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Nota di contenuto	ch. 1. Independent-particle model. 1.1. Introduction. 1.2. Bosons. 1.3. Fermions. 1.4. Matrix elements of one-body operators. 1.5. Matrix elements of two-body operators. 1.6. Density matrices. 1.7. Ideal Bose gas confined in a harmonic potential. 1.8. The Fermi gas. 1.9. Finite temperature and quasiparticles ch. 2. The Hartree-Fock theory. 2.1. Introduction. 2.2. The Hartree-Fock method for fermions. 2.3. The Hartree-Fock method for bosons. 2.4. The Gross-Pitaevskii equations. 2.5. Hartree-Fock in second quantization language. 2.6. Hartree-Fock at finite temperature. 2.7. Hartree-Fock-Bogoliubov and BCS ch. 3. The Brueckner-Hartree-Fock (BHF) theory. 3.1. Introduction. 3.2. The Lippman-Schwinger equation. 3.3. The Bethe-Goldstone equation. 3.4. The one-dimensional fermion system. 3.5. Numerical results of BHF calculation in different systems. 3.6. The g matrix for the 2D electron gas ch. 4. The density functional theory (DFT). 4.1. Introduction. 4.2. The density functional formalism. 4.3. Examples of application of the density functional theory. 4.4. The Kohn-Sham equations. 4.5. The local density approximation for the exchange-correlation energy. 4.6. The local spin density approximation (LSDA). 4.7. Inclusion of current terms in the DFT (CDFT). 4.8. Ensemble density functional theory. 4.9.

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	DFT for strongly correlated systems: nuclei and helium. 4.10. DFT for mixed systems. 4.11. Symmetries and mean field theories ch. 5. Quantum dots in a magnetic field. 5.1. Introduction. 5.2. The independent-particle model. 5.3. Fractional regime. 5.4. Hall effect. 5.5. Elliptical quantum dots in a magnetic field. 5.8. The Aharanov-Bohm effect and quantum rings ch. 6. Monte Carlo methods. 6.1. Introduction. 6.2. Standard quadrature formulae. 6.3. Random variable distributions and central limit theorem. 6.4. Calculation of integrals by the Monte Carlo method. 6.5. Markov chains. 6.6. The Metropolis algorithm [M(RT)[symbol]]. 6.7. Variational Monte Carlo for liquid [symbol]He. 6.8. Monte Carlo methods and quantum mechanics. 6.9. Propagation of a state in imaginary time. 6.10. Schrödinger equation in imaginary time. 6.11. Importance sampling. 6.12. Fermion systems and the sign problem. Ch. 7. The density response. 7.6. The current response function theory. 7.1. Introduction. 7.2. General formalism. 7.3. Linear response function and sum rules. 7.4. Finite temperature. 7.5. The density response. 7.6. The current response to an electromagnetic field. 7.7. The density response for non-interacting homogeneous systems ch. 8. The linear response function in Landau theory. 8.2. Time-dependent Hartree (TDH) for homogeneous systems: the RPA. 8.3. TDH for the density matrix and the Landau equations. 8.4. The RPA for bosons. 8.6. The time-dependent Gross-Pitaevskii theory. 8.7. Time dependent Hartree-Fock (TDHF) and the matrix RPAE. 8.8. Examples of application of the TDLSDA theory ch. 9. Dynamic correlations and response function and dielectric constant. 8.13. Examples of application of the TDLSDA theory ch. 9. Dynamic correlations and response function 9.1. Introduction. 9.2. Interaction energy and correlation energy of many-particle excitations. 9.10. The polarization potential model. 9.11. The Gross-Kohn model. 9.12. The method of Lorentz transforms ch. 9. Dynamic correlation energy and correlation potent
Sommario/riassunto	A study of modern many-particle physics. It describes homogenous systems, such as electron gas in different dimensions, the quantum well in an intense magnetic field, liquid helium and nuclear matter, and addresses finite systems, such as metallic clusters, quantum dots, helium drops and nuclei.