



4D Electron Microscopy: Imaging in Space and Time

By Ahmed H. Zewail, John M. Thomas

Imperial College Press, United Kingdom, 2010. Paperback. Book Condition: New. 244 x 164 mm. Language: English . Brand New Book. The modern electron microscope, as a result of recent revolutionary developments and many evolutionary ones, now yields a wealth of quantitative knowledge pertaining to structure, dynamics, and function barely matched by any other single scientific instrument. It is also poised to contribute much new spatially-resolved and time-resolved insights of central importance in the exploration of most aspects of condensed matter, ranging from the physical to the biological sciences. Whereas in all conventional EM methods, imaging, diffraction, and chemical analyses have been conducted in a static - time-integrated - manner, now it has become possible to unite the time domain with the spatial one, thereby creating four-dimensional (4D) electron microscopy. This advance is based on the fundamental concept of timed, coherent single-electron packets, or electron pulses, which are liberated with femtosecond durations. Structural phase transitions, mechanical deformations, and the embryonic stages of melting and crystallization are examples of phenomena that can now be imaged in unprecedented structural detail with high spatial resolution, and ten orders of magnitude as fast as hitherto. No monograph in existence attempts to cover the revolutionary dimensions...



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