

International Conference

# **Days on Diffraction 2019**

June 3 – 7, 2019

St. Petersburg

**Program**

8.30 Registration &amp; Coffee

10.00 Opening (Main Hall)

	<b><i>Diffraction (I)</i></b> (Main Hall) Chair: Andrey Shanin
10.10	Lyalinov M.A., Polyanskaya S.V.: The asymptotics of the wave field scattered by an impedance sector
10.30	Popov M.M.: On theory of surface wave propagation on smooth strictly convex surfaces embedded in $\mathbb{R}^3$
10.50	Elizabeth Its: Riemann–Hilbert approach to scattering problems in elastic media

11.10 Coffee break

	<b><i>Acoustics and elastic waves</i></b> (Main Hall) Chair: Serge Gavrilov	<b><i>Numerical approaches (I)</i></b> (Hall 311) Chair: Leonid Goray
11.30	Filippenko G.V.: The energy flux analysis of the wave processes in the cylindrical shell with spring-type boundary condition on the outer surface	M.A. Basarab: Measuring the dynamic characteristics of Coriolis vibratory gyroscopes via the Hilbert transform technique
11.50	Glushkov E.V., Glushkova N.V., Miakisheva O.A.: On the non-existence of low-frequency traveling A0 mode in a fluid-immersed elastic plate	Alexander S. Dashkov, Leonid I. Goray: Performance improvements of the boundary integral-equation method for diffraction gratings using classic concurrency approaches
12.10	Wilde M.V.: Transition of edge waves to wedge waves in a semi-infinite elastic plate with facets	Oktyabrskaya A.O., Spiridonov A.O., Karchevskii E.M.: Numerical modeling of active microcavities with piercing holes using the Muller boundary integral equations and the Galerkin method
12.30	G.L. Zavorokhin, A.I. Nazarov, S.A. Nazarov: The symmetric mode of an elastic solid wedge with the opening close to a flat angle	Poplavskiy M.V., Vyatchanin S.P.: Asymmetric modified Fabry–Perot cavities for increase the sensitivity of gravitational wave detectors
12.50	Mozhaev V.G., Suierkulova Zh.N., Tleukenov S.K.: Limiting bulk acoustic waves for the basal plane of cubic crystals	Belyayev Yu.N.: Parametric amplification of a longitudinal wave by shear ones in an anisotropic layer
13.10		

13.20 Lunch at *Chateau Vintage* restaurant

	<b><i>ODE and dynamic systems</i></b> (Main Hall) Chair: Alexander Kazakov	<b><i>Numerical approaches (II)</i></b> (Hall 311) Chair: Yakov Bogomolov
15.00	Mikhail V. Babich: On Okamoto-like symmetries of isomonodromic deformation equations	
15.20	Smirnov A.O.: Covering of elliptic curves and Fuchsian equations	Kovtanyuk A.E., Chebotarev A.Yu., Dekalchuk A.A., Botkin N.D., Lampe R.: Non-stationary mathematical model of oxygen transport in brain
15.40	Gelfreikh N.G., Ivanov A.V.: Period-doubling biurcations in the generalized FitzHugh–Nagumo system	Trofimova O.N., Kovtanyuk A.E., Prokhorov I.V.: Mathematical modeling of pulse laser therapy using gold nanoparticles
16.00	Ivanov A.V., Panteleeva P.Yu.: Multibump trajectories of adiabatically perturbed periodic Hamiltonian systems with pitchfork bifurcations	Asadchikov, V.E., Goray, L.I., Dashkov, A.S., Roshchin, B.S., Muslimov, A.E.: X-ray reflectometry and fluorescence analysis of gratings working in classical and conical diffraction

16.20	Sergey Vakulenko, Ivan Morozov: Centralized networks	Iovane G., Nasedkin A.V.: Computer simulation of torsional transducer from porous piezo-ceramics with twisted rod
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16.40 **Coffee break**

	<b><i>Electromagnetics (I)</i></b> (Main Hall) Chair: Sergei Tretyakov	
17.00	Sergej Orlov, Pavel Gotovski, Justas Baltrukonis, Orestas Ulčinas, Titas Gertus: Optical engineering of vector pulsed beams with parabolic and elliptic cross-sections and their propagation through planar interface	
17.20	Kudrin A.V., Petrov E.Yu., Zaboronkova T.M., Zaitseva A.S.: Radiation from nonsymmetric sources in a magnetoplasma	
17.40	V. Zalipaev, A. Matveentsev, V. Bulgakova, S. Pozdnyakova, A. Rgevski: Electromagnetic waves scattering from infinite periodic arrays of thin absorbing wires	
18.00	Raschetova D.V., Valovik D.V.: Fully symmetric guided electromagnetic waves in a shielded slab filled with anisotropic dielectric	

	<b>Spectral theory methods (I)</b> Chair: Andrey Badanin	(Main Hall)	<b>Inverse methods (I)</b> Chair: Eric Todd Quinto	(Hall 203)
9.30	Meshkova Yu.M., Suslina T.A.: Homogenization of elliptic and parabolic equations in a bounded domain with the Neumann boundary condition		Denisiuk A.: On range condition of the tensor x-ray transform in $\mathbb{R}^n$	
9.40				
9.50	Meshkova Yu.M.: On homogenization of periodic parabolic systems			
10.10	Dorodnyi M.A.: Homogenization of the periodic Schrödinger-type equations with the lower order terms		R.G. Novikov: Moutard type transformations for generalized analytic functions and for the conductivity equation	
10.30	Sloushch V.A.: Homogenization of high order elliptic operators with correction terms		Venky P. Krishnan: Momentum ray transforms	
10.40				
10.50	Pastukhova S.E.: Homogenization of multivalued monotone operators under nonstandard growth conditions			

11.10 **Coffee break**

	<b>Spectral theory methods (II)</b> (Main Hall) Chair: Svetlana Pastukhova	<b>Underwater acoustics. Theory and simulation (I)</b> (Hall 311) Chair: Pavel Petrov	<b>Inverse methods (II)</b> (Hall 203) Chair: Mikhail Belishev
11.30	Andrey Badanin: Third order operators with three-point conditions associated with Boussinesq's equation	Akulichev V.A., Bulanov V.A., Bugaeva L.K.: On the structure of the acoustic field in the sea containing a developed bubble layer near the surface	Fedor Goncharov: Weighted Radon transforms and their inversion
11.50	Mokeyev D.S.: Dislocation problem for the Dirac operator	Zaikin O.S., Petrov P.S.: Acoustics@home volunteer computing project and an investigation on the accuracy of dispersion-based geoacoustic inversion method	Timonov A., Tamasan A.: Regularisation of a weighted least gradient Robin problem for conductivity imaging
12.00			
12.10	Saburova N.Yu.: Spectrum of Schrödinger operators with guided potentials on periodic graphs	Katsnelson B.G., Petrov P.S.: Excitation and propagation of whispering gallery waves in shallow water waveguide in the vicinity of a curvilinear isobath	
12.30	Nikita N. Senik: On homogenization for a locally periodic elliptic Dirichlet problem	Tyshchenko A.G., Petrov P.S., Ehrhardt M.: Wide-angle mode parabolic equation with transparent boundary conditions and its applications in shallow water acoustics	Filatova V.M., Pestov L.N.: Breast ultrasound tomography problem: 3D simulation
12.50	Vasilchuk V.: Fluctuations of the spectrum of symmetrically deformed unitary invariant random matrix ensemble	M.Yu. Trofimov: Consideration of reflected waves in the parabolic equation method of arbitrarily high accuracy	
13.00			

13.10 **Lunch at Mama Roma restaurant**

	<b>Spectral theory methods (III)</b> (Main Hall) Chair: Tatiana Suslina	<b>Underwater acoustics. Theory and simulation (II)</b> (Hall 311) Chair: Mikhail Trofimov	<b>Inverse methods (III)</b> (Hall 203) Chair: Roman Novikov
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15.00	Borzov V.V., Damaskinsky E.V.: Decomposition of eigenfunctions of the continuous spectrum of a locally perturbed discrete Schrödinger operator by eigenfunctions of the continuous spectrum of an unperturbed operator	Lunkov A.A.: Modeling the interference pattern of bottom reverberation in the presence of intense internal waves on an ocean shelf	Vladislav V. Kravchenko: Transmutation operator method for efficient solution of forward and inverse spectral problems
15.20 15.30	Kharuk N.V., Gulevich D.R.: Excitons in the Kronig–Penney model	Sergeev S.A., Tolchennikov A.A., Petrov P.S.: On the simulation of pulse acoustic signals in the shallow water with slope of the bottom	
15.40	Nazarov S.A., Slutskiy A.S.: The polarization matrix for a junction of elastic rods	Virovlyansky A.L., Kazarova A. Yu., Lyubavin L. Ya.: Stable components of wave fields in underwater acoustic waveguides	
16.00	Ivanov A.V., Kharuk N.V.: Heat kernel for Laplace operator with covariant derivative: expansions, path integral and gauges	Katsnelson B.G., Godin O.A., Yarina M.V.: Time frequency analysis of the sound field modal decomposition in shallow water in the presence of internal waves	
16.20	Robert Jordan Bishop: The analysis of bending thin periodically perforated plates	Yu.M. Zaslavsky, V.Yu. Zaslavsky: Features of the bottom seismic wave by the generation of a hydroacoustic source in a condition of the shore zone (3D numerical simulation)	

16.40 **Coffee break**

	<b><i>Electromagnetics (II)</i></b> (Main Hall) Chair: Tatiana Zaboronkova	
17.00	Pavel Gotovski, Sergej Orlov, Vitalis Vosylius: Vectorial focus wave modes with elliptic and parabolic cross-section at planar interface between two dielectrics	
17.20	Albooyeh M., Simovski C.R., Safari M., Tretyakov S.A.: Extreme scattering properties of small objects with compensated loss	
17.40	Kondratiev N.M., Lobanov V.E.: Effect of forward-backward wave coupling on Kerr frequency comb generation in optical microresonators	
18.00	D.V. Vikulin, M.A. Yavorsky: All-fiber polarization-dependent optical-vortex-controlling via acousto-optic interaction	
18.20	Kurseeva V.Yu.: Numerical method for electromagnetic non-polarized symmetric hybrid wave propagation problem in a non-homogeneous media with arbitrary nonlinear saturation	

20.00 **Boat trip**

	<b>Localized waves (I)</b> (Main Hall) Chair: Hendrik Paul Urbach	<b>Underwater acoustics. Theory and simulation (III)</b> (Hall 311) Chair: Boris Katsnelson	<b>Inverse methods (IV)</b> (Hall 203) Chair: Sergei Avdonin
9.50	Kuydin V.V., Perel M.V.: Gaussian beams for Dirac equation in electromagnetic field	Kozitskiy S.B.: Examples of test calculations by the acoustic mode parabolic equation with the mode interaction and the elastic bottom	
10.10	Fedorov S.V., Rosanov N.N., Veretenov N.A.: Topological 3D-laser solitons and their transformations	Kan V.A., Liu E.R., Sushchenko A.A.: Ocean bathymetry as an inverse problem for the radiative transfer equation	Manmohan Vashisth: Reconstruction for the coefficients of a quasilinear elliptic partial differential equation
10.30	Alexander S. Blagoveshchensky, Aleksei P. Kiselev: Bateman-type non-complexified solution of the wave equation with two spatial variables	Gulin O.E., Yaroshchuk I.O.: On the solution of the problem of low-frequency acoustic signal propagation in a shallow-water waveguide with three-dimensional random inhomogeneities	Ali Feizmohammadi: Recovery of time dependent coefficients from boundary data for hyperbolic equations
10.40			
10.50	Ya.L. Bogomolov, A.D. Yuna-kovsky: On hyperbolization of an unbounded Schrödinger type operator	Volkov M.V., Lunkov A.A., Petnikov V.G., Grigor'ev V.A.: Normal mode coupling in a waveguide with a range-dependent sound speed profile in the bottom	

11.10 **Coffee break**

	<b>Localized waves (II)</b> (Main Hall) Chair: Nikolay Rosanov	<b>Inverse methods (V)</b> (Hall 203) Chair: Victor Mikhaylov
11.30	Plachenov A.B., Dyakova G.N.: Generalized quadratic Helmholtz–Gauss beams	Harrach, B., Jahn, T.N., Potthast, R.: Beyond the Bakushinskii veto part II: Discretisation and white noise
11.50	Bulygin A.N., Pavlov Yu.V.: Solutions of the nonlinear nonautonomous Klein–Fock–Gordon equation. Choice of ansatz	
12.00		Yavar Kian: Inverse problems for diffusion equations
12.10	Manevitch L.I., Kovaleva M.A.: The condition of non-conventional synchronyzation existence in the chains of weakly coupled autogenerators	
12.30	Barshak E.V., Alexeyev C.N., Vikulin D.V., Lapin B.P., Yavorsky M.A.: Types of mode dispersion of optical vortices in twisted optical fibers	Pestov L.N.: Approximate controllability of the wave equation with mixed boundary conditions
12.50	Xi Z., Urbach H.P.: Tunable spin-orbit optical coupling to retrieve the shape of deep subwave-length objects from the scattered far field intensity	
13.00		

13.10 **Lunch at Mama Roma restaurant**

	<b>Asymptotic methods (I)</b> (Main Hall) Chair: Alexander Fedotov	<b>Inverse methods (VI)</b> (Hall 203) Chair: Leonid Pestov
15.00	Dobrokhotov S.Yu.: Asymptotic solutions to the Cauchy problem with localized initial data for linear systems of evolution equations with real characteristics	Avdonin S.A.: Control and inverse for quantum graphs

15.20	Fedotov A., Shchetka E.: The values of the integrated density of states in the spectral gaps of the Harper operator	Agaltsov A.D.: Uniqueness and reconstruction in time-harmonic passive inverse problems with applications to helioseismology
15.30	Anikin A.Yu., Dobrokhotov S.Yu., Nazaikinskii V.E., Minenkov D.S.: Localized solutions of two-dimensional linearized shallow water equation near a shore	
16.00	Klevin A.I.: Asymptotic “bouncing ball” type eigenfunctions of the two-dimensional Schrödinger operator with symmetric potential	
16.20	Minenkov D.S.: Asymptotics of the stationary Schrödinger equation in the Weyl chamber	

16.40 **Coffee break**

	<b><i>Diffraction (II)</i></b> (Main Hall) Chair: Mikhail Lyalinov
17.00	A.V. Shanin, A.I. Korolkov, K.S. Knyazeva: Matrix Klein–Gordon equations for waveguides
17.20	Ekaterina A. Zlobina: High-frequency diffraction by a contour with a Hölder discontinuity of curvature
17.40	Anna Kirpichnikova, Nataliya Kirpichnikova: Creeping waves in the shadow region with the Neumann conditions

	<i>Asymptotic methods (II)</i> (Main Hall) Chair: Sergei Dobrokhotov	<i>Inverse problems (VII)</i> (Hall 203) Chair: Alexander Denisiuk
9.30	Anikin A.Yu., Dobrokhotov S.Yu., Nazaikinskii V.E., Tsvetkova A.V.: Asymptotic eigenfunctions of the 2D operator $\nabla D(x)\nabla$ degenerating on the boundary of the domain and billiards with semi-rigid walls	
9.50	Sergeev S.A.: Asymptotic solution of the explicit difference scheme for the wave equation with localized initial data	
10.10	Vybornyi E.V.: On discrete WKB methods for resonance electromagnetic traps	Eric Todd Quinto: Microlocal analysis of a Compton tomography problem
10.30	Fedotov A.: Two coalescing turning points for difference equation	
10.40		Timonov A.A., Belishev M.I., Karazeeva N.A.: On quantitative acoustic imaging via boundary control method
10.50	B. Tirozzi, P. Buratti, F. Alladio, P. Micozzi: Preliminary 2D modelling of the screw pinch plasma in PROTO-SPHERA	

11.10 **Coffee break**

	<i>Waves in complex media</i> (Main Hall) Chair: Maria Wilde	<i>Inverse problems (VIII)</i> (Hall 203) Chair: Maxim Demchenko
11.30	Grekova E.F.: Linear homogeneous isotropic viscoelastic constrained reduced Cosserat medium as an acoustic metamaterial	Belishev M.I., Simonov S.A.: The wave model of a metric space with measure
11.50	Polyanskiy V.A., Belyaev A.K., Porubov A.V., Yakovlev Yu.A., Polyanskiy A.M.: Nonlinear waves of the inner medium due to dynamic loading of bi-continuum	
12.00		A.S. Mikhaylov, V.S. Mikhaylov: Krein strings with nonsmooth mass density. Forward and inverse problems
12.10	Shishkina E.V., Gavrillov S.N., Mochalova Yu.A.: Forced oscillation of a system with time-varying parameters possessing a single trapped mode: a resonant case	
12.30	Alexander A. Zharov, Jr., Alexander A. Zharov: Giant nonlinear Goos-Hänchen effect at the reflection of light from gyrotropic liquid metacrystal	Kaplun A.V.: Eikonal algebra on metric graph
12.50		

13.00 **Lunch at *Mama Roma* restaurant**

	<i>Water waves (I)</i> (Main Hall) Chair: Nikolay Kuznetsov
15.00	Mats Ehrnström, Yuexun Wang: Enhanced existence time of solutions to the fractional Korteweg – de Vries equation
15.20	Vladimir Kozlov: Two-dimensional solitary waves with a near-bottom stagnation
15.40	Dobrokhotov S.Yu., Petrov P.N.: Asymptotics of long surface waves generated by a localized source moving along the bottom of the basin
16.00	Oleg V. Motygin: Non-uniqueness in the problem of forward motion of bodies in a two-layer fluid
16.20	Nikolay Kuznetsov: Direct and inverse spectral problems for sloshing of a two-layer fluid

16.40 **Coffee break**



	<i>Water waves (II)</i> chair Vladimir Kozlov	(Main Hall)
17.00	Bulatov V.V., Vladimirov Yu.V.: Internal gravity waves in stratified medium with shear flows: analytical solutions and asymptotics	
17.20	Khabakhpasheva T.I., Shishmarev K.A., Korobkin A.A.: Hydroelastic waves in ice channel caused by moving load	
17.40	Dişibüyük N.B., Korobkin A.A., Yilmaz, O.: Diffraction of flexural-gravity waves from a vertical cylinder of non-circular cross section	
18.00	Malenica S., Korobkin A.A., Khabakhpasheva T.I.: An overview of the methods for linear and nonlinear diffraction of flexural gravity waves with vertical circular cylinder	
18.20	Gaydukov R.K., Danilov V.G.: Multideck structures of boundary layers in compressible flows	

**Friday, June 7, 2019**

**Physics Faculty, Petrodvorets**

**8.10**            **Departure of the buses from St.Petersburg (Ital'yanskaya ulitsa) to Petrodvorets**

**9.00**            **Posters**

**Plenary talk** — Chair: Mikhail Belishev

**9.25**    Boris Vainberg: *Propagation of waves in three-dimensional periodic media*

**10.00**            **Coffee break & Posters**

I.V. Boikov, A.I. Boikova, V.A. Roudnev: Continuous operator method application for direct and inverse scattering problems.

Dmitrieva L.A., Kuperin Yu.A., Mokin P.V., Chernykh G.A.: Using specialized artificial neural networks to generate time series similar to human electroencephalograms.

Es'kin V.A., Kudrin A.V.: A method for constructing an orthogonal system of eigenwaves of a cluster of open gyrotropic cylindrical waveguides.

Farafonov V.G., Ustimov V.I., Sokolovskaya M.V., Il'in V.B.: Solution of the electrostatic problem for a core-mantle particle with non-confocal spheroidal boundaries of the layer.

Liu X., Petrov N.V., Kulya M.S., Tsyarkin A.N., Grachev Ya.V., Kozlov S.A.: Spectral Huygens filter for pulsed broadband terahertz radiation.

Melikhova A.S., Popov I.Y.: Resonant state completeness for a ball with attached wires in magnetic field.

Philippov V.B.: On some numerical method for solving integral equations of the theory of diffraction.

Poletaev D.A., Sokolenko B.V., Prisyazhniuk A.V., Shostka N.V., Karakchieva O.S. : Digital holographic imaging of inhomogeneities at the optical fiber soldering area.

Razumov D.D., Salin M.B.: Numerical simulation of sound scattering on a partly rough pressure-release surface via boundary element method.

Sergeeva N.V., Wilde M.V.: Asymptotic analysis of harmonic waves propagation in a viscoelastic layer in the cases of fractional Voigt and Maxwell models.

Shestopalov Yuri, Snegur Maxim, Smolkin Eugene: Diffraction of TM polarized EM waves by nonlinear inhomogeneous Goubau line.

Tagirdzhanov A.M., Kiselev A.P.: Nonintegrability of the energy density of "complex source" wavefields.

Tushavin G.V., Trifanov A.I.: Structure of invariant subspaces of the rotation group image under the Jordan mapping.

Vornovskikh P.A., Sushchenko A.A.: Remote sensing problem in the existence of acoustic noise in the ocean.

Vorontsova I.O., Melnik M.V., Tsyarkin A.N., Kozlov S.A.: Modified Z-scan method: numerical simulation and analytical solution.

Vozianova A.V., Gill V.V., Sharaevsky M.V., Soboleva V.Y., Khodzitsky M.K.: Emission illusion at the angle.

Xi Z., Urbach H.P.: Steering light by tailored excitation of nano-antennas and applications to nano-metrology.

Z.A. Yanson: Nonstationary inhomogeneous waves near the boundary of an anisotropic elastic body.

**Plenary talks** — Chair: Aleksei Kiselev

**11.25**    Valery Smyshlyaev: *On the diffraction of whispering gallery waves by boundary inflection points*

**12.00**    Alexander Korobkin: *Water exit and entry*

**Friday, June 7, 2019**

**Physics Faculty, Petrodvorets**

**13.10**

**Lunch at *Krasnyy Kabachok* restaurant**

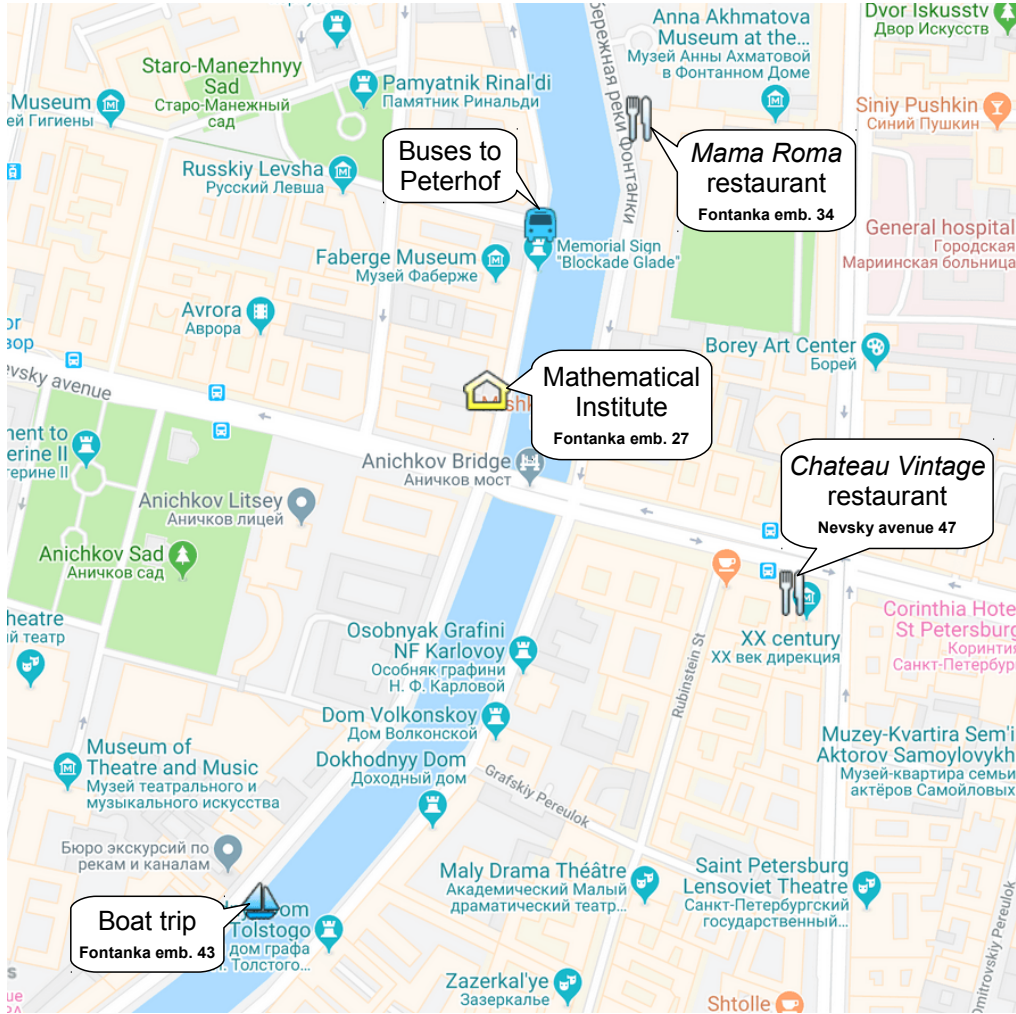
**14.30**

**Excursion**

**18.00**

**Picnic party at Peterhof forest**

## PDMI area map



## Map of the picnic area

