REVIEWS

Condensed Matter Physics—Dynamic Correlations. By Stephen W. Lovesey, *Frontiers in Physics Series*, Vol. 49. (The Benjamin/Cumings Publishing Company, Inc., Advanced Book Programme, Reading, Massachusets 01867, U.S.A.), 1980. Pp. 191, Price : Paper bound $ 14.50 ; Hard bound $ 26.50.

Over the past two decades the use of correlation functions in condensed matter physics has become quite pervasive, and rightly so. For, they are the natural quantities in terms of which to discuss the (linear) response of condensed matter systems to external perturbations, their scattering of particles and radiation, and their relaxation to equilibrium. Nevertheless, there are not many books that deal extensively with correlation functions, especially dynamic correlation functions. The publication of a book which entirely is devoted to the discussion of dynamic correlations is therefore very welcome.

Dr. Lovesey's book contains a wealth of material. The chapters are divided roughly according to the various methods for calculating dynamic correlation functions, and in each chapter the methods are illustrated by applying them to various model systems. In the introductory chapter the basic framework and the motivation for using dynamic correlation functions is set out and illustrated using the elementary example of an anharmonic oscillator. The second chapter is devoted to stochastic equations, and there is a good discussion of general construction and features of stochastic equations. This is accompanied by a rather detailed treatment of the incompressible Navier-Stokes liquid and a comparatively brief treatment of the time dependent Ginsburg-Landau model, using decoupling of equations of motion and diagramatic techniques. The third chapter is devoted to the discussion of the Generalised Langevin equation and the Memory function formalism due to Mori and others, illustrated with applications to anharmonic vibrations in a continuum model of a solid, paramagnet (focuss on 1-D) in an applied magnetic field, monatomic liquid and hydrodynamic spin waves. The material in the fourth chapter of the book, on renormalisation group techniques is very new and probably constitutes the high point of the book. Here the same two examples discussed earlier in chapter II, *i.e.*, the Navier-Stokes Liquid and the Ginsburg Landau model, are treated using field theoretic renormalisation group techniques (dimensional regularisation, Callan-Symanzik equation, etc.). Chapter V contains more standard material, related to causal Green's functions computed using decoupling of equations of motion, and these methods are applied to the problems of a mass impurity in a harmonic lattice, dielectric response of the electron gas and non-linear spin-wave interactions in a Ferromagnet. In the last chapter, dynamic properties of the electron gas in a steady magnetic field and collective spin modes in the Hubbard model of itenerant magnetism are discussed from the standpoint of linear response theory using meanfield-random phase type approximations. Some of the model systems have been treated by more than one method, and this helps to bring out the strengths and weaknesses of the various methods.

As regards Dr. Lovesey's presentation of the above material, I do not find it particularly illuminating. The treatment of the majority of the topics comes out as a *derivation of specific results*, with very little insight. At the risk of offering an opinion that may be considered subjective, I cannot help contrast this book with Dr. Foster's 'Hydrodynamic fluctuations, broken symmetry and correlation functions'. Ofcourse the focus and the scope of the two books are different, but where there is an overlap of topics, such as in the case of formal properties and motivation for the use of correlation functions, hydrodynamic limit, memory function formalism, etc., I find the latter's treatment immensely more illuminating and satisfying.

The above comments not withstanding, Dr. Lovesey's book is a welcome addition to the literature on Dynamic Correlations.

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Annual Review of Neuroscience. Eds. : W. M. Cowan, Z. W. Hall and E. R. Kandel. (Annual Reviews Inc., Palo Alto, CA 64306, U.S.A.), 1979. Pp. 555. Price : $ 17.50.

This volume presents 16 reviews on recent advances in fields of : Ion Channels (2), Axonal Transport (1), Neurotransmitters (2), Opiate Receptors (1), Central Catecholamine Neurons(1), Steroid Actions on Brain(1), Development of Behaviour in Infant (1), Biology of Affective Disorders (1) and Slow Viral Infections (1),

The reminiscing review opening the Volume is by Seymour S. Kety on "The Metamorphosis of a Psychobiologist". Every paragraph of it is most insightful into the making of the science of Psychobiology spanning the last five decades. The central philosophy of Dr. Kety's life has been: "For my part, these mysterious illnesses that had baffled the human race for centuries had not revealed any of their secrets to me. I could think of no better investment of these new and unprecedented resources than using them to establish a broad program of fundamental research, representing all of the disciplines concerned with the brain and behaviour."

Spitzer's review presents that the inward current is carried mainly by calcium ions in the early stages of development, but later currents are of sodium in the channel of the action potentials. The mechanism for this change is, however, yet to be elucidated. Kelly *et al.*'s review deals with the recent progress on effects of neurotoxins on the synaptic terminal, *i.e.*, the release of the neurotransmitter. The calcium ions role is very vital in the release of the neurotransmitter by the process of exocytosis. This review discusses the limited usefulness of studies on synaptosomes in biochemical studies carried so far. It appears that bacterial toxins inhibit release of neurotransmitters by binding to gangliosides in the nerve terminals, spider venom toxins deplete the content of synaptic vesicals by mobilising calcium, and snake venom toxins inhibit nerve terminals by hydrolysing the phospholipids. The concept of modulation of synaptic transmission is discussed in the review of Kupfermann. Schwartz compares in his review the fast axonal transport (upto 410 mm/day) to the intracellular motility processes possibly involving contractile proteins. Sachar and Baron's review on the biology of affective disorders emphasizes that major depressive illness is an inherited disorder affecting the hypothalamus, which is well-known to have complexly connecting pathways and neurotransmitters. They hope that the deviation in the functioning of the brain in the affective disorder may soon be understood in view of the impressive scientific progress already attained in various directions.

The *Annual Review of Neuroscience* 1979 is another outstanding Volume in its series which must be read by those who are in the profession.

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