

Classical and Quantum Statistical Physics

Statistical physics examines the collective properties of large ensembles of particles, and is a powerful theoretical tool with important applications across many different scientific disciplines. This book provides a detailed introduction to classical and quantum statistical physics, including links to topics at the frontiers of current research. The first part of the book introduces classical ensembles, provides an extensive review of quantum mechanics, and explains how their combination leads directly to the theory of Bose and Fermi gases. It contains a detailed analysis of the quantum properties of matter and introduces the exotic features of vacuum fluctuations. The second part discusses more advanced topics such as the two-dimensional Ising model and quantum spin chains. This modern text is ideal for advanced undergraduate and graduate students interested in the role of statistical physics in current research. One hundred and forty homework problems reinforce key concepts and further develop readers' understanding of the subject.

Carlo Heissenberg is a postdoctoral scholar at the Nordic Institute for Theoretical Physics (Nordita) in Stockholm, and at Uppsala University. He received his PhD from Scuola Normale Superiore in Pisa, with a thesis on asymptotic symmetries and higher spin theories, and his research is now focused on the interface between scattering amplitudes and gravitational waves.

Augusto Sagnotti is Professor of Theoretical Physics at Scuola Normale Superiore and has taught the Statistical Physics course there since 2017. His research is focused on gravitational physics and conformal field theory, and his pioneering contribution led to the introduction of orientifold vacua in string theory. He is a recipient of the Humboldt Research Award.