

Abstract Submitted
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Investigations of student understanding of the Boltzmann factor and its applications¹ JOHN THOMPSON, TREVOR SMITH, DONALD MOUNTCASTLE, University of Maine — In ongoing research into the learning and teaching of thermodynamics and statistical physics concepts in the upper division, we are exploring student understanding of the Boltzmann factor and its applications. Results from written questions indicate student confusion applying the Boltzmann factor to compare occupation probabilities of different levels of the same system. Starting from these research results we are developing a small-group guided inquiry worksheet (“tutorial”) to guide students to derive the Boltzmann factor and the canonical partition function. The tutorial is based on an approach found in many standard thermal physics texts, which discusses the canonical ensemble from the point of view of the canonical “system” and the “reservoir” having a fixed total energy. Individual clinical interviews based on the tutorial provide more in-depth information about student thinking on this topic. Results and observations from implementation will be discussed.

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