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Nota di contenuto	1. Basic concepts and fundamental dynamics. 1. Wavepacket. 2. Adiabatic and nonadiabatic treatments. 3. Quantum control by pulse shaping. 4. Multiphoton vs. tunneling ionization. 5. High-order harmonic generation (HHG). 6. Rescattering of electrons. 7. Above-threshold ionization (ATI). 8. Above-threshold dissociation (ATD). 9. Coulomb explosion. 10. Alignment and orientation. 11. Molecular chirality. 12. Molecular ADK theory for tunneling ionization rate. 13. Summary -- 2. Experimental setups and methods. 1. Laser-induced Coulomb explosion imaging. 2. High-order harmonic generation. 3. Molecular orientation and its observation -- 3. Theoretical treatments of wavepackets. 1. Generation of wavepacket and its propagation. 2. Numerical methods for wavepacket propagation. 3. Wavepacket propagation method in the scattering matrix framework -- 4.Molecular manipulation techniques with laser technologies and their applications. 1. Introduction. 2. Techniques for molecular alignment. 3. Techniques for molecular orientation. 4. Various applications with a sample of aligned or oriented molecules. 5. Concluding remarks -- 5. Electronic and nuclear dynamics in intense laser fields. 1. Electron-nuclei

correlated motions in H[symbol]. 2. Interelectronic correlation in a hydrogen molecule. 3. Reaction dynamics of carbon dioxide. 4. Benzene. 5. Fullerene. 6. Ejection of triatomic hydrogen molecular ions from hydrocarbons -- 6. Electron rotation induced by laser pulses. 1. Introduction. 2. Electronic ring currents generated by circularly polarized laser pulses. 3. Control of unidirectional rotations of [symbol] -electrons in chiral aromatic molecules. 4. Nonadiabatic effects of laser-induced [symbol]-electron rotation -- 7. Photoisomerization and its control. 1. Introduction. 2. Real-time observation of stilbene cis-trans isomerization. 3. Quamtum control of retinal isomerization in bacteriorhodopsin. 4. Quantum control of retinal isomerization in rhodopsin -- 8. Quantum control of molecular chirality. 1. Molecular chirality transformation in a preoriented racemic mixture. 2. Pump-dump control via an electronic excited state. 3. Stimulated Raman adiabatic passage method. 4. Control of helical chirality. 5. Quantum control in a randomly oriented racemic mixture using three polarization components of the electric fields.

Sommario/riassunto

In this monograph, the fundamental theories and methods, as well as experimental methods and results, of real-time observation of both nuclear and electronic motions in molecular systems are described.