

Nonequilibrium Physics at Short Time Scales: Formation of Correlations

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Book review

Nonequilibrium Physics at Short Time Scales: Formation of Correlations

K Morawetz (ed)

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It is a happy situation when similar concepts and theoretical techniques can be applied to widely different physical systems because of a deep similarity in the situations being studied. The book illustrates this well; it focuses on the description of correlations in quantum systems out of equilibrium at very short time scales, prompted by experiments with short laser pulses in semiconductors, and in complex reactions in heavy nuclei. In both cases the experiments are characterized by nonlinear dynamics and by strong correlations out of equilibrium. In some systems there are also important finite-size effects.

The book comprises several independent contributions of moderate length, and I sometimes felt that a more intensive effort in cross-coordination of the different contributions could

have been of help. It is divided almost equally between theory and experiment. In the theoretical part, there is a thorough discussion both of the kinematic aspects (description of correlations) and the dynamical ones (evaluation of correlations). The experimental part is naturally divided according to the nature of the system: the interaction of pulsed lasers with matter on the one hand, and the correlations in finite-size systems (nanoparticles and nuclei) on the other. There is also a discussion on the dynamics of superconductors, a subject currently of great interest.

Although an effort has been made to keep each contribution self-contained, I must admit that reading level is uneven. However, there are a number of thorough and stimulating contributions that make this book a useful introduction to the topic at the level of graduate students or researchers acquainted with quantum statistical mechanics.

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