University	Peter the Great St. Petersburg Polytechnic University
Level of English proficiency	Advanced (C1)
Educational program and field of the educational program for which the applicant will be accepted	PHYSYCAL SCIENCES & TECHNOLOGY 1.5.2. Biophysics BIOLOGY & BIOTECHNOLOGY 1.5.3. Molecular biology 1.5.6. Biotechnology
List of research projects of the potential supervisor (participation/leadership)	Grant “Development of scientific and theoretical foundations for the creation of logistics networks based on digital platforms” funded by RFBR according to the research project № 20-014-00029
List of the topics offered for the prospective scientific research	1) Russian Science Foundation grant No. 22-14-00278 (Project Supervisor: A.L. Konevega, 2017-2019) "Translating ribosome - conformational foundations of functioning and inhibition". 2) Agreement No. 075-15-2021-1360 of the Federal Scientific and Technical Program for the Development of Synchrotron and Neutron Research “Development of a domestic innovative theranostic medicine based on terbium isotopes for radioimmune therapy of malignant neoplasms of various histological types" (Project Supervisor: A.L. Konevega, 2021-2023) 3) RFBR 20-04-60491 COVID (Project Supervisor: A.L. Konevega, 2020-2022) “Fundamental principles for the development of new medicine with specific activity against SARS-CoV-2 coronavirus.” 4) RSF №17-14-01416 (Supervisor: A.L. Konevega, 2017-2019) “Conformational dynamics of the translational ribosome”. 5) RFBR komfi No. 17-00-00368 (Supervisor: A.L. Konevega, 2017-2019) “Study of the kinetics and mechanism of inhibition of specific mRNA sequences translation”. 6) RFBR 13-04-40212N (komfi) “Study of molecular mechanisms of elongation cycle reactions and development of methods for searching for new classes of antibacterial agents having impact on protein biosynthesis”. (Supervisor: A.L. Konevega 2013-2015).
	Natural sciences 1.06. Biological sciences, Biophysics
	Supervisor’s research interests Radiopharmaceuticals, medical radiology, proton therapy, Antibiotics that inhibit protein biosynthesis, cryoelectron microscopy
	Research highlights Radiopharmaceuticals development, Molecular mechanism of protein biosynthesis, cryoelectron microscopy

<table>
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Research supervisor:
Andrei Konevega,
PhD in Physics and Mathematics (Peter the Great St. Petersburg Polytechnic University, 2005)</td>
<td>Supervisor’s specific requirements:
Basic education in the field of physics, biology or medicine.</td>
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<td>Supervisor’s main publications
Pletnev PI, et al. Ribosomal protein S18 acetyltransferase RimI is responsible for the acetylation of elongation factor Tu. J Biol Chem. 2022 May;298(5):101914. doi: 10.1016/j.jbc.2022.101914. Epub 2022 Apr 7. PMID: 35398352; PMCID: PMC9079301.

Paleskava A, et al. Differential Contribution of Protein Factors and 70S Ribosome to Elongation. Int J Mol Sci. 2021 Sep 5;22(17):9614. doi: 10.3390/ijms22179614. PMID: 34502523; PMCID: PMC8431766.
Garaeva L, et al. Delivery of functional exogenous proteins by plant-derived vesicles to human cells in vitro. Sci Rep. 2021 Mar 22;11(1):6489. doi: 10.1038/s41598-021-85833-y. PMID: 33753795; PMCID: PMC7985202.
Maksimova EM, et al.. Multifaceted Mechanism of Amicoumacin A Inhibition of Bacterial Translation. Front Microbiol. 2021 Feb 12;12:618857. doi: 10.3389/fmicb.2021.618857. PMID: 33643246; PMCID: PMC7907450.
Pichkur EB, et al. Insights into the improved macrolide inhibitory activity from
the high-resolution cryo-EM structure of dirithromycin bound to the E. coli 70S ribosome. RNA. 2020 Jun;26(6):715-723. doi: 10.1261/rna.073817.119. Epub 2020 Mar 6. PMID: 32144191; PMCID: PMC7266154.</td>
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<td>Results of intellectual activity
By means of methods of prestationary kinetics, biochemical and biophysical methods the mechanisms of action of antibiotics - inhibitors of protein synthesis have been characterized. Cryoelectron microscopy and X-ray diffraction analysis have been used to obtain spatial structures of ribosomal functional complexes with inhibitors. Structural and functional correspondence has been established and the molecular mechanism of action of antibiotics has been investigated in detail.
For the first time, a new mechanism of regulation of translation initiation in case of a strict response has been discovered.
Cryoelectron microscopy was used to study the ribosome complex in the process of re-coding the AUG stop codon to the amino acid selenocysteine (Sec). The mechanism of GTPase activation has been demonstrated. The kinetic parameters of re-coding, GTP hydrolysis, and peptide bond synthesis were studied making use of prestationary kinetics methods.
The enzyme that provides the formation of a tRNA post-transcriptional modification – dihydrouridine. It has a unique mechanism for recognizing the corresponding substrate nucleotide at different positions of tRNA: 16 and 20. For correct positioning of the substrate in the active center, the tRNA body turns at 160 degrees.</td>
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	The functional ribosome complex in the process of decoding the correct codon (UUC for tRNAPhe), stabilized by the antibiotic kyrromycin, was studied by means of cryoelectron microscopymethods. The use of an aberration corrector in combination with a high-class technique for obtaining homogeneous samples made it possible to obtain a structure with a record high resolution (< 3Å).