Oleg Olendski, Ph.D.

Assistant Professor
King Abdullah Institute for Nanotechnology
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Citizenships: Canadian
Languages: English, Russian, Belarusian, Polish
Membership: American Physical Society

Keywords: theoretical semiconductor physics, computational nanophysics, low-dimensional quantum nanostructures (quantum wells, quantum wires, quantum dots), numerical methods (linear algebra, integration and differentiation, statistical analysis: linear and nonlinear optimization of large-scale data, finite difference, elimination of catastrophic cancellation of precision), mathematical modeling

Technical Proficiencies

Programming Languages: Fortran (20+ years), C/C++ (15 years), Matlab (8 years), Maple (10 years), *Mathematica* (13 years)
Platforms and Tools: Linux (Red Hat), Microsoft Visual Studio, Delphi.

Education

1987 M.Sc. Degree in Theoretical Physics
Grodno State University, Grodno, Belarus
Title of M.Sc. thesis: "Calculation of the capacitance of two coaxial cylinders of the same diameter with their butt-ends separated by the arbitrary distance"
Supervisor: Professor P. S. Fridberg

1994 Ph.D. in Computational Physics
Belarusian State University, Minsk, Belarus
Title of Ph.D. thesis: "Modeling of the influence of the external electromagnetic fields on quantum nanostructures"
Supervisor: Professor A. M. Shirokov, Corresponding Member of the Belarusian Academy of Sciences

The constant reviewer of *The Physical Review and Physical Review Letters* journals, occasional reviewer of the IOP and Elsevier journals

Professional Experience and Duties

King Abdullah Institute for Nanotechnology, King Saud University, Riyadh, KSA *2010 –*
Assistant Professor
Research in theoretical nanophysics. Write papers in scientific journals and present calculated results at the conferences. Mentor and teach graduate and Ph.D. students (courses Phys 502 *Methods of Mathematical Physics*, Phys 652 *Quantum Mechanics*).

Computational Center for Molecular Structures and Interaction, Jackson, USA *2003 – 2010*
Research Scientist
Recruited to lead a NSF and DoD funded project "Novel Nanostructures Based on Low-Dimensional Semiconductor Systems". Design and implement advanced numerical algorithms for exact quantum calculations of the optical and electronic properties of the new class of semiconductor based devices (quantum waveguides and dots) in electromagnetic fields. Create, debug, test and run Fortran and C++ code on Linux and Windows platforms. Write papers in scientific journals and present calculated results at the conferences. Mentor and teach students.

JDS Uniphase, Ottawa, ON, Canada *2000 - 2002*
Research Scientist
Designed Arrayed Waveguide Grating (AWG) for optical multiplexing/demultiplexing devices. Developed and implemented an idea of statistical numerical optimization of non uniformity of the cross-talk for adjacent channels that was applicable for TE- and TM- modes and automatically took into account polarization dependent loss for each channel. Implemented linear and nonlinear optimization for calculating effective and group indices of AWGs as a function of the wavelength at different temperatures. Compared efficiencies of silica and InP–based planar lightwave circuits.

Northern Digital Inc., Waterloo, ON, Canada *1999 – 2000*
Research Scientist
Developed and implemented linear and nonlinear multivariate statistical algorithms that allowed to substantially increase accuracy of precise 3D spatial measurement sensors based on plastic fiber technology for medical applications. Applied theory of Euler angles and roll-pitch-yaw geometry for the correct determination of the bend and twist of the ShapeTape sensor. Performed experiments for characterization and optimization of 3D measurement sensors.

Waterloo Maple Inc., Waterloo, ON, Canada *1998 – 1999*
Mathematical Developer
Participated in the project to make a computer algebra system Maple V compliant with IEEE standard for Binary Floating-Point Arithmetic. Introduced changes into the code to accommodate new features of the Standard such as numerical exceptions, "Not a Number", signed floating zero, infinity. Reviewed, changed, debugged and tested library code for special mathematical functions extending their definitions to and describing their properties on the whole complex plane.

Atomic and Molecular Engineering Laboratory, Minsk, Belarus *1992 - 1998*
Belarusian State University
and
Department of Physics, Kwangju, South Korea *1995 - 1996*
Chonnam National University
Researcher (1992 – 1995), **Senior Researcher** (1996 – 1998)
Developed computational tools in (Fortran, Pascal and C/C++) for efficient calculation of the design of metallic planar waveguides and ultra-small devices of modern electronics and optoelectronics based on exact solutions of Schrödinger and/or Maxwell differential equations. Conducted comparative analysis of different numerical methods and showed that, for the structures studied, appropriate semi analytical mode-matching technique is more efficient than differential Runge-Kutta methods. Proposed, developed and implemented semi classical method of solving Boltzmann kinetic integro-differential equation for bulk semiconductors. Wrote papers in scientific journals and presented discovered results at a number of international conferences.

List of Publications

1) . O. Olendski, "Guiding structures with multiply connected cross sections: Evolution of propagation in external fields at complex Robin parameters "// Annals of Physics, vol. 327, p. 1365 (2012)
2). H. Najar and O. Olendski, "Spectral and localization properties of the Dirichlet wave guide with two concentric Neumann discs"// Journal of Physics A: Mathematical and Theoretical, vol. 44, art. 305304 (2011)
3). O. Olendski and L. Mikhailovska, "Deformed volcano disk in magnetic fields"//in *Physics, Chemistry and Application of Nanostructures. Proceedings of International conference Nanomeeting 2011*. edited by V. E. Borisenko, S. V. Gaponenko, V. S. Gurin, C. H. Kam, *World Scientific*, Singapore, 2011, pp. 74-77

4) . O. Olendski, “Resonant alteration of propagation in guiding structures with complex Robin parameter and its magnetic-field-induced restoration ”// Annals of Physics, vol. 326, p. 1479 (2011)
5). O. Olendski and L. Mikhailovska, “Theory of a curved planar waveguide with Robin boundary conditions”// Physical Review E, vol. **81**, art. 036606 (2010)
6). O. Olendski and L. Mikhailovska, “Analytical and numerical study of a curved planar waveguide with combined Dirichlet and Neumann boundary conditions in a uniform magnetic field”// Physical Review B, vol. **77**, art. 174405 (2008)
7). O. Olendski, Q.L. Williams and T.V. Shahbazyan, “Two-dimensional magnetoexcitons in the presence of spin-orbit coupling”// Physical Review B, vol. **77**, art. 125338 (2008)
8). O. Olendski and L. Mikhailovska, “A straight quantum waveguide with mixed Dirichlet and Neumann boundary conditions in uniform magnetic fields”// Journal of Physics A: Mathematical and Theoretical, vol. **40**, p. 4609 (2007)
9). O. Olendski and T.V. Shahbazyan, “Theory of anisotropic spin relaxation in quantum dots”// Physical Review B, vol. **75**, art. 041306(R) (2007)
10). O. Olendski and T.V. Shahbazyan, “Anisotropy of exciton spectrum and spin-orbit interactions in quantum wells in tilted magnetic field”// Journal of Physics: Conference Series, vol. **38**, p. 224 (2006)
11). O. Olendski and T.V. Shahbazyan, “Two-dimensional magnetoexcitons in the presence of spin-orbit interaction”, in *Narrow Gap Semiconductors: Proceedings of the 12th International Conference on Narrow Gap Semiconductors*, edited by J. Kono and J. Leotin, (Institute of Physics Conference Series, v. **187**, Taylor and Francis, New York, 2006), p. 531 (8 pages)
12). O. Olendski and L. Mikhailovska, “Curved quantum waveguides in uniform magnetic fields”// Physical Review B, vol. **72**, art. 235314 (2005)
13). O. Olendski and L. Mikhailovska, “Localized-mode evolution in a curved planar waveguide with combined Dirichlet and Neumann boundary conditions”// Physical Review E, vol. **67**, art. 056625 (2003)
14). O. Olendski and L. Mikhailovska, “Fano resonances of a curved waveguide with an embedded quantum dot”// Physical Review B, vol. **67**, art. 035310 (2003)
15). O. Olendski and L. Mikhailovska, “Bound-state evolution in curved waveguides and quantum wires”// Physical Review B, vol. **66**, art. 035331 (2002)
16). O. Olendski, C.S. Kim, O.H Chung and C.S. Lee, “Persistent current of a two-electron quantum disk”// Physical Review B, vol. **55**, p. 9834 (1997)
17). C.S. Kim and O. Olendski, “The effect on currents of anticrossings in the energy spectrum in quantum wells under crossed electric and magnetic fields”// Semiconductor Science and Technology, vol. **12**, p. 788 (1997)
18). C.S. Kim, J.C. Nahm and O. Olendski, “High-field transport of hot electrons in semiconductors: moment method”// Journal of the Korean Physical Society, vol. **30**, p. S321 (1997)
19). O. Olendski and C.S. Kim, “Quantum disk in nonuniform magnetic fields”// Journal of the Korean Physical Society, vol. **31,** p. 461 (1997)
20). C.S. Kim and O. Olendski, “Conductance anomaly in a quantum well”// Applied Physics Letters, vol.**69**, p. 2575 (1996)
21). C.S. Kim and O. Olendski, “Landau levels and persistent currents in nonuniform magnetic fields”// Physical Review B, vol. **53**, p. 12917 (1996)
22). O. Olendski and C.S. Kim, “Cylindrical δ-potential in external magnetic fields: a model for semiconductor nanostructures”// Journal of Physics: Condensed Matter, vol. **8**, p. 2197 (1996)
23). O. Olendski, “One-dimensional δ-potential in external fields”// Journal of Physics: Condensed Matter, vol. **7**, p. 5067 (1995)
24). O. Olendski, “A Dirac particle in a time-varying magnetic field”// Journal of Physics A: Mathematical and General, vol. **27**, p. 5001 (1994)
25). O. Olendski, “A charged particle in a time-varying magnetic field”// Journal of Physics A: Mathematical and General, vol. **26**, p.7651 (1993)
26). O. Olendskii, “Superlattice surface states in external fields”// Journal of Physics: Condensed Matter, vol. **5**, p. 5437 (1993)
27). O. Olendski, “A finite quantum well in a magnetic field”// Vesti Akad. Navuk Belarusi, #2, p. 94 (1993) (in Russian).
28). O.Z. Olendskii, “Polarization in a magnetic field. Infinitely deep well”// Soviet Physics -Solid State, vol. **34**, p. 1653 (1992)

29). O.Z. Olendskii, “Particle passage through multilayer tunneling structures”//Soviet Physics –Technical Physics, vol. **37**, p. 46 (1992)
30). O. Olendski, “Particle passage through system of potential barriers with periodically oscillating heights”// Issue of Belarussian State University, #1, p.6 (1992,) (in Russian).
31). O. Olendskii, “Electron interaction with oscillations in multilayer tunneling structures”// Physics Letters A, vol. **161**, p. 170 (1991)