

Quantum Mechanics for Nanostructures

By Vladimir V. Mitin, Dmitry I. Sementsov, Nizami Z. Vagidov

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The properties of new nanoscale materials, their fabrication and applications, as well as the operational principles of nanodevices and systems, are solely determined by quantum-mechanical laws and principles. This textbook introduces engineers to quantum mechanics and the world of nanostructures, enabling them to apply the theories to numerous nanostructure problems. The textbook covers the fundamentals of quantum mechanics, including uncertainty relations, the Schrödinger equation, perturbation theory, and tunneling. These are then applied to a quantum dot, the smallest artificial atom, and compared to hydrogen, the smallest atom in nature. Nanoscale objects with higher dimensionality, such as quantum wires and quantum wells, are introduced, as well as nanoscale materials and nanodevices. Numerous examples throughout the text help students to understand the material.

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Editorial Review

About the Author
Vladimir V. Mitin is SUNY Distinguished Professor at the Department of Electrical Engineering and Adjunct Professor of Physics at the University at Buffalo, The State University of New York. He is the author of eight textbooks and monographs and more than 490 professional publications and presentations.

Dmitry I. Sementsov is Professor of Physics at Ulyanovsk State University, Russia. He is the author of more than 420 papers in peer-reviewed journals.

Nizami Z. Vagidov is Research Assistant Professor of Electrical Engineering at the University at Buffalo, The State University of New York. He is the author of about 90 professional publications in the fields of solid-state electronics, nanoelectronics, and nanotechnology.

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