Approximations, Idealizations, and Models in Statistical Mechanics

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Abstract

In this paper, a criticism of the traditional theories of approximation and idealization is given. After identifying the real purpose and measure of idealization in the practice of science, it is argued that the best way to characterize idealization is not to formulate a logical model -- something analogous to Hempel's D-N model for explanation -- but to study its different guises in the praxis of science. A case study of it is then made in thermostatistical physics. After a brief sketch of the theories for phase transitions and critical phenomena, I examine the various idealizations that go into the making of models at three difference levels.

Keywords:	approximation approbation, laws of nature, thermodynamics, Ising-models, thermodynamic limit
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