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Statistical mechanics rooted in maximum entropy method shows absence of the Gibbs paradox CHIH-YUAN TSENG, National Central University — Studying the Gibbs paradox problem indicates Gibbs’s statistical mechanics may not be a general theory for thermodynamics. We found that most of conventional resolutions only provide explanations for “supplementary” introduction of the Gibbs correction rather than re-develop statistical theory to comprehend corresponding aspects. In this talk, we will show a general theory of statistical mechanics based on generalized maximum entropy method, which is designed for inductive inference. The general theory integrates prior knowledge of the system and measurements of macroscopic properties into a general ensemble. Based on the general theory, the $1/N!$ is simply a prior distribution that denotes our prior knowledge for indistinguishability of N microstates instead of the correction for the canonical ensemble. There is no Gibbs paradox. It is simply a consequence of incomplete statistical description for classical thermodynamic systems.

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