DENIS V. KHOMITSKY

University	National Research Lobachevsky State University of Nizhny Novgorod
Level of English proficiency	Advanced
Educational program and field of the educational program for which the applicant will be accepted	1.3. Physical sciences 1.3.8. Condensed Matter Physics
List of research projects of the potential supervisor (participation/leadership)	1. State assignment of the Ministry of Science and Higher Education of the Russian Federation "Nanostructured semiconductors, Dirac materials and crystals of biologically active substances for photonics, spintronics, quantum computing and biomedicine", project No. 0729-2020-0058 (2020-2022) (participant) 2. State assignment of the Ministry of Science and Higher Education of the Russian Federation "Quantum structures for quantum technologies", project No. FSWR-2023-0035 (2023-2025) (participant)
List of the topics offered for the prospective scientific research	1) Spin dynamics in quantum dots in nonstationary electric field; 2) Quantum dots in topological insulators formed by magnetic barriers; 3) Quantum states and transport in in two-dimensional topological semimetals; 4) Spin and optical properties of heterostructures with quantum wells and magnetic atom layers.
 Research supervisor: Denis V. Khomitsky Doctor of Science/PhD (Lobachevsky State University of Nizhny Novgorod)	**Physical and technical sciences**
	Supervisor's research interests Spintronics, topological insulators, spin, optical, magnetic and transport properties of nanostructures.
	Research highlights Theoretical modeling of quantum states, spin textures, optical and transport properties of semiconductor nanostructures such as quantum wells, nanowires and quantum dots with spin-orbit coupling. Tunneling and external field driving effects on the spin evolution. Quantum dot formation in topological insulators by magnetic barriers. Modeling of bulk and edge states in two-dimensional topological semimetals, including the effects of magnetic field. Regular and irregular dynamics of tunneling and spin in nonstationary fields applied to nanostructures.
	Supervisor's specific requirements Well-developed skills in basic methods of quantum mechanics; Well-developed skills in solid state physics; Good skills in programming of problems in quantum mechanics, mathematical physics and linear algebra.
	Supervisor's main publications 11 papers in WoS, Scopus and RSCI during 2020-2024, including: [1] D.V. Khomitsky, E.A. Lavrukhina, and E.Ya. Sherman, Spin Rotation by Resonant Electric Field in Few-Level Quantum Dots: Floquet Dynamics and Tunneling // Physical Review Applied. – 2020. – V.14. – P.014090. [2] M.V. Dorokhin, M.V. Ved, P.B. Demina, D.V. Khomitsky, K.S. Kabaev, M.A.G. Balanta, F. Ikawa, B.N. Zvonkov, and N.V.

	Dikareva, Role of resident electrons in the manifestation of a spin polarization memory effect in Mn delta-doped GaAs heterostructures // Physical Review B. – 2021. – V.104. – P.125309. [3] D.V. Khomitsky, A.A. Konakov and E.A. Lavrukhina, Formation of bound states from the edge states of 2D topological insulator by macroscopic magnetic barriers // Journal of Physics: Condensed Matter. – 2022. – V.34. – P.405302. [4] D.V. Khomitsky and S.A. Studenikin, Single-spin Landau-Zener-Stückelberg-Majorana interferometry of Zeeman-split states with strong spin-orbit interaction in a double quantum dot // Physical Review B. – 2022. – V.106. – P.195414. [5] D.V. Khomitsky, M.V. Bastrakova, V.O. Munyaev, N.A. Zaprudnov, and S.A. Studenikin, Controllable single-spin evolution at subharmonics of electric dipole spin resonance enhanced by four-level Landau-Zener-Stückelberg-Majorana interference // Physical Review B. – 2023 – V.108. – P.205404.
	Results of intellectual activity -