Topics in Statistical Mechanics
2nd Edition
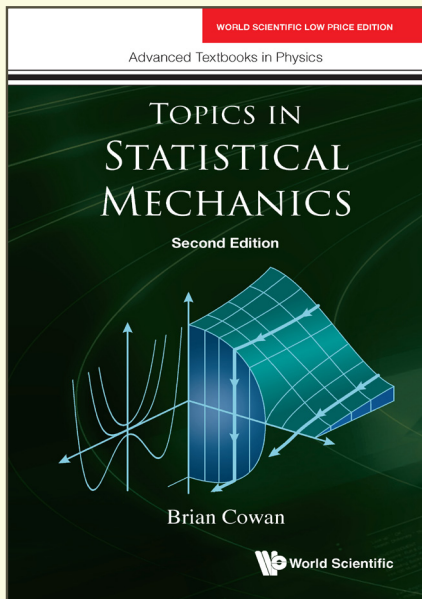
By **Brian Cowan**
(Royal Holloway, University of London, UK)

WORLD SCIENTIFIC LOW PRICE EDITION

Advanced Textbooks in Physics

TOPICS IN STATISTICAL MECHANICS

Second Edition

Brian Cowan

World Scientific

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ABOUT THE BOOK

Building on the material learned by students in their first few years of study, *Topics in Statistical Mechanics* (*Second Edition*) presents an advanced level course on statistical and thermal physics. It begins with a review of the formal structure of statistical mechanics and thermodynamics considered from a unified viewpoint. There is a brief revision of non-interacting systems, including quantum gases and a discussion of negative temperatures. Following this, emphasis is on interacting systems. First, weakly interacting systems are considered, where the interest is in seeing how small interactions cause small deviations from the non-interacting case. Second, systems are examined where interactions lead to drastic changes, namely phase transitions. A number of specific examples is given, and these are unified within the Landau theory of phase transitions. The final chapter of the book looks at non-equilibrium systems, in particular the way they evolve towards equilibrium. This is framed within the context of linear response theory. Here fluctuations play a vital role, as is formalised in the fluctuation–dissipation theorem.

The second edition has been revised particularly to help students use this book for self-study. In addition, the section on non-ideal gases has been expanded, with a treatment of the hard-sphere gas, and an accessible discussion of interacting quantum gases. In many cases there are details of *Mathematica* calculations, including *Mathematica* Notebooks, and expression of some results in terms of Special Functions.

READERSHIP

Final year undergraduates, Masters and PhD students in Statistical Mechanics, Thermodynamics and Phase Transitions.

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- The Methodology of Statistical Mechanics

- Practical Calculations with Ideal Systems
- Non-ideal Gases
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  - Evaluation of the Correlation Function Integral
  - Bose–Einstein and Fermi–Dirac Distribution Functions

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