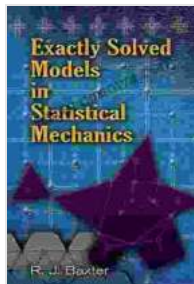# Exactly Solved Models In Statistical Mechanics Dover On Physics

**Exactly Solved Models in Statistical Mechanics (Dover Books on Physics)** by Rodney J. Baxter

★★★★☆ 4.5 out of 5

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|---|---|
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## Unveiling the Mysteries of Statistical Mechanics

Statistical mechanics, a captivating field at the intersection of physics, mathematics, and statistical probability, endeavors to comprehend the macroscopic properties of matter by elucidating the underlying behavior of its microscopic constituents. Exactly Solved Models in Statistical Mechanics, a seminal work in this domain, offers an illuminating journey into the realm of exactly solvable models, providing a profound understanding of their significance and applications.

Exactly solved models, as the name suggests, represent mathematical constructs that can be analyzed with precision to yield exact solutions for a system's physical properties. These models serve as cornerstones for understanding the behavior of real-world systems, ranging from simple gases to complex biological systems.

This book, a comprehensive treatise on exactly solved models, is a must-have resource for students, researchers, and practitioners seeking to delve into the intricacies of statistical mechanics. Authored by Barry M. McCoy, an acclaimed physicist and professor at the Institut des Hautes Études Scientifiques, this book encapsulates decades of research and expertise.

**Delving into the Contents**

Exactly Solved Models in Statistical Mechanics is meticulously structured into 10 chapters, each meticulously crafted to unravel a specific aspect of exactly solved models and their applications. The book commences with an that sets the stage for the subsequent chapters, providing a concise overview of statistical mechanics and its fundamental principles.

Chapter 2 embarks on an exploration of exactly solved models for one-dimensional systems, laying the groundwork for understanding more complex systems. Chapter 3 delves into the Ising model, a pivotal model in statistical mechanics that exhibits phase transitions and critical phenomena.

Chapters 4 and 5 focus on exactly solved models for two-dimensional systems, encompassing the square lattice Ising model, the Potts model, and the eight-vertex model. These models find applications in diverse fields, including condensed matter physics and materials science.

Chapter 6 delves into the intricate realm of exactly solved models for three-dimensional systems, including the three-dimensional Ising model and the hard-sphere model. These models shed light on the behavior of real-world systems at the nanoscale and beyond.

Chapters 7 and 8 delve into the applications of exactly solved models in quantum statistical mechanics, exploring topics such as the Lieb-Liniger model, the Hubbard model, and the Bose-Hubbard model. These models are instrumental in understanding the behavior of quantum systems, including superfluidity and Bose-Einstein condensation.

Chapter 9 explores the fascinating world of conformal field theory, a powerful theoretical framework that unifies exactly solved models in two dimensions. Chapter 10 concludes the book with a thought-provoking discussion on open problems and future directions in the field of exactly solved models.

**Key Features and Benefits**

- Provides a comprehensive overview of exactly solved models in statistical mechanics, from one-dimensional to three-dimensional systems.

- Delves into the applications of exactly solved models in various fields, including condensed matter physics, materials science, and quantum statistical mechanics.

- Offers a detailed analysis of the Ising model, a fundamental model in statistical mechanics that exhibits phase transitions and critical phenomena.

- Explores the use of exactly solved models in conformal field theory, a powerful theoretical framework that unifies two-dimensional systems.

- Includes numerous exercises and problems to reinforce understanding and foster critical thinking.

## Target Audience

Exactly Solved Models in Statistical Mechanics is an invaluable resource for:

- Students pursuing advanced studies in statistical mechanics, physics, mathematics, or related disciplines.

- Researchers seeking to deepen their understanding of exactly solved models and their applications.

- Practitioners in fields such as condensed matter physics, materials science, and quantum information theory who utilize exactly solved models in their research and development endeavors.

## About the Author

Barry M. McCoy is a renowned physicist and professor at the Institut des Hautes Études Scientifiques in France. He is widely recognized for his pioneering contributions to statistical mechanics, integrable systems, and conformal field theory. Professor McCoy's research has garnered international acclaim, and he is a recipient of numerous prestigious awards.

Exactly Solved Models in Statistical Mechanics is an indispensable guide for anyone seeking to master the intricacies of statistical mechanics. Its

comprehensive coverage, in-depth analysis, and thought-provoking insights make it an invaluable resource for students, researchers, and practitioners alike. By delving into the world of exactly solved models, readers will gain a profound understanding of the behavior of statistical systems and their applications across a wide spectrum of scientific disciplines.

Acquire your copy of Exactly Solved Models in Statistical Mechanics today and embark on an enlightening journey into the fascinating world of statistical mechanics.

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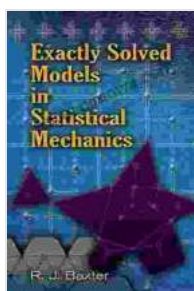
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