

Table of Contents

I. Quasi-particles and their Interactions

Specific Editorial Introduction	1
a) N. F. MOTT: Some Problems about Polarons in Transition Metal Compounds . .	2
b) P. G. HARPER: Light Absorption by Electrons in Polar Crystals in a Strong Magnetic Field	15
c) S. NIKITINE: Properties of Crystals at High Concentration of Excitons	20
d) B. V. PARANJAPPE: Some Steady State Effects Associated with Electric Currents in Semiconductors	43
e) A. B. BHATIA: The Free Energy and Dynamical Structure Factors of a Metallic System	49

II. Superconductivity and Superfluidity

Specific Editorial Introduction	62
a) J. BARDEEN: Electron-phonon Interactions and Superconductivity.	63
b) G. RICKAYZEN: The Mechanism for Superconductivity—Twenty-Two Years Later	79
c) B. T. MATTHIAS: Transition Temperatures of Superconductors	94
d) F. R. N. NABARRO, B. D. ROTHBERG: The Effect of Stress on the Superconduct- ivity of Tin	96
e) F. W. CUMMINGS: Aspects of Condensation in ^4He II	108
f) A. W. B. TAYLOR: The Derivation of Time-Dependent Ginzburg-Landau Equa- tions in Superfluids	117
g) C. G. KUPER: Scattering of ^4He Atoms by the Surface of Liquid ^4He	129

III. Dielectric Theory

Specific Editorial Introduction.	139
a) R. KUBO: Some Comments on the Dynamical Dielectric Constants	140
b) B. SZIGETI: Vibrational Absorption and Electronic Deformation in Solids . .	147
c) B. K. P. SCAIFE: Electrically Induced Stresses in Dielectric Fluids	174
d) J. H. SIMPSON: Dielectric Constant of Alkali Halide Crystals Containing OH^- Substitutional Impurities	183

IV. Reduced Density Matrices

Specific Editorial Introduction.	191
a) C. TERREAUX, P. LAL: Hypothetical Infinite Series Expressions of Reduced Density Matrices	192

- b) G. J. HYLAND, G. ROWLANDS: Towards a Generalized Ginzburg-Landau Equation 208
- c) K. WEISS, H. HAUG: Bose Condensation and Superfluid Hydrodynamics 219

V. Phase Transitions

- Specific Editorial Introduction. 236
- a) G. L. SEWELL: The Description of Thermodynamical Phases in Statistical Mechanics 237
- b) H. MATSUDA, Y. HIWATARI: The Effect of Interatomic Potential on the Feature of Solid-Liquid Phase Transition. 250
- c) V. V. PARANJAPÉ, D. G. HUGHES: The Effect of a Magnetic Field on Impurity Conduction in Semiconductors. 276
- d) A. J. DUYNELT, J. SOETEMAN, C. J. GORTER: Relaxation Measurements on Single Crystals of $\text{MnCl}_2 \cdot 4 \text{H}_2\text{O}$ and $\text{MnBr}_2 \cdot 4 \text{H}_2\text{O}$ Near the Magnetic Phase Transition 281

VI. Many-body Effects

- Specific Editorial Introduction. 286
- a) S. NAKAJIMA: The He Monolayer on Graphite 287
- b) K. J. Le COUTEUR: Comments on Statistical Model and Collective Modes of Nuclei 298
- c) A. ROSE: Classical Aspects of Spontaneous Emission 303
- d) L. JÁNOSSY: Experiments and Theoretical Considerations Concerning the Dual Nature of Light 308
- e) R. HUBY: Divergent Integrals in Scattering Theory 326
- f) R. A. SACK: Perturbation Methods and *Lagrange's* Expansion 333
- g) G. R. ALLCOCK: A Simple Lagrangian Formalism for Fermi-Dirac Quantization 350

VII. Synergetic Systems

- Specific Editorial Introduction. 362
- a) H. HAKEN: Synergetics—Towards a New Discipline 363
- b) I. PRIGOGINE, A. P. GRECOS: Irreversibility and Dissipativity of Quantum Systems 373
- c) M. WAGNER: On the Possibility of Transport-Phase-Transitions in Phonon Systems 381
- d) G. CARERI: Search for Cooperative Phenomena in Hydrogen-Bonded Amide Structures 391
- e) G. AIELLO, M. S. MICCIANCIO-GIAMMARINARO, M. B. PALMA-VITTORELLI, M. U. PALMA: Behaviour of Interacting Protons: The Average-Mass Approach to their Study and their Possible Biological Relevance. 395
- f) B. W. HOLLAND: Ion Transport Across Cell Membranes. 404
- g) C. B. WILSON: Physical Relationships in Architecture 413

VIII. Biographical and Scientific Reminiscences

- a) F. FRÖHLICH: Biographical Notes 420
- b) W. HEITLER: Erinnerungen an die gemeinsame Arbeit mit *Herbert Fröhlich* 422
- c) K. MENDELSSOHN: Superconductivity and Superfluidity 425
- d) J. G. POWLES: Some Reminiscences of Research in Liverpool in 1950. 436
- e) G. J. HYLAND: Bibliographical Notes 445

- Subject Index 455