allows postoperative monitoring to detect relapse, and provides additional information useful for determining treatment tactics.

 *(Scientific Advisor: Elina A. Genina, Doctor in Physics and Mathematics, Professor, Department of Optics and Biophotonics, SSU)*

**Nikita Shabunin, Vasily Sharonov**

*Microwave Obstruction Filters Development Based on the Reflective Properties of Microwave Photonic Crystals*

The theoretical and practical possibility of using microwave photonic crystals, in a scheme with a Y-circulator, as the main material for creating narrow-band microwave filters has been studied. The work demonstrates good correlation between the results of computer simulation and experimental data.

*(Scientific Advisor: Aleksandr V. Skripal, Doctor in Physics and Mathematics, Professor, Head of the Department of Solid Body Physics, SSU)*

**Yuri Surkov**

*Pilot Study of a Low-invasive Ex Vivo Optical Clearing Method Using Needle-free Injection of Optical Clearing Agents*

A new approach to the rapid delivery of optical clearing agents (OCA) to the skin with the aim of fast and efficient optical clearing (OC) of biological tissues is proposed. This method is based on the needleless injection of OCA into the skin. To monitor the condition of the skin of a laboratory rat *ex vivo* before and immediately after needle-free injection of OCA, 10x magnification dermatoscopy, high-frequency ultrasound and optical coherence tomography (OCT) were used. We showed the effect of instantaneous OC after injection of undiluted Omnipaque-300. To analyze changes in the optical parameters of the skin, a method was used that allows one to reconstruct the attenuation coefficients of the OCT signal with depth resolution. The results of the pilot study offer a way to improve the efficiency and speed of optical clearing for further clinical applications in optical imaging and phototherapy.

 *(Scientific Advisor: Elina A. Genina, Doctor in Physics and Mathematics, Professor, Department of Optics and Biophotonics, SSU)*

**POSTER SESSION 2: Natural Sciences (Building 12, Room 126)**

**April 11, Tuesday, 12:30-13:45**

**Time-limit: 7 minutes**

***Anna Yu. Smirnova (****PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

***Mikhail V. Pozharov*** *(PhD in Chemistry, Associate Professor, Department of General and Inorganic Chemistry, SSU)*

**Anastasia Mironova**

*Main Complexes of Invertebrate Animals of Xylotrophic Basidiomycetes of the Saratov Region*

The report considers the complex of invertebrate animals of xyltrophic basidial fungi. A total of 5,920 specimens of invertebrates have been found on the fruit bodies of xyltrophic basidial fungi, of which 4,658 are coleoptera. The vast majority of invertebrates inhabiting fungi substrates encountered in the studied territories are biceps (15%) and coleoptera (77%) insects.

*(Scientific Advisor: Vasily V. Anikin, PhD in Biology, Professor, Department of Animal Morphology and Ecology, SSU; Olga V. Pavlova, PhD in Education, Associate Professor, Department of the English Language and Intercultural Communication, SSU )*

**Anna Sklyar**

*Reactivity of Benzopyrroloimidazolones with Electrophilic Reagents of the Ethoxymethylenemalononitrile Series*

The report deals with the reactivity of benzopyrroloimidazolones in reactions with electrophilic reagents of the ethoxymethylenemalononitrile series and discusses possible pathways for the reaction. Analysis of the reaction centers and physicochemical properties of the proposed compounds was carried out, using quantum chemical calculations and the platform of artificial intelligence - sintelly. The report discusses the spectral and physical data of the obtained compounds, and draws conclusions about the preferred way of formation.

*(Scientific Advisor: Vyacheslav S. Grinev, PhD in Chemistry, Associate Professor, Department of Organic and Bioorganic Chemistry, SSU; Language advisor: Anna A. Sosnovskaya, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Anton Smirnov**

*Synthesis and Properties of a Graft Copolymer of Xanthan Gum and Acrylamide*

The report is devoted to obtaining and studying the water-absorbing properties of the grafted copolymer of xanthan gum and acrylamide. The studied product was synthesized by graft copolymerization under microwave radiation conditions. Varying the content of acrylamide in the initial reaction mixture made it possible to obtain several copolymer samples. The ability of the graft copolymer to water swelling was determined by measuring the mass of samples after contact with water and calculating the ratio of the resulting mass to the sample weight. The result of the measurements was the construction of the dependence of water absorption on the amount of acrylamide in the reaction mixture.

*(Scientific Advisor: Anna B. Shipovskaya, PhD in Chemistry, Professor, Department of Polymers on the basis of LLC "Akripol"; Language advisor: Anna A. Sosnovskaya, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Polina Soboleva**

*Electrostatic Unfolding of Albumin Driven by pH Changes: A Molecular Dynamics Study*

The report describes electrostatic unfolding of albumin driven by pH changes for understanding the mechanisms behind the formation of additional ligand-protein contacts during the imprinting process. All-atom molecular dynamics simulations of albumin were carried out to understand how electrostatics can affect the conformation of a single albumin molecule just prior to self-assembly as well as interactions between two proteins. This work contributes to our general understanding of protein aggregation mechanisms, provides critical new insights about the equilibrium conformation of albumin in its partially denatured state at low pH, and may spur significant progress in our efforts to develop imprinted protein.

*(Scientific Advisor: Natalia A. Burmistrova, PhD in Chemistry, Professor, Institute of Chemistry, SSU Language advisor: Anna A. Sosnovskaya, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Anna Hrykina**

*Li3V2(PO4)3 and Carbon Nanotube Composites as Electrode Materials fEnergy Storage Systems*

The report discusses the use of composites based on Li3V2(PO4)3 (LVP) synthesized by us with carbon nanotubes (CNT). The electrochemical behavior of the composites was studied in battery models with a counter electrode based on Li4Ti5O12 (LTO) and a reference electrode made of lithium metal. Galvanostatic cycling showed that an increase in the proportion of carbon nanotubes in the electrode material leads to a significant decrease in the difference between the charge and discharge voltages, as well as to an increase in the cycling capacity and cycling stability. This corresponds to more energy efficient energy storage when using the studied composites.

*(Scientific Advisor: Arseniy V. Ushakov, PhD in Chemistry, Associate Professor, Department of Physical Chemistry, SSU; Language advisor: Anna A. Sosnovskaya, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Ekaterina Yurova**

*Applying the Method of Projection on Latent Structures for the Separate Spectrophotometric Determination of Antibiotics in Combined Drugs*

The report discusses the use of a combination of spectrophotometry and chemometric algorithms for the quantitative determination of the content of active pharmaceutical ingredients in both single-component and multicomponent medicines. The possibility of the method of projection on latent structures (PLC) for the determination of tinidazole and ciprofloxacin in their combined presence is evaluated. A multidimensional calibration was obtained, with the help of which the content of these medicinal substances in various preparations containing both components was determined.

*(Scientific Advisor: Tatyana Yu. Rusanova, PhD in Chemistry, Head of Department, Department of Analytical Chemistry and Chemical Ecology, SSU; Language advisor: Anna A. Sosnovskaya, PhD in Philology, Associate Professor, Department of the English Language and Intercultural Communication, SSU)*

**Участники конференции:**

1. Абрамова Анастасия Дмитриевна, магистрант института физики, 1321 гр., СГУ им. Н.Г. Чернышевского
2. Адушкина Виктория Вячеславовна, магистрант биологического факультета, 143 гр., СГУ им. Н.Г. Чернышевского
3. Балаева Вера Вячеславовна, магистрант института физики, 1211 гр., СГУ им. Н.Г. Чернышевского
4. Батанова Анна Камильевна, магистрант института физики, 1321 гр., СГУ им. Н.Г. Чернышевского
5. Бирун Анжелика Алексеевна, магистрант института физики, 2321 гр., СГУ им. Н.Г. Чернышевского
6. Бурденкова Елена Юрьевна, магистрант механико-математического факультета, 127 гр., СГУ им. Н.Г. Чернышевского
7. Васильева Виктория Сергеевна, магистрант института физики, 2321 гр., СГУ им. Н.Г. Чернышевского
8. Вахлаева Анна Михайловна, бакалавр института физики, 3081 гр., СГУ им. Н.Г. Чернышевского
9. Векленко Ксения Владимировна, магистрант факультета компьютерных наук и информационных технологий, 172 гр., СГУ им. Н.Г. Чернышевского
10. Гаврилова Анна Юрьевна, магистрант института физики, 1321 гр., СГУ им. Н.Г. Чернышевского
11. Гамаюнова Виктория Олеговна, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
12. Гричек Виктория Михайловна, студент факультета компьютерных наук и информационных технологий, 461 гр., СГУ им. Н.Г. Чернышевского
13. Громова Галина Владиславовна, студент факультета компьютерных наук и информационных технологий, 341 гр., СГУ им. Н.Г. Чернышевского
14. Груздев Артем Анатольевич, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
15. Гудкова Екатерина Андреевна, студент географического факультета, 422 гр., СГУ им. Н.Г. Чернышевского
16. Гуйо Герман Александрович, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
17. Дубровский Александр Ильич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
18. Дунаев Павел Дмитриевич, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
19. Егорова Ольга Игоревна, студент факультета иностранных языков и лингводидактики, 414 гр., СГУ им. Н.Г. Чернышевского
20. Елизаров Арсений Даниилович, магистрант института физики, 1224 гр., СГУ им. Н.Г. Чернышевского
21. Еловенко Дарья Андреевна, магистрант биологического факультета, 143 гр., СГУ им. Н.Г. Чернышевского
22. Емельянов Тимофей Дмитриевич, аспирант факультета компьютерных наук и информационных технологий 1-го года обучения, СГУ им. Н.Г. Чернышевского
23. Еремакина Анастасия Викторовна, магистрант биологического факультета, 142 гр., СГУ им. Н.Г. Чернышевского
24. Кижаев Дмитрий Викторович, аспирант экономического факультета, 1-го года обучения СГУ им. Н.Г. Чернышевского
25. Кильдишева Вероника Андреевна, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
26. Клычков Никита Александрович, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
27. Коврижников Александр Викторович, магистрант биологического факультета, 141 гр., СГУ им. Н.Г. Чернышевского
28. Кокин Евгений Анатольевич, аспирант механико-математического факультета 1-го года обучения, СГУ им. Н.Г. Чернышевского
29. Колесниченко Павел Андреевич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
30. Коннова Светлана Сергеевна,магистрант института физики, 1224 гр., СГУ им. Н.Г. Чернышевского
31. Корнилова Надежда Юрьевна, магистрант института физики, 1321 гр., СГУ им. Н.Г. Чернышевского
32. Котума Андрей Александрович, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
33. Кулисева Юлия Игоревна, магистрант биологического факультета, 142 гр., СГУ им. Н.Г. Чернышевского
34. Левицкий Семён Геннадьевич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
35. Лещев В. Константинович, магистрант института физики, 1224 гр., СГУ им. Н.Г. Чернышевского
36. Локтев Илья Константинович, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
37. Лосев Семен Константинович, аспирант географического факультета 1-го года обучения СГУ им. Н.Г. Чернышевского
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39. Нарцев Андрей Дмитриевич, аспирант факультета компьютерных наук и информационных технологий 1-го года обучения, СГУ им. Н.Г. Чернышевского
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41. Остроухов Даниил Григорьевич, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
42. Павловская Анастасия Сергеевна, магистрант факультета компьютерных наук и информационных технологий, 172 гр., СГУ им. Н.Г. Чернышевского
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46. Плешков Владимир Николаевич, аспирант механико-математического факультета 1-го года обучения, СГУ им. Н.Г. Чернышевского
47. Полещук Владимир Михайлович, магистрант института физики, 1321 гр., СГУ им. Н.Г. Чернышевского
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50. Родичкин Павел Андреевич, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
51. Седова Дина Кирилловна, магистрант института физики, 2321 гр., СГУ им. Н.Г. Чернышевского
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54. Такаишвили Лев Вячеславович, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
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56. Успенский Дмитрий Кириллович, студент факультета компьютерных наук и информационных технологий, 341 гр., СГУ им. Н.Г. Чернышевского
57. Хачатуров Эдуард Гариевич, аспирант биологического факультета 1-го года обучения СГУ им. Н.Г. Чернышевского
58. Хрустицкий Кирилл Владимирович, аспирант механико-математического факультета 1-го года обучения, СГУ им. Н.Г. Чернышевского
59. Царанников Станислав Валерьевич, магистрант института физики, 2321 гр., СГУ им. Н.Г. Чернышевского
60. Чернец Мария Владиславовна, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
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63. Шкодин Максим Сергеевич, магистрант факультета компьютерных наук и информационных технологий, 173 гр., СГУ им. Н.Г. Чернышевского
64. Шнайдер Илья Андреевич, аспирант факультета компьютерных наук и информационных технологий 1-го года обучения, СГУ им. Н.Г. Чернышевского
65. Шубин Сергей Алексеевич, аспирант экономического факультета, 1-го года обучения СГУ им. Н.Г. Чернышевского

**Участники конференции c постерными (стендовыми докладами):**

1. Андреев Антон Андреевич, студент 4 курса института физики СГУ им. Н.Г. Чернышевского
2. Богомолова Александра Владимировна, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
3. Великанов Илья Сергеевич, студент 3 курса института физики СГУ им. Н.Г. Чернышевского
4. Гудова Юлия Дмитриевна, магистрант 1224 гр., института физики СГУ им. Н.Г. Чернышевского
5. Коваленко Ксения Александровна, магистрант 1221 гр., института физики СГУ им. Н.Г. Чернышевского
6. Королева Дарья Александровна, магистрант 1221 гр., института физики СГУ им. Н.Г. Чернышевского
7. Короневский Никита Владимирович, аспирант института физики СГУ им. Н.Г. Чернышевского
8. Лепилин Павел Андреевич, магистрант института физики, 1224 гр., СГУ им. Н.Г. Чернышевского
9. Луконина Варвара Андреевна, магистрант института физики, 1221 гр., СГУ им. Н.Г. Чернышевского
10. Масленникова Арина Алексеевна, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
11. Миронова Анастасия Алексеевна, аспирант биологического факультета 1-го года обучения СГУ им. Н.Г. Чернышевского
12. Помякшева Маргарита Владимировна, магистрант 1221 гр., института физики СГУ им. Н.Г. Чернышевского
13. Рябов Евгений Александрович, аспирант института физики СГУ им. Н.Г. Чернышевского
14. Сергеева Бэла Владимировна, аспирант 2-го года обучения института физики СГУ им. Н.Г. Чернышевского
15. Серебрякова Изабелла Анатольевна, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
16. Скляр Анна Евгеньевна, аспирант института химии 1-го года обучения СГУ им. Н.Г. Чернышевского
17. Смирнов Антон Константинович, аспирант института химии 1-го года обучения СГУ им. Н.Г. Чернышевского
18. Соболева Полина Михайловна, аспирант института химии 1-го года обучения СГУ им. Н.Г. Чернышевского
19. Сурков Юрий Игоревич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
20. Сурков Юрий Игоревич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
21. Фомин Андрей Анатольевич, аспирант факультета компьютерных наук и информационных технологий 1-го года обучения, СГУ им. Н.Г. Чернышевского
22. Хайрушев Игорь Валентинович, магистрант института физики, СГУ им. Н.Г. Чернышевского
23. Хрыкина Анна Валериевна, аспирант института химии 1-го года обучения СГУ им. Н.Г. Чернышевского
24. Чуланов Кирилл Алексеевич, магистрант института физики, 1221 гр., СГУ им. Н.Г. Чернышевского
25. Шабунин Никита Олегович, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
26. Шабунин Никита Олегович, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
27. Шаронов Василий Евгеньевич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
28. Шаронов Василий Евгеньевич, аспирант института физики 1-го года обучения СГУ им. Н.Г. Чернышевского
29. Юрова Екатерина Владимировна, аспирант института химии 1-го года обучения СГУ им. Н.Г. Чернышевского

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**Zeit: 16-00 Tagungsort:** Online платформа Zoom

<https://us04web.zoom.us/j/764471884?pwd=MGM0eVNnNlF3QWJmTnFQK05mTkVLUT09>

***Идентификатор конференции:*** 764 471 884
***Код доступа:*** april2020

**Vorsitzende: T.A. Schido,** *Kandidat der philologischen Wissenschaften, Dozentin*

***Vorträge*** *(Redezeit 7 Minuten)*

**Farida Achmedowa**

Die Geschichte der türkischen Migration in Deutschland.

*(Wissenschaftlicher Betreuer: W.G. Zyplin, Kandidat der historischen Wissenschaften, Professor)*

**Dmitriy Borissow**

Hopjor ist Russlands Perle

**Alina Borodussowa**

Zur Deutung des Ethnonyms „Kasache“

 *(Wissenschaftlicher Betreuer: A.W. Baranow, Kandidat der historischen Wissenschaften, Dozent)*

**Elmira Buschkowa, Nadeshda Fentschenko**

Das Vorschulsystem in Russland und in Deutschland

**Darina Isbassarowa**

Die Merkmale der Grundschulbildung in Russland und in Deutschland

**Anna Kwas**

Vertrauen als Wert in der politischen Kommunikation

*(Wissenschaftlicher Betreuer: S.A. Danilow, Kandidat der philosophischen Wissenschaften, Dozent)*

**Marija Semjonowa**

**Historisch-theoretische Grundlagen der eurasischen Integration**

*(Wissenschaftlicher Betreuer: Ju.G.Golub, Doktor der historischen Wissenschaften, Professor)*

**Vladislaw Smirnof**

Russische Praxis des Einsatzes von PMCs in der Arabischen Republik Syrien

*(Wissenschaftlicher Betreuer: W.G. Zyplin, Kandidat der historischen Wissenschaften, Professor)*

**Julija Torjanik**

Die Macht des Wahnsinns in einer postsäkularen Gesellschaft

*(Wissenschaftliche Betreuerin: E.W. Romanowskaja, Doktorin der philosophischen Wissenschaften, Professorin)*

**Alina Fomina**

Entstehung des deutschen Bankensystems

**Участники немецкой секции**

1. **Ахмедова Фарида**, студентка 2 курса Института истории и международных отношений СГУ имени Н.Г. Чернышевского

 ***«История турецкой миграции в Германии»***

 *(Научный руководитель В.Г. Цыплин, кандидат исторических наук, профессор)*

1. **Борисов Дмитрий,** студент 2 курса Института химии

 СГУ имени Н.Г. Чернышевского

 ***«Хопер – жемчужина России»***

**3. Бородусова Алина**, студентка 2 курса Института истории и международных

 отношений СГУ имени Н.Г. Чернышевского

 ***«К истокам этнонима «казах»***

 *(Научный руководитель А.В. Баранов, кандидат исторических наук, доцент)*

**4. Бушкова Эльмира, Фенченко Надежда,** студентки 1 курса факультета ППиСО СГУ имени Н.Г. Чернышевского

 ***«Система дошкольного образования в России и в Германии»***

**5. Избасарова Дарина,** студентка 1 курса факультета ППиСО СГУ

 имени Н.Г. Чернышевского

 «***Особенности начального образования в России и Германии»***

 **6. Квас Анна,** аспирант 1 курса философского факультета

 СГУ имени Н.Г. Чернышевского

 **«Доверие как ценность политической коммуникации»**

*(Научный руководитель С.А. Данилов, кандидат философских наук, доцент)*

**7. Семенова Мария,** магистрант 2 курса Института истории и международных

 отношений СГУ имени Н.Г. Чернышевского

 ***«Историко-теоретические основы евразийской интеграции»***

 *(Научный руководитель Ю.Г. Голуб, доктор исторических наук, профессор)*

 **8. Смирнов Владислав,** студент 2 курса Института истории и международных

 отношений СГУ имени Н.Г. Чернышевского

 ***«Российская практика использования Частных Военных Компаний в Сирийской Арабской Республике»***

*(Научный руководитель В.Г. Цыплин, кандидат исторических наук, профессор)*

 **9. Торяник Юлия**, аспирант 2 курса философского факультета

 СГУ имени Н.Г. Чернышевского

 ***«Власть безумия в постсекулярном обществе»***

*(Научный руководитель Е.В. Романовская, доктор философских наук, профессор)*

**10.Фомина Алина,** студентка 1 курса экономического факультета СГУ имени

 Н.Г. Чернышевского

 ***«Становление банковской системы Германии»***