1.	Record Nr.	UNINA9910250049503321
	Autore	Morfonios Christian V
	Titolo	Control of Magnetotransport in Quantum Billiards : Theory, Computation and Applications / / by Christian V. Morfonios, Peter Schmelcher
	Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2017
	ISBN	3-319-39833-4
	Edizione	[1st ed. 2017.]
	Descrizione fisica	1 online resource (X, 252 p. 49 illus., 48 illus. in color.)
	Collana	Lecture Notes in Physics, , 0075-8450 ; ; 927
	Disciplina	530.416
	Soggetti	Semiconductors Optical materials Electronics - Materials Nanotechnology Magnetism Magnetic materials Nanoscience Nanostructures Optical and Electronic Materials Nanotechnology and Microengineering Magnetism, Magnetic Materials Nanoscale Science and Technology
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Nota di contenuto	Introduction -- Electrons in mesoscopic low-dimensional systems -- Coherent electronic transport: Landauer-Büttiker formalism -- Stationary scattering in planar confining geometries -- Computational quantum transport in multiterminal and multiply connected structures -- Magnetoconductance switching by phase modulation in arrays of oval quantum billiards -- Current control in soft-wall electron billiards: energy-persistent scattering in the deep quantum regime -- Directional transport in multiterminal focusing quantum billiards -- Summary, conclusions, and perspectives.

Sommario/riassunto   In this book the coherent quantum transport of electrons through two-dimensional mesoscopic structures is explored in dependence of the interplay between the confining geometry and the impact of applied magnetic fields, aiming at conductance controllability. After a top-down, insightful presentation of the elements of mesoscopic devices and transport theory, a computational technique which treats multiterminal structures of arbitrary geometry and topology is developed. The method relies on the modular assembly of the electronic propagators of subsystems which are inter- or intra-connected providing large flexibility in system setups combined with high computational efficiency. Conductance control is first demonstrated for elongated quantum billiards and arrays thereof where a weak magnetic field tunes the current by phase modulation of interfering lead-coupled states geometrically separated from confined states. Soft-wall potentials are then employed for efficient and robust conductance switching by isolating energy persistent, collimated or magnetically deflected electron paths from Fano resonances. In a multiterminal configuration, the guiding and focusing property of curved boundary sections enables magnetically controlled directional transport with input electron waves flowing exclusively to selected outputs. Together with a comprehensive analysis of characteristic transport features and spatial distributions of scattering states, the results demonstrate the geometrically assisted design of magnetoconductance control elements in the linear response regime.