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Autore	Rivasseau Vincent
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Nota di contenuto	1.Introduction to the Renormalization Group with Applications to Non-Relativistic Quantum Electron Gases. Vincent Rivasseau -- 2.Cold Quantum Gases and Bose-Einstein Condensation. Robert Seiringer -- 3. Quantum Coulomb gases. Jan Philip Solovey -- 4. SUSY Statistical Mechanics and Random Band Matrices. Thomas Spencer.
Sommario/riassunto	The book is based on the lectures given at the CIME school "Quantum many body systems" held in the summer of 2010. It provides a tutorial introduction to recent advances in the mathematics of interacting systems, written by four leading experts in the field: V. Rivasseau illustrates the applications of constructive Quantum Field Theory to 2D interacting electrons and their relation to quantum gravity; R. Seiringer

describes a proof of Bose-Einstein condensation in the Gross-Pitaevski limit and explains the effects of rotating traps and the emergence of lattices of quantized vortices; J.-P. Solovej gives an introduction to the theory of quantum Coulomb systems and to the functional analytic methods used to prove their thermodynamic stability; finally, T. Spencer explains the supersymmetric approach to Anderson localization and its relation to the theory of random matrices. All the lectures are characterized by their mathematical rigor combined with physical insights.