

World Scientific Series in 20th Century Physics – Vol. 35

## **A CAREER IN THEORETICAL PHYSICS**

Second Edition

by **Philip W Anderson** (*Princeton University, USA*)

This unique volume presents the scientific achievements of Nobel laureate P W Anderson, spanning the many years of his career. In this new edition, the author has omitted some review papers as well as **added over 15 of his research papers**. As in the first edition, he provides an introduction to each paper by explaining the genesis of the papers or adding some personal history.

The book provides a **comprehensive overview of the author's work which include significant discoveries and pioneering contributions**, such as his work on the Anderson model of magnetic impurities and the concept of localization; the study of spin glasses, the fluctuating valence problem and superexchange; his prediction of the existence of superfluidity in  $\text{He}^3$ ; his involvement in the discovery of the Josephson effect; his discovery of the "Higgs" mechanism in elementary particle physics; and so on.

*The new papers added to this edition include "Pressure Broadening in the Microwave and Infrared Regions", a condensation of most of the author's thesis; "Ordering and Antiferromagnetism", the best-known of his papers involving what are known as "frustrated" lattices; and "Localized Magnetic States in Metals", a paper mentioned in his Nobel Prize citation along with localization and superexchange; to name but a few.*

*A Career in Theoretical Physics* is an essential source of reference for physicists, chemists, materials scientists and historians of science. It is also suitable reading for graduate students.

## **BEAUTIFUL MODELS**

70 Years of Exactly Solved Quantum Many-Body Problems

by **Bill Sutherland** (*University of Utah, USA*)

This invaluable book provides a broad introduction to the fascinating and beautiful subject of many-body quantum systems that can be solved exactly. The subject began with Bethe's famous solution of the one-dimensional Heisenberg magnet more than 70 years ago, soon after the invention of quantum mechanics. Since then, the diversity and scope of such systems have been steadily growing.

*Beautiful Models* is self-contained and unified in presentation. It may be used as an advanced textbook by graduate students and even ambitious undergraduates in physics. It is also suitable for the non-experts in physics who wish to have an overview of some of the classic and fundamental models in the subject. The explanations in the book are detailed enough to capture the interest of the curious reader, and complete enough to provide the necessary background material needed to go further into the subject and explore the research literature.

## **METHUSELAH FLIES**

### **A Case Study in the Evolution of Aging**

edited by **Michael R Rose** (*University of California, Irvine, USA*), **Hardip B Passananti** (*Orrick, Herrington & Sutcliffe LLP, Irvine, USA*) & **Margarida Matos** (*University of Lisbon, Portugal*)

*Methuselah Flies* presents a trailblazing project on the biology of aging. It describes research on the first organisms to have their lifespan increased, and their aging slowed, by hereditary manipulation. These organisms are fruit flies from the species *Drosophila melanogaster*, the great workhorse of genetics. Michael Rose and his colleagues have been able to double the lifespan of these insects, and improved their health in numerous respects as well. The study of these flies with postponed aging is one of the best means we have of understanding, and ultimately achieving, the postponement of aging in humans. As such, the carefully presented detail of this book will be of value to research devoted to the understanding and control of aging.

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## **A CAREER IN THEORETICAL PHYSICS**

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by **Philip W Anderson** (*Princeton University, USA*)

**Contents:** Pressure Broadening in the Microwave and Infrared Regions; Absence of Diffusion in Certain Random Lattices; Theory of Dirty Superconductors; Localized Magnetic States in Metals; Infrared Catastrophe in Fermi Gases with Local Scattering Potentials; The Fermi Glass: Theory and Experiment; Possible Consequences of Negative U Centers in Amorphous Materials; Localization Redux; Suggested Model for Prebiotic Evolution: The Use of Chaos; Physics: The Opening to Complexity; and other papers.

## **BEAUTIFUL MODELS**

70 Years of Exactly Solved Quantum Many-Body Problems

by **Bill Sutherland** (*University of Utah, USA*)

**Contents:** Integrability and Nondiffraction; Techniques; The Classical Limit; Groundstate Wavefunctions of Product Form; The Heisenberg–Ising Model; Consistency; Exchange Models; The Sinh–Cosh Model; Exchange Lattice Systems by Freezing; The Hubbard Model.

## **METHUSELAH FLIES**

A Case Study in the Evolution of Aging

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**Contents:** Creation and Long-term Evolution of Methuselah Flies; Stress, Resistance, Physiology, and Aging; Reproduction, Nutrition, and Aging; Genetics and Molecular Biology of Methuselah Flies; Reverse Evolution of Methuselah Flies; Aging, Development, and Crowding.

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## **A CAREER IN THEORETICAL PHYSICS**

Second Edition

by **Philip W Anderson** (*Princeton University, USA*)

**Readership:** Physicists, chemists and materials scientists.

## **BEAUTIFUL MODELS**

70 Years of Exactly Solved Quantum Many-Body Problems

by **Bill Sutherland** (*University of Utah, USA*)

**Readership:** Advanced undergraduates and graduate students in physics; non-experts interested in exactly solved quantum many-body systems.

## **METHUSELAH FLIES**

A Case Study in the Evolution of Aging

edited by **Michael R Rose** (*University of California, Irvine, USA*), **Hardip B Passananti** (*Orrick, Herrington & Sutcliffe LLP, Irvine, USA*) & **Margarida Matos** (*University of Lisbon, Portugal*)

**Readership:** Biologists and doctors interested in the study of aging.

## List of Subject Classifications

### **Agricultural Sciences**

- Animal Science
- Crop Science
- Fishery
- Forestry

### **Architecture/Building Management**

- Architecture
- Building Management

### **Arts & Social Science**

- Anthropology
- Biography
- Cultural Studies
- Education
- International Relations
- Literature
- Maritime Studies
- Nature
- Philosophy
- Political Science/Policy Studies/  
Public Policy
- Social Issues/Human Security

### **Asian Studies**

- Asian Business/Management
- Asian Culture/Literary Studies/  
Literature
- Asian Economies
- Asian History
- Asian Politics/Society
- China Studies

### **Business and Management**

- Corporate Governance
- Decision Sciences
- Entrepreneurship
- General Business and  
Management
- Innovation/Technology/  
Knowledge/Information  
Management
- International Trade/Business
- Marketing
- Operations Management/  
Operations Research/  
Supply Chain Management
- Organizational Behavior/  
Industrial Organization

### **Chemistry**

- Analytical Chemistry
- Biological Chemistry
- Catalytic Chemistry
- Computational Chemistry
- Electrochemistry
- Emulsion/Microemulsion  
Chemistry
- Environmental/Atmospheric  
Chemistry
- Fullerene Chemistry
- Industrial Chemistry
- Inorganic Chemistry
- Materials Chemistry/  
Nanochemistry
- Nuclear Chemistry
- Organic Chemistry
- Photochemistry
- Physical Chemistry
- Polymer Chemistry
- Solid State Chemistry
- Supramolecular Chemistry
- Surface/Interface Chemistry
- Theoretical/Quantum Chemistry
- General

### **Computer Science**

- Artificial Intelligence/  
Machine Learning
- Databases/Information  
Sciences
- Digital Security
- Fuzzy Logic
- Machine Perception/  
Computer Vision

- Neural Networks/Networking
- Pattern Recognition/  
Image Analysis
- Robotics and Automated  
Systems
- Software Engineering/  
Programming
- Supercomputing/  
Parallel Computing
- Theoretical Computer Science
- General

### **Economics & Finance**

- Computational Economics/  
Finance
- Corporate Finance
- Developmental Economics
- Environmental/Energy  
Economics
- General Economics
- Globalization
- Health Economics
- History of Economic Thought/  
Economic History
- International Economics
- International Finance
- Macroeconomics/  
Microeconomics/
- Mathematical/Quantitative  
Finance
- Mathematical Economics/  
Game Theory/ Econometrics
- Money & Banking/  
Investments/Financial  
Markets & Institutions
- Political Economy

### **Engineering**

- Aerospace Engineering
- Biomedical Engineering/  
Bioengineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Earthquake Engineering
- Electrical & Electronic  
Engineering
- Engineering Mechanics
- Industrial Engineering
- Materials Engineering
- Mechanical Engineering
- Ocean Engineering/  
Coastal Engineering
- Systems Engineering
- General

### **Environmental Science**

- Biological Conservation &  
Preservation
- Climatology/Meteorology
- Energy Studies/Research
- Environmental Education
- Environmental Engineering
- Environmental Management &  
Planning
- Environmental Technology
- Geology/Earth Studies/  
Earth Science
- Hydrology
- Natural Resource
- Oceanography
- Pollution
- Waste Management
- Water Management

### **General**

- Chinese Publications
- General

### **Healthcare**

- Disease
- Food Processing
- Food Science & Technology
- Medical Education
- Medical Law & Medical Ethics
- Nursing
- Nutrition
- Occupational & Community  
Medicine
- Physiotherapy
- Psychology
- Public Health
- Social Medicine

## History of Science

- History of Science

## Life Sciences/Biology

- Animal/Plant Physiology
- Biochemistry/  
Biological Chemistry
- Bioinformatics/Biocomputing/  
Computational Biology/  
Proteomics/Systems Biology
- Biomathematics
- Biophysics
- Biotechnology
- Botany/Plant Biology
- Cell/Molecular Biology/  
Structural Biology
- Cognitive Science
- Ecology
- Evolution Biology
- Fish & Marine Biology
- Genetics and Genomics
- Human Biology/Biological  
Anthropology/Primateology
- Microbiology / Virology  
Research
- Natural Product Research
- Neurobiology
- Cancer Research
- Stem Cells Research
- Tissue Engineering
- Zoology
- General

## Materials Science

- Amorphous Materials
- Ceramics
- Electron Microscopy,  
Scanning, Tunnelling
- Glasses, Insulators and  
Optical Materials
- Liquid Crystals &  
Crystallography
- Metallography
- Microelectronics
- New Materials
- Polymers
- Semiconductors &  
Related Areas
- Spectroscopy and Other  
Analytical Techniques
- Superconductivity &  
Magnetic Materials
- Surface Science
- Tribology
- General

## Mathematics

- Algebra & Number Theory
- Analysis & Differential Equations
- Approximation Theory
- Coding Theory & Cryptography
- Combinatorics & Graph Theory
- Complex Analysis
- Fluid Mechanics
- Geometry & Topology
- Logic and Set Theory
- Mathematical Biology
- Mathematical Modeling
- Mathematical Physics
- Numerical Analysis &  
Computational Mathematics
- Optimization & Control Theory
- Probability & Statistics
- Stochastic Analysis
- General

## Medicine

- Alternative Medicine/  
Chinese Medicine
- Anaesthesia
- Anatomy/Neuroanatomy
- Aviation Medicine/  
Aeromedical Science
- Cardiology
- Clinical Biochemistry
- Dentistry
- Dermatology
- Ear, Nose & Throat
- Embryology
- Endocrinology
- Forensic Medicine
- Gastroenterology
- General Surgery
- Geriatric Medicine/  
Gerontology
- Haematology
- HIV & AIDS Research
- Human Physiology
- Immunology
- Infectious Diseases
- Internal Medicine
- Microbiology/Virology
- Nephrology/Renal Medicine
- Neurology/Neuroscience
- Nuclear Medicine/Radiology/  
Medical Imaging
- Obstetrics & Gynaecology

- Oncology
- Ophthalmology
- Orthopaedics/Biomechanics/  
Orthopaedic Surgery
- Paediatrics
- Pathology
- Pharmacology/ Drug Discovery/  
Pharmaceuticals
- Psychiatry
- Respiratory Medicine/  
Pulmonary Medicine
- Rheumatology
- Toxicology
- Tropical Medicine & Hygiene
- Urology
- Vascular Medicine
- General

### **Nanotechnology & Nanoscience**

- Atom Manipulation
- Computational Nanoscience
- General Nanoscience
- Magnetic Properties of  
Nanostructures
- MEMS/NEMS
- Nanobiotechnology
- Nanoelectronics
- Nanofabrication and  
Nanomanipulation
- Nanomaterials and  
Nanostructures
- Nanomechanics
- Nanomedicine
- Nanophotonics
- Nanotechnology in Energy  
and the Environment
- Picotechnology

### **Nonlinear Science, Chaos & Dynamical Systems**

- Complex Systems

### **Physics**

- Accelerator Physics/  
Experimental Physics
- Applied Physics
- Astrophysics/Astronomy/  
Cosmology
- Atomic Physics
- Classical Mechanics/  
Electrodynamics
- Computational Physics
- Condensed Matter Physics/  
Solid State Physics
- General Physics
- Geophysics
- High Energy Physics/  
Particle Physics
- High Temperature  
Superconductivity
- Laser Physics
- Liquid Crystal
- Low Temperature Physics
- Molecular Physics
- Nuclear Physics
- Optics
- Plasma Physics
- Quantum Physics/Quantum  
Mechanics/Quantum Information
- Semiconductors
- Statistical Physics
- Theoretical Physics
- Thermodynamics

### **Popular Science**

- Popular Science