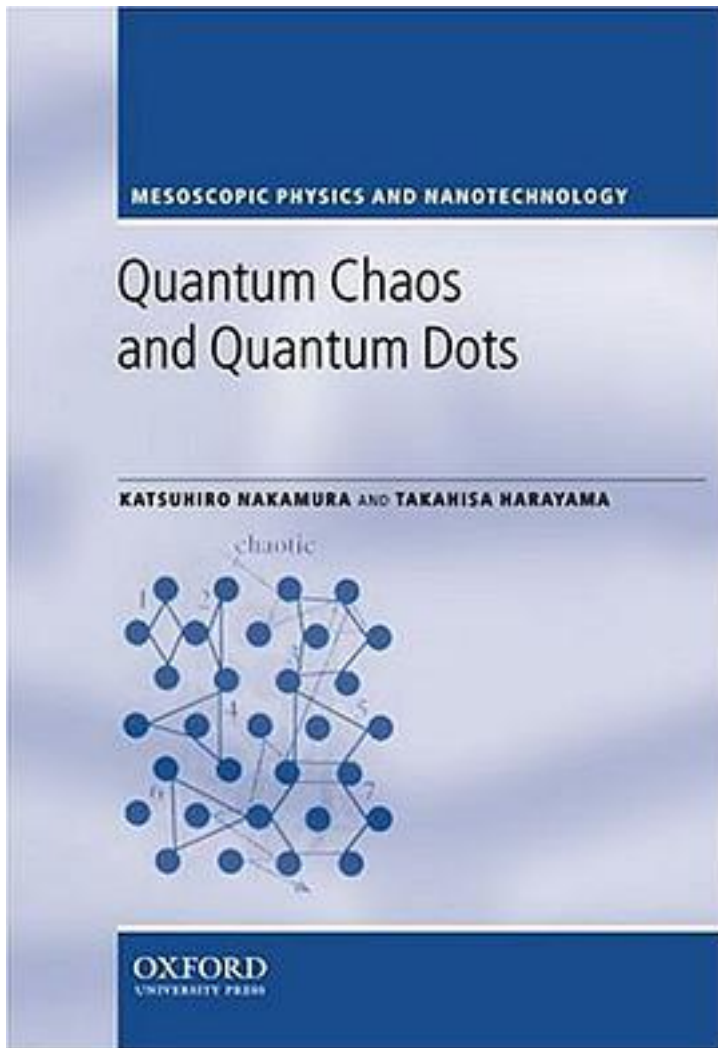


Quantum Chaos and Quantum Dots (Mesoscopic Physics and Nanotechnology)



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Dynamics of billiard balls and their role in physics have received wide attention since the monumental lecture by Lord Kelvin at the turn of the 19th century. Billiards can nowadays be created as quantum dots in the microscopic world enabling one to envisage the so-called quantum chaos, i.e. quantum manifestation of chaos of billiard balls. In fact, owing to recent progress in advanced technology, nanoscale quantum dots, such as chaotic stadium and antidot lattices analogous to the Sinai Billiard, can be fabricated at the interface of semiconductor heterojunctions. This book begins its exploration of the effect of chaotic electron dynamics on ballistic quantum transport in quantum dots with a puzzling experiment on resistance fluctuations for stadium and circle dots. Throughout the text, major attention is paid to the semiclassical theory which makes it possible to interpret quantum phenomena in the language of the classical world. Chapters one to four are concerned with the elementary statistical methods (curvature, Lyapunov exponent, Kolmogorov-Sinai entropy and escape rate), which are needed for a semiclassical description of transport in quantum dots. Chapters five to ten discuss the topical subjects in the field, including the ballistic weak localization, Altshuler-Aronov-Spivak oscillation, partial time-reversal symmetry, persistent current, Arnold diffusion and Coulomb blockade.

作者介绍:

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