

# Cambridge Elements

Elements in the Philosophy of Physics

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## FOUNDATIONS OF STATISTICAL MECHANICS

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## Foundations of Statistical Mechanics

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**Abstract:** Statistical mechanics is the third pillar of modern physics, next to quantum theory and relativity theory. It aims to account for the behaviour of macroscopic systems in terms of the dynamical laws that govern their microscopic constituents and probabilistic assumptions about them. In this Element, the authors investigate the philosophical and foundational issues that arise in SM. The authors introduce the two main theoretical approaches, Boltzmannian statistical mechanics and Gibbsian statistical mechanics, and discuss how they conceptualise equilibrium and explain the approach to it. In doing so, the authors examine how probabilities are introduced into the theories, how they deal with irreversibility, how they understand the relation between the micro and the macro level, and how the two approaches relate to each other. Throughout, the authors also pinpoint open problems that can be the subject of future research. This title is also available as Open Access on Cambridge Core.

**Keywords:** statistical mechanics, probability, equilibrium, Boltzmann, Gibbs

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