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Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction -- Basics of Single-File Diffusion -- SFD in a Semi-infinite System with Absorbing Boundary -- First-Passage Properties of a Tracer in a Finite Interval -- Basics of Stochastic Thermodynamics -- Work Distribution in Logarithmic-Harmonic Potential -- Conclusions and Outlook.
Sommario/riassunto	This thesis both broadens and deepens our understanding of the Brownian world. It addresses new problems in diffusion theory that

have recently attracted considerable attention, both from the side of nanotechnology and from the viewpoint of pure academic research. The author focusses on the difussion of interacting particles in restricted geometries and under externally controlled forces. These geometries serve, for example, to model ion transport through narrow channels in cell membranes or a Brownian particle diffusing in an optical trap, now a paradigm for both theory and experiment. The work is exceptional in obtaining explicit analytically formulated answers to such realistic, experimentally relevant questions. At the same time, with its detailed exposition of the problems and a complete set of references, it presents a clear and broadly accessible introduction to the domain. Many of the problem settings and the corresponding exact asymptotic laws are completely new in diffusion theory.