have been avoided: the author has deliberately chosen (and so states) to use a language unfamiliar to physicists; perhaps this is really for the best, but one badly needs an occasional translation here and there! The second failing has no justification: the book is incredibly sloppily put together. Subscripts, symbols, words, equations, references, index, titles, tables—all are garbled far too frequently! (Even theorems are not immune: we have the ludicrous example of a "nonparameter subgroup.") The sloppiness is primarily typographical garbling, but not always: for example many key concepts are never defined, products of groups are not distinguished notationally from product of sets, etc. One long calculation is presented, in laborious detail—but the concluding, and essential, steps are inexplicably omitted. This unnecessary carelessness greatly limits the book's usefulness.

Hermann's occasional views on physics should not go unchallenged either. Consider this astonishing remark (page 134, repeated on page 137): "In general, quantum mechanics has a formal structure parallel to that of classical mechanics, but *in principle, having nothing to do with it.*" (The italics are mine.)

Despite these criticisms, which may be taken as forewarnings, the book *does* contain a great deal of very valuable information, much more accessible than can be found elsewhere; it can definitely be recommended to theoretical physicists with a good knowledge of group theory. The material is so important, in fact, that it is hoped that a second edition be considered, or even that other mathematicians be encouraged to try to do better.

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Of skeletons and electron flows

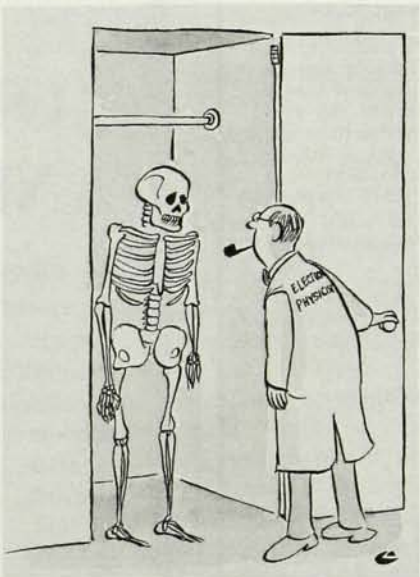
ELECTRON DYNAMICS OF DIODE REGIONS. By Charles K. Birdsall, William B. Bridges. 270 pp. Academic Press, New York, 1966. $10.00

by J. Arol Simpson

Every family has skeletons in their closets and the family of electron physicists is no exception. The fact that our knowledge of the details of time-dependent electron flows is restricted to one dimensional model calculations is something most of us would like to forget. The authors of this book are engineers, and facing the hard facts of the real world, they cannot forget and do us a real favor by casting light into this dark corner, "telling it like it is."

They lead us from the general concepts of time dependent flow down the dusty corridors of linear space-charge theory until we are brought face to face with the terrors of nonlinear onsets of instability, nonuniform field distributions, crossed-field gaps, and multivelocity streams. The only cheerful note I personally can find is that they demonstrate that the solid-state people also face these horrors.

The authors never lose heart and present their material in calm, direct prose, and although the work is mathematical in nature they are not afraid to use words when they serve



the purpose better than equations. Scattered through the book are a number of well chosen problems and exercises that allow the reader to test his understanding of the material or to explore interesting sidetracks. In this and other ways the book reflects the teaching experience of the authors, and I recommend it to those seeking a text for the opening of a senior or graduate course in microwave devices.

I also recommend it to all who work or would like to work in electron dynamics and desire a solid background in the field.

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Shape of the earth

THEORY OF SATELLITE GEODESY: Applications of Satellites to Geodesy. By W. M. Kaula. 124 pp. Blaisdell, Waltham, Mass., 1966. $5.75

by Robert E. Street

Satellite geodesy is one of the very active fields of modern scientific research. It was born with the space age and has become the newest tool of the geodeticist in his continuing effort to determine the exact shape of our earth. Classical potential theory can be used to derive a series expansion for the gravitational potential of an irregularly shaped body of unknown density distribution with zonal and tesseral harmonic coefficients. Observations of close earth satellites can then be used to determine the numerical values of these coefficients.

The present brief monograph derives the mathematical expressions needed and this it does carefully and in sufficient detail. It discusses the effect of other phenomena such as radiation pressure, lunar-solar effects and atmospheric drag. The statistical problem of the reduction of observations is covered and finally there is a brief treatment of recent results. The difference in numerical values of the coefficients obtained by different observers points up the difficulties.

The advanced undergraduate with a good knowledge of calculus and the elements of celestial mechanics should find this book a very good, relatively easy introduction to the field. For more detail and numerical procedures he can then turn to the references given.

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For statistical experts

ADVANCES IN CHEMICAL PHYSICS, Vol. 11. I. Prigogine, ed. 406 pp. Interscience, New York, 1967. $17.75

by Kurt E. Shuler

Volume 11 of *Advances in Chemical Physics*, like its immediate predecessor, is again a topical volume, devoted to equilibrium and nonequilibrium statistical mechanics. The equilibrium part deals with point defects in solids, dense ionic systems and simple mixtures based on the average potential model. The nonequilibrium part treats relaxation and transport properties of electrolytes, nuclear paramagnetic relaxation in solids and generalized Boltzmann equations in the style of Bogoliubov, Choh and Uhlenbeck, Cohen and Prigogine.

As I wrote in my review of volume 10 of this series, a topical volume of reviews serves a useful purpose in bringing the reader almost up to date on the development and present status of some specialized field. To serve such a purpose, the articles must be authoritative and well written. This objective has certainly been met in this volume.

This book deals with a number of special topics in statistical mechanics and appears to be addressed primarily to active researchers in these fields and their graduate students. Four of the six articles are by members of the "Brussels school" and there is consequently a high density of diagrams and Fourier coefficients. Maybe the "Kirkwood school" will be stimulated to exercise its right of reply.

One unhappy note should be mentioned. The references in the various papers go only through 1964. The work of the last 2.5 years is not covered. Several important new develop-