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Book Review: *Fundamental Problems in Statistical Mechanics VI*

Fundamental Problems in Statistical Mechanics VI. Proceedings of the Sixth International Summer School on Fundamental Problems in Statistical Mechanics, Trondheim, Norway, June 18–30, 1984. Ed. E. G. D. Cohen, North-Holland, Amsterdam, 1985.

This is proceedings number six from a series of summer schools reflecting almost 25 years development in statistical mechanics. Most proceedings appearing nowadays tend to be a collection of research articles and of summaries on most recent developments. This may be of benefit to the specialist in providing a snapshot of momentary activities, offers little help only to the uninitiated, however. Fortunately *Fundamental Problems in Statistical Mechanics VI*, including its predecessors, are an exception to the rule. The contributors explain carefully and outline for those just interested, but also give a first hand to those seeking deeper study. The net result is an authorative introduction and review of fields of active current interest in statistical mechanics.

Out of curiosity I looked up the content of volume I (year 1961). Emphasis was on foundational problems in statistical mechanics, many-body theory, kinetic theory of moderately dense gases, and stochastic theory of irreversible processes. Critical phenomena had not yet made their appearance. 24 years seem to be a long time, also in science. At least, the focus has shifted considerably since the time of the first school.

There are four articles on interfaces and surfaces (M. E. Fisher, E. H. Hauge, M. Wortis, D. Bedeaux). They include the wetting of a wall by a fluid, wetting in many component systems, the problem of the order of the wetting transition, the equilibrium properties of the liquid–vapor interface, surface phases and transitions, and the equilibrium shape of crystals. J. M. J. van Leeuwen and F. van Dieren explain a real space renormalization for classical fluids. A next topic are disordered systems. The random field problem with applications to real magnets is discussed by G. Grinstein. T. R. Kirkpatrick, and J. R. Dorfman treat the Anderson

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localization. It is interesting to see how methods developed originally in kinetic theory are applied to this quantum mechanical problem. Spin glasses and the large area of classical random media are not covered. The interplay between statistical mechanics and quantum field theory has been fruitful for both sides. It is represented by an introduction to lattice gauge theory (J. B. Kogut). The theory of dynamical systems has become very fashionable. H. L. Swinney discusses the transition to the turbulent Couette–Taylor flow and a transition sequence for the Belousov–Zhabotinski reaction. J. Rudnick develops the renormalization group technique for the period-doubling transition for maps on the interval and for the phase-locking transition for critical circle maps. Spinodal decomposition, droplet growth and pattern formation are covered by J. Langer. M. Ernst studies reaction limited growth processes on the basis of Smoluchowski's coagulation equation. Finally an article by E. G. D. Cohen and R. Schmitz describes an interesting development in the dynamical theory of fluids. The problem is to predict the correlations in non-equilibrium steady states. The answer is given for the Rayleigh–Bernard cell and for the Taylor cell up to the first instability.

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