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Nota di contenuto	Carsten A. Ullrich, Time-dependent density-functional theory: features and challenges, with a special view on matter under extreme conditions -- Aurora Pribram-Jones, Stefano Pittalis, E.K.U. Gross, and Kieron Burke, Thermal Density Functional Theory in Context -- Valentin V. Karasiev, Travis Sjostrom, Debajit Chakraborty, James W. Dufty, Keith Runge, Frank E. Harris, and S.B. Trickey, Innovations in Finite-Temperature Density Functionals -- Hannes Schulz and Andreas Görling, Toward a comprehensive treatment of temperature in electronic structure calculations: Non-zero-temperature Hartree-Fock and exact-exchange Kohn-Sham methods -- Ethan Brown, Miguel A Morales, Carlo Pierleoni, and David Ceperley, Quantum Monte Carlo

techniques and applications for warm dense matter -- D. Saumon, C.E. Starrett, J.A. Anta, W. Daughton and G. Chabrier, The structure of warm dense matter modeled with an average atom model with ion-ion correlations -- Carsten Fortmann, Dynamical structure factor in High Energy Density Plasmas and application to X-Ray Thomson Scattering -- Winfried Lorenzen, Andreas Becker, and Ronald Redmer, Progress in Warm Dense Matter and Planetary Physics -- Tomorr Haxhimali and Robert E. Rudd, Diffusivity of Mixtures in Warm Dense Matter Regime -- Paul E. Grabowski, A Review of Wave Packet Molecular Dynamics.

Sommario/riassunto

Warm Dense Matter (WDM) occupies a loosely defined region of phase space intermediate between solid, liquid, gas, and plasma, and typically shares characteristics of two or more of these phases. WDM is generally associated with the combination of strongly coupled ions and moderately degenerate electrons, and careful attention to quantum physics and electronic structure is essential. The lack of a small perturbation parameter greatly limits approximate attempts at its accurate description. Since WDM resides at the intersection of solid state and high energy density physics, many high energy density physics (HEDP) experiments pass through this difficult region of phase space. Thus, understanding and modeling WDM is key to the success of experiments on diverse facilities. These include the National Ignition Campaign centered on the National Ignition Facility (NIF), pulsed-power driven experiments on the Z machine, ion-beam-driven WDM experiments on the NDCX-II, and fundamental WDM research at the Linear Coherent Light Source (LCLS). Warm Dense Matter is also ubiquitous in planetary science and astrophysics, particularly with respect to unresolved questions concerning the structure and age of the gas giants, the nature of exosolar planets, and the cosmochronology of white dwarf stars. In this book we explore established and promising approaches to the modeling of WDM, foundational issues concerning the correct theoretical description of WDM, and the challenging practical issues of numerically modeling strongly coupled systems with many degrees of freedom.